California ISO
Shaping a Renewed Future

TECHNICAL BULLETIN

Natural Gas Price Calculation

February 21, 2014

Contents

Executive Summary

The ISO proposes to file with FERC a request for a tariff waiver to, in the event of significant natural gas price increases between days, allow the ISO to: (1) update the natural gas price used in the calculation of the minimum load and start-up proxy costs used in the day-ahead market runs; and (2) allow the use of only one natural gas price index rather than two or more in updating the gas prices used for that day. The tariff waiver will be narrowly scoped to address atypical and significant increases in natural gas prices, as occurred on February 6, 2014. The tariff waiver will allow the ISO more flexibility to react in times of significant natural gas price spikes and more effectively reflect these costs in the market.

Background

The ISO calculates gas-fired generating units' start-up costs based on a unit's start-up fuel and natural gas prices. The ISO refers to these calculations as "proxy costs." The ISO also calculates units' minimum load costs, which are calculated based on a unit's heat rate characteristics and natural gas prices. The ISO also includes operations and maintenance costs in its calculation of these costs. The ISO adds 10 percent to its calculation of minimum load costs to arrive at the minimum load costs used by the ISO market.

The ISO uses these costs differently depending on whether a market participant has elected the "proxy cost" or the "registered cost" option for the start-up or minimum load costs of a unit. Market participants can elect either of these two options for either a unit's start-up costs, minimum load costs, or both. The ISO implements these options as follows:

- Proxy Cost Option: Market participants can submit daily start-up and/or minimum load bids that can be no more than the unit's proxy costs. The ISO uses the unit's proxy start-up and/or minimum load costs to create a bid if a market participant does not submit a required bid.
- Registered Cost Option: Market participants can submit a start-up and/or minimum load bid that stands for 30 days, unless the proxy cost calculation exceeds the registered costs, in which case the market participant can switch to the proxy cost option. This minimum load cost bid for parties under this option can be up 150% the unit's proxy costs as calculated by the ISO.

If a unit elects the Registered Cost Option, it will remain so for a minimum of 30 days in the ISO's Master File unless the unit's minimum load and start-up costs as calculated pursuant to the Proxy Cost option exceed the Registered Cost option. Under this scenario, the scheduling coordinator may elect to switch to the Proxy Cost option for the balance of any 30-day period

Issue and proposed tariff waiver

On February 6, 2014, natural gas prices increased three-fold from approximately $7/MMBtu the previous day to $20/MMBtu in some regions. While generators can provide energy bids that reflect more updated natural gas prices, the ISO's proxy cost calculations of start-up and minimum load costs used in the day-ahead market is based on natural gas prices that have a time lag because that is when more than one natural gas price index is available. Consequently, the start-up and minimum load costs for units that selected the proxy cost option did not incorporate the natural gas price spike that occurred on February 6th. The ISO proposes a waiver of certain tariff provisions to address scenarios under which there are significant natural gas price increases (see the Appendix for the affected tariff sections) so that the increases will be more accurately reflected in the start-up and minimum load costs of units that select the proxy cost option.

In calculating the cost of fuel used in calculating start-up and minimum load proxy costs under the proxy cost option, the ISO is currently required by its tariff and business practice manuals to use 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. For the purposes of the day-ahead market, the ISO is also required to update the gas price index between 19:00 and 22:00 Pacific Time of the previous day using natural gas prices published on the day that is two 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. The ISO proposes to ask the FERC for a tariff waiver for section 39.7.1.1.1.3 to allow the ISO to use only one natural gas index rather than the minimum of two currently specified, and to be able to use a more up to date index for the day-ahead market.

Figure 1 below provides an illustrative example of when the ISO calculates the natural gas price for minimum load and start-up proxy prices used by the day-ahead market under the current tariff provisions and how this would change with a tariff waiver. For example, the ISO currently uses the gas price index for gas traded on Day 2 to be delivered on Day 3 (highlighted in blue). The ISO updates this information between 19:00 and 22:00 on Day 2 (highlighted in blue). On Day 3, the gas price from Day 2 (for delivery on Day 3) will be used for both the real-time and day-ahead market runs (also highlighted in blue). The process repeats for Day 3 and 4 (this time highlighted in green).

Under the proposed tariff waiver, should the ISO anticipate a significant natural gas price increase the morning of Day 3, then the ISO would seek to use more updated information before the close of the day-ahead market (noted in the box highlighted in yellow) rather than the lower gas price from Day 2 (highlighted in blue). The ISO believes that use of a more up-to-date price index will allow the ISO to better reflect a resource's costs in the day-ahead market run.

