

October 1, 2014

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

**Re: California Independent System Operator Corporation
Docket No. ER15- ____ -000**

**Tariff Amendment to Modify Start-Up and Minimum Load Cost
Recovery Mechanisms**

Dear Secretary Bose:

The California Independent System Operator Corporation (“CAISO”) submits this tariff amendment to modify the tariff provisions regarding recovery of start-up and minimum load costs.¹ Specifically, the CAISO proposes to: (1) eliminate the registered cost option for resources other than for use-limited resources; (2) increase the proxy cost daily bid cap from 100 percent to 125 percent; and (3) add provisions to allow the CAISO to use updated natural gas price data in its day-ahead market when natural gas prices for a trading day exceed the normal tariff-based gas price index by more than 125 percent, using a mechanism similar to the one approved by the Commission earlier this year in response to a CAISO tariff waiver petition.

This filing is the latest in a series of improvements the CAISO has made to its tariff mechanisms providing for the recovery of costs by generating resources participating in its markets.² The revisions are specifically designed to be

¹ The CAISO submits this filing pursuant to section 205 of the Federal Power Act, 16 U.S.C. § 824d. Capitalized terms not otherwise defined herein have the meanings set forth in the CAISO tariff. References to numbered sections are references to sections of the CAISO tariff unless otherwise indicated.

² See *California Independent System Operator Corp.*, 128 FERC ¶ 61,282, at PP 26-30 (2009) (accepting various tariff revisions to “provide resource owners the needed flexibility to choose the option that best enables recovery of their start-up and minimum load costs”); *California Independent System Operator Corp.*, 134 FERC ¶ 61,257, at PP 4, 23-24, 26 (2011)

implemented for the upcoming 2014-15 winter season to avoid market inefficiencies and reduce the risk of unrecoverable costs associated with any significant and sudden increases in the price of natural gas, such as those that occurred on a few occasions in California this past winter.

The CAISO requests that the Commission accept the proposed tariff revisions effective as of December 1, 2014.

I. Executive Summary

Pursuant to its tariff, the CAISO optimizes the economic commitment of generating resources in the markets it operates based on resources' market bids as well as their commitment costs, which consist of start-up and minimum load costs. Currently, scheduling coordinators on behalf of resources may choose either the proxy cost option or the registered cost option for specifying these costs. The proxy cost option uses cost-based information to calculate resource-specific variable start-up and minimum load costs, while the registered cost option allows scheduling coordinators to register fixed start-up and minimum load cost values of their choosing subject to a registered cost cap, which is currently set at 150 percent of the projected proxy cost. Resources under the proxy cost option have the additional flexibility to submit daily bids for their start-up and minimum load costs up to 100 percent of the calculated proxy cost. Scheduling coordinators can switch between these options after 30 days.

The CAISO tariff also includes rules that specify the use of generated energy bids, which the CAISO uses when a bid is required but not submitted, and variable cost default energy bids, which the CAISO uses in its local market power mitigation process. Like start-up and minimum load costs, generated energy bids and variable cost default energy bids incorporate resource-specific costs such as natural gas costs for gas-fired generating resources.

The CAISO³ calculates the daily natural gas price index each day between 7:00 p.m. and 10:00 p.m. Pacific using up to four (but at least two) natural gas prices published that day. The CAISO uses this gas price index in the next day's day-ahead market run for the following trading day as well as the next day's real-

(accepting tariff revisions to "further increase resource owners' flexibility in choosing between the options available to recover start-up and minimum load costs by allowing a resource to select a different recovery option for each type of cost and by introducing a daily bid option"); *California Independent System Operator Corp.*, 141 FERC ¶ 61,237 (2012) (conditionally accepting tariff revisions that allow resources to recover greenhouse gas compliance costs in their commitment costs, default energy bids, and generated bids); *California Independent System Operator Corp.*, 145 FERC ¶ 61,082 (2013) (accepting tariff revisions to include additional categories of costs eligible for inclusion in proxy cost calculations for start-up and minimum load costs, default energy bids, and generated bids).

³ Currently, the CAISO contracts with Potomac Economics to perform this task.

time market. The CAISO determines natural gas costs for resources under the registered cost option based on a monthly average of gas futures contracts.

During this past winter, natural gas prices faced by the CAISO's generators were uncharacteristically volatile and peaked at unprecedented levels. The CAISO recognized that the interplay between this price volatility and its natural gas price index created the potential for inefficient market outcomes and unrecoverable fuel costs in the event of a significant price spike. As a result, in March, the CAISO filed a petition for limited tariff waiver to allow the CAISO, in the event of a significant increase in near-term natural gas prices, to use a gas price published on the morning of the day-ahead market run rather than the prior evening's calculated gas price index in the day-ahead market. The CAISO also explained in its waiver filing that it intended to initiate a stakeholder process to address these concerns and to amend the tariff prior to the 2014-15 winter season. The Commission granted the waiver effective until April 30, 2014, as requested by the CAISO.

The CAISO conducted the promised stakeholder process over the past several months. As a result, the CAISO proposes the following tariff revisions, which will provide market participants with additional bidding flexibility on a daily basis, as well as use of a more up-to-date gas price in the event of significant price increase:

- Increase the proxy cost bid cap from 100 percent to 125 percent. This revision will provide additional flexibility for resources to account for commitment costs not included in the proxy cost calculation, subject to a cap to limit potential market power concerns. Analyses performed by the CAISO indicate that the increased proxy cost bid cap will allow resources to capture the vast majority of observed natural gas price volatility.
- Eliminate the registered cost option for resources other than use-limited resources. The registered cost option has largely been rendered obsolete by the other tariff revisions proposed in this filing, particularly the increase in the daily proxy bid cap. However, the CAISO proposes to retain the registered cost option for use-limited resources until it can develop a mechanism to allow such resources to bid their opportunity costs reflecting the limited amount of hours they can operate.
- Include a mechanism to use and update the natural gas price in the day-ahead market in the event of a significant and sudden spike in natural gas prices. This mechanism is similar to the one approved by the Commission in response to the CAISO's March 2014 petition for tariff waiver.
- Make other tariff clarifications as explained more fully below.

These changes will allow scheduling coordinators to more effectively manage their resources and allow the CAISO markets to better reflect natural gas price volatility.

II. Background

A. CAISO Tariff

1. The Proxy Cost and Registered Cost Options

In the day-ahead market, the CAISO commits generating resources and publishes a financially binding day-ahead schedule. The costs the market considers when making commitment decisions include the costs of starting up resources (start-up costs) and the costs of running resources at their minimum operating levels (minimum load costs).⁴ On a 30-day basis, scheduling coordinators for resources participating in the CAISO markets may choose either the proxy cost option or the registered cost option for specifying their start-up costs or minimum load costs for the resources.⁵ These two options are designed to provide resources with adequate compensation for start-up and minimum load costs while also mitigating potential market power concerns by setting a cap on the resources' allowed daily bids for those costs.

Resources subject to the proxy cost option recover start-up costs and minimum load costs consisting of cost components specified in the tariff that reflect the resources' actual unit-specific performance parameters.⁶ For natural gas-fired resources, one of these cost components is a formulaic value adjusted for fuel-cost variation on a daily basis using a natural gas price index.⁷ The

⁴ See tariff section 31.3; tariff appendix A, definitions of "Start-Up Cost" and "Minimum Load Costs."

⁵ Tariff section 30.4. A scheduling coordinator for a resource can choose the proxy cost option or the registered cost option for specifying either the start-up costs or the minimum load costs or both. *Id.* Thus, for a 30-day period, the scheduling coordinator could choose the proxy cost option for both the resource's start-up costs and minimum load costs, or could choose the proxy cost option for the resource's start-up costs and the registered cost option for the resource's minimum load costs, *etc.* The proxy cost (*i.e.*, the cost under the proxy cost option) is calculated pursuant to tariff section 30.4.1.1 and the registered cost (*i.e.*, the cost under the registered cost option) is calculated pursuant to tariff section 30.4.1.2. See tariff appendix A, definitions of "Proxy Cost" and "Registered Cost."

⁶ Tariff section 30.4.1.1.1.

⁷ Tariff section 39.7.1.1.1.3 specifies how the CAISO calculates the natural gas price index. The CAISO uses the natural gas price index for start-up and minimum load costs, variable cost default energy bids and generated bids. See *also* business practice manual for market instruments at section C.1 ("The daily Gas Price Index (GPI) is the index that is used in the calculation of the Default Energy Bids, as well as the generated bids including Startup Costs, and

CAISO calculates the natural gas price index between 7:00 p.m. and 10:00 p.m. Pacific Time using up to four (but at least two) natural gas prices published that day from the following sources: Natural Gas Intelligence, SNL Energy/BTU's Daily Gas Wire, Platt's Gas Daily, and the Intercontinental Exchange ("ICE"). The CAISO uses this gas price index in the next day's day-ahead market run for the following trading day, as well as the next day's real-time market.⁸ A resource subject to the proxy cost option can submit daily bids for the resource's start-up and minimum load costs that are between zero and a cap of 100 percent of the calculated proxy cost.⁹

Of the four publications specified in the CAISO tariff, ICE publishes gas prices the earliest in the day – by as early as 10:01 a.m., or by noon at the latest.¹⁰ The CAISO's experience has been that ICE almost always publishes the gas prices by 10:01 a.m. This timing coincides with the timing of the CAISO's day-ahead market, which normally closes (*i.e.*, the CAISO no longer accepts bids for the following trading day) at 10:00 a.m., and the CAISO normally publishes the results by 1:00 p.m.¹¹

The registered cost option, on the other hand, allows scheduling coordinators to register fixed start-up and minimum load cost values of their choosing for each resource they represent in the CAISO's master file, subject to a cost cap set at 150 percent of the projected proxy cost, which is calculated on a monthly basis.¹² Scheduling coordinators must remain under either the proxy

Minimum Load Costs.”).

⁸ The result of this timing is that the CAISO calculates the natural gas prices used in the day-ahead market for the applicable trading day based on prices published two days prior. For example, using a sample trading day (the December 3 trading day), the CAISO calculates natural gas prices between 7:00 and 10:00 p.m. on December 1, and utilizes those prices in the day-ahead market for the December 3 trading day, which closes at 10:00 a.m. on December 2. The reason for using gas prices published on December 1 is that, except for ICE, all of the other price sources specified in the CAISO tariff are published well after the close of the CAISO's day-ahead market.

⁹ Tariff sections 30.7.9, 30.7.10.

¹⁰ See business practice manual for market instruments at section C.3. The earliest that any of the other publications can provide gas prices is 4:00 p.m. *Id.*

¹¹ Tariff section 30.5.1(a); tariff appendix A, definition of “Market Close.” The CAISO has the authority, however, to modify the normal timing of the day-ahead market either (1) in the event of a market disruption, to prevent a market disruption, or to minimize the extent of a market disruption, or (2) to preserve system reliability, prevent an imminent or threatened system emergency, or retain operational control over the CAISO controlled grid during an actual system emergency. Tariff sections 7.7.15.1(a), 31.6.1(i).

¹² Tariff sections 30.4.1.2, 39.6.1.6. Projected proxy cost is different from proxy cost and is determined using a different calculation.

cost option or the registered cost option for a minimum of 30 days before they can switch.¹³ The registered cost option is less flexible than the proxy cost option in that it does not incorporate daily gas costs or allow for daily bidding of commitment costs like the proxy cost option does.

2. Variable Cost Default Energy Bids

The CAISO uses default energy bids to mitigate bids of resources subject to local market power mitigation.¹⁴ When a resource's bid is mitigated, the CAISO substitutes the default energy bid for use in the market clearing process and also uses it to determine the resource's bid cost recovery compensation.¹⁵ The CAISO also uses default energy bids to settle exceptional dispatches and residual imbalance energy.¹⁶ In determining default energy bids calculated using the variable cost option, the CAISO uses the same natural gas price index as used in proxy cost calculations, described above.¹⁷

3. Generated Bids

The CAISO generates cost-based bids when a scheduling coordinator does not submit a bid for a resource that is subject to a must-offer requirement as a resource adequacy resource or pursuant to the generally applicable scheduling and infrastructure bidding rules as set forth in the CAISO tariff and the business practice manual.¹⁸ As with start-up and minimum load costs, the CAISO uses the gas price index formula set forth in its tariff to determine natural gas costs for generated bids of natural gas-fired resources.¹⁹

¹³ Tariff sections 30.4, 30.4.1.2. There is one exception: if the daily proxy cost calculation exceeds its registered costs, a scheduling coordinator can switch from the registered cost option to the proxy cost option for the remainder of the 30-day period. Tariff section 30.4.1.2.

¹⁴ See tariff section 39.7.1, *et seq.* Each scheduling coordinator can choose one of the following three options as its preferred option for calculating default energy bids: (1) the variable cost option, (2) the negotiated rate option, or (3) the locational marginal price option.

¹⁵ Tariff section 11.8.

¹⁶ See tariff sections 11.5.6 and 11.5.5, respectively.

¹⁷ See *supra* note 7 and accompanying text.

¹⁸ See tariff sections 30.7.3.4, 40.6.8; tariff appendix A, definition of "Generated Bid".

¹⁹ See *supra* note 7 and accompanying text. As with the tariff provisions discussed above regarding the recovery of start-up and minimum load costs under the proxy cost option, although the tariff provisions regarding generated bids do not directly reference section 39.7.1.1.1.3, the CAISO interprets the provisions in section 39.7.1.1.1.3 to apply to the calculation of generated bids.

B. Spikes in Natural Gas Prices and the CAISO's Prior Petition for Limited Waiver

During certain days in December 2013 and the first two months of 2014, the CAISO markets faced uncharacteristically higher and more volatile natural gas prices than the markets had previously experienced since the CAISO's current market design went into effect in April 2009. In particular, between the evening of February 5 and the morning of February 6 of 2014, California natural gas markets experienced price increases amounting to roughly 300 percent.

The higher natural gas prices experienced on February 5 were not reflected in the proxy cost calculation of start-up and minimum load costs for resources that were committed in the CAISO's day-ahead market on February 5 for the February 6 trading day because the gas price index was based on gas prices published on February 4.²⁰ Similarly, registered costs for resources subject to the registered cost option did not reflect the February 5 gas prices.²¹ There were two consequences. First, because commitment costs reflected lower natural gas prices than bids for energy above resources' minimum load, the CAISO's day-ahead market committed more resources at their minimum load. Second, energy revenues at the locational marginal price were unlikely to cover actual natural gas costs.

Following discussions with market participants, on March 6, 2014, the CAISO filed a petition for limited waiver of certain provisions in tariff section 39.7.1.1.1.3 to allow the CAISO to use the most recently available natural gas prices in the event of a significant price spike for market execution and settlement purposes, and waiver of provisions in tariff section 30.4.1.2 to allow resources subject to the registered cost option to quickly switch to the proxy cost option until gas prices subsided. The CAISO requested that the Commission grant the tariff waiver until April 30, 2014.²²

With respect to tariff section 39.7.1.1.1.3, the CAISO proposed that, if the daily gas price reported by ICE on the morning of the day-ahead market run exceeded any natural gas price index calculated for the day-ahead market between 7:00 p.m. and 10:00 p.m. Pacific time on the preceding day by a percentage threshold (initially set at 150 percent), the CAISO would use the gas

²⁰ See *supra* notes 7-8 and accompanying text.

²¹ See *supra* note 13 and accompanying text.

²² Petition for Limited Waiver of Tariff Provisions, Request for Shortened Comment Period, and Request for Expedited Commission Action by March 19, 2014, Docket No. ER14-1440-000 (Mar. 6, 2014) ("Petition for Limited Tariff Waiver").

price reported by ICE in all CAISO cost formulas and market processes for that day's day-ahead market instead of the natural gas price index calculated pursuant to the section. The CAISO explained that ICE's index was the only price index of those listed in tariff section 39.7.1.1.1.3 that was published around the time that the day-ahead market closes (10:00 a.m.). Using the ICE prices in these circumstances was appropriate because when a significant spike in gas prices occurs, market efficiency and cost recovery are better served by relying on data that reflect the price differential for the applicable trading day, even if that means using the only available source for up-to-date gas prices.²³

The CAISO also explained that it intended to commence a stakeholder process in April 2014 to address the issues raised by volatile gas market conditions and to develop tariff solutions. The CAISO stated that it expected the stakeholder process would require at least several months to complete but it was committed to developing an interim solution that could be implemented in the fall of 2014, prior to the upcoming 2014-15 winter season, if such a solution did not require substantial system changes.²⁴

On March 21, 2014, the Commission issued an order granting the Petition for Limited Tariff Waiver until April 30, as requested by the CAISO.²⁵

C. Stakeholder Process

As described in the Petition for Limited Tariff Waiver, the CAISO initiated a stakeholder process in April 2014 to develop tariff solutions to the issues raised by volatile gas market conditions. The stakeholder process resulted in this tariff amendment filing and included:²⁶

- A series of five papers issued by the CAISO;

²³ *Id.* at 13-15, 17-18.

²⁴ *Id.* at 19.

²⁵ *California Independent System Operator Corp.*, 146 FERC ¶ 61,218 (2014) ("March 21 Order"). Also, on March 14, 2014, the Commission issued an order granting the narrower petition for limited tariff waiver filed in Docket No. ER14-1442. *California Independent System Operator Corp.*, 146 FERC ¶ 61,184 (2014) ("March 14 Order"). The Commission stated that the tariff waiver granted in the March 21 Order superseded the waiver granted in the March 14 Order. March 21 Order at P 22.

²⁶ In 2012 and 2013, the CAISO conducted other stakeholder processes to enhance the commitment cost and related tariff provisions that led to tariff amendments accepted by the Commission. See *California Independent System Operator Corp.*, 141 FERC ¶ 61,237; *California Independent System Operator Corp.*, 145 FERC ¶ 61,082.

- The development of draft tariff provisions and revised tariff provisions;
- Five stakeholder conference calls to discuss the CAISO papers and the draft tariff provisions; and
- Five opportunities for stakeholders to submit written comments on the CAISO papers and the draft tariff provisions.²⁷

The CAISO Governing Board (“Board”) authorized the preparation and filing of this tariff amendment at its September 18-19, 2014, meeting.²⁸

The CAISO’s Department of Market Monitoring supported this tariff amendment,²⁹ and the CAISO’s Market Surveillance Committee supported the tariff amendment as a near-term solution.³⁰ Stakeholders generally supported, or supported with qualifications, the tariff revisions contained in this filing. The CAISO addresses specific issues raised by stakeholders in section III.E of this transmittal letter.

III. Proposed Tariff Revisions

A. Increase the Proxy Cost Bid Cap to 125 Percent

The CAISO proposes to revise the existing proxy cost bid cap of 100 percent of the resource’s calculated proxy cost to 125 percent. This will permit the scheduling coordinator for a resource subject to the proxy cost methodology

²⁷ Materials relating to this stakeholder process are available on the CAISO website at <http://www.aiso.com/informed/Pages/StakeholderProcesses/CommitmentCostEnhancements.aspx>. The materials include the Commitment Cost Enhancements Revised Draft Final Proposal (Aug. 21, 2014) (“Revised Draft Final Proposal”), which is provided in attachment C to this filing. A list of key dates in the stakeholder process for this tariff amendment is provided in attachment E to this filing.

²⁸ Materials related to the Board’s authorization to prepare and submit this filing are available on the CAISO website at <http://www.aiso.com/informed/Pages/BoardCommittees/Default.aspx>. The materials include a memorandum to the Board from Keith Casey, Vice President, Market and Infrastructure Development (Sept. 11, 2014) (“Board Memorandum”), which is provided in attachment D to this filing.

²⁹ See Department of Market Monitoring memorandum to CAISO Governing Board (Sept. 11, 2011), which is available on the CAISO website at <http://www.aiso.com/informed/Pages/BoardCommittees/Default.aspx>.

³⁰ See Opinion on Commitment Cost Enhancements issued by the Market Surveillance Committee (final as of Sept. 8, 2014), which is available on the CAISO website at <http://www.aiso.com/informed/Pages/BoardCommittees/Default.aspx>.

to submit daily bids for the resource's start-up costs and minimum load costs between zero and 125 percent of the resource's calculated proxy cost.³¹ Because the 125-percent cap is an upper limit, scheduling coordinators will remain free to bid below the cap to ensure that their resources are economically selected by the CAISO market optimization given market conditions.

This tariff revision is just and reasonable because it will provide additional flexibility for scheduling coordinators to account for commitment costs not included in the proxy cost calculation, while also providing reasonable protection against the exercise of market power.³² The 125-percent cap will also account for variations in the standard resource-specific costs that are used in the CAISO's master file, such as the variable operation and maintenance expense, greenhouse gas costs, and natural gas imbalance charges.³³

The CAISO anticipates that the increased proxy cost bid cap will allow resources to capture the vast majority of costs associated with observed natural gas price volatility. A CAISO review of gas price volatility shows that, since the CAISO began operating under its current market design in April 2009, there have been only seven days when natural gas prices have increased by more than 125 percent from the previous evening's gas index calculations.³⁴ Based on an analysis of these gas price increases and confidential information on actual gas costs provided by stakeholders, the CAISO believes that the 125-percent proxy cost bid cap will cover almost all gas price volatility between the day-ahead gas price index and intra-day gas prices.³⁵ In addition, the CAISO's proposal, which will use the single gas price published in the morning (*i.e.*, the index published by ICE) in the day-ahead market when it exceeds the gas price index calculated on the previous evening by more than 125 percent,³⁶ will ensure that resources can recover gas costs associated with any extraordinary price spikes to the extent the increase in the proxy cost bid cap does not allow their recovery.³⁷ Thus, the increased cap will enhance market efficiency, allow resources to be adequately

³¹ Revised tariff sections 30.7.9, 30.7.10. In this filing, references to a proposed tariff section mean a new section the CAISO proposes to add to the tariff, and references to a revised tariff section mean an existing section of the tariff that the CAISO proposes to revise.

