

Submitted By	Company	Date Submitted
Brian Theaker	NRG Energy, Inc. ("NRG")	April 21, 2016

In general, NRG supports the CAISO’s straw proposal. In particular, NRG appreciates that the CAISO recognizes:

- The compelling and unavoidable need to ensure that generators can reflect more timely and accurate gas costs in their offers to the CAISO; and
- How use of the after-the-fact cost recovery mechanism, intended to be used in exceptional circumstances only, could become routine unless changes are made that allow a generator to reflect more timely gas costs in its bids.

The CAISO’s acknowledgement that its current market rules and processes do not allow generators to either reflect or recover their true costs and the CAISO’s apparent intent to remedy that long-standing problem provides an optimistic foundation to this accelerated stakeholder process. NRG is encouraged by this straw proposal and hopes that this is a watershed moment that will lead to market changes that yield better dispatch and cost recovery, not just for the current challenging period without Aliso Canyon, but beyond that time as well.

NRG’s comments follow. *NRG’s comments are in italic type*, while the **CAISO proposal or request for comment to which NRG is responding is in bold type**. Page number and section number references are to the Straw Proposal.

The CAISO posits two problems with the current market structure. Based on experience from June 2015, NRG adds a third:

1. The timing of the gas and electric markets are misaligned. The CAISO issues DA schedules at 1 PM, while the timely cycle closes at 11 AM and the most liquid trading takes place in the morning before the close of the timely cycle. This means that, under tight balancing conditions, generators must look to the intra-day market to procure the gas they need to follow CAISO dispatch instructions and market awards.
2. The gas price reference used for commitment costs and default energy bids is a stale gas price index that may not reflect the cost of procuring gas to follow the CAISO’s dispatch instructions and market awards. This not only means the CAISO’s market optimization may be producing schedules and issuing dispatch instructions based on inaccurate information, which can cause reliability issues in both the gas or electric systems side (for example, this is exactly what happened in February 2014), but it puts generators at risk for being unable to recover the costs they incur to follow CAISO market awards and dispatch instructions.
3. The CAISO’s day-ahead market does not account for constraints in the gas supply system and can issue physically infeasible schedules (i.e., financially binding schedules for which market participants cannot obtain gas). This is what happened on June 30, 2015.

Stakeholders have communicated to the ISO [that] sometimes, gas cannot be procured because they might not be able to find a seller. Under this scenario, the ISO instruction could cause resources to incur balancing charges for operating outside the tolerance band to follow the instruction. The ISO wishes to better understand what scenarios could cause these instances and to explore whether any improvements are necessary to address this scenario. (Page 12)

NRG Comment: NRG has observed this dynamic during the recent extreme gas events (such as December 2013 and February 2014), when counterparties, faced with severe penalties for under-nominating gas, are reluctant or unwilling to sell gas, even if they might have a long gas position.

NRG notes that trading liquidity decreases in the intra-day gas markets as the day goes on, and effectively ceases to exist as the final nomination cycle (Intra-day Cycle 3) nears at 5 p.m. PPT.

Outage and curtailments. The CAISO's policy is that generators are responsible for submitting plant-level limitations via OMS once the outages are made public. (Page 14)

NRG Comment: NRG agrees with the CAISO that it is often unclear to generators what the plant-level limitation will be based on the outage communication from the gas company. In NRG's experience, generators do not "prefer to wait" until they receive an actionable limitation from the gas company; instead, they just may have no idea what the plant-level limitation is based on the outage information communicated from the gas company.

Further, NRG agrees with the CAISO that gas curtailment information is communicated not by gas company operating personnel with the authority to adjust curtailment amounts, but by gas company client representatives who are not empowered to adjust the curtailment quantities. For example, in recent curtailment events in which SoCalGas directed NRG units to come offline, it was the client representative telling NRG on behalf of Gas Control that NRG units must be shut down. This introduces additional process lag during a time when prompt and accurate action may be critical. (Page 26)

In situations in which generators must restate their availability via OMS because of gas curtailments, they must be permitted to use an OMS nature-of-work category (such as "ambient-not due to temperature") that will not impose RAIM penalties due to the gas curtailment. Given the importance of this issue, NRG respectfully urges the CAISO to provide in this stakeholder process clear guidance on what nature-of-work category to use in gas curtailment situations. Such clear guidance will be greatly appreciated.