Figure 1: Day-Ahead Market Natural Gas Price Calculation Timing

Current natural gas price calculation				
Time	**Event**	**Day 2**	**Day 3**	**Day 4**
T-75 min	ISO real-time market closes	Use gas price from Day 1 (for Day 2 delivery)	Use gas price from Day 2 (for Day 3 delivery)	Use gas price from Day 3 (for Day 4 delivery)
Approx. 6:00-10:00	Gas trading for next day delivery	Gas for Day 3 delivery	Gas for Day 4 delivery	Gas for Day 5 delivery
10:00	ISO day-ahead market closes	Use gas price from Day 1 (for Day 2 delivery)	Use gas price from Day 2 (for Day 3 delivery)	Use gas price from Day 3 (for Day 4 delivery)
19:00-22:00	ISO updates gas price index with today's trades	Update with gas for Day 3 delivery	Update with gas for Day 4 delivery	Update with gas for Day 5 delivery

Proposed natural gas price calculation				
Time	**Event**	**Day 2**	**Day 3**	**Day 4**
T-75 min	ISO real-time market closes	Use gas price from Day 1 (for Day 2 delivery)	Use gas price from Day 2 (for Day 3 delivery)	Use gas price from Day 3 (for Day 4 delivery)
Approx. 6:00-10:00	Gas trading for next day delivery	Gas for Day 3 delivery	Gas for Day 4 delivery	Gas for Day 5 delivery
10:00	ISO day-ahead market closes	Use gas price from Day 1 (for Day 2 delivery)	Use gas price from Day 3 (for Day 4 delivery)	Use gas price from Day 3 (for Day 4 delivery)
19:00-22:00	ISO updates gas price index with today's trades	Update with gas for Day 3 delivery	Update with gas for Day 4 delivery	Update with gas for Day 5 delivery

Only one reliable natural gas price index is available at approximately the 10:00 timeframe that could be used to calculate fuel costs for purposes of determining cost-based start-up and minimum load proxy costs for the day-ahead market run. This is the index produced by the IntercontinentalExchange, Inc. (ICE).

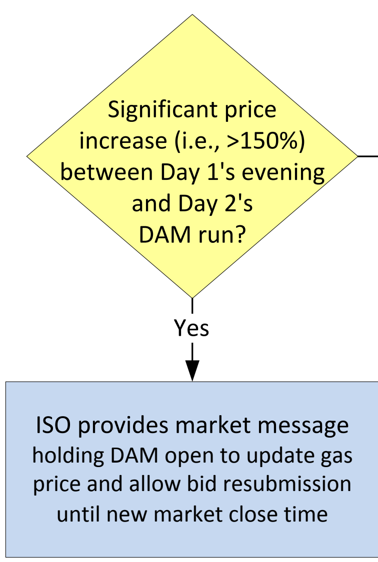
The update in the natural gas price index will affect units under the proxy cost option but not the registered cost option. Therefore, the ISO proposes to ask the FERC for a tariff waiver for section 30.4.1.2 to allow units to switch from the registered to the proxy cost option without the requirement that the unit's costs under the proxy cost option exceed those under the registered cost option.

The ISO proposes the following process to identify the events that will trigger use of the single index available on the same day under the tariff waiver if granted. Figure 2 below summarizes these processes into a flowchart.

1. Based on the best information available, the ISO will monitor on a daily basis whether there will be significant natural gas price increases between the night before when the natural gas price was updated and the start of the day-ahead market run the next day. If no significant increase is expected, the ISO will follow its current procedures consistent with the current tariff and business practice manuals.
2. If there is a change in natural gas prices between the previous night and before the day-ahead market run in excess of an ISO-determined threshold (for example, an increase of 150%), the ISO will initiate a new process to incorporate a more up to date index in the calculation of the proxy cost option.
3. The new process will include one or more market messages from the ISO to communicate at minimum the following points:
   a. The trigger for the procedure to use the more updated index has been met;
   b. The day-ahead market will be held open beyond the currently allowable timeframe;
   c. The updated natural gas price calculation from the IntercontinentalExchange, Inc. (ICE);
   d. The time at which Scheduling Coordinators can start to resubmit day-ahead start-up and minimum load costs under the proxy cost option and market bids; and
   e. The new time at which the day-ahead market will close.

The latest the ISO will update the natural gas price will be at 12:00 noon and the latest the market will close will be at 12:30 to ensure we can publish at 14:30.

Figure 2: Proposed process under tariff waiver flowchart



Next steps

The schedule for stakeholder engagement with regard to the tariff waiver is as follows:

Date	Event
Friday, 2/21/14	Technical bulletin posted
Thursday, 2/27/14	Stakeholder call
Tuesday, 3/4/14	Stakeholder comments due
Wednesday, 3/5/14	ISO files tariff waiver with FERC

The ISO also plans to review this issue more comprehensively via a separate stakeholder process that includes review of the current market bidding rules. A separate notice will be provided.

Comments should be sent to: Delphine Hou at dhou@caiso.com.

Appendix: Affected tariff sections

39.7.1.1.1.3 Calculation of Natural Gas Price

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 index 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.

30.4.1.2 Registered Cost Option

Under the Registered Cost option, the Scheduling Coordinator may register values of its choosing for Start-Up Costs and Minimum Load Costs in the Master File subject to the maximum limit specified in Section 39.6.1.6. For a resource to be eligible for the Registered Cost option there must be sufficient information in the Master File to calculate the Proxy Cost option for the specific Registered Cost 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 option, exceed the Registered Cost option, in which case the Scheduling Coordinator may elect to switch to the Proxy Cost option for the balance of any 30-day period, 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 the Registered Cost option, 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.