³² See Department of Market Monitoring memorandum to CAISO Governing Board, at 3 (Sept. 11, 2011).

³³ See *supra* note 6 and accompanying text.

³⁴ Revised Draft Final Proposal at 8.

³⁵ *Id.* at 8-9. See also *supra* notes 7-8 and accompanying text.

³⁶ See section III.C.1 of this transmittal letter.

³⁷ Revised Draft Final Proposal at 17.

compensated for their costs, and align with other tariff revisions proposed in this filing.³⁸

B. Eliminate the Registered Cost Option for Resources Other than Use-Limited Resources

In conjunction with raising the proxy cost bid cap to 125 percent, the CAISO proposes to eliminate the registered cost option for all resources except for use-limited resources. As a result, resources other than use-limited resources will be required to utilize the proxy cost methodology.³⁹

There are several reasons why it is just and reasonable to eliminate the registered cost methodology⁴⁰ for the majority of CAISO resources.⁴¹ First, the registered cost methodology will be rendered largely obsolete by the revisions to the proxy cost methodology discussed above. Both methodologies use identical inputs, except that the proxy cost methodology is more flexible in that it uses a more updated natural gas price, while the registered cost methodology has the significant disadvantage of using a monthly futures gas price that often does not reflect current gas prices. Consequently, the gas price used as the basis for the registered cost methodology can lead to the inefficient dispatch of resources. This occurred during the February 2014 natural gas price spike, when most resources utilized the registered cost methodology. As a result, the commitment costs used by the CAISO market were significantly lower than resources' actual commitment costs and lower than energy costs. This led to inefficient and suboptimal resource commitment decisions that committed resources to minimum load in lieu of dispatching them for incremental energy. Moreover,

³⁸ The CAISO does not believe there is a need at this time to require any additional *ex post* verification of costs. Scheduling coordinators can effectively manage their costs by bidding their appropriate start-up costs and/or minimum load costs on a daily basis. A daily *ex post* cost verification regime would create a significant monitoring burden and be potentially disruptive if the CAISO did not accept submitted costs and was required to resettle the market. Revised Draft Final Proposal at 7.

³⁹ Revised tariff sections 27.7.1, 30.4, 30.4.1.2, 30.5.2.4, 30.7.9, 30.7.10, 39.6.1.6, 39.6.1.6.1, and 39.6.1.6.2.

⁴⁰ Because resources other than use-limited resources will be unable to use the registered cost option, it would be a misnomer to continue to call their sole remaining choice of the proxy cost an "option." Therefore, the CAISO proposes to rename it the proxy cost *methodology* and, to avoid confusion, the CAISO proposes to rename the registered cost option the registered cost *methodology*.

⁴¹ In the Commitment Costs Refinements 2012 stakeholder initiative, CAISO considered the idea of eliminating the registered cost methodology, but ultimately discarded it. At the time, the CAISO and stakeholders decided to retain the registered cost methodology in light of the implementation of the new cap-and-trade program for greenhouse gas emissions in California and recent CAISO market design changes.

once gas prices fell in March 2014, the registered cost methodology continued to reflect the higher prices from February, and as a result the commitment costs used by the market were correspondingly too high in March, thus resulting in inefficient resource commitment and dispatch in both months.⁴²

The CAISO also performed an analysis showing that resources' start-up and minimum load costs have a high sensitivity to gas price fluctuations, which scheduling coordinators can better manage using the daily bidding option subject to the proposed 125-percent cap under the proxy cost methodology because, as described above, the proxy cost methodology will have increased headroom to reflect gas volatility.⁴³

In addition, it is appropriate to eliminate rather than modify the registered cost methodology for resources that are not use-limited. From an implementation perspective, for the registered cost methodology to provide benefits similar to those provided by the revised proxy cost methodology, the CAISO would have to make systems or process changes to add a bidding functionality or reduce the 30-day period for making changes to the gas price. Indeed, reducing the 30-day period might require the current registered cost bid cap of 150 percent to be reduced in order to protect against the potential exercise of market power. The CAISO does not have an explicit market power mitigation methodology for commitment costs like it has for energy. Instead, the registered cost submitted by scheduling coordinators, up to the 150-percent cap, is held for 30 days so that resources cannot take advantage of temporary system changes. For example, a resource experiencing atypically high congestion due to a short-term transmission outage may temporarily increase its commitment cost bids to the 150-percent cap. When the outage is resolved, the resource may lower its bids to ensure that it can be economically dispatched. By requiring that resources stay on the same bid for 30-days reduces the likelihood that temporary system changes can be taken advantage of by those resources with local market power.

If the 30-day hold is reduced, the CAISO would consequently reduce the registered cost cap percentage, thus moving that cap closer to the 125-percent level of the proxy cost bid cap proposed below.⁴⁴ Providing resources other than use-limited resources with a single, flexible, and effective methodology – the

⁴² Revised Draft Final Proposal at 11-12; Board Memorandum at 5.

⁴³ Revised Draft Final Proposal at 19-24. This analysis compared the start-up costs and minimum load costs of resources under the registered cost methodology for the time period when the registered cost cap was set at 200 percent of the projected proxy cost (November 2012 through June 2013) and a time period when the registered cost cap was set at its current 150-percent level (November 2013 through June 2014). *Id.* at 19.

⁴⁴ *Id.* at 13.

proxy cost methodology – will help to streamline the CAISO’s existing processes and, as demonstrated above, provide sufficient headroom for recovery of commitment costs by resources.

The CAISO proposes to allow use-limited resources to continue to utilize the registered cost methodology in response to concerns expressed by some stakeholders that use-limited resources would be unable to bid their opportunity costs given the proposed level of the proxy cost bid cap. A use-limited resource is a resource that, due to design considerations or other non-economic reasons, is unable to operate continuously.⁴⁵ Thus, scheduling coordinators for use-limited resources need to be able to submit bids for start-up or minimum load costs at higher prices to account for their limited number of operating hours due to these restrictions. As a result, use-limited resources typically start up and operate only when the system need is greatest. The increased bid amounts based on these limitations reflect opportunity costs of only running the use-limited resources when prices are high. The opportunity costs for some use-limited resources could be greater than the proposed 125-percent proxy cost bid cap. Consequently, it is just and reasonable to retain the registered cost methodology – with its existing 150-percent cap for use-limited resources – until the CAISO can implement new provisions to enable use-limited resources to directly bid their opportunity costs.⁴⁶

In the stakeholder process, the CAISO and stakeholders began developing provisions for including opportunity costs in the proxy cost bid cap for use-limited resources. However, stakeholders commented that there was not enough time to fully vet the proposal before the upcoming winter season and raised concerns that trying to do so could cause an unwarranted delay in implementing the proposed tariff revisions until after the winter. Therefore, the CAISO proposes to retain the registered cost methodology as an option for use-limited resources on an interim basis until the CAISO can develop and implement a complete proposal for allowing use-limited resources to include opportunity costs in the proxy cost bid cap. The CAISO expects that to happen before the 2015-16 winter season, and at such time the CAISO will submit tariff revisions to eliminate the registered cost methodology altogether.⁴⁷

⁴⁵ Tariff appendix A, definition of “Use-Limited Resource.” As explained below, the CAISO is proposing to amend this definition as part of this filing.

⁴⁶ Board Memorandum at 5.

⁴⁷ Revised Draft Final Proposal at 15-16; Board Memorandum at 5-6.

C. Include in the Tariff the Use of Updated Natural Gas Price Data in the Event of a Spike in Natural Gas Prices

1. Triggering of an Alternative Natural Gas Price

The CAISO proposes to revise tariff section 39.7.1.1.1.3 to trigger the use of an alternative natural gas price whenever a significant and sudden spike in natural gas prices occurs. Specifically, the CAISO proposes to add new tariff language stating that if a daily gas price reported by ICE on the morning of the day-ahead market run exceeds 125 percent of any natural gas price index calculated for the day-ahead market between 7:00 p.m. and 10:00 p.m. Pacific time on the preceding day, the CAISO will use the natural gas price reported by ICE in all CAISO cost formulas and market processes for that day's day-ahead market that would otherwise use the natural gas price index.⁴⁸

This proposed tariff revision is just and reasonable. The Commission approved a similar triggering mechanism and method of determining the alternative natural gas price in its March 21 Order on the CAISO's tariff waiver petition.⁴⁹ In that order, the Commission concluded that it is "reasonable to use the ICE index, given that the close of the day-ahead market coincides with the time the index is regularly published, and therefore it is the index that will most accurately reflect the price of natural gas at the time of the day-ahead market."⁵⁰

The only significant difference between this proposal and the mechanism approved in the March 21 Order is that in the waiver petition, the trigger for the alternative calculation methodology was contained in a business practice manual and initially set at 150 percent of the natural gas price index calculated for the day-ahead market on the preceding day. Based on the analysis the CAISO conducted, in this amendment, the CAISO proposes to establish a 125-percent trigger in the tariff. As explained above, the CAISO's analysis indicates that gas prices have only rarely spiked by more than 125 percent in the CAISO market since implementation of the CAISO's market design in 2009.⁵¹ Therefore, the proposed 125-percent trigger will allow use of the alternative natural gas price to address any significant or unexpected events that may occur in the future. Setting the trigger at a level higher than 125 percent would create the possibility

⁴⁸ Proposed tariff section 39.7.1.1.1.3(b). This 125-percent trigger will apply solely to natural gas costs and should not be confused with the 125-percent proxy cost bid cap discussed above in section II.B this transmittal letter, which will apply to all start-up costs and minimum load costs.

⁴⁹ March 21 Order at PP 7-9, 22-24.

⁵⁰ *Id.* at P 25.

⁵¹ See section II.A of this transmittal letter (citing Revised Draft Final Proposal at 7-9).

that some of those events might not trigger the alternative natural gas price, thereby increasing the risks of under-recovery of fuel costs and inefficient market commitment decisions.⁵² Thus, setting the cap at 125 percent strikes an appropriate balance between providing resources a reasonable opportunity to recover their fuel costs and protecting against the potential exercise of market power until such the time as a more dynamic market power mitigation mechanism can be developed and implemented explicitly for commitment costs.

The CAISO recognizes that when the alternative natural gas price is triggered, it may result in increased costs borne by load-serving entities. However, it provides suppliers with a reasonable opportunity to recover their costs. Also, given the historical rarity of dramatic natural gas price spikes in California, the CAISO expects that suggests that such increased costs can reasonably be expected to occur infrequently, if ever. Also, in the March 21 Order, the Commission explained that “increased costs to load as a result of more accurate cost recovery calculations do not amount to a legally cognizable harm.”⁵³ The alternative natural gas price triggered pursuant to this tariff amendment will provide more accurate cost recovery calculations, just like the alternative natural gas price triggered pursuant to the limited tariff waiver.

The existing tariff states that the CAISO may implement a temporary variation or waiver of the timing requirements applicable to the day-ahead market in the event that any of the criteria listed in the tariff section are met.⁵⁴ For purposes of clarification, the CAISO proposes to revise this section by adding to the list of criteria the triggering of the alternative natural gas price described above.⁵⁵

Following Commission acceptance of the provisions regarding the alternative natural gas price, the CAISO will have the tariff authority to use the following process to address the occurrence of sudden and significant natural gas price spikes:

⁵² The Commission also found that the CAISO’s proposal in the Petition for Limited Tariff Waiver to maintain the 150-percent threshold in a business practice manual was appropriate because doing so “is temporary, and allows flexibility to immediately announce a change in the threshold to the market, if necessary.” March 21 Order at P 26 (citing March 14 Order at P 22). The CAISO proposes to include the proposed 125-percent threshold in the tariff rather than the business practice manual because that threshold is not a temporary measure like the 150-percent threshold, which expired on April 30, 2014.

⁵³ *Id.* at P 24.

⁵⁴ Tariff section 31.6.1.

⁵⁵ Revised tariff section 31.6.1(v).

Day 1 (e.g., December 1) –

- Between 7:00 p.m. and 10:00 p.m. Pacific Time – Update natural gas prices pursuant to the current tariff process in preparation for the day-ahead market run.

Day 2 (e.g., December 2) –

- Before 10:00 a.m. Pacific time – Monitor intra-day natural gas prices. If natural gas prices are trending upwards, put internal processes and CAISO markets on alert for a potential update to the gas price index and a delay in the close of the day-ahead market.⁵⁶
- Approximately 10:00 a.m. – If the ICE index does not indicate natural gas prices that are greater than 125 percent of the previous evening's prices, there will be no change to current process and day-ahead market closes. If the ICE index does indicate natural gas prices that are greater than 125 percent of the previous evening's prices, proceed to:
 - Notify market participants of a delay in the day-ahead market close and suspend bidding temporarily.
 - Update the natural gas price index used in proxy cost calculations, default energy bids, and generated bids.
 - Automatically switch use-limited resources subject to the registered cost methodology to the proxy cost methodology if the proxy cost with the updated gas price index is higher than the registered cost.⁵⁷
 - Notify market participants that the day-ahead market is open for (re)bidding and establish a new time for the close of the day-ahead market.

⁵⁶ Under existing tariff authority, an expected significant increase in natural gas prices constitutes a market disruption that permits the CAISO to hold the day-ahead market open for this longer time, as well as to allow the resubmission of bids. See tariff section 7.7.15. The CAISO will report such events to the Commission consistent with the requirements of section 7.7.15. Also, as explained in section I.A of this transmittal letter, the CAISO has existing tariff authority to modify the normal timing of the day-ahead market in order to preserve system reliability, prevent an imminent or threatened system emergency, or retain operational control over the CAISO controlled grid during an actual system emergency.

⁵⁷ See section II.C.2 of this transmittal letter.

- Run the market optimization and publish market awards.⁵⁸

This is essentially the same process described in the Petition for Limited Tariff Waiver.⁵⁹

2. Switching Use-Limited Resources from the Registered Cost Methodology to the Proxy Cost Methodology and Reverting Back to the Registered Cost Methodology

The CAISO proposes to revise tariff section 30.4.1.2 to address switching a resource from the registered cost methodology to the proxy cost methodology in the event that the alternative natural gas price described above is triggered. Specifically, the CAISO has revised the tariff to state that if the alternative natural gas price is triggered, and a use-limited resource's start-up costs and minimum load costs calculated pursuant to the proxy cost methodology using the alternative gas price exceeds the value registered in the master file, then the CAISO will switch the use-limited resource to the proxy cost methodology. Any use-limited resource thereby switched to the proxy cost methodology will revert to the registered cost methodology when the use-limited resource's alternative proxy cost calculation no longer exceeds the value registered using the registered cost methodology.⁶⁰

This tariff revision is just and reasonable. The Commission approved a similar mechanism in the March 21 Order.⁶¹ As the Commission explained, "[b]ecause this waiver will permit resources to switch back to the registered cost option on all days when the price increase threshold has not been met, it enhances the ability of resources to recoup their start-up and minimum load costs without upsetting CAISO's current market design."⁶² The same reasoning holds true for the switching and reversion mechanism proposed in this tariff amendment filing.

⁵⁸ Revised Draft Final Proposal at 13-14. As explained in the Petition for Limited Tariff Waiver, the settlement impact of the use of the updated ICE price will flow through the CAISO's existing settlement authority for bid cost recovery, exceptional dispatch, and residual imbalance energy. Petition for Limited Tariff Waiver at 22.

⁵⁹ *Id.* at 13-15.

⁶⁰ Proposed tariff section 30.4.1.2(b). These determinations will be made separately for both start-up costs and minimum load costs. *Id.*

⁶¹ March 21 Order at PP 10, 22-25.

⁶² *Id.* at P 25.

Requiring use-limited resources to switch to the proxy cost methodology under the circumstances described above will also ensure efficient dispatch of resources and permit the CAISO market to reflect accurate costs for all resources in the event of a natural gas price spike. As explained earlier,⁶³ the gas price used as the basis for the registered cost methodology can lead to the inefficient dispatch of resources in the event of a significant price spike between the time the gas price index is calculated on the evening prior to the day-ahead market run and the gas price published in the morning of the day-ahead market, which is what happened during the February 2014 natural gas price spike.

D. Other Revisions

The CAISO also proposes several clarifying revisions to the tariff. First, the CAISO has revised the existing tariff section regarding the calculation of start-up cost and minimum load cost values for natural gas-fired resources under the proxy cost methodology to specify that such values can be “[f]ormulaic natural gas cost values adjusted for fuel-cost variation on a daily basis using the natural gas price calculated pursuant to [tariff] Section 39.7.1.1.1.3.”⁶⁴ The existing tariff section states that such values are calculated pursuant to a business practice manual. While those values are currently calculated in the same manner under both tariff section 39.7.1.1.1.3 and the applicable business practice manual,⁶⁵ the CAISO determined that it is appropriate to reference the tariff section rather than the business practice manual.

In the existing tariff section regarding the calculation of start-up cost and minimum load cost values for non-natural gas-fired resources under the proxy cost methodology, the CAISO proposes to clarify that such values can be “relevant cost information of the particular resource, including fuel or fuel equivalent input costs.”⁶⁶ Further, the CAISO proposes to clarify the existing tariff section regarding multi-stage generating resources to state that the proxy cost methodology for calculating start-up costs and minimum load costs will apply to all the multi-stage generating resource configurations for a multi-stage generating resource that is not a use-limited resource and for a multi-stage generating resource that is a use-limited resource and elects to use the proxy cost methodology.⁶⁷

⁶³ See section III.B of this transmittal letter.

⁶⁴ Revised tariff section 30.4.1.1.1(a).

⁶⁵ See *supra* note 7.

⁶⁶ Revised tariff section 30.4.1.1.2(a).

⁶⁷ Revised tariff section 30.4.1.1.3.

The CAISO proposes to clarify the existing tariff section regarding maximum registered cost values for start-up and minimum load costs to state that the projected proxy cost for natural gas-fired resources will include a gas price component, a major maintenance expense component, if available, a volumetric grid management charge component, and, if eligible, a projected greenhouse gas allowance price component calculated as set forth in the tariff section.⁶⁸ The CAISO also proposes to revise the section to specify the components of the projected proxy cost for non-natural gas-fired resources.⁶⁹

In the existing tariff definition of a use-limited resource, the CAISO proposes to clarify that the definition is not limited to resource adequacy resources, and that a use-limited resource that is also a resource adequacy resource must also meet the definition of a resource adequacy resource.⁷⁰ In addition, the CAISO proposes to remove language in this definition that potentially could be read to suggest that a use-limited resource must be able to operate on every trading day.⁷¹ Lastly, the CAISO proposes to correct non-substantive typographical errors in the existing tariff definitions of the terms projected proxy cost, proxy cost, and registered cost.⁷²

E. Responses to Stakeholder Comments

Stakeholders generally expressed support for the tariff revisions proposed in this filing. However, some stakeholders raised issues that the CAISO addressed as discussed below.

Some stakeholders asserted that the proxy cost bid cap should be increased to 150 percent (*i.e.*, the same percentage cap level that applies under the registered cost methodology) to address intra-day gas price volatility, instead of the 125-percent level proposed by the CAISO. In response, the CAISO explained that its own analysis and confidential data provided pursuant to non-disclosure agreements show that the proposed 125-percent cap will address almost all gas price volatility due to day-over-day and intra-day gas price movements such as the volatility that has occurred on just seven occasions since 2009. In addition, the proposed alternative method of determining the natural gas price in the event of a spike in natural gas prices should address all

⁶⁸ Revised tariff section 39.6.1.6.

⁶⁹ *Id.*

⁷⁰ Revised tariff appendix A, definition of “Use-Limited Resource.”

⁷¹ *Id.*

⁷² Revised tariff appendix A, definitions of “Projected Proxy Cost,” “Proxy Cost,” and “Registered Cost.”

remaining extraordinary events that may occur. Moreover, as discussed above,⁷³ the CAISO will retain the registered cost cap of 150 percent for use-limited resources until the CAISO can develop and implement a complete proposal to allow use-limited resources to include opportunity costs in the proxy cost bid cap.

Some stakeholders requested direct out-of-market reimbursement of incurred natural gas costs. The CAISO responded by explaining that its analysis shows that the proposed 125-percent proxy cost bid cap and method of determining the alternative natural gas price in the event of a natural gas price spike support recovery of natural gas costs as reflected in commitment costs. In other words, the CAISO provides suppliers with a reasonable opportunity to recover their costs. Under a market-based rate regime, the CAISO is not obligated to guarantee cost recovery. Further, an obligation to provide out-of-market reimbursement of costs not reflected in the market optimization would reduce market efficiency, create complexities as to how to define eligibility for direct reimbursement, and potentially create gaming opportunities.⁷⁴ That is, in order for the market outcome to be efficient, costs must be reflected in bids or other inputs to the optimization.