Gas Availability Constraint. CAISO proposes to implement a real-time market constraint that would limit, over a day, the gas burn in an "affected area" (which could be one or more operating zones identified by SoCalGas or SDG&E) as communicated to the CAISO by the gas company. The maximum daily gas burn would be allocated hourly based on the expected load shape. (Section 5.1, Pages 13-15)

NRG Comment: NRG was encouraged by the clarification during the April 19 MSC discussion that the ISO intends to implement this constraint in the day-ahead market as well, when the condition is known in

time to include in the day-ahead market. As experienced on June 30, 2015, if the CAISO's day-ahead market does not constrain electric schedules based on the physical capability of the gas system to provide gas to the generators receiving those schedules, the potential for catastrophe is significant. The catastrophe is that generators will be exposed to real-time prices that could turn out to be extremely high under constrained pipeline conditions simply because they will be unable to get gas for what amounts to physically infeasible day-ahead schedules. Again, even if the gas company discloses an outage with sufficient advance notice, the communication may not provide generators with enough detail for the generators to take meaningful action in the CAISO's markets.

Given that net load, not load, is likely a better indicator of price and gas burn, the gas burn limit should be allocated on the basis of expected net load shape, not expected load shape. There may be better and more sophisticated ways to allocate the hourly burn limit than just net load, and NRG looks forward to those conversations.

The CAISO notes that "If the constraint was violated, the price of the constraint would be reflected in market prices." NRG agrees that the price of a violated constraint should be reflected in market prices but is not clear about how the CAISO is planning to price this constraint. NRG requests the CAISO provide additional detail on how this constraint would set market prices when it binds.

Reserving transfer capability on Path 26. The CAISO proposes to reduce the Available Transfer Capability (ATC) on Path 26 to ensure there is adequate north-to-south transfer capability available to support reliable grid operations in the affected area. (Section 5.2, Page 16)

NRG Comment: NRG agrees with the CAISO that reserving transfer capability on Path 26 will impact parties that hold CRRs on this path. Holding back southbound transfer capability will also tend to increase prices south of the constraint, which could result in additional gas burn in this area. Given that the concern with the gas supply system is less about total send-out and more about a mismatch between send-out and nomination, increasing the gas burn the affected area, however, may not in and of itself detrimentally impact the reliability of the gas supply system. In any case, this proposal is likely to have far-reaching impacts on many aspects of the CAISO's markets, and should be thoroughly examined and discussed before it is adopted.

No change to the Day-Ahead Market Timeline (page 17)

NRG Comment: The CAISO asserts that increased forecast error from advancing the DA market timing would exacerbate the risk of increased real-time re-dispatch (Page 17), but could alleviate the price risk associated with having to submit day-ahead market bids prior to the close of the timely cycle (Page 11). The CAISO has acknowledged that a key problem is that the timing of its Day-Ahead market is misaligned with the timing of the timely gas cycle, but has repeatedly shown no interest in changing the timing of its Day-Ahead market (including in the Straw Proposal). Given the CAISO's position on changing the timing of the Day-Ahead market, and further given the increased balancing risk that the loss of Aliso Canyon entails, the CAISO must take other steps to ensure that market participants can accurately represent the true marginal cost of their generation in all CAISO offers and to mitigate the balancing risk.

Publishing Advisory 2DA Results. The CAISO proposes providing advisory results from the day-ahead market run two days in advance of the operating day (2DA) to allow market participants to better plan gas use.

The CAISO seeks input as to whether the CAISO should use the most recent set of market bids used in the DAM for the 2DA run, or whether it should use the bids submitted for the 2DA run.