Some stakeholders requested additional bidding flexibility to reflect intra-day and penalty costs assessed by natural gas pipeline companies to participants in the CAISO market. In response, the CAISO explained that the proposed increase in the proxy cost bid cap and method of determining the alternative natural gas price in the event of a natural gas price spike will provide significant additional flexibility to address all natural gas price increases. This should be sufficient to address reasonably foreseeable volatility. Further, the purpose of the stakeholder initiative that led to this tariff amendment was to find solutions that the CAISO can implement in time for the upcoming winter season. The CAISO and stakeholders will have the opportunity to consider longer-term market design changes for both energy and commitment cost bids in a more comprehensive bidding rules initiative scheduled to begin later in 2014. That stakeholder initiative will include discussion regarding greater bidding flexibility and recovery of intra-day gas costs, based on more comprehensive data than has been provided or assessed so far. The CAISO has also resumed its stakeholder process to consider further enhancements to provide for recovery of natural gas pipeline penalty costs, although that stakeholder process is reconsidering its approach for recovery of these penalty costs.⁷⁵ Any CAISO

⁷³ See section III.B of this transmittal letter.

⁷⁴ Board Memorandum at 7 and attachment A thereto at 2.

⁷⁵ Revised Draft Final Proposal at 16-19; Board Memorandum at 7 and attachment A thereto at 2. Materials related to the stakeholder process for the initiative on recovery of gas pipeline penalty costs are available on the CAISO website at <http://www.caiso.com/informed/Pages/StakeholderProcesses/NaturalGasPipelinePenaltyRecover>

proposal resulting from such effort will require coordination with and input from natural gas companies. Such activities did not occur in this initiative, and thus it is inappropriate to consider penalty cost recovery in this proceeding. In any event, the stakeholder process preceding this tariff amendment did not address explicit mechanisms for penalty cost recovery, and such issue is beyond the scope of this proceeding.

Some stakeholders requested that the CAISO use just the ICE gas price index on a permanent basis instead of using just that index only in the event of a natural gas price spike. The CAISO responded that a permanent change to the ICE index was not appropriate at this time because it would require a permanent shift in the day-ahead market process and would have a major implementation impact, requiring the CAISO to delay the closing of the day-ahead market and delay the publication of day-ahead market results. The CAISO continues to monitor broader industry discussions regarding an alignment of the gas and electric day that may result in a shift in the day-ahead market processes. Moreover, the use of a single gas price index is a departure from the current tariff and would require more detailed and careful consideration.⁷⁶ The use of multiple gas price indices (at least when a spike in natural gas prices does not need to be quickly addressed) is also consistent with guidance previously provided by the Commission.⁷⁷ Thus, until demonstrated otherwise, there are sound reasons for relying on a multitude of prices to create the gas price index during the normal course. It provides for a representative sample of gas prices and assures that anomalous results in one index cannot unduly sway the proxy price.

Lastly, one stakeholder asserted that the CAISO should implement a method similar to the proposed method of determining the alternative natural gas price in the event of a natural gas price spike, to account for significant overnight *decreases* in natural gas prices. The CAISO responded that the purpose of the proposed alternative calculation method is to give resources a more reasonable opportunity to recover their costs. Also, the proposed 125-percent proxy cost bid

[y.aspx](#).

⁷⁶ Revised Draft Final Proposal at 14.

⁷⁷ See *California Independent System Operator Corp.*, 116 FERC ¶ 61,274, at P 1045 (2006) (“We believe the proxy gas price established from the four regional indices will sufficiently reflect the daily fluctuation in gas prices”), *order on clarification and reh’g*, 119 FERC ¶ 61,076, at P 502 (2007) (“These four published indices are widely used by industry participants to measure change in regional gas prices, and averaging of these four indices allows market participants to reduce their exposure to fluctuating gas prices, while improving their risk management strategy in the energy market.”); *California Independent System Operator Corp.*, 141 FERC ¶ 61,237, at P 31 (2012) (citation omitted) (“[Commission] staff noted that using a composite index made by averaging more than one index can avoid gaps in index availability. The Staff Report therefore suggested that entities may choose to average across several index developers for the same time period or average over several time periods from the same developer.”).

cap is an upper limit, and resources will presumably be incentivized to lower their bids to remain competitive in the event of a large overnight decrease in natural gas prices.⁷⁸

IV. Effective Date

The CAISO requests that the Commission accepts the tariff revisions contained in this filing effective as of December 1, 2014.

V. Communications

Correspondence and other communications regarding this filing should be directed to:

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VI. Service

The CAISO has served copies of this filing on the California Public Utilities Commission, the California Energy Commission, and all parties with Scheduling Coordinator Agreements under the CAISO tariff. In addition, the CAISO has posted a copy of the filing on the CAISO website.

VII. Contents of this Filing

In addition to this transmittal letter, this filing includes the following attachments:

Attachment A	Clean CAISO tariff sheets incorporating this tariff amendment
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⁷⁸ Attachment A to Board Memorandum at 5.

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Attachment B	Red-lined document showing the revisions contained in this tariff amendment
Attachment C	Revised Draft Final Proposal
Attachment D	Board Memorandum
Attachment E	List of key dates in the stakeholder process

VIII. Conclusion

For the reasons set forth in this filing, the CAISO respectfully requests that the Commission accept the tariff changes contained in this filing effective as of December 1, 2014.

Respectfully submitted,

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Attachment A – Clean Tariff Sheets

Tariff Amendment – Modify Start-Up and Minimum Load Cost Recovery Mechanisms

California Independent System Operator Corporation

27.7 Constrained Output Generators

27.7.1 Election Of Constrained Output Generator Status

A Scheduling Coordinator on behalf of a Generating Unit eligible for COG status must make an election to have the resource treated as a COG before each calendar year by registering the resource's PMin in the Master File as equal to its PMax less 0.01 MW ($P_{Min} = P_{Max} - 0.01 \text{ MW}$) within the timing requirements specified for Master File changes described in the applicable Business Practice Manual. Generating Units with COG status will be eligible to set LMPs in the IFM and RTM based on their Calculated Energy Bids.

As with all Generating Units that are not Use-Limited Resources, a Scheduling Coordinator on behalf of a COG that is not a Use-Limited Resource must use the Proxy Cost methodology, as provided in Section 30.4, for determining its Start-Up Costs and Minimum Load Costs. A Scheduling Coordinator on behalf of a COG that is a Use-Limited Resource must elect to use either the Proxy Cost methodology or the Registered Cost methodology, as provided in Section 30.4, for determining its Start-Up Costs and Minimum Load Costs. A Calculated Energy Bid of a COG that is not a Use-Limited Resource will be calculated based on the Proxy Cost methodology. A Calculated Energy Bid of a COG that is a Use-Limited Resource will be calculated based on its election of the Proxy Cost methodology or the Registered Cost methodology. Whenever a Scheduling Coordinator for a COG submits an Energy Bid into the IFM or RTM, the CAISO will override that Bid and substitute the Calculated Energy Bid if the submitted Bid is different from the Calculated Energy Bid.

* * *

30.4 Proxy Cost and Registered Cost Methodologies

Scheduling Coordinators for Generating Units and Resource-Specific System Resources that are not Use-Limited Resources will be subject to the Proxy Cost methodology for their Start-Up Costs and Minimum Load Costs.

Scheduling Coordinators for Generating Units and Resource-Specific System Resources that are Use-Limited Resources may elect on a thirty (30) day basis to use either the Proxy Cost methodology or the Registered Cost methodology for specifying their Start-Up Costs and

Minimum Load Costs to be used for those resources in the CAISO Markets Processes. The elections are independent; that is, a Scheduling Coordinator for a Use-Limited Resource electing to use either the Proxy Cost methodology or the Registered Cost methodology for Start-Up Costs may make a different election for Minimum Load Costs. If a Scheduling Coordinator has not made an election, the CAISO will assume the Proxy Cost methodology as the default. Scheduling Coordinators for Multi-Stage Generating Resources may also register with the CAISO their Transition Costs on a thirty (30)-day basis.

30.4.1 Start-Up and Minimum Load Costs

30.4.1.1 Proxy Cost Methodology

30.4.1.1.1 Natural Gas-Fired Resources

For each natural gas-fired resource, the Proxy Cost methodology uses formulas for Start-Up Costs and Minimum Load Costs based on the resource's actual unit-specific performance parameters. The Start-Up Cost and Minimum Load Cost values utilized for each such resource in the CAISO Markets Processes will be either (a) or (b) below:

- (a) Formulaic natural gas cost values adjusted for fuel-cost variation on a daily basis using the natural gas price calculated pursuant to Section 39.7.1.1.1.3. Start-Up Costs also include: (i) the cost of auxiliary power calculated using the unit-specific MWh quantity of auxiliary power used for Start-Up multiplied by a resource-specific electricity price; (ii) a greenhouse gas cost adder for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, which is calculated for each Start-Up as the product of the resource's fuel requirement per Start-Up, the greenhouse gas emissions rate authorized by the California Air Resources Board, and the applicable Greenhouse Gas Allowance Price; (iii) the rates for the Market Services Charge and System Operations Charge multiplied by the shortest Start-Up Time listed for the resource in the Master File, multiplied by the P_{Min} of the resource, multiplied by 0.5; and (iv) a resource-specific adder, if applicable, for major maintenance expenses (\$ per Start-Up) determined by the CAISO or

Independent Entity selected by the CAISO to determine such major maintenance expenses.

Minimum Load Costs also include: (i) operation and maintenance costs as provided in Section 39.7.1.1.2; (ii) a greenhouse gas cost adder for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, which is calculated for each Start-Up as the product of the resource's fuel requirement at Minimum Load, the greenhouse gas emissions rate authorized by the California Air Resources Board, and the applicable Greenhouse Gas Allowance Price; (iii) the rates for the Market Services Charge and System Operations Charge multiplied by the PMin of the resource; (iv) the Bid Segment Fee; and (v) a resource-specific adder, if applicable, for major maintenance expenses (\$ per operating hour) determined pursuant to Section 30.4.1.1.4.

- (b) Values specified by Scheduling Coordinators pursuant to Sections 30.7.9 and 30.7.10.

In the event that the Scheduling Coordinator for a unit does not provide sufficient data for the CAISO to determine the unit's base Proxy Costs or one or more of the additional components of the unit's Proxy Costs, the CAISO will assume that the unit's base Start-Up Costs and Minimum Load Costs, or the indeterminable additional component(s) of the unit's Start-Up Costs or Minimum Load Costs, are zero.

30.4.1.1.2 Non-Natural Gas-Fired Resources

For each non-natural gas-fired resource, Start-Up Cost and Minimum Load Cost values under the Proxy Cost methodology shall be based on either (a) or (b) below:

- (a) The relevant cost information of the particular resource, including fuel or fuel equivalent input costs, which will be provided to the CAISO by the Scheduling Coordinator and maintained in the Master File.

Start-Up Costs will also include: (i) greenhouse gas allowance costs for each resource registered with the California Air Resources Board as having a

greenhouse gas compliance obligation, as provided to the CAISO by the Scheduling Coordinator; (ii) the rates for the Market Services Charge and System Operations Charge multiplied by the shortest Start-Up Time listed for the resource in the Master File, multiplied by the PMin of the resource, multiplied by 0.5; and (iii) a resource-specific adder, if applicable, for major maintenance expenses (\$ per Start-Up) determined by the CAISO or Independent Entity selected by the CAISO to determine such major maintenance expenses.

Minimum Load Costs also include: (i) operation and maintenance costs as provided in Section 39.7.1.1.2; (ii) greenhouse gas allowance costs for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, as provided to the CAISO by the Scheduling Coordinator; (iii) the rates for the Market Services Charge and System Operations Charge multiplied by the PMin of the resource; (iv) the Bid Segment Fee; and (v) a resource-specific adder, if applicable, for major maintenance expenses (\$ per operating hour) determined by the CAISO or an Independent Entity selected by the CAISO.

For each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, the information provided to the CAISO by the Scheduling Coordinator must be consistent with information submitted to the California Air Resources Board. Adders for major maintenance expenses will be determined pursuant to Section 30.4.1.1.4.

- (b) Values specified by Scheduling Coordinators pursuant to Sections 30.7.9 and 30.7.10.

In the event that the Scheduling Coordinator for a unit does not provide sufficient data for the CAISO to determine one or more components of the unit's Proxy Costs, the CAISO will assume that the indeterminable component(s) of the unit's Start-Up Costs or Minimum Load Costs are zero.

30.4.1.1.3 Multi-Stage Generating Resources

The Proxy Cost methodology for calculating Start-Up Costs and Minimum Load Costs will apply to all the MSG Configurations for a Multi-Stage Generating Resource that is not a Use-Limited Resource and for a Multi-Stage Generating Resource that is a Use-Limited Resource and elects to use the Proxy Cost methodology. The Proxy Cost values for Multi-Stage Generating Resources will be calculated for each specific MSG Configuration.

* * *

30.4.1.2 Registered Cost Methodology

- (a) Under the Registered Cost methodology, the Scheduling Coordinator for a Use-Limited Resource may register values of its choosing for Start-Up Costs and/or Minimum Load Costs in the Master File subject to the maximum limit specified in Section 39.6.1.6. For a Use-Limited Resource to be eligible for the Registered Cost methodology there must be sufficient information in the Master File to calculate the value pursuant to the Proxy Cost methodology, which will be used to validate the specific value registered using the Registered Cost methodology. Any such values will be fixed for a minimum of 30 days in the Master File unless: (a) the resource's costs for any such value, as calculated pursuant to the Proxy Cost methodology, exceed the value registered using the Registered Cost methodology, in which case the Scheduling Coordinator may elect to switch to the Proxy Cost methodology for the balance of any 30-day period, except as set forth in Section 30.4.1.2(b); or (b) any cost registered in the Master File exceeds the maximum limit specified in Section 39.6.1.6 after this minimum 30-day period, in which case the value will be lowered to the maximum limit specified in Section 39.6.1.6. If a Multi-Stage Generating Resource elects to use the Registered Cost methodology, that election will apply to all the MSG Configurations for that resource. The cap for the Registered Cost values for each MSG Configuration will be based on the Proxy Cost values calculated for each MSG Configuration, which are also subject to the maximum limit specified in Section 39.6.1.6.
- (b) If the alternative natural gas price set forth in Section 39.7.1.1.1.3(b) is triggered, and a Use-Limited Resource's Start-Up Costs or Minimum Load Costs calculated pursuant to

the Proxy Cost methodology using the alternative gas price exceeds the value registered in the Master File, then the CAISO will switch the Use-Limited Resource to the Proxy Cost methodology. Any Use-Limited Resource switched to the Proxy Cost methodology pursuant to this Section 30.4.1.2(b) will revert to the Registered Cost methodology when the Use-Limited Resource's alternative Proxy Cost calculation no longer exceeds the value registered using the Registered Cost methodology. These determinations will be made separately for both Start-Up Costs and Minimum Load Costs.

* * *

30.5.2.4 Supply Bids for System Resources

In addition to the common elements listed in Section 30.5.2.1, Supply Bids for System Resources shall also contain: the relevant Ramp Rate; Start-Up Costs; and Minimum Load Costs.

Resource-Specific System Resources are subject to the Proxy Cost methodology or the Registered Cost methodology for Start-Up Costs and Minimum Load Costs as provided in Section 30.4, and Transaction ID as created by the CAISO. Other System Resources are not eligible to recover Start-Up Costs and Minimum Load Costs. Resource-Specific System Resources are eligible to participate in the Day-Ahead Market on an equivalent basis as Generating Units and are not obligated to participate in RUC or the RTM if the resource did not receive a Day-Ahead Schedule unless the resource is a Resource Adequacy Resource. If the Resource-Specific System Resource is a Resource Adequacy Resource, the Scheduling Coordinator for the resource is obligated to make it available to the CAISO Market as prescribed by Section 40.6. Dynamic Resource-Specific System Resources are also eligible to participate in the HASP and RTM on an equivalent basis as Generating Units. The quantity (in MWh) of Energy categorized as Interruptible Imports (non-firm imports) can only be submitted through Self-Schedules in the Day-Ahead Market and cannot be incrementally increased in the HASP or RTM. Bids submitted to the Day-Ahead Market for ELS Resources will be applicable for two days after they have been submitted and cannot be changed the day after they have been submitted.

* * *

30.7.9 Format And Validation Of Start-Up Costs And Shut-Down Costs

For a Generating Unit or a Resource-Specific System Resource, the submitted Start-Up Cost expressed in dollars (\$) as a function of down time expressed in minutes must be a staircase function with up to three (3) segments defined by a set of 1 to 4 down time and Start-Up Cost pairs. The Start-Up Cost is the cost incurred to start the resource if it is offline longer than the corresponding down time. The last segment will represent the cost to start the resource from cold Start-Up and will extend to infinity. The submitted Start-Up Cost function shall be validated as follows:

- (a) The first down time must be zero (0) min.
- (b) The down time entries must match exactly (in number, sequence, and value) the corresponding down time breakpoints of the Start-Up Cost function, as registered in the Master File for the relevant resource as either the Proxy Cost or Registered Cost.
- (c) The Start-Up Cost for each segment must not be negative and must be equal to the Start-Up Cost of the corresponding segment of the Start-Up Cost function, as registered in the Master File for the relevant resource. In addition, if the Proxy Cost methodology pursuant to Section 30.4 applies to the resource, the Scheduling Coordinator for that resource may submit a daily Bid for the Start-Up Cost that must not be negative but may be less than or equal to one hundred twenty-five (125) percent of the Proxy Cost. For a resource that is eligible and has elected to use the Registered Cost methodology pursuant to Section 30.4, if a value is submitted in a Bid for the Start-Up Cost, it will be overwritten by the Registered Cost reflected in the Master File. If no value for Start-Up Cost is submitted in a Bid, the CAISO will insert the Master File value, as either the Proxy Cost or Registered Cost based on the methodology elected pursuant to Section 30.4.

- (d) The Start-Up Cost function must be strictly monotonically increasing, i.e., the Start-Up Cost must increase as down time increases.

The Start-Up cost for a Reliability Demand Response Resource shall be zero (0). For Participating Loads and Proxy Demand Resources, a single Shut-Down Cost in dollars (\$) is the cost incurred to Shut-Down the resource after receiving a Dispatch Instruction. The submitted Shut-Down Cost must not be negative. For Multi-Stage Generating Resources, the Scheduling Coordinator must provide Start-Up Costs for each MSG Configuration into which the resource can be started.

30.7.10 Format And Validation Of Minimum Load Costs

For a Generating Unit or a Resource-Specific System Resource, the submitted Minimum Load Cost expressed in dollars per hour (\$/hr) is the cost incurred for operating the unit at Minimum Load. The submitted Minimum Load Cost must not be negative. In addition, if the Proxy Cost methodology pursuant to Section 30.4 applies to the resource, the Scheduling Coordinator for that resource may submit a daily Bid for the Minimum Load Cost that must not be negative but may be less than or equal to one hundred twenty-five (125) percent of the Proxy Cost value. For a resource that is eligible and has elected to use the Registered Cost methodology pursuant to Section 30.4, any submitted Minimum Load Cost must be equal to the Minimum Load Cost as registered in the Master File.

For Participating Loads, the submitted Minimum Load Cost (\$/hr) is the cost incurred while operating the resource at reduced consumption after receiving a Dispatch Instruction. The submitted Minimum Load Cost must not be negative.

* * *

31.6.1 Criteria For Temporary Waiver Of Timing Requirements

The CAISO may at its sole discretion implement any temporary variation or waiver of the timing requirements of this Section 31 and Section 6.5.3 (including the omission of any step) if any of the following criteria are met:

- (i) such waiver or variation of timing requirements is reasonably necessary to preserve System Reliability, prevent an imminent or threatened

System Emergency or to retain Operational Control over the CAISO Controlled Grid during an actual System Emergency.

- (ii) because of error or delay, the CAISO requires additional time to fulfill its responsibilities;
- (iii) problems with data or the processing of data cause a delay in receiving or issuing Bids or publishing information on the CAISO's secure communication system;
- (iv) problems with telecommunications or computing infrastructure cause a delay in receiving or issuing Day-Ahead Schedules or publishing information on the CAISO's secure communication system;
- (v) the alternative natural gas price set forth in Section 39.7.1.1.1.3(b) is triggered.

* * *

39.6.1.6 Maximum Start-Up Cost and Minimum Load Cost Registered Cost Values

The maximum Start-Up Cost and Minimum Load Cost values registered in the Master File by Scheduling Coordinators for resources that are eligible and elect to use the Registered Cost methodology in accordance with Section 30.4 will be limited to 150% of the Projected Proxy Cost. The Projected Proxy Cost for natural gas-fired resources will include a gas price component, a major maintenance expense component, if available, a volumetric Grid Management Charge component, and, if eligible, a projected Greenhouse Gas Allowance Price component calculated as set forth in this Section 39.6.1.6. The Projected Proxy Cost for non-natural gas-fired resources will be based on costs provided to the CAISO pursuant to Section 30.4.1.1.2, a major maintenance expense component, if available, a volumetric Grid Management Charge component, and, if eligible, a projected Greenhouse Gas Allowance Price component calculated as set forth in this Section 39.6.1.6.

39.6.1.6.1 Gas Price Component of Projected Proxy Cost

For natural gas-fired resources, the CAISO will calculate a gas price to be used in establishing maximum Start-Up Costs and Minimum Load Costs after the twenty-first day of each month and

post it on the CAISO Website by the end of each calendar month. The price will be applicable for Scheduling Coordinators for natural gas-fired Use-Limited Resources electing to use the Registered Cost methodology until a new gas price is calculated and posted on the CAISO Website. The gas price will be calculated as follows:

- (1) Daily closing prices for monthly natural gas futures contracts at Henry Hub for the next calendar month are averaged over the first twenty-one (21) days of the month, resulting in a single average for the next calendar month.
- (2) Daily prices for futures contracts for basis swaps at identified California delivery points, are averaged over the first twenty-one (21) days of the month for the identified California delivery points as set forth in the Business Practice Manual.
- (3) For each of the California delivery points, the average Henry Hub and basis swap prices are combined and will be used as the baseline gas price applicable for calculating the caps for Start-Up and Minimum Load costs for Use-Limited Resources electing to use the Registered Cost methodology. The most geographically appropriate will apply to a particular resource.
- (4) The applicable intra-state gas transportation charge as set forth in the Business Practice Manual will be added to the baseline gas price for each Use-Limited Resource that elects to use the Registered Cost methodology to create a final gas price for calculating the caps for Start-Up and Minimum Load Costs for each such resource.

For non-natural gas-fired resources, the Projected Proxy Costs for Start-Up Costs and Minimum Load Costs will be calculated using the information contained in the Master File used for calculating the Proxy Cost, as set forth in the Business Practice Manual.

39.6.1.6.2 Projected Greenhouse Gas Allowance Price

For resources that are registered with the California Air Resources Board as having a greenhouse gas compliance obligation, the CAISO will calculate a projected Greenhouse Gas Allowance Price component to be used in establishing maximum Start-Up Costs and Minimum Load Costs after the twenty-first day of each month and will post it on the CAISO Website by the

end of that month. The projected Greenhouse Gas Allowance Price component will be applicable for Scheduling Coordinators on behalf of eligible Use-Limited Resources electing to use the Registered Cost methodology until a new projected Greenhouse Gas Allowance Price component is calculated and posted on the CAISO Website. The projected Greenhouse Gas Allowance Price component will be calculated by averaging the applicable daily Greenhouse Gas Allowance Prices calculated over the first twenty (20) days of the month using the methodology set forth in Section 39.7.1.1.1.4.

* * *

39.7.1.1.1.3 Calculation of Natural Gas Price

- (a) Except as set forth in Section 39.7.1.1.1.3(b), the CAISO will use different gas price indices for the Day-Ahead Market and the Real-Time Market and a gas price index will be calculated using at least two prices from two or more of the following publications: Natural Gas Intelligence, SNL Energy/BTU's Daily Gas Wire, Platt's Gas Daily, and the Intercontinental Exchange. If a gas price index is unavailable for any reason, the CAISO will use the most recent available gas price index. For the Day-Ahead Market, the CAISO will update the gas price indices between 19:00 and 22:00 Pacific Time using natural gas prices published on the day that is two (2) days prior to the applicable Trading Day, unless gas prices are not published on that day, in which case the CAISO will use the most recently published prices that are available. For the Real-Time Market, the CAISO will update gas price indices between the hours of 19:00 and 22:00 Pacific Time using natural gas prices published one (1) day prior to the applicable Trading Day, unless gas prices are not published on that day, in which case the CAISO will use the most recently published prices that are available.
- (b) If a daily gas price reported by the Intercontinental Exchange on the morning of the Day-Ahead Market run exceeds one hundred twenty-five (125) percent of any natural gas price index calculated for the Day-Ahead Market between 19:00 and 22:00 Pacific Time on the preceding day, the CAISO will utilize the gas price reported by the Intercontinental Exchange in all CAISO cost formulas and market processes for that day's Day Ahead

Market that would normally utilize the natural gas price index calculated pursuant to this Section 39.7.1.1.1.3.

* * *

Appendix A

Master Definition Supplement

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- Projected Proxy Cost

A calculation of a resource's Start-Up Costs and Minimum Load Costs for a prospective period used to determine the maximum Registered Cost for the resource, as set forth in Section 39.6.1.6 for a 30-day period pursuant to Section 30.4.

* * *

- Proxy Cost

The cost basis of a generating resource for which the operating cost is calculated as an approximation of the actual operating cost pursuant to Section 30.4.1.1.

* * *

- Registered Cost

The cost basis of a generating resource for which the operating cost is determined from registered values pursuant to Section 30.4.1.2.

- Use-Limited Resource

A resource that, due to design considerations, environmental restrictions on operations, cyclical requirements, such as the need to recharge or refill, or other non-economic reasons, is unable to operate continuously. This definition is not limited to Resource Adequacy Resources. A Use-Limited Resource that is a Resource Adequacy Resource must also meet the definition of a Resource Adequacy Resource.

Attachment B – Marked Tariff Sheets

Tariff Amendment – Modify Start-Up and Minimum Load Cost Recovery Mechanisms

California Independent System Operator Corporation

27.7 Constrained Output Generators

27.7.1 Election Of Constrained Output Generator Status

A Scheduling Coordinator on behalf of a Generating Unit eligible for COG status must make an election to have the resource treated as a COG before each calendar year by registering the resource's PMin in the Master File as equal to its PMax less 0.01 MW ($P_{Min} = P_{Max} - 0.01 \text{ MW}$) within the timing requirements specified for Master File changes described in the applicable Business Practice Manual. Generating Units with COG status will be eligible to set LMPs in the IFM and RTM based on their Calculated Energy Bids.

As with all Generating Units that are not Use-Limited Resources, a Scheduling Coordinator on behalf of a COG that is not a Use-Limited Resource must ~~use either~~ the Proxy Cost ~~methodology option or the Registered Cost option~~, as provided in Section 30.4, for determining its Start-Up Costs and Minimum Load Costs. A Scheduling Coordinator on behalf of a COG that is a Use-Limited Resource must elect to use either the Proxy Cost methodology or the Registered Cost methodology, as provided in Section 30.4, for determining its Start-Up Costs and Minimum Load Costs.

A ~~COG's~~ Calculated Energy Bid of a COG that is not a Use-Limited Resource will be calculated based on the Proxy Cost methodology~~this election~~. A Calculated Energy Bid of a COG that is a Use-Limited Resource will be calculated based on its election of the Proxy Cost methodology or the Registered Cost methodology. Whenever a Scheduling Coordinator for a COG submits an Energy Bid into the IFM or RTM, the CAISO will override that Bid and substitute the Calculated Energy Bid if the submitted Bid is different from the Calculated Energy Bid.

* * *

30.4 Proxy Cost and Registered Cost Methodologies Election For Start-Up Costs And Minimum Load Costs

Scheduling Coordinators for Generating Units and Resource-Specific System Resources that are not Use-Limited Resources ~~will~~ may be subject to elect on a thirty (30)-day basis either of the two options provided below (the Proxy Cost ~~methodology option or the Registered Cost option~~) for specifying their Start-Up Costs and Minimum Load Costs. ~~to be used for those resources in the CAISO Markets Processes.~~

Scheduling Coordinators for Generating Units and Resource-Specific System Resources that are Use-Limited Resources may elect on a thirty (30) day basis to use either the Proxy Cost methodology or the Registered Cost methodology for specifying their Start-Up Costs and Minimum Load Costs to be used for those resources in the CAISO Markets Processes. The elections are independent; that is, a Scheduling Coordinator for a Use-Limited Resource electing to use either the Proxy Cost ~~methodologyoption~~ or the Registered Cost ~~methodologyoption~~ for Start-Up Costs may make a different election for Minimum Load Costs. If a Scheduling Coordinator has not made an election, the CAISO will assume the Proxy Cost ~~methodologyoption~~ as the default-~~option~~.

Scheduling Coordinators for Multi-Stage Generating Resources may also register with the CAISO their Transition Costs on a thirty (30)-day basis.

30.4.1 Start-Up and Minimum Load Costs

30.4.1.1 Proxy Cost ~~MethodologyOption~~

30.4.1.1.1 Natural Gas-Fired Resources

For each natural gas-fired resource, the Proxy Cost ~~methodologyoption~~ uses formulas for Start-Up Costs and Minimum Load Costs based on the resource's actual unit-specific performance parameters. The Start-Up Cost and Minimum Load Cost values utilized for each such resource in the CAISO Markets Processes will be either (a) or (b) below:

- (a) Formulaic natural gas cost values adjusted for fuel-cost variation on a daily basis using the natural gas price-as calculated pursuant to Section 39.7.1.1.1.3.a ~~Business Practice Manual~~.

Start-Up Costs also include: (i) the cost of auxiliary power calculated using the unit-specific MWh quantity of auxiliary power used for Start-Up multiplied by a resource-specific electricity price; (ii) a greenhouse gas cost adder for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, which is calculated for each Start-Up as the product of the resource's fuel requirement per Start-Up, the greenhouse gas emissions rate authorized by the California Air Resources Board, and the

applicable Greenhouse Gas Allowance Price; (iii) the rates for the Market Services Charge and System Operations Charge multiplied by the shortest Start-Up Time listed for the resource in the Master File, multiplied by the PMin of the resource, multiplied by 0.5; and (iv) a resource-specific adder, if applicable, for major maintenance expenses (\$ per Start-Up) determined by the CAISO or Independent Entity selected by the CAISO to determine such major maintenance expenses.

Minimum Load Costs also include: (i) operation and maintenance costs as provided in Section 39.7.1.1.2; (ii) a greenhouse gas cost adder for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, which is calculated for each Start-Up as the product of the resource's fuel requirement at Minimum Load, the greenhouse gas emissions rate authorized by the California Air Resources Board, and the applicable Greenhouse Gas Allowance Price; (iii) the rates for the Market Services Charge and System Operations Charge multiplied by the PMin of the resource; (iv) the Bid Segment Fee; and (v) a resource-specific adder, if applicable, for major maintenance expenses (\$ per operating hour) determined pursuant to Section 30.4.1.1.4.

- (b) Values specified by Scheduling Coordinators pursuant to Sections 30.7.9 and 30.7.10.

In the event that the Scheduling Coordinator for a unit does not provide sufficient data for the CAISO to determine the unit's base Proxy Costs or one or more of the additional components of the unit's Proxy Costs, the CAISO will assume that the unit's base Start-Up Costs and Minimum Load Costs, or the indeterminable additional component(s) of the unit's Start-Up Costs or Minimum Load Costs, are zero.

30.4.1.1.2 Non-Natural Gas-Fired Resources

For each non-natural gas-fired resource, Start-Up Cost and Minimum Load Cost values under the Proxy Cost ~~methodology~~ shall be based on either (a) or (b) below:

- (a) The relevant cost information of the particular resource, including fuel or fuel equivalent input costs, which will be provided to the CAISO by the Scheduling Coordinator and maintained in the Master File.

Start-Up Costs will also include: (i) greenhouse gas allowance costs for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, as provided to the CAISO by the Scheduling Coordinator; (ii) the rates for the Market Services Charge and System Operations Charge multiplied by the shortest Start-Up Time listed for the resource in the Master File, multiplied by the PMin of the resource, multiplied by 0.5; and (iii) a resource-specific adder, if applicable, for major maintenance expenses (\$ per Start-Up) determined by the CAISO or Independent Entity selected by the CAISO to determine such major maintenance expenses.

Minimum Load Costs also include: (i) operation and maintenance costs as provided in Section 39.7.1.1.2; (ii) greenhouse gas allowance costs for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, as provided to the CAISO by the Scheduling Coordinator; (iii) the rates for the Market Services Charge and System Operations Charge multiplied by the PMin of the resource; (iv) the Bid Segment Fee; and (v) a resource-specific adder, if applicable, for major maintenance expenses (\$ per operating hour) determined by the CAISO or an Independent Entity selected by the CAISO.

For each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, the information provided to the CAISO by the Scheduling Coordinator must be consistent with information submitted to the California Air Resources Board. —Adders for major maintenance expenses will be determined pursuant to Section 30.4.1.1.4.

- (b) Values specified by Scheduling Coordinators pursuant to Sections 30.7.9 and 30.7.10.

In the event that the Scheduling Coordinator for a unit does not provide sufficient data for the CAISO to determine one or more components of the unit's Proxy Costs, the CAISO will assume that the indeterminable component(s) of the unit's Start-Up Costs or Minimum Load Costs are zero.

30.4.1.1.3 Multi-Stage Generating Resources

~~If a Multi-Stage Generating Resource elects to~~The Proxy Cost methodology for calculating Start-Up Costs and Minimum Load Costs~~option, that election~~ will apply to all the MSG Configurations for a Multi-Stage Generating Resource that is not a Use-Limited Resource and for a Multi-Stage Generating Resource that is a Use-Limited Resource and elects to use the Proxy Cost methodology. The Proxy Cost values for Multi-Stage Generating Resources will be calculated for each specific MSG Configuration.

* * *

30.4.1.2 Registered Cost MethodologyOption

(a) Under the Registered Cost methodology~~option~~, the Scheduling Coordinator for a Use-Limited Resource may register values of its choosing for Start-Up Costs and/or Minimum Load Costs in the Master File subject to the maximum limit specified in Section 39.6.1.6. For a Use-Limited Resource to be eligible for the Registered Cost methodology~~option~~ there must be sufficient information in the Master File to calculate the value pursuant to the Proxy Cost methodology~~option, which will be used to validate for~~ the specific value registered using the Registered Cost methodology~~option value~~. Any such values will be fixed for a minimum of 30 days in the Master File unless: (a) the resource's costs for any such value, as calculated pursuant to the Proxy Cost methodology~~option~~, exceed the value registered using the Registered Cost methodology~~option~~, in which case the Scheduling Coordinator may elect to switch to the Proxy Cost methodology~~option~~ for the balance of any 30-day period, except as set forth in Section 30.4.1.2(b); or (b) any cost registered in the Master File exceeds the maximum limit specified in Section 39.6.1.6 after this minimum 30-day period, in which case the value will be lowered to the maximum limit specified in Section 39.6.1.6. If a Multi-Stage Generating Resource elects

to use the Registered Cost ~~methodologyoption~~, that election will apply to all the MSG Configurations for that resource. The cap for the Registered Cost values for each MSG Configuration will be based on the Proxy Cost values calculated for each MSG Configuration, which are also subject to the maximum limit specified in Section 39.6.1.6.

(b) If the alternative natural gas price set forth in Section 39.7.1.1.1.3(b) is triggered, and a Use-Limited Resource's Start-Up Costs or Minimum Load Costs calculated pursuant to the Proxy Cost methodology using the alternative gas price exceeds the value registered in the Master File, then the CAISO will switch the Use-Limited Resource to the Proxy Cost methodology. Any Use-Limited Resource switched to the Proxy Cost methodology pursuant to this Section 30.4.1.2(b) will revert to the Registered Cost methodology when the Use-Limited Resource's alternative Proxy Cost calculation no longer exceeds the value registered using the Registered Cost methodology. These determinations will be made separately for both Start-Up Costs and Minimum Load Costs.

* * *

30.5.2.4 Supply Bids for System Resources

In addition to the common elements listed in Section 30.5.2.1, Supply Bids for System Resources shall also contain: the relevant Ramp Rate; Start-Up Costs; and Minimum Load Costs.

Resource-Specific System Resources ~~are subject to may elect~~ the Proxy Cost ~~methodologyoption~~ or the Registered Cost ~~methodologyoption~~ for Start-Up Costs and Minimum Load Costs as provided in Section 30.4, and Transaction ID as created by the CAISO. Other System Resources are not eligible to recover Start-Up Costs and Minimum Load Costs. Resource-Specific System Resources are eligible to participate in the Day-Ahead Market on an equivalent basis as Generating Units and are not obligated to participate in RUC or the RTM if the resource did not receive a Day-Ahead Schedule unless the resource is a Resource Adequacy Resource. If the Resource-Specific System Resource is a Resource Adequacy Resource, the Scheduling Coordinator for the resource is obligated to make it available to the CAISO Market as prescribed by Section 40.6. Dynamic Resource-Specific System Resources are also eligible to participate in

the HASP and RTM on an equivalent basis as Generating Units. The quantity (in MWh) of Energy categorized as Interruptible Imports (non-firm imports) can only be submitted through Self-Schedules in the Day-Ahead Market and cannot be incrementally increased in the HASP or RTM. Bids submitted to the Day-Ahead Market for ELS Resources will be applicable for two days after they have been submitted and cannot be changed the day after they have been submitted.

* * *

30.7.9 Format And Validation Of Start-Up Costs And Shut-Down Costs

For a Generating Unit or a Resource-Specific System Resource, the submitted Start-Up Cost expressed in dollars (\$) as a function of down time expressed in minutes must be a staircase function with up to three (3) segments defined by a set of 1 to 4 down time and Start-Up Cost pairs. The Start-Up Cost is the cost incurred to start the resource if it is offline longer than the corresponding down time. The last segment will represent the cost to start the resource from cold Start-Up and will extend to infinity. The submitted Start-Up Cost function shall be validated as follows:

- (a) The first down time must be zero (0) min.
- (b) The down time entries must match exactly (in number, sequence, and value) the corresponding down time breakpoints of the Start-Up Cost function, as registered in the Master File for the relevant resource as either the Proxy Cost or Registered Cost.
- (c) The Start-Up Cost for each segment must not be negative and must be equal to the Start-Up Cost of the corresponding segment of the Start-Up Cost function, as registered in the Master File for the relevant resource. In addition, if the Proxy Cost ~~methodologyoption~~ pursuant to Section 30.4 applies to the resource, the Scheduling Coordinator for that resource may submit a daily Bid for the Start-Up Cost that must not be negative but may be less than or equal to one hundred twenty-five (125) percent of the Proxy Cost. For a resource that is eligible and has elected to use the Registered Cost ~~methodologyoption~~ pursuant to Section 30.4, if a

value is submitted in a Bid for the Start-Up Cost, it will be overwritten by the Registered Cost reflected in the Master File. If no value for Start-Up Cost is submitted in a Bid, the CAISO will insert the Master File value, as either the Proxy Cost or Registered Cost based on the ~~methodologyoption~~ elected pursuant to Section 30.4.

- (d) The Start-Up Cost function must be strictly monotonically increasing, i.e., the Start-Up Cost must increase as down time increases.

The Start-Up cost for a Reliability Demand Response Resource shall be zero (0). For Participating Loads and Proxy Demand Resources, a single Shut-Down Cost in dollars (\$) is the cost incurred to Shut-Down the resource after receiving a Dispatch Instruction. The submitted Shut-Down Cost must not be negative. For Multi-Stage Generating Resources, the Scheduling Coordinator must provide Start-Up Costs for each MSG Configuration into which the resource can be started.

30.7.10 Format And Validation Of Minimum Load Costs

For a Generating Unit or a Resource-Specific System Resource, the submitted Minimum Load Cost expressed in dollars per hour (\$/hr) is the cost incurred for operating the unit at Minimum Load. The submitted Minimum Load Cost must not be negative. In addition, if the Proxy Cost ~~methodologyoption~~ pursuant to Section 30.4 applies to the resource, the Scheduling Coordinator for that resource may submit a daily Bid for the Minimum Load Cost that must not be negative but may be less than or equal to one hundred twenty-five (125) percent of the Proxy Cost value. For a resource that is eligible and has elected to use the Registered Cost ~~methodologyoption~~ pursuant to Section 30.4, any submitted Minimum Load Cost must be equal to the Minimum Load Cost as registered in the Master File.

For Participating Loads, the submitted Minimum Load Cost (\$/hr) is the cost incurred while operating the resource at reduced consumption after receiving a Dispatch Instruction. The submitted Minimum Load Cost must not be negative.

* * *

31.6.1 Criteria For Temporary Waiver Of Timing Requirements

The CAISO may at its sole discretion implement any temporary variation or waiver of the timing requirements of this Section 31 and Section 6.5.3 (including the omission of any step) if any of the following criteria are met:

- (i) such waiver or variation of timing requirements is reasonably necessary to preserve System Reliability, prevent an imminent or threatened System Emergency or to retain Operational Control over the CAISO Controlled Grid during an actual System Emergency.
- (ii) because of error or delay, the CAISO requires additional time to fulfill its responsibilities;
- (iii) problems with data or the processing of data cause a delay in receiving or issuing Bids or publishing information on the CAISO's secure communication system;
- (iv) problems with telecommunications or computing infrastructure cause a delay in receiving or issuing Day-Ahead Schedules or publishing information on the CAISO's secure communication system;
- (v) the alternative natural gas price set forth in Section 39.7.1.1.1.3(b) is triggered.