NRG Comment: The CAISO rejected changing the timing of the Day-Ahead market due to concerns that moving the timing up a few hours would degrade the accuracy associated with Day-Ahead schedules and result in greater real-time deviations from those schedules (Page 17). Given that the reliability of 2DA results will be even more questionable (because forecasts of both gas price and electric demand will be even more uncertain), NRG would not be comfortable procuring gas based on “advisory” schedules. Nevertheless, this advance information may help the market and NRG supports it being published.

In response to which set of bids should be used for this 2DA run, market participant 2DA bids should be used where available, and if those bids are unavailable, DA bids could be used.

Real-Time Gas Balancing Constraint. The CAISO proposes implementing a real-time market constraint that would limit the real-time re-optimization of generation within the affected area. The daily limit (e.g., 150 MMcf) would be allocated hourly based on the expected load shape. If CAISO determined that additional re-dispatch was needed outside of that balancing constraint, the CAISO would re-dispatch through exceptional dispatch. (Section 6.2, pages 17-20)

NRG Comment: NRG supports further consideration of this constraint. However, NRG recommends that this constraint be allocated hourly based on both (1) expected net load, not load, shape, and (2) the potential variability in dispatch in the affected region that could be driven by intermittent resource and load variability. Further, NRG encourages the CAISO to make the 150 MMcf limit an adjustable parameter so that the limit can be changed if and when experience indicates that it could be changed, and to publish this limit in CRMI whenever the constraint is enforced.

Better real-time gas price information in the market optimization. Calling it “...paramount that generators across the ISO real-time footprint have the ability to submit commitment cost and incremental energy offers reflective of their marginal costs...”, the CAISO proposes two options for incorporating real-time gas information into the market optimization.

Option 1 – allow generators to submit, along with their real-time energy offers, their expected gas commodity price and gas transportation price. (Section 7.1, pages 21-22)

NRG Comment: NRG strongly supports this option. This option would better mimic the kinds of bidding rules used in the Eastern markets. It allows the entity bidding the generator to reflect more timely and accurate gas price information in its offers to the CAISO, rather than hinging the reasonableness of the entity’s offers on a gas price index that may have no relation to the actual price of gas procured to supply the corresponding dispatch instruction or market award. NRG notes that market participants need the

ability to update real-time offers throughout (i.e. multiple times) the operating day in order to accurately reflect any changes in market conditions.

Further, this action would greatly reduce the number of times when market participants would need to seek after-the-fact cost recovery at FERC.

While the CAISO has expressly proposed to include gas non-compliance charges in Option 2, it's not clear how the CAISO envisions gas non-compliance charges would be treated in a market participant's offers under Option 1. If a generator stands to incur non-compliance penalties by either increasing or decreasing their gas burn under OFO conditions (e.g., by changing their burn after 5 PM on a day when an OFO has been called), generators must be allowed to include those penalties in the submitted gas price. Given the CAISO's prior reticence to allow a generator to recover OFO penalties, NRG requests that CAISO clarify how it would treat OFO penalties under Option 1.

The CAISO notes that such an option would need to be routinely monitored (Straw Proposal at 22). NRG looks forward to a discussion that will identify important details of this monitoring process, including what information market participants will have to retain and how long they will have to retain it.

NRG believes strongly that this is the superior option, both for the period under which Aliso Canyon operation is restricted and beyond that period. Tying bid caps and cost recovery to mis-timed and inaccurate estimates of gas costs is not a sustainable structure for a mature market. This option will also reduce misalignments between the gas and power markets.

Option 2 - Use a volume-weighted average price of exchange trades (e.g., the ICE same-day price). The cost of noncompliance charges would be added to this price after the close of intra-day 3 cycle at 5 PM Pacific.

NRG Comment: This option, while it would amount to an improvement over the current regime, is inferior to Option 1.

First, counterparties do not trade gas on ICE on weekends, holidays and after standard business hours. There would be no reliable ICE price available for these extended periods of time.

Second, related to a question the CAISO seeks comment on, it may not be possible to determine the optimal period over which to calculate a same-day price. During the gas curtailment event in February 2014, the same day price fluctuated from \$12 to \$40, depending on the time of day. The longer the period the WAP is calculated, the higher the probability it is not reflective of actual market conditions. During the February, 2014 gas event, compensating generators at the weighted average intraday price would not have compensated the generator(s) who purchased gas at the higher range of intra-day prices.