* * *

39.6.1.6 Maximum Start-Up Cost and Minimum Load Cost Registered Cost Values

The maximum Start-Up Cost and Minimum Load Cost values registered in the Master File by Scheduling Coordinators for resources that are eligible and elect to use the Registered Cost methodology option in accordance with Section 30.4 will be limited to 150% of the Projected Proxy Cost. The Projected Proxy Cost for natural gas-fired resources will include a gas price component, a major maintenance expense component, if available, a volumetric Grid Management Charge component, and, if eligible, a projected Greenhouse Gas Allowance Price component calculated as set forth in this Section 39.6.1.6. The Projected Proxy Cost for non-natural gas-fired resources will be based on costs provided to the CAISO pursuant to Section

30.4.1.1.2, a major maintenance expense component, if available, a volumetric Grid Management Charge component, and, if eligible, a projected Greenhouse Gas Allowance Price component calculated as set forth in this Section 39.6.1.6.

39.6.1.6.1 Gas Price Component of Projected Proxy Cost

For natural gas-fired resources, the CAISO will calculate a gas price to be used in establishing maximum Start-Up Costs and Minimum Load Costs after the twenty-first day of each month and post it on the CAISO Website by the end of each calendar month. The price will be applicable for Scheduling Coordinators for natural gas-fired Use-Limited Resources electing to use the Registered Cost ~~methodologyoption~~ until a new gas price is calculated and posted on the CAISO Website. The gas price will be calculated as follows:

- (1) Daily closing prices for monthly natural gas futures contracts at Henry Hub for the next calendar month are averaged over the first twenty-one (21) days of the month, resulting in a single average for the next calendar month.
- (2) Daily prices for futures contracts for basis swaps at identified California delivery points, are averaged over the first twenty-one (21) days of the month for the identified California delivery points as set forth in the Business Practice Manual.
- (3) For each of the California delivery points, the average Henry Hub and basis swap prices are combined and will be used as the baseline gas price applicable for calculating the caps for Start-Up and Minimum Load costs for Use-Limited Resources electing to use the Registered Cost ~~methodologyoption~~. The most geographically appropriate will apply to a particular resource.
- (4) The applicable intra-state gas transportation charge as set forth in the Business Practice Manual will be added to the baseline gas price for each Use-Limited Resource that elects to use the Registered Cost ~~methodologyoption~~ to create a final gas price for calculating the caps for Start-Up and Minimum Load Costs for each such resource.

For non-natural gas-fired resources, the Projected Proxy Costs for Start-Up Costs and Minimum

Load Costs will be calculated using the information contained in the Master File used for calculating the Proxy Cost, as set forth in the Business Practice Manual.

39.6.1.6.2 Projected Greenhouse Gas Allowance Price

For resources that are registered with the California Air Resources Board as having a greenhouse gas compliance obligation, the CAISO will calculate a projected Greenhouse Gas Allowance Price component to be used in establishing maximum Start-Up Costs and Minimum Load Costs after the twenty-first day of each month and will post it on the CAISO Website by the end of that month. The projected Greenhouse Gas Allowance Price component will be applicable for Scheduling Coordinators on behalf of eligible Use-Limited Resources electing to use the Registered Cost ~~methodology~~ until a new projected Greenhouse Gas Allowance Price component is calculated and posted on the CAISO Website. The projected Greenhouse Gas Allowance Price component will be calculated by averaging the applicable daily Greenhouse Gas Allowance Prices calculated over the first twenty (20) days of the month using the methodology set forth in Section 39.7.1.1.1.4.

* * *

39.7.1.1.1.3 Calculation of Natural Gas Price

(a) ~~Except as set forth in Section 39.7.1.1.1.3(b) To calculate the natural gas price,~~ the CAISO will use different gas price indices for the Day-Ahead Market and the Real-Time Market and ~~each~~ gas price index will be calculated using at least two prices from two or more of the following publications: Natural Gas Intelligence, SNL Energy/BTU's Daily Gas Wire, Platt's Gas Daily, and the Intercontinental Exchange. If a gas price index is unavailable for any reason, the CAISO will use the most recent available gas price index. For the Day-Ahead Market, the CAISO will update the gas price ~~indices~~ between 19:00 and 22:00 Pacific Time using natural gas prices published on the day that is two (2) days prior to the applicable Trading Day, unless gas prices are not published on that day, in which case the CAISO will use the most recently published prices that are available. For the Real-Time Market, the CAISO will update gas price indices between the hours of 19:00 and 22:00 Pacific Time using natural gas prices published one (1) day prior to the

applicable Trading Day, unless gas prices are not published on that day, in which case the CAISO will use the most recently published prices that are available.

(b) If a daily gas price reported by the Intercontinental Exchange on the morning of the Day-Ahead Market run exceeds one hundred twenty-five (125) percent of any natural gas price index calculated for the Day-Ahead Market between 19:00 and 22:00 Pacific Time on the preceding day, the CAISO will utilize the gas price reported by the Intercontinental Exchange in all CAISO cost formulas and market processes for that day's Day Ahead Market that would normally utilize the natural gas price index calculated pursuant to this Section 39.7.1.1.1.3.

* * *

Appendix A

Master Definition Supplement

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- Projected Proxy Cost

A calculation of a resource's Start-Up Costs and Minimum Load Costs for a prospective period used to determine the maximum Registered Cost for the resource, ~~{as set forth in Section 39.6.1.6 for a 30-day period pursuant to as set forth in Section 30.4.}~~

* * *

- Proxy Cost

The cost basis of a generating resource for which the operating cost is calculated as an approximation of the actual operating cost pursuant to Section 30.4.~~1.(1).~~

* * *

- Registered Cost

The cost basis of a generating resource for which the operating cost is determined from registered values pursuant to Section 30.4.~~1.(2).~~

- Use-Limited Resource

A resource that, due to design considerations, environmental restrictions on operations, cyclical requirements, such as the need to recharge or refill, or other non-economic reasons, is unable to

operate continuously ~~on a daily basis, but is able to operate for a minimum set of consecutive Trading Hours each Trading Day.~~ This definition is not limited to Resource Adequacy Resources.
A Use-Limited Resource that is a Resource Adequacy Resource must also meet the definition of a Resource Adequacy Resource.

Attachment C – Revised Draft Final Proposal

Tariff Amendment – Modify Start-Up and Minimum Load Cost Recovery Mechanisms

California Independent System Operator Corporation



**Commitment Cost Enhancements
Revised Draft Final Proposal**

August 21, 2014

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1. Changes from the draft final proposal

Section 3 – The schedule for the stakeholder process has been revised to accommodate this revised draft final proposal. We ask stakeholders to submit comments on this revised draft final proposal *instead of* the draft final proposal. Due to the timing and straightforward changes proposed in this revised draft final proposal, the ISO will not be scheduling a call.

Section 5.2 – The ISO proposes to retain the registered cost option for use-limited resources only until the ISO has developed and implemented an opportunity cost for these resources.

Section 5.3 – The ISO proposes to modify the manual process to include automatic switching of any resource under the registered cost option to proxy on the day of a gas price spike if the updated proxy cost is higher than the registered cost. The switch will be effective for the duration of the gas price spike but resources will revert back to the registered cost option afterwards.

Section 6 – Clarifications on what stays the same for the registered cost option.

2. Background

During the winter season of 2013-2014, the ISO energy market experienced abnormally volatile and high natural gas price spikes. For example, on February 4, 2014 at 9:50 p.m., the natural gas index prices applicable to resources in the ISO markets ranged from \$7.63/MMBtu to \$8.62/MMBtu. But by February 5, 2014 at 10:01 a.m., those prices had increased to a range of \$12.29/MMBtu to \$23.53/MMBtu.

In light of the sudden increase in gas prices, the ISO was not able to reflect the gas price spike in its resource commitment decisions. The ISO calculates the start-up and minimum load costs for resources under either the “proxy cost” or “registered cost” option selected by the resource. For resources under the proxy cost option, the ISO is required to rely on at least two natural gas price indices published the day prior to running the day-ahead market, per tariff section 39.7.1.1.1.3. For the registered cost option, the gas price is based on a monthly forward projection and the total registered cost is limited to no more than 150% of the projected proxy costs. Resources selecting the registered cost option must remain under that option for 30 days, unless the proxy costs are higher than registered. Lastly, the ISO tariff specifies, per section 30.4.1.2, that a registered cost option resource that switches to the proxy cost option must remain under the proxy cost option for the remainder of the 30-day period.

To address the potential for additional natural gas price spikes for the duration of the winter season, on March 6, 2014 the ISO filed with the Federal Energy Regulatory Commission (FERC) a proposed tariff waiver of the above referenced two sections until April 30, 2014. In the tariff waiver filing, the ISO also committed to commence a stakeholder process in April to address the issues raised by gas market conditions and to more comprehensively develop an

interim solution that can be implemented in the fall if such solutions do not require substantial system changes. FERC granted the ISO's tariff waiver on March 21, 2014.¹

There are two additional processes that deserve mention here:

- First, the ISO has existing board-approved policy to specifically address inclusion of operational flow order penalties under specific circumstances. The ISO has not yet submitted tariff changes to FERC to implement that policy because it needs to clarify the definition of operational flow orders covered by the policy. The ISO will do that as part of the tariff development process for the operational flow order policy concurrent with this stakeholder initiative. Recently, Southern California Gas Company and San Diego Gas & Electric Company filed an application with the California Public Utilities Commission for a proposed treatment of low operational flow order and emergency flow order requirements.² The ISO is working on ensuring that our proposed operational flow order tariff language will be consistent with this new proposal.
- Second, on March 20, 2014, the FERC released a notice of proposed rulemaking (NOPR) to address coordination and scheduling practices of the interstate natural gas pipeline companies and the electricity industry.³ The NOPR provides the natural gas and electricity industries six months to reach a consensus. While the NOPR is not directly related to commitment cost pricing in the ISO market, issues discussed there may overlap with the proposal in this initiative.

3. Schedule for policy stakeholder engagement

The proposed schedule for the policy stakeholder process is listed below. It has been revised to accommodate a revised draft final proposal with a new comment submission date. Rather than submitting comments for the draft final proposal, we are asking stakeholders to submit comments instead on this revised draft final proposal. Due to the timing and straightforward changes proposed in this revised draft final proposal, the ISO will not be scheduling a call.

¹ *California Indep. Sys. Operator Corp.*, 146 FERC 61,218 (2014).

² Application of Southern California Gas Company (U 904 G) and San Diego Gas & Electric Company (U 902 G) for Low Operational Flow Order and Emergency Flow Order Requirements, June 27, 2014. Available at: <http://www.socalgas.com/regulatory/documents/a-14-06-021/FINAL%20Low%20Flow%20App.pdf>

³ <http://www.ferc.gov/whats-new/comm-meet/2014/032014/M-1.pdf>

Date	Event
Wed 4/30/14	Issue paper/straw proposal posted
Wed 5/7/14	Stakeholder call
Wed 5/21/14	Stakeholder comments due
Tue 6/10/14	Revised straw proposal posted
Tue 6/17/14	Stakeholder call
Tue 7/1/14	Stakeholder comments due on revised straw proposal
Tue 7/15/14	Second revised straw proposal posted
Tue 7/22/14	Stakeholder call
Tue 7/29/14	Stakeholder comments due on second revised straw proposal posted
Tue 8/12/14	Draft final proposal posted
Tue 8/19/14	Stakeholder call
Tue 8/26/14	Stakeholder comments due on draft final proposal
Thu 8/21/14	Revised draft final proposal posted
Wed 8/27/14	Stakeholder comments due on revised draft final proposal
Thu/Fri 9/18-9/19/14	Board of Governors meeting

4. Initiative scope

Under this initiative, the ISO intends to adopt more updated natural gas costs in resources' minimum load and start-up costs prior to the 2014-2015 winter season. Accordingly, the ISO is proposing a straightforward means to achieve this solution but the ISO will still need to assess whether it can implement the proposal before next winter.

For more comprehensive, long-term solutions with greater implementation impacts, the ISO will commence the bidding rules initiative in the third quarter of 2014. This future initiative will explore a broader array of bidding rules in the ISO market including for energy and commitment costs.

5. Proposal

In 2012, the ISO conducted the *Commitment Cost Refinements, 2012* stakeholder process⁴ and consequently implemented the following changes:

1. Reduced the registered cost option cap from 200% to 150% of the calculated proxy cost; and
2. Included the following costs into the proxy cost calculation: major maintenance, greenhouse gas (GHG), and components of the grid management charge.

⁴ <http://www.caiso.com/informed/Pages/StakeholderProcesses/CommitmentCostsRefinement2012.aspx>

The registered cost option exists in order to strike a balance between allowing more accurate cost recovery and limiting potential market power abuse. The original proposal in the 2012 stakeholder process would have reduced the cap to 125%. This was subsequently raised to 150% out of concerns such as the potential volatility and illiquidity in the nascent GHG market, the use of futures gas prices averaged over each month rather than a more variable daily price, and natural gas balancing charges that are not included in the cost categories. On the other hand, the cap was reduced from 200% and the 30-day hold for the registered cost option was retained to mitigate market manipulation, such as the potential to inflate bid cost recovery payments by strategic behavior designed to operate resources at minimum load.⁵ In addition, the ISO currently does not have a market power mitigation methodology explicitly for start-up and minimum load costs other than this 150% cap. As the Department of Market Monitoring notes:

Another option that has been discussed in the past has been to automatically apply mitigation only when it is determined that a unit may have local market power – such as the ISO’s automated procedures for energy bid mitigation. In practice, however, units may have market power as a result of various capacity constraints that require units to be committed and operating at least at minimum load. These constraints include the minimum online constraints (MOCs) and new constraints being added through the flexible ramping product and the contingency modeling enhancements. Unlike transmission constraints used to determine if energy bid mitigation should be triggered, these other constraints are much more complex and may not be binding when market power may occur.⁶

In the 2012 stakeholder process and in recent comments to the FERC regarding the ISO’s tariff waiver, numerous stakeholders have voiced a preference to bid in their start-up and minimum load costs in order to better reflect daily natural gas prices and other costs. The ISO agrees that to the extent practical, market participants should be allowed to reflect and manage their costs through bidding. The ISO wants more up-to-date gas prices reflected in the market optimization to ensure market efficiency. For example, on February 6th, the price differential between commitment costs and incremental energy bids committed a number of resources to minimum load in lieu of dispatching them for incremental energy. However, this flexibility needs to be balanced against robust bidding rules and implementation and monitoring burden. In order to maintain this balance but provide greater flexibility, the ISO proposes to increase the proxy cost option bid cap and eliminate the registered cost option.

⁵ See “Chapter 7: Market Competitiveness and Mitigation” in Department of Market Monitoring, *2013 Annual Report on Market Issues & Performance*, April 2014.

⁶ Department of Market Monitoring, *2013 Annual Report on Market Issues & Performance*, April 2014, page 262.

5.1. Increase proxy cost option cap

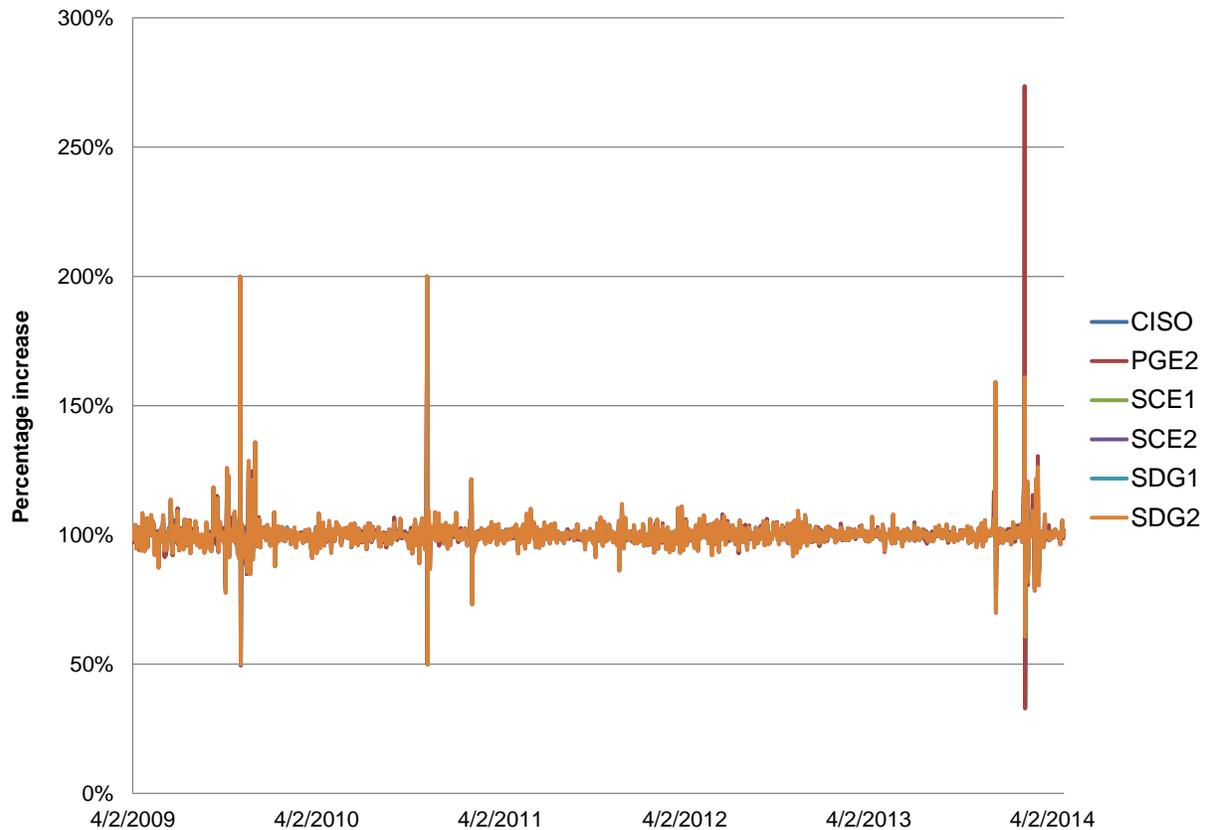
The ISO proposes to increase the proxy cost option cap from 100% of the daily calculated cost to 125%. The ISO proposes to retain the proxy cost option, but modify it, because it already has the daily bidding functionality that stakeholders have requested and better reflects more current natural gas costs. For example, this option is updated based on at least two daily gas price indices rather than a fixed projected price under the registered cost option. The ISO proposes to retain the use of gas price indices because it helps to mitigate market power abuse and provides consistency with other ISO market process such as generated bids for physical resources and the calculation of default energy bids. Therefore, modifying the proxy cost option to allow for added flexibility would have fewer implementation impacts than modifying the registered cost option. All other characteristics of the proxy cost option would remain the same as detailed in Section 6.

Though we propose to increase the cap, the ISO does not believe there is a need at this time to require any additional *ex post* cost verification. We believe that market participants can effectively manage their costs by bidding in their appropriate minimum load and/or start-up costs on a daily basis. A daily *ex post* cost verification regime for costs exceeding 100% of proxy (but under the proposed proxy cap of 125%) would also create a greater monitoring burden and be potentially disruptive if submitted costs are not accepted and market resettlement is required. For example, the Department of Market Monitoring notes that “if rules are modified to allow participants to submit their own start-up and minimum load bids without any specific limits, some form of mitigation will still be needed. After the fact review of bids would be very administratively burdensome, and would not mitigate the distortion in the market that would have already occurred due to use of the unmitigated bids.”⁷

An increase in the bid cap will provide flexibility to account for a variety of costs such as normal gas price volatility and the one day lag in the gas price indices used in the day-ahead market. The figure below shows the day-over-day percentage increase in natural gas prices for each of the ISO gas regions. The figure shows that gas price volatility has been rare in the ISO market since the beginning of MRTU.

⁷ Department of Market Monitoring, *2013 Annual Report on Market Issues & Performance*, April 2014, page 262.

Figure 1
Day-over-day percentage increase in natural gas price (April 2009 - April 2014)



The table below is derived from the figure above and only shows the trade dates when the day-over-day percentage increase exceeds 120% in any gas region. The increase is not necessarily uniform over the entire ISO. Overall, there have been seven instances where the increase exceeded 125% (shown in light blue) but only two instances of extreme price spikes of over 200%, including the February 6th event (shown in darkest blue with white font).

Table 1
Day-over-day gas prices increases over 120% (April 2009 - April 2014)

Trade Date	CISO	PGE2	SCE1	SCE2	SDG1	SDG2
10/6/2009	119%	119%	124%	126%	124%	126%
10/8/2009	123%	123%	121%	123%	121%	123%
11/1/2009	198%	198%	200%	200%	200%	200%
11/18/2009	127%	127%	127%	129%	127%	129%
11/24/2009	125%	125%	120%	121%	120%	121%
12/1/2009	122%	122%	134%	136%	134%	136%
11/7/2010	200%	200%	200%	200%	200%	200%
2/3/2011	102%	102%	120%	122%	120%	121%
12/10/2013	120%	120%	156%	159%	156%	159%
2/5/2014	126%	126%	118%	119%	118%	119%
2/6/2014	274%	274%	159%	121%	159%	121%
3/1/2014	105%	105%	121%	122%	121%	122%
3/4/2014	130%	130%	125%	126%	125%	126%

Instances:

>=125%	7	7	7	7	7	7
>=150%	3	3	4	3	4	3
>=200%	2	2	2	2	2	2

In addition to gas price spikes, there may be other costs that are not perfectly accounted for under the proxy cost option. For example, the increased cap can account for variations in the standard resource-specific costs that are used in the Master File, such as the variable O&M. The increased bid cap will allow participants to capture the vast majority of observed natural gas price volatility and additional costs.⁸ This meets the ISO objective to ensure on the whole that resources are appropriately compensated for their costs and aligns with other market design changes. For the reasons stated above, the ISO proposes an increased proxy cap of 125%.

The cap need not be as high as the registered cost cap because that option relied on a fixed natural gas forecast and required the resource to remain with the same cost for at least 30 days. Furthermore, increased bidding flexibility should be considered in the context of other market changes. On May 1, the ISO implemented bid cost recovery changes, including the separation of day-ahead and real-time bid cost recovery which is expected to attract more real-time economic bids by providing more cost recovery in the day-ahead. While there are some new safeguards in the recently approved bid cost recovery tariff amendments, they do not expressly create a market power mitigation methodology for commitment costs or an uninstructed deviation penalty. It will be important to see the market impacts of these changes.

Though the increased proxy cap will be effective on most days, it would not be able to capture extreme price spikes like those observed on February 6th. Therefore, the ISO proposes to retain

⁸ Note that a 125% increase in natural gas prices will result in a total cost increase of less than 125% because of other costs included in the start-up and minimum load cost calculations.

a portion of the manual operations as described in the tariff waiver to update the natural gas price index using the single ICE index, which is published at approximately 10 am. This would delay the close of the day-ahead market.⁹ See Section 5.3 below for more details. In the next section, we discuss the proposed elimination of the registered cost option.

5.2. Retain the registered cost option only for use-limited resources in the interim

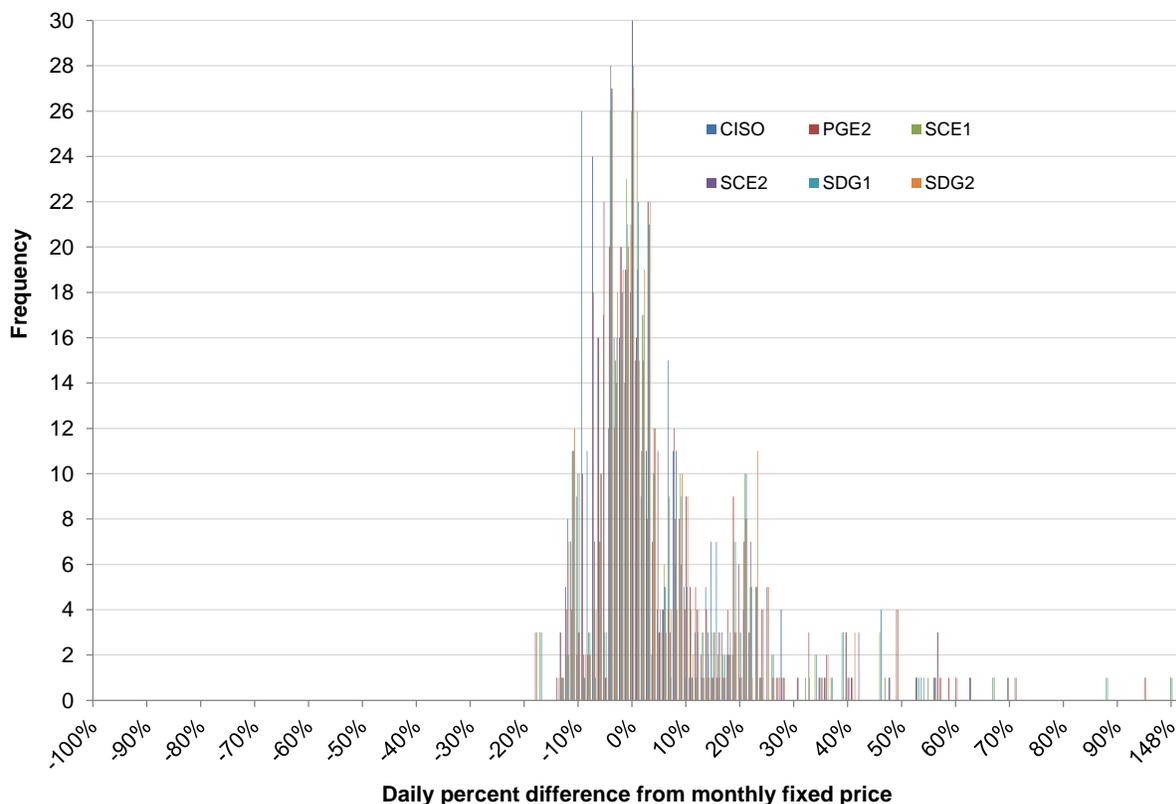
The ISO proposes to eliminate the registered cost option except for use-limited resources. Stakeholders have expressed concern that use-limited resources will not be able to reflect an opportunity cost under the proposed 125% proxy cap. Since the ISO will not be able to develop an opportunity cost for this upcoming winter, we propose to retain the registered cost option for use-limited resources until the ISO has developed and implemented a methodology for calculating opportunity costs. When the ISO has implemented such a methodology, the registered cost option will be eliminated. The retention of the registered cost option only applies to use-limited resources as defined by the ISO tariff. The ISO is proposing no changes to the current registered cost option, which will retain the use of a 30-day hold and a cap of 150% of calculated proxy cost based on the monthly futures gas price (for gas-fired resources).

All non-use-limited resources will need to use the proxy cost option. The 2012 stakeholder initiative also contemplated the elimination of the registered cost option. At the time it was deemed necessary to retain this option in light of the start of the GHG market and the numerous market design changes being discussed (such as separation of the day-ahead and real-time bid cost recovery). As those milestones have passed, it is appropriate now to revisit this issue.

With the above proposed improvements to the proxy cost option, we view the existing registered cost option to be largely obsolete. Both cost options would have identical inputs except that the proxy cost option has a more updated natural gas price. Figure 2 below counts the number of times the daily gas price was above or below the monthly fixed gas price per region from June 2013 through April 2014. This frequency is distributed along the x-axis based on the percentage increase or decrease. The figure clearly shows that for all regions and for the majority of days, the daily gas price is above the monthly fixed price. In other words, the high bid cap on the registered cost option largely absorbs the upward price volatility that is not reflected on the whole in the monthly fixed price during this period.

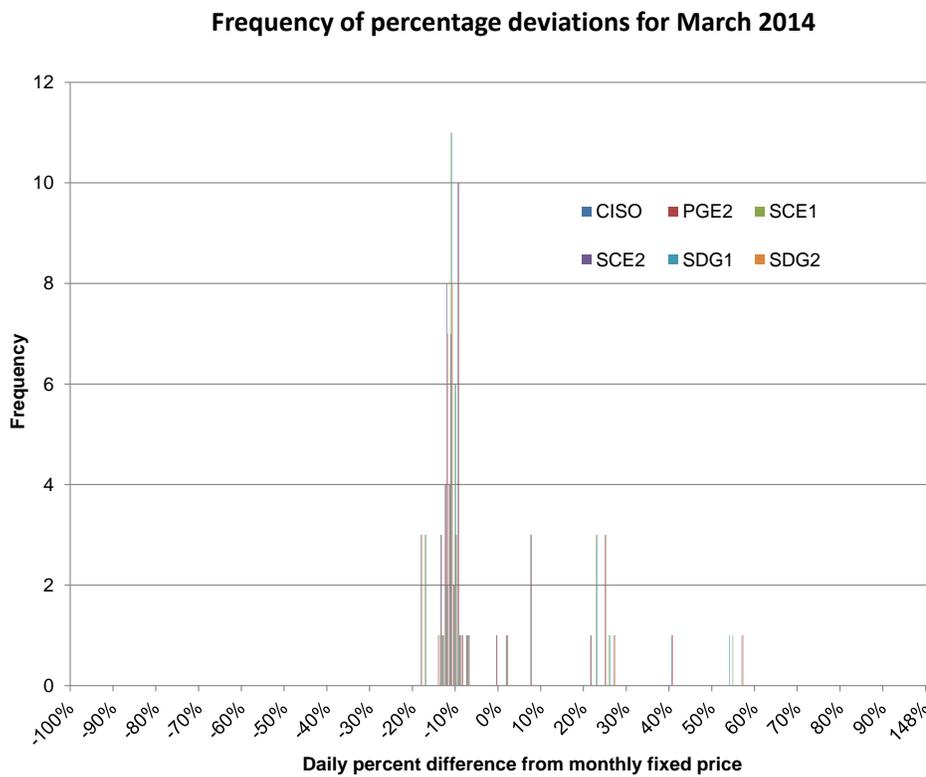
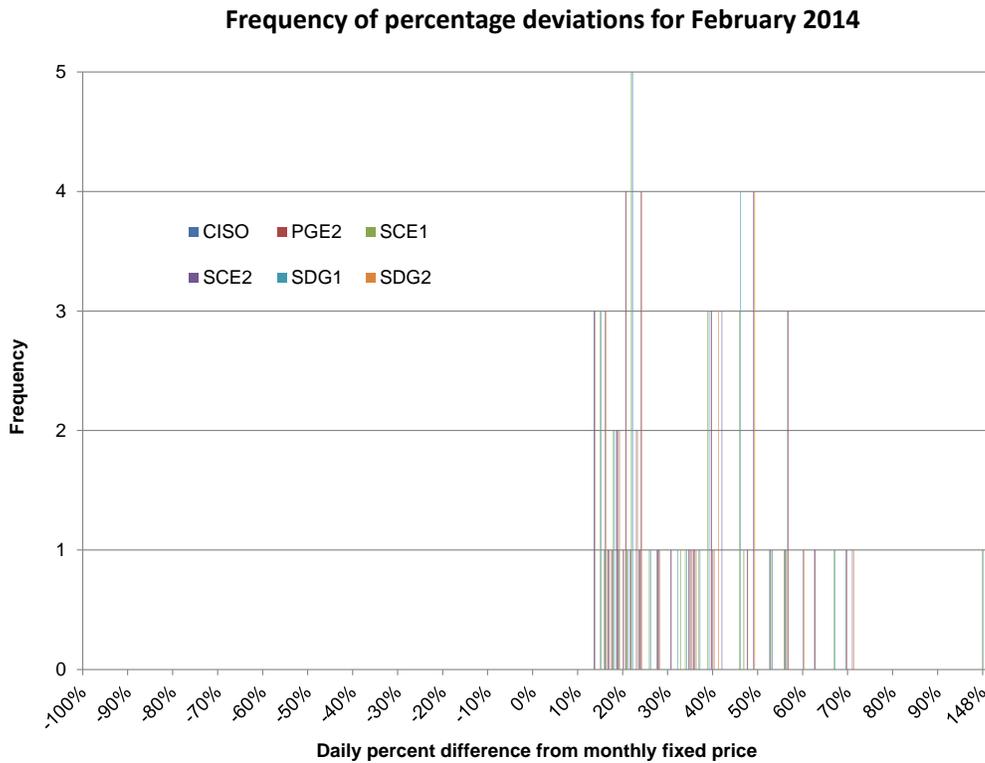
⁹ The FERC NOPR seeks to start the gas day earlier which may allow the gas price indices to publish earlier in the day. On the other hand, the FERC NOPR also seeks to delay the close of the timely nomination cycle which can have the opposite effect.

Figure 2
Frequency of percentage deviations between the daily and monthly fixed gas price
(June 2013 – April 2014)



The following pair of charts in Figure 3 highlights the inefficiency caused by the lag in the monthly fixed price. The chart on top shows that in February 2014, the daily gas prices were *always* higher than the fixed monthly price. For February 6th, the day of the extreme gas price spike, the daily gas price increase over the fixed monthly price was 364% for the CISO and PGE2 gas regions. March 2014 shows the opposite situation. Likely as a result of high gas prices in February, the monthly fixed price for March increased on average by \$1/MMBTU. However, the March 2014 chart on the bottom shows that the daily gas prices trended lower as shown by the cluster of events around the -10% range.

Figure 3
Comparison of February and March 2014 deviation frequency



Implementation-wise, revisions to the registered cost option such as adding a bidding functionality or reducing the 30-day hold will require more systems and process changes. In fact, reducing the 30-day hold may well require a reduction in the current bid cap of 150%, moving the registered cost option closer to proxy.

5.3. Retain manual process from tariff waiver

As mentioned in Section 5.1 above, the ISO intends to retain the majority of the manual process as described in the tariff waiver. We have provided additional information in this revised draft final proposal to address automatic switching of resources from the registered to the proxy cost option. Use-limited resources on the registered cost option will be automatically switched to proxy on the day of a gas price spike if the updated proxy cost is higher than the registered cost. The calculation will be made separately for minimum load and start-up. The switch will be effective for the duration of the gas price spike but resources will revert back to the registered cost option afterwards. The ISO believes this proposal ensures efficient dispatch on the day of a gas price spike but retains flexibility for use-limited resources to use the registered cost option.

This manual process only impacts the day-ahead market and attempts to correct for the lag in updating the gas price indices used in the optimization. The ISO would prefer a non-manual solution but may not be able to implement one before the next winter season. We continue to explore options to automate this process or implement a superior option.

In the meantime, we propose that the manual process be triggered when the natural gas price for any region is more than 125% of the gas price for that region from the previous night.¹⁰ Currently, the final gas price that the ISO uses for each gas region is based on at least two gas price indices.¹¹ These gas prices are updated between 7:00 p.m. and 10:00 p.m. Pacific Time to be used the following day in the day-ahead market optimization. The ISO proposes to monitor the intra-day gas prices the morning of the day-ahead market optimization for any significant movements in the gas price in any one of the ISO's six gas regions. Though the ISO will monitor intra-day gas prices, we will still rely on the use of a gas price index. The only one available the morning of the day-ahead market optimization is the Intercontinental Exchange (ICE) index. The ISO tariff currently requires the use of two or more indices and the use of the single ICE index is a departure from current practice. However, the ISO believes that the manual process will be exercised rarely. If by the time the ICE index is published (at approximately 10:00 a.m.) and the natural gas price for any of ISO's six gas regions is greater than 125% of the gas price used in the previous night, the ISO would delay the day-ahead market, update the gas prices of all six regions with the ICE index numbers in the default energy bids, proxy cost calculations, and generated bids, and allow market participants to (re)submit all bids up to the proposed 125% proxy cap. In summary, the major steps are:

¹⁰ For example: $\$4.00/\text{MMBtu} \times 125\% = \$5.00/\text{MMBtu}$ so the manual process will be triggered if the gas price is greater than $\$5.00/\text{MMBtu}$.

¹¹ See tariff section 39.7.1.1.1.3.

1. Day 1
 - a. Between 19:00 and 22:00 Pacific Time update gas prices per current process in preparation of the day-ahead market run.
2. Day 2
 - a. Before 10:00 monitor the intra-day gas prices and if gas prices are trending upwards, put internal processes and ISO markets on alert for potential update to the gas price index and delay in close of the day-ahead market.
 - b. Approximately 10:00 – if the ICE index does not have prices that are greater than 125% of the previous night's, no change to current process and day-ahead market closes.
 - c. Approximately 10:00 – if the ICE index has prices that are greater than 125% of the previous night's, proceed to:
 - i. Notify participants of delay in day-ahead market close and suspend bidding temporarily
 - ii. Update the gas price index used in default energy bids, proxy cost calculations, and generated bids.
 1. Automatically switch use-limited resources on the registered cost option to proxy if the proxy cost with the updated gas price index is higher than the registered cost. Resources will automatically switch back to registered when there is no longer a price spike day.
 - iii. Notify participants that day-ahead market is open for (re)bidding and new time for close of the day-ahead market
 - iv. Run optimization and publish awards

We note that the 125% proxy cap is on all costs, not just natural gas and that may create some overlap in cost accounting. However, the ISO's proposal aims to simplify the implementation and administrative burden of calculating the exact percentage for every resource and cost type.

The manual process approved in the tariff waiver also provides for comparing registered to proxy costs. Since the ISO proposes to eliminate the registered cost option, we will not retain this part of the process.

Lastly, stakeholders have asked for a permanent switch to use the ICE index. However, as the timing above shows, this would require a permanent shift in the day-ahead market process and is considered a major implementation impact. ISO continues to monitor broader industry discussions of aligning the gas and electric day that may result in a shift in the day-ahead market processes. Moreover, the use of a single gas price index is a departure from the current tariff and would require more detailed and careful consideration.

5.4. Opportunity costs for gas-fired use-limited dispatchable resources

In response to stakeholder concerns, the ISO will defer discussion of an opportunity cost methodology to a separate initiative. We aim to start the initiative in October and target the February 2015 Board of Governors meeting. Though there was overwhelming stakeholder support, there are numerous details that cannot be resolved and implemented before this winter. We appreciate the many thoughtful and helpful stakeholder comments on this issue.

An opportunity cost adder was intended to increase the commitment and dispatch efficiency of use-limited resources, especially if the ISO develops more stringent must offer obligations that include daily bid insertion. It would have provided the ISO with more bids and flexibility. While the status quo is not ideal, the ISO notes that the existing registered cost option is also not an optimal method of representing opportunity costs due to the 30-day hold to address market power concerns. The ISO provides two examples of inefficiencies for a scheduling coordinator that provides a registered cost of 150% of proxy for a use-limited gas-fired resource held to that cost for 30 days.

In the event of a slow gas price increase across a month that does not trigger the manual process, the 30-day hold may mean that a resource becomes “too” economic by the end of the 30 days. In other words, the registered cost, based on averaged futures prices, is lower than commitment costs produced by the daily gas price index. This may lead to the resource getting dispatched beyond its use limitations. The scheduling coordinator would have two options to try to remedy this situation. The first is to apply for a change from registered to proxy under the current tariff section 30.4.1.2 for the remainder of the 30 days. This process may require five to 11 business days according to section 30.7.3.2 for Master File changes. The second option is for the scheduling coordinator to immediately cease to bid the resource into the market until the end of the 30 days, at which point the registered cost could be changed. Either option is not optimal for the scheduling coordinator or the ISO as use limitations may be violated or resources may be kept from the market.

In the event of a slow gas price decrease across a month, the 30-day hold may mean that a resource becomes “too” expensive by the end of the 30 days. In other words, the registered cost, based on averaged futures prices, is higher than commitment costs produced by the daily gas price index. This may lead to very little or no commitment of the resource. The scheduling coordinator would not be able to remedy this situation except to wait for the end of the 30-day hold (note that resources cannot switch to proxy if the recalculated proxy cost is lower). This is an inefficient outcome for the scheduling coordinator and the ISO as the resource would be under-utilized.

In conversations with stakeholders, the ISO understands that scheduling coordinators or resource owners already calculate some form of opportunity cost on their own to be reflected in the registered cost provided to the ISO. Though the ISO will not be able to calculate an opportunity cost adder for this winter, we remain committed to doing so as soon as possible to increase the efficiency in the market. The ISO still intends to have an opportunity cost

methodology in place for use-limited resources impacted by more stringent must offer obligations developed under the Reliability Services Initiative.

The ISO will announce the start of a separate initiative for the opportunity cost methodology at a later date and further discussion of this topic will continue there.

6. Maintaining existing processes and topics for further consideration

To the extent possible the ISO would like to maintain existing processes and practices such as:

- Daily bidding remains available under the proxy option.
- No change to the cost elements (*i.e.*, major maintenance adder) included under the current proxy or registered cost options or their characteristics.
- Aside from the proposed increased bid cap, no changes are proposed to the treatment of non-natural gas-fired resources under the current proxy cost option.
- No changes are proposed to Master File entries that are currently used to calculate the proxy and registered cost options such as the start-up energy curve or the start-up fuel cost curve.
- No change in proxy and registered cost bids between the day-ahead and real-time, *i.e.*, a single minimum load or start-up cost will be used for the Trade Date.
- Maintain use of at least two natural gas price indices in the day-ahead and real-time optimizations under normal conditions.
- This proposal does not automatically modify any negotiated costs such as major maintenance adders.
- No *ex post* cost verifications for costs within the 125% proposed proxy cap or the existing 150% registered cost cap.

The ISO seeks to improve its commitment and dispatch and ensure on the whole that resources are appropriately compensated for their costs. We believe that the ISO's proposal provides this balance. Some stakeholders have noted that additional consideration is needed for the recovery of intra-day gas costs.¹² Since we cannot implement any real-time bidding functionality for this winter, some stakeholders have suggested that the ISO can reimburse the scheduling coordinator for intra-day gas costs incurred. This is not ideal since it would undermine efficient market dispatch. However, the ISO reiterates its request for more data in order to make an informed judgment. Some stakeholders have provided limited data (*e.g.*, intra-day gas costs for the gas price spike day of February 6, 2014) to show that some intra-day gas costs are particularly high. However, the ISO would like more comprehensive data such as:

- What were the intra-day gas prices and costs incurred by units that had a real-time-related commitment (*e.g.*, real-time only commitment to minimum load or real-time

¹² The ISO limits this discussion to intra-day commodity costs.

exceptional dispatch) versus the gas price index? Note the ISO is seeking actual costs incurred versus simply the intra-day gas prices. We prefer the data to be provided for at least a year to analyze trends and overall impact to the resource.