The CAISO asks these questions under Option 2:

(1) What time should the real-time gas price index be calculated (e.g. T-135)?

NRG Comment: Noting the problems mentioned above, if this option is adopted the gas price should be calculated as close to the close of bidding for the applicable real-time period (T-75) as possible. If feasible (and NRG does not believe it is), the ISO would effectively take “snapshots” of the real-time gas market as quoted on ICE (assuming a viable market exists at the time) as close to the close of the bidding window as possible.

(2) What is an appropriate window for valuing real-time gas price index for given interval (e.g. 6 hours, after midnight)?

NRG Comment: As close to real-time as possible.

(3) Does this real-time gas price index need to be updated hourly or would an update every 4 hours be sufficient to capture real-time price information in the real-time markets?

NRG Comment: More frequent updates will more closely align offers to the CAISO with the true conditions in the gas market. Hourly updates would be ideal, but may be unrealistic. A rolling 4-hour window might be feasible. However, as noted above, such updates may not reflect the cost of gas a market participant might actually incur.

Increasing the commitment cost cap headroom. The CAISO indicates that is it considering increasing the real-time commitment cost bid cap to reflect changes in the intra-day price relative to the price used to set the bid cap. (Page 21)

NRG Comment: NRG supports consideration of increased headroom in the commitment cost bid cap, especially as an interim measure, until permanent changes that allow market participants to reflect more timely information on their units’ true marginal costs are implemented. While NRG supports increasing the commitment cost bid cap as an interim measure as needed, given that the level of the commitment cost bid cap has been a contentious issue, NRG respectfully urges the CAISO to use this opportunity to address the fundamental problems underlying the CAISO’s representation of marginal cost. If market participants have an opportunity to reflect the most timely gas price information in their CAISO market offers, the actual level of the headroom provided by the bid cap becomes less important.

Accelerate Commitment Cost Enhancements 3 Provisions: The CAISO proposes to accelerate two provisions from its recent Commitment Cost Enhancements stakeholder process (Section 8, pages 24-25):

- **Market participants will have the ability to re-bid commitment costs in the real-time market when a resource has not been committed in the day-ahead market.**

NRG Comment: NRG strongly supports this proposal. Market participants must have the ability to update their offers for uncommitted resources throughout the operating day in order to ensure those offers reflect any changes in market conditions.

- **Market participants will have the opportunity to file with the Federal Energy Regulatory Commission to recover commitment costs that exceed the commitment cost bid cap and**

result in a net revenue shortfall over the day considering all market revenue. Further, the CAISO proposes that this provision be expanded to include costs due to the dispatch of mitigated energy bids.

NRG Comment: NRG strongly supports this proposal as well, including the CAISO's proposal to expand it to include dispatch under mitigated energy bids.

Improved Day-Ahead gas Price (Section 9, page 25). Citing the fact that the ICE has changed its publication time for its day-ahead index to 11:30 AM Pacific, which makes it impossible for the CAISO to use this price as the basis for adjusting the bid caps for its Day-Ahead market when the applicable gas price index changes more than 25% day-over-day, the CAISO proposes two options:

Option 1: Use a gas price (and, presumably, transportation rate) submitted by generators.

Option 2: Use a rolling volume-weighted average price of exchange-traded intra-day and same day transactions within that fuel region.

NRG Comment: As noted above: NRG prefers Option 1, which allows market participants to accurately price the ever-volatile natural gas market in their bids. This construct more closely mimics that bidding rules adopted in Eastern ISO markets and allows market participant to reflect more timely gas price information in their offers to the CAISO.

Changes to Operating Procedure 4120. (Appendix A). The CAISO is contemplating the following changes:

1. After receiving a curtailment notification, the ISO will perform assessment of curtailments impact on electric reliability and determine preferred allocation of curtailment across affected generators in a manner that supports reliability in both gas and electric systems.

NRG Comment: NRG supports this. The curtailment allocation should account for actual generator heat rates, as reflected in a unit's RDT file, so as to ensure the most efficient allocation of gas curtailments.