- How would the increased bid cap be considered with out-of-market intra-day gas cost recovery? For example, should the proxy cap be reduced to 100% for any resource that also receives this type of cost recovery? The ISO would also propose that the costs be considered in bid cost recovery.
- What happens when natural gas prices are lower in the intra-day than day-ahead?
- Who would be responsible for validating out-of-market intra-day gas costs? Aside from real-time-related commitments, when else would recovery of out-of-market intra-day gas costs be allowed or under what specific conditions?
- Would recovery of out-of-market intra-day gas costs discourage hedging (either financial or physical)?
- What mechanisms, if any, can a gas-fired generator use to hedge (either financially or physically) the cost of buying gas in the intra-day market when the generator is not scheduled to operate day-ahead? For each hedging mechanisms identified, please explain how the generator would be able to recover the cost of the hedge.
- Would the overall FERC effort to align the electric and natural gas days help to alleviate the stakeholder concerns about intra-day gas price volatility and illiquidity?

The ISO would appreciate more comprehensive data in order to engage in an informed discussion. At this point, we have some evidence that intra-day costs can be higher than during the timely and evening nomination cycles but we do not know the extent to which this impacts stakeholders over time.

6.1. Update based on stakeholder comments

The ISO has requested from stakeholders actual gas costs incurred over a period of time (preferably a year or more to understand trends) in order to inform this initiative and the longer term bidding rules initiative. This type of data could help the ISO better understand the financial decisions participants need to make that may require an increase in the proxy bid cap. Based on confidential information requested by and provided to the ISO under this initiative, the ISO believes that the proposed 125% proxy bid cap will cover the vast majority of gas price volatility between the day-ahead gas price index and intra-day gas prices. The proposed manual process in this interim stakeholder process should address the remaining extraordinary events. The ISO greatly appreciates the time and effort expended by market participants to provide and explain the data the received.

In addition to the data provided by stakeholders, the ISO has also conducted its own analysis on intra-day gas prices and believes that the proposed 125% proxy bid cap will cover the vast majority of gas price volatility with the manual process able to address a significant price spike.

The ISO would like to reiterate the following points:

- The ISO has noted that its discussion of intra-day gas costs is limited to commodity costs. Several comments mention recovery of penalty costs, which brings up a broader policy question about whether a penalty designed to increase the reliability of the natural gas system should be reimbursed in the electricity market. Doing so may undermine the use of these penalties and requires close coordination between the electric and gas industries. This issue is being discussed in a limited scope under the ISO's proposed tariff revisions to address resources' ability to recover OFO penalties. The ISO clarifies it will do so as part of an OFO policy tariff development that we plan to be concurrent with the policy development portion of this stakeholder initiative, likely beginning late July or August. Outside of this narrow OFO discussion, the ISO will not be able to sufficiently address the broader question of reimbursement for penalties in this interim stakeholder initiative but can consider it in the longer-term bidding rules initiative.
- Some stakeholders have suggested that additional recovery of intra-day gas costs would be needed on a limited basis for "extraordinary" days, such as a gas price spike event. If that is the case, the ISO would like to understand if the proposed manual process would provide the means to recover all or a significant amount of those costs.
- Some stakeholders have suggested that additional recovery of intra-day gas costs is needed on a much more frequent basis. The ISO will need to review information received to better understand this scenario. The ISO will consider allowing scheduling coordinators to update minimum load and start-up costs in the real-time market in the longer term bidding rules initiative but this change would not be feasible by this winter because of the system and market rule changes it would require.
- Hedging is a business decision best left to resource owners. While it may not be economic to hedge against every contingency, the ISO does not want to discourage practices that attempt to mitigate risk. The focus of this question is to better understand whether participants can hedge, what mechanisms are available, and whether there are obstacles or disincentives in using those existing mechanisms arising out of the ISO's market design.

7. Topics for the bidding rules initiative

The ISO will start a more comprehensive bidding rules initiative in Q3 2014. In this initiative we expect to discuss topics that cannot be adequately addressed here such as:

- Reflection of intra-day natural gas costs (either through greater bidding flexibility or directly invoicing for certain gas costs) and the market rules and implementation changes needed to support it;
- Potentially breaking up the current three-day weekend gas "package" into separate Saturday/Sunday and Monday packages;

- Creating a process to periodically review the cost cap to ensure that it still enables headroom for market participants to accurately reflect their natural gas costs; and
- Consideration of using only a single gas price index (and potential change to the existing day-ahead market close timeline).

8. Comparison of 200% and 150% registered cost cap

In response to stakeholders, the following analysis shows the impact of reducing the registered cost cap from 200% to 150%. As described in Section 5 above, the 2012 *Commitment Cost Refinements* initiative reduced the registered cost cap from 200% to 150% of projected proxy costs, but included additional cost items in the calculated proxy cost thus increasing the headroom for the registered cost option. The analysis shows that overall for gas-fired resources, the reduced cap on the registered cost option did not decrease Scheduling Coordinators' ability to reflect costs in the registered cost option. Gas-prices played a large role in the increase in registered costs after the cap was reduced. As noted in Section 5.2, the 30-day period for which a projected proxy costs applies reflected a significantly higher cap for the registered cost option calculated in March 2014 due to the higher gas prices in February. The analysis shows a high sensitivity to gas price fluctuations, which can be better managed under the proposed daily 125% cap for the proxy cost option.

In its analysis, the ISO compared the minimum load and start-up costs of resources under the registered cost option (for either start up or minimum load) when the cap was 200% and after the cap was reduced to 150%. The data was compiled for the same time period to account for seasonal variations. The 200% registered cost period is from November 2012 through June 2013 while the 150% registered cost period is from November 2013 through June 2014. The eight graphs below focus on gas-fired resources and compare the costs on a normalized basis. The first four graphs show the minimum load costs for combined cycle, gas turbine, reciprocating generation, and steam turbines. The registered minimum load costs are normalized by dividing the cost by the minimum generation (Pmin) of each unit to produce a \$/MW metric shown on the left-side y-axis. The metric for multi-stage generators was calculated using only startable configurations using the configuration's specific Pmin and minimum load cost. Each graph also shows the daily gas price indices used in the ISO market for gas regions PGE2 and SCE1 on the right-side y-axis.

Figure 4

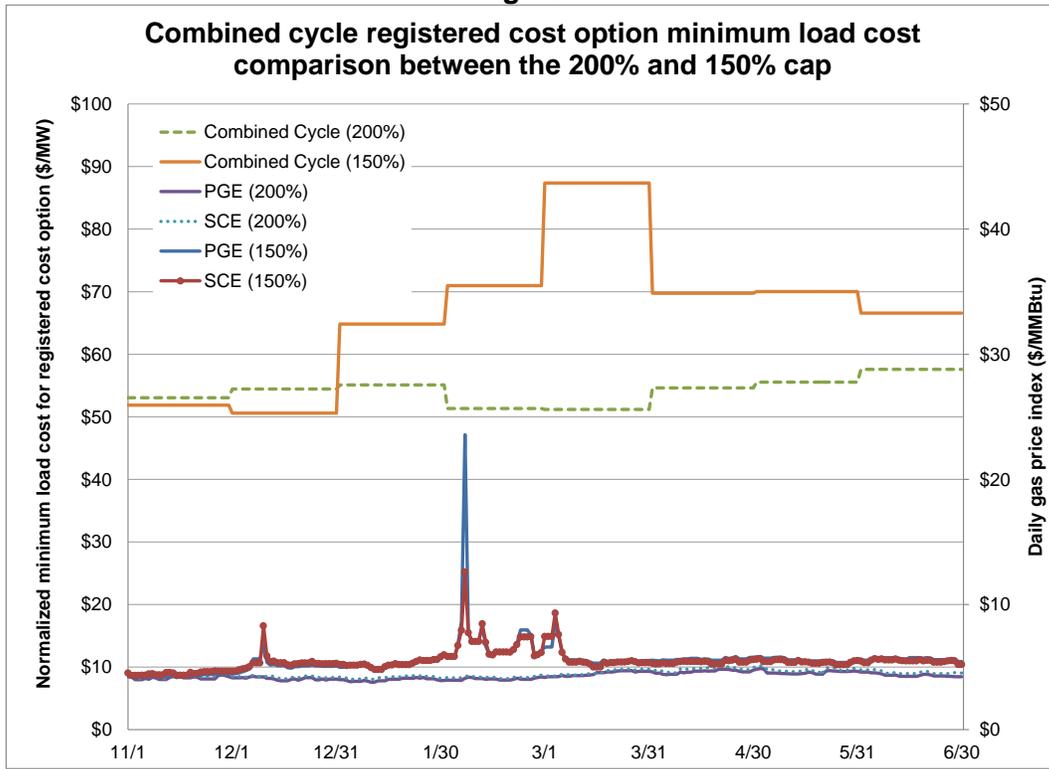


Figure 5

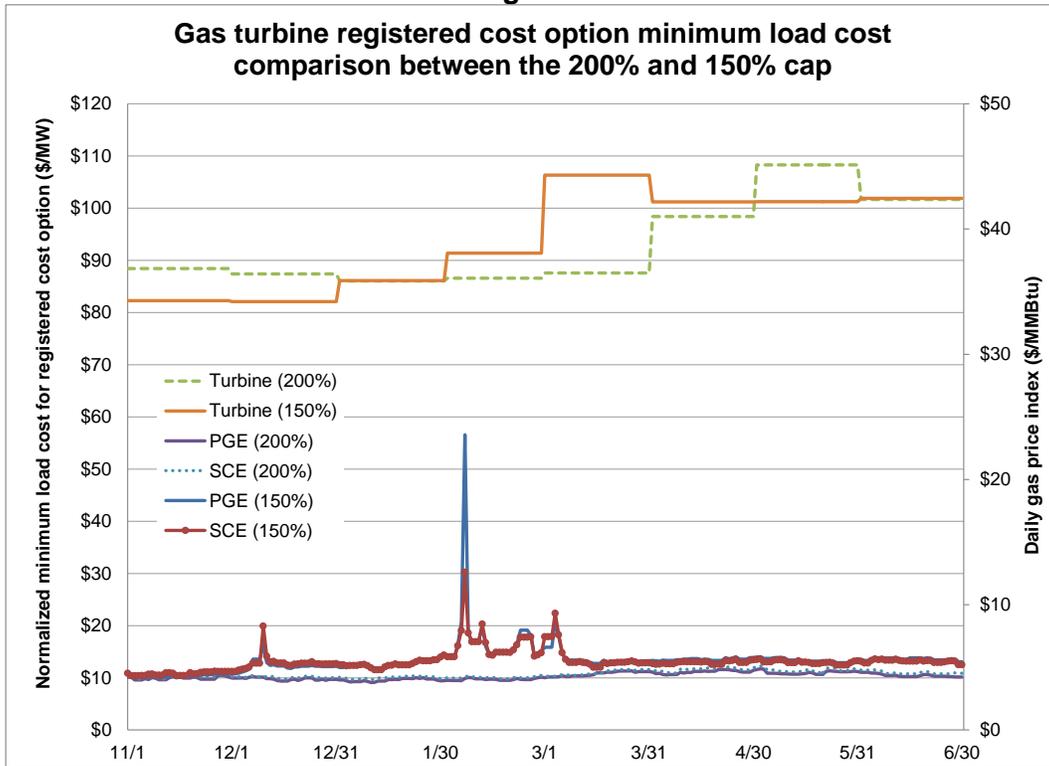


Figure 6

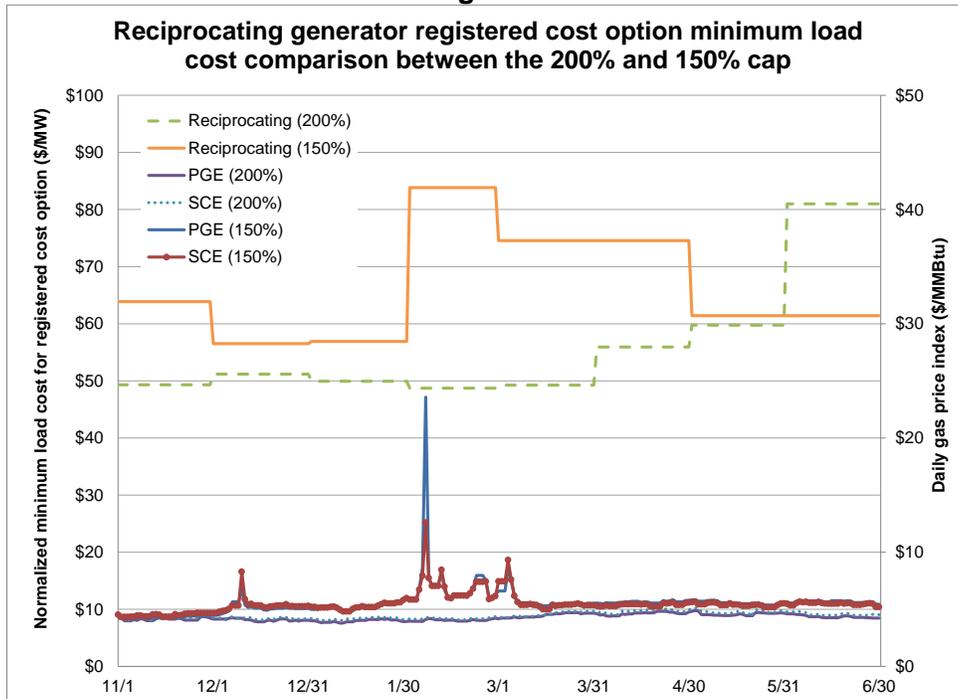
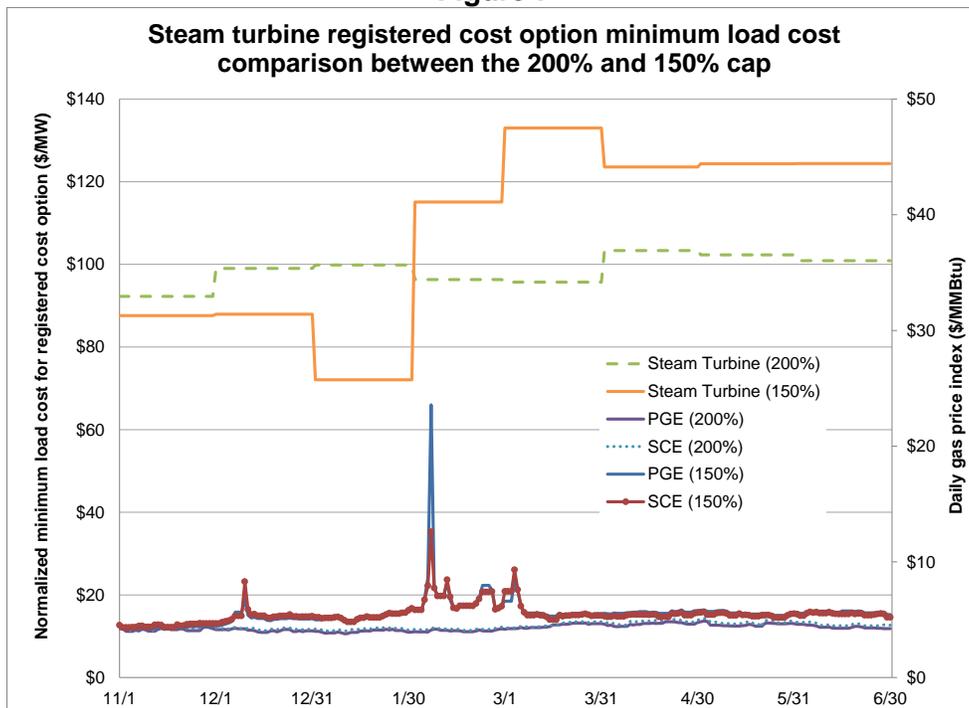


Figure 7



The next four graphs show the start-up costs for combined cycle, gas turbine, reciprocating generation, and steam turbines. The registered start-up costs are normalized by dividing the

cost by the minimum generation (Pmin) of each unit to produce a \$/MW metric shown on the left-side y-axis. The metric for multi-stage generators was calculated using only startable configurations using the configuration’s specific Pmin and start-up cost. We calculated the metric to keep this consistent with the minimum load calculation but in practice the start-up cost is allocated over the entire commitment period of the resource. Each graph also shows the daily gas price indices used in the ISO market for gas regions PGE2 and SCE1 on the right-side y-axis.

Figure 8

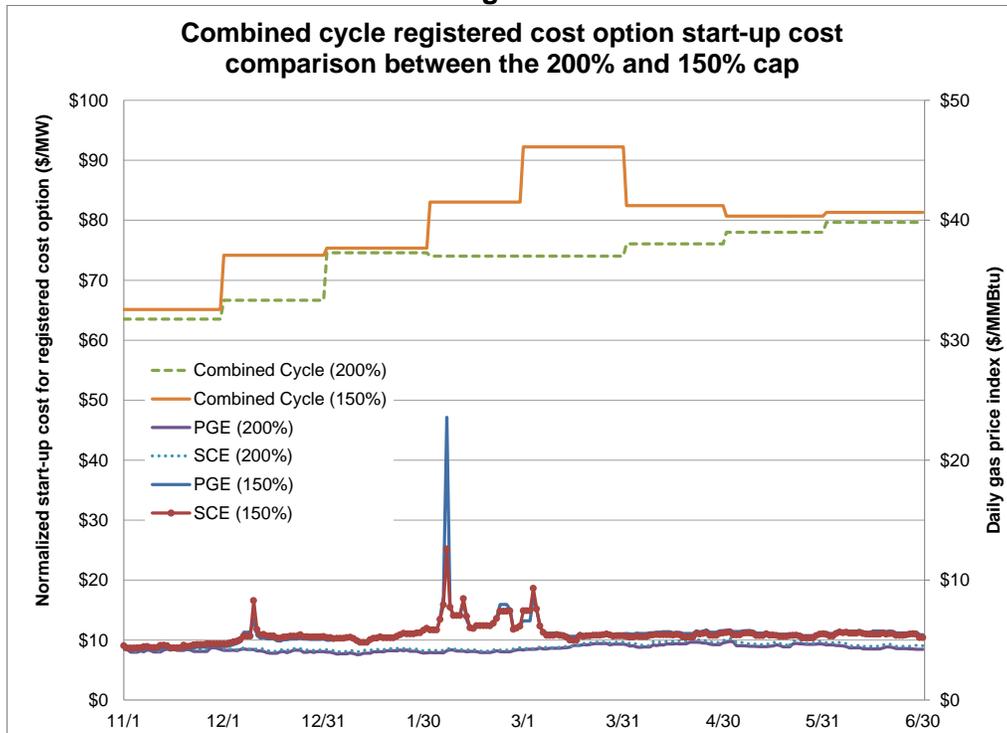


Figure 9

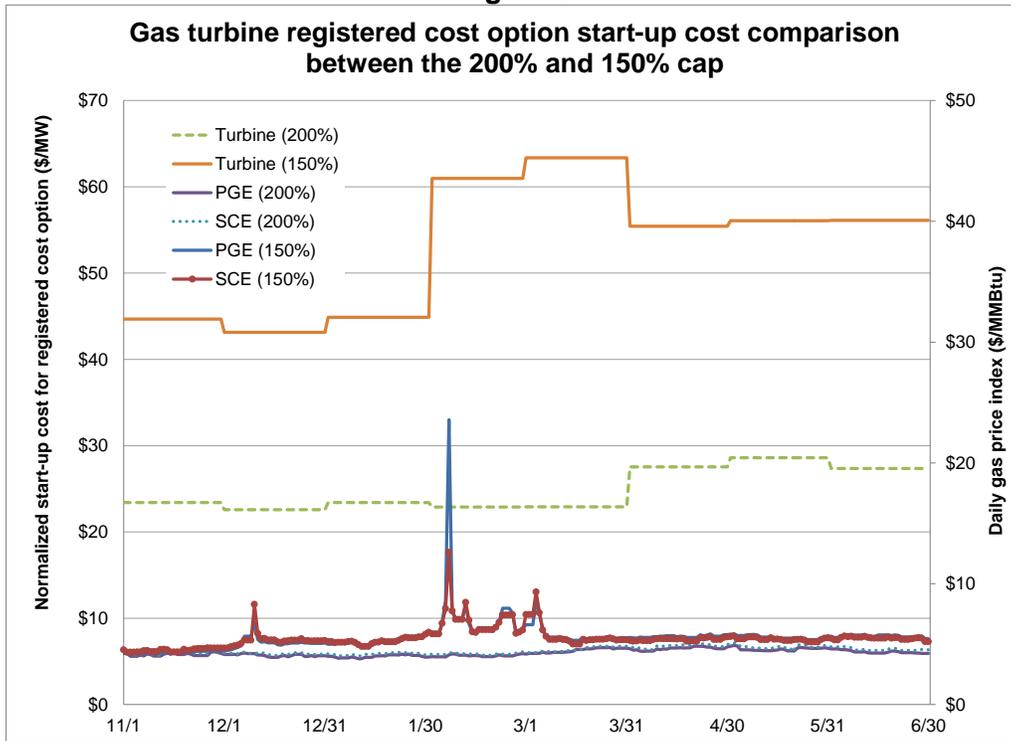


Figure 10

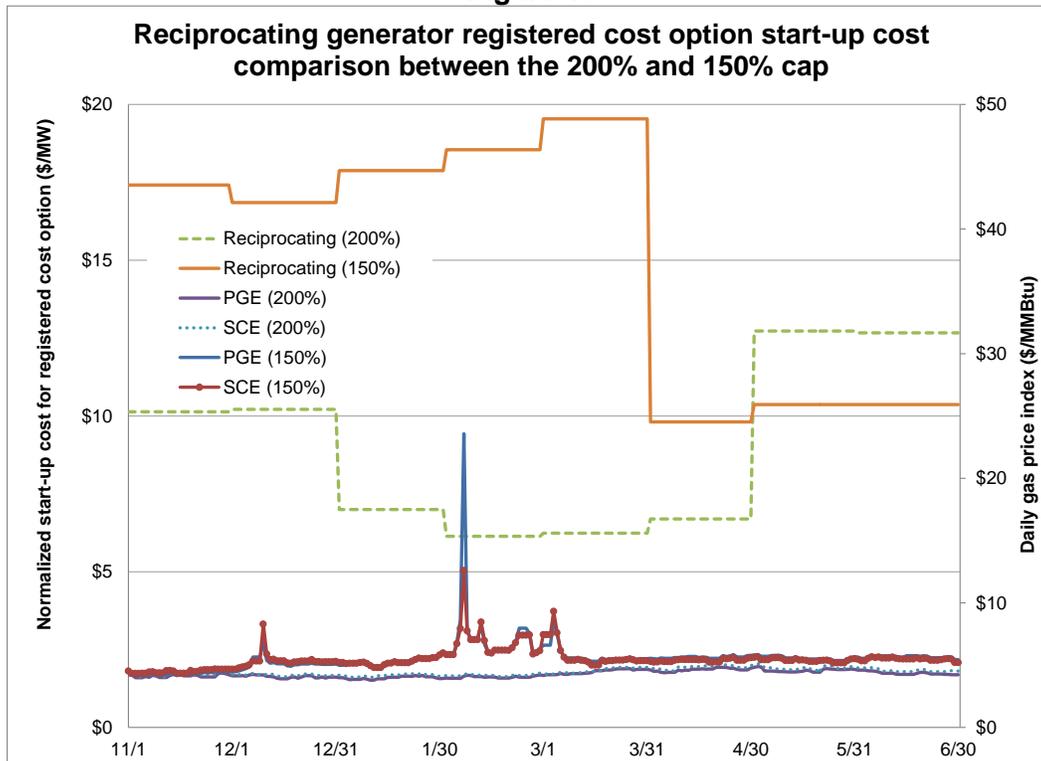
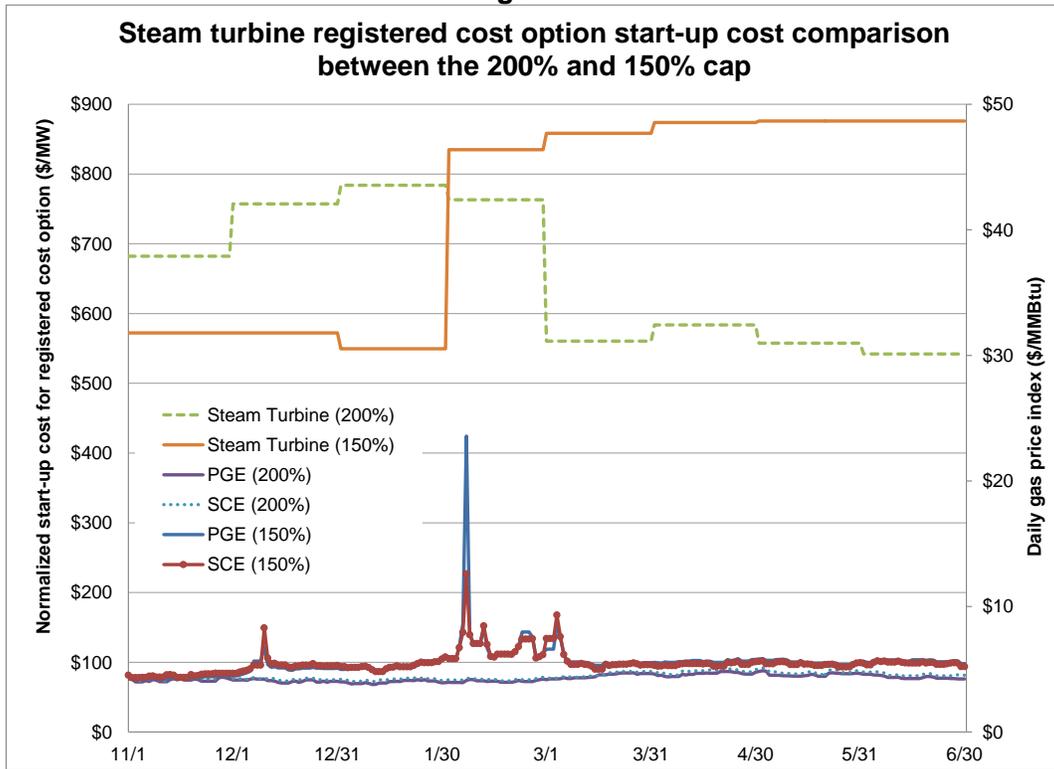


Figure 11



9. Next Steps

The ISO will not be conducting a call on this revised draft final proposal given the limited changes. Stakeholders should submit written comments on this revised draft final proposal rather than the draft final proposal by August 27, 2014 to ComCosts2@caiso.com.

Attachment D – Board Memorandum

Tariff Amendment – Modify Start-Up and Minimum Load Cost Recovery Mechanisms

California Independent System Operator Corporation

Memorandum

To: ISO Board of Governors

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

Date: September 11, 2014

Re: **Decision on commitment cost enhancements**

This memorandum requires Board action

EXECUTIVE SUMMARY

Last winter extreme weather conditions in the mid-west and on the east coast caused abnormally high levels of gas price volatility across the country, including California. The ISO market could not reflect the large swings in gas prices in its resource commitment decisions because the commitment costs used by the ISO market were based largely on a fixed cost option selected by generators. This led to inefficient commitment and dispatch of generation.

Management is seeking Board approval of targeted market rule changes for generation commitment costs that will improve market efficiency by ensuring that more accurate natural gas prices are used for ISO dispatch decisions. The proposed enhancements also provide market participants with greater flexibility to manage risks associated with natural gas price volatility.

Generator commitment costs include the costs of starting up a generator and the costs of running a generator at its minimum load levels so that it is available for future dispatch. Under the current market structure, generators can choose between a fixed cost option and a variable cost option. The fixed cost option is called the “registered cost” option, and does not follow daily changes in gas prices. Rather, the registered cost option uses a monthly gas price and has a cap of 150% of calculated costs. The variable cost option, called the “proxy cost” option, tracks daily changes in natural gas prices. It uses a daily gas price and is capped at 100% of the calculated costs. Most generators have selected the fixed cost option, which led to the inefficient commitment and dispatch of generation last winter during volatile gas price periods.

Management is proposing to raise the cost cap of the proxy cost option to 125% and eliminate the registered cost option for all gas-fired resources except those designated as being “use-limited”. Management proposes that use-limited resources, which are

resources that have start and run limitations due to environmental or other operational restrictions, be able to temporarily retain the registered cost option to reflect potential opportunity costs of running the generator. Management proposes to retain the registered cost option for use-limited resources until the ISO implements new functionality to enable resources to reflect opportunity costs in their start up and minimum load bids.

These enhancements will allow generators more flexibility to provide more accurate commitment costs to the ISO and better ensure that ISO market dispatch decisions are based on current gas prices.

Management proposes the following motion:

Moved, that the ISO Board of Governors approves the proposed commitment cost enhancements proposal, as described in the memorandum dated September 11, 2014; 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

The proposed commitment cost enhancements include market rule changes that will collectively provide for more accurate generator start-up and minimum operating level costs for use in the ISO market. The proposal was specifically designed so that it can be quickly implemented for the upcoming winter season to avoid the market inefficiencies that occurred last winter during periods of extreme volatility in natural gas prices.

Background

The ISO currently has two bidding options for start-up and minimum operating level costs. The two options are designed to mitigate potential market power concerns by capping the bid price of a generators start-up and minimum load bids (collectively referred to as “commitment costs”). The two options are the registered cost option and the proxy cost option:

- The registered cost option allows market participants to bid up to 150 percent of a projected cost calculated by the ISO and is fixed for 30 days. The cost components for this option include natural gas, maintenance costs, greenhouse gas regulation compliance costs, and ISO grid management charge costs. The natural gas component is determined by the average of monthly natural gas futures price. To mitigate local market power, this relatively high 150 percent bid

cap is balanced with a requirement that the bids are fixed for 30 days.¹ This eliminates the ability of a market participant to submit high commitment cost bids during days the participant has reason to believe the ISO market must commit a certain generator.

- The proxy cost option, on the other hand, is more flexible by incorporating daily gas costs and allows for daily bidding of commitment costs. It allows a market participant to submit bid prices for commitment costs up to 100 percent of costs calculated by the ISO using a daily gas price index and the same cost items as the registered cost option.

Although the proxy cost calculation uses a daily gas price, there is a one-day lag in the gas price used in the proxy cost option. This one-day lag exists because the day-ahead gas indices used by the ISO are published late in the day after the ISO day-ahead market runs. Consequently, the ISO must use day-ahead gas indices from the previous night that are for the following day's gas market, which is one day behind the trading day for the ISO day-ahead market. For example, the gas price indices are published the evening of Day 1 for gas trading on Day 2. The ISO will incorporate these gas prices into the proxy costs on the morning of Day 2 when running the day-ahead market for Day 3. Therefore, the gas price indices for Day 2 are used for Day 3 proxy cost commitment cost calculations in the ISO day-ahead market.

Last winter due to extreme weather conditions, gas markets experienced abnormally high volatility. The ISO market could not reflect the large swings in gas prices in its resource commitment decisions for two reasons. First, the majority of the natural gas fueled generators had selected the registered cost option, which provides for a fixed cost for start-up and minimum load costs based on a monthly gas price. Next, for generators that had selected the proxy cost option that captures daily changes in natural gas costs, the large price swings were not captured because the commitment costs used by the ISO market were determined by gas prices from the previous trade day. As discussed above, this second issue was due to timing conflicts with the ISO market process and the publishing of daily gas indices. Both of these issues led to inefficient commitment and dispatch of generation during volatile gas price periods.

To address the potential for additional gas price spikes, in February of this year the ISO sought and received Federal Energy Regulatory Commission approval to implement a temporary tariff waiver to manually update the gas price used by the market with the most recently available natural gas index price during periods of extreme gas price volatility. This waiver expired on April 30, 2014. As part of that tariff waiver filing, the

¹ A market participant can only switch a generator to the "proxy cost" option if they have been under the registered cost option for 30 consecutive days or if the proxy cost is higher than the registered cost. If the participant chooses to switch to the proxy cost option because it is higher than the registered cost, they must remain under the proxy cost option for the remainder of the 30-day period.

ISO committed to conduct a stakeholder process to address the issues raised by the volatile gas market conditions by developing and implementing a more comprehensive solution in advance of the upcoming winter season.

Proposed enhancements

Given the current structure and the issues that arose due to volatile gas prices last winter, Management proposes three enhancements to the market rules for bidding commitment costs:

1. Increase in the proxy cost option bid cap from 100 percent to 125 percent of the daily-calculated cost.
2. Eliminate the registered cost option, except for temporarily retaining it for use-limited generators until the ISO can implement market enhancements that effectively account for use-limitations.
3. Retain a manual process to update gas prices used by the market in the event of extreme gas price spikes between the time the natural gas price indices are published and the time of the ISO's day-ahead market.

Each of these is discussed in detail below.

Increase proxy cost option bid cap from 100 percent to 125 percent

Management proposes to increase the proxy cap under the proxy cost option from 100 percent of a generator's calculated cost to 125 percent of its calculated costs. This will provide additional flexibility for market participants to account for commitment costs not included in the proxy cost calculation while providing protection against local market power. Costs not captured by the proxy cost calculation include day-over-day and intra-day gas price volatility, and generator-specific variations from the generic costs the ISO considers. While the registered cost option's cap of 150 percent of calculated costs could ostensibly cover these costs, the proxy cost option more accurately reflects generators' current costs because it uses an updated gas price index each day. Because of this, it does not need the large "headroom" above calculated costs. The register cost option needs this large headroom because it locks gas prices in for 30 days.

Management analyzed historic gas price day-over-day and intra-day gas price volatility and found that increasing the proxy cost cap from 100 percent to 125 percent will account for the vast majority of gas price volatility. Since April 2009, there have been only seven instances in which the gas price for the next day was more than 125 percent of the previous night's price. For those limited days when the gas price increases more

than 25 percent, Management proposes to use a manual process, described below, to update the gas prices used in the day-ahead market.

Eliminate the registered cost option for most generators

The proposed enhancements to the proxy cost option largely eliminates the need for the registered cost option. The single exception is in the consideration of use-limited resources as explained below.

The registered cost option has identical inputs to the proxy cost option except that registered cost option has the strong disadvantage that it uses a monthly futures gas price that often does not reflect current gas prices. Consequently, the gas price used as the basis for the registered cost option can lead to the inefficient dispatch of resources. This occurred during the February 2014 gas price spike when most generators were under the registered cost option. As a result, the commitment costs used by the ISO market were significantly lower than generator's actual costs. Moreover, once gas prices fell in March 2014, the registered cost option continued to reflect the higher prices from February and the commitment costs used by the market were too high. This resulted in inefficient generator commitment and dispatch in both months. Given the proposal to increase the bid cap on the proxy cost option to 125%, which should provide sufficient headroom for recovery of a resource's actual commitment costs, Management is proposing to eliminate the registered cost option for all resources except, temporarily, for those having use limitations.

Management proposes to temporarily retain the registered cost option for use-limited generators. A use-limited generator is a generator used to meet resource adequacy requirements but has environmental or operational restrictions on how often it can start up or operate. Market participants submit start-up or minimum load bids for these generators at higher prices to account for these restrictions. As a result, use-limited generators are only started and operated at minimum load when the system need is greatest. The increased bid amount to reflect these limitations reflects opportunity costs of only running the generator when prices are high. The opportunity costs for some use-limited generators could be greater than the proxy cost option's 125 percent cap. Therefore, it is reasonable to retain the registered cost option with a 150 percent cap until new provisions are implemented to enable these resources to bid their opportunity costs.

As part of the stakeholder initiative leading to this proposal, Management proposed provisions for including opportunity costs into the proxy cost cap for use-limited resources. However, stakeholders commented there was not enough time to vet fully the methodology and raised concerns that this could delay the implementation of proposed enhancements past this winter. Management thus proposes to retain the registered cost option for use-limited resources until it completes a subsequent stakeholder initiative to complete the opportunity cost methodology. Management

expects to have the opportunity cost provisions to be implemented prior to the winter of 2015-2016.

Use a manual process to update gas prices if a gas price spike occurs

To address relatively rare extreme gas price spikes, Management proposes to use a manual process to update gas prices used by the market when the price in the morning is over 125 percent of the previous night's index prices. Management found only seven instances since April 2009 where the gas price for the next day is greater than or equal to 125 percent of the previous night's prices. One of the events occurred in February 2014.

To implement this manual process, when the ISO observes a significant increase in gas prices the ISO will delay the close of the day-ahead market and incorporate an updated gas price published by the Intercontinental Exchange. The price from this index will be used to update the commitment cost bid cap and other market inputs that use the gas price index. Market participants have the opportunity to rebid after the gas prices are updated. Since this process only updates the proxy cost option, Management proposes an automatic day-of switch for use-limited resources under the registered to the proxy cost option so that their commitment costs also reflect the updated gas price. This will ensure that the ISO market reflects accurate costs for all generators in the event of a gas price spike.

POSITIONS OF THE PARTIES

Stakeholders generally support the increase of the proxy cost cap from 100 percent to 125 percent but several generators feel the proxy cost cap should be set even higher (e.g., 150%) to better ensure recovery of costs associated with intra-day gas price volatility. Stakeholders also overwhelmingly support the use of the manual process on the day of a natural gas price spike. Finally, stakeholders that are concerned about bidding opportunity costs for use-limited resources support the retention of the registered cost option.

The Market Surveillance Committee supports Management's proposal as a near term solution. The MSC's Final Opinion is attached. The Department of Market Monitoring also supports Management's proposal. The DMM report is also attached for reference.

The following addresses stakeholder positions raised during the stakeholder process. A detailed stakeholder comment matrix is attached.

Position 1: Some stakeholders believe the proxy cost option should have a bid cap of 150 percent of calculated costs rather than 125 percent to address intra-day gas price volatility.

Response: Management's own analysis and confidential data provided under non-disclosure agreements show the proposed 125 percent cap under the proxy cost option will cover the vast majority of gas price volatility due to day-over-day and intra-day gas price movements. In addition, the proposed manual process addresses the remaining extraordinary events. A higher bid cap is appropriate under the registered cost option because the bid price is locked in for a month and there can be significant gas price changes over this time. Conversely, the ISO updates the gas price for the proxy cost option bid cap every day so a lower amount of headroom is appropriate. This bid cap is an important market power mitigation measure.

Position 2: Some stakeholders have requested direct out-of-market reimbursement of incurred natural gas costs.

Response: Management's analysis shows that the 125 percent proxy cap and the manual process support recovery of natural gas costs as reflected in commitment costs. Out-of-market reimbursement of costs not reflected in the market optimization would reduce market efficiency and potentially create gaming opportunities.

Position 3: Some market participants requested additional bidding flexibility to reflect intra-day and penalty costs from gas pipeline companies to market participants in the ISO market.

Response: Given the flexibility provided under the increased proxy cap and manual process, the ISO believes there is sufficient flexibility to address the vast majority of gas price increases. This initiative seeks to find solutions that the ISO can implement by the upcoming winter. Greater bidding flexibility will be addressed in a longer term bidding rules initiative scheduled to begin later this year, which will consider long term market design changes for both energy and commitment cost bids. Finally, Management is considering further enhancements that will provide for recovery of gas pipeline penalties caused by ISO dispatches.

CONCLUSION

Management recommends the Board approve the commitment cost enhancements proposal described in this memorandum. The enhancements can be implemented in time for the upcoming winter and will result in increased market efficiency and provide market participants with greater ability to manage risks associated with natural gas price volatility.



Board of Governors September 18-19, 2014 Decision on commitment cost enhancements proposal

Motion

Moved, that the ISO Board of Governors approves the proposed commitment cost enhancements proposal, as described in the memorandum dated September 11, 2014; and

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

Moved: Olsen Second: Galiteva

Board Action: Passed	Vote Count: 5-0-0
Bhagwat	Y
Foster	Y
Galiteva	Y
Mullin	Y
Olsen	Y

Motion Number: 2014-09-G2

Attachment E – Key Dates in Stakeholder Process

Tariff Amendment – Modify Start-Up and Minimum Load Cost Recovery Mechanisms

California Independent System Operator Corporation

List of Key Dates in the Stakeholder Process for this Tariff Amendment

Date	Event/Due Date
April 30, 2014	CAISO issues paper entitled "Commitment Cost Enhancements – Issue Paper & Straw Proposal"
May 7, 2014	CAISO hosts stakeholder conference call that includes discussion of paper issued on April 30 and presentation entitled "Commitment Costs Enhancements – Issue Paper/Straw Proposal Discussion"
May 21, 2014	Due date for written stakeholder comments on paper issued on April 30
June 10, 2014	CAISO issues paper entitled "Commitment Cost Enhancements – Revised Straw Proposal"
June 17, 2014	CAISO hosts stakeholder conference call that includes discussion of paper issued on June 10 and presentation entitled "Commitment Costs Enhancements – Revised Straw Proposal Discussion"
July 1, 2014	Due date for written stakeholder comments on paper issued on June 10
July 15, 2014	CAISO issues paper entitled "Commitment Cost Enhancements – Second Revised Straw Proposal"
July 22, 2014	CAISO hosts stakeholder meeting that includes discussion of paper issued on July 15 and presentation entitled "Commitment Costs Enhancements – Second Revised Straw Proposal Discussion"
July 29, 2014	Due date for written stakeholder comments on paper issued on July 15
August 12, 2014	CAISO issues paper entitled "Commitment Cost Enhancements – Draft Final Proposal"
August 19, 2014	CAISO hosts stakeholder conference call that includes discussion of paper issued on August 12 and presentation entitled "Commitment Cost Enhancements – Draft Final Proposal Discussion"
August 21, 2014	CAISO issues paper entitled "Commitment Cost Enhancements – Revised Draft Final Proposal"
August 27, 2014	Due date for written stakeholder comments on paper issued on August 21
September 17, 2014	CAISO issues draft tariff revisions to implement commitment cost enhancements
September 24, 2014	Due date for written stakeholder comments on draft tariff revisions issued on September 17
September 26, 2014	CAISO hosts stakeholder conference call that includes discussion of draft tariff revisions issued on September 17