2. At the time ISO provides pro rata curtailment amounts for each generator under its control to SoCalGas it will also provide a second set of curtailment amounts reflecting the preferred allocation of curtailment amounts across affected generators and request the gas company issue its curtailments based on these amounts instead of pro rata given electric reliability needs.

NRG Comment: As noted above, NRG supports the CAISO determining the most efficient and effective curtailments based on the generators' actual heat rates. Allocating curtailments on a pro-rata basis will not ensure the most efficient and effective curtailment.

3. Explore how both SoCalGas and the ISO could formalize its joint procedure for various types of events so that affected generators would have one resource to consult to understand the procedure and the roles of each entity under this procedure.

NRG Comment: NRG experienced first-hand problems that are created by miscommunication between the CAISO and SoCalGas. NRG has proposed that generators be brought into CAISO-pipeline company discussions precisely to address the problems caused by miscommunication. The CAISO and SoCalGas have been reticent to consider three-way communications involving the CAISO, generator and the pipeline company. In that light, NRG strongly supports developing procedures that eliminate, or at least minimize, the likelihood of miscommunication between the CAISO and gas company and have the generator communicating with a single party so as to avoid receiving conflicting directives.

4. Host a joint training prior to summer 2016 where both SoCalGas and ISO staff will ensure all generators have been fully briefed on the appropriate procedures for each event and can field questions at that time.

NRG Comment: NRG strongly supports this.

Discussion Items (Appendix B):

(1) How, if at all, could the ISO provide additional information to generators prior to the intraday 3 for GD1 and the timely for GD2 gas nomination deadlines?

NRG Comment: The CAISO should provide better, actionable information regarding a unit's expected gas burn (e.g., avoiding "TBD" instructions) as early as possible.

(2) What market changes or other tools, if any, could improve resources' ability to procure and nominate gas for GD1 and GD2 earlier to alleviate reliability and price risk?

NRG Comment: NRG supported moving the timing of the DA market so results would be published before the timely cycle trading had closed. However, it appears the CAISO will not consider this option.

(3) How do resources especially medium, short, or fast start units procure gas to meet ISO instructions in light of the risk of deviating from daily gas balancing requirements? Is there a difference in procurement practices depending on whether a binding start up instruction is issued versus if only advisory start up instructions have been issued?

NRG Comment: Under tight balancing conditions, including either daily balancing, OFO conditions (which impose daily balancing) or the possibility of swinging between High and Low OFO conditions on the same day, generators may conservatively procure some amount of the gas they are likely to burn and then rely on the same-day market to balance the burn. The amount of forward gas that a market participant will procure for an expected (but not yet committed) gas burn will depend on the prevailing pipeline conditions. However, procuring gas forward without a binding commitment to burn the gas is not a risk-free strategy, especially under High OFO conditions.

The ISO should expect offers which rely on the intra-day gas market will go up through the day due to the inherent liquidity/pricing risks involved. NRG is already seeing a decrease in the amount intraday gas currently being offered in the market. This is most likely due to the lack of storage (including injection & withdrawal rights) owned by market participants.

(4) What market changes or tools, if any, would support gas system reliability while efficiently dispatching resources to support electric system reliability in the real-time?

NRG Comment: NRG believes that ensuring that generators can present timely information on gas costs in all parts of the offer curves to the CAISO's market optimization is the single most important thing that can be done to support gas system reliability.

(5) What market changes, if any, could improve ISO's ability to better model and compensate resources for the higher costs associated with committing or dispatching these resources identified in Section [0]?

NRG Comment: Again, ensuring that generators can present generator offer curves that reflect the most timely gas cost information to the CAISO's market optimization in all time frames will not only help create efficient market outcomes but will help ensure cost recovery. Given the challenges associated with getting the most dynamic information into the CAISO's market systems, NRG supports the proposed "Option 1" regime in which market participants would provide timely information on gas costs to the CAISO's market optimization.

(6) How, if at all, the ISO should address or coordinate gas curtailments that effect ISO generation?

NRG Comment: The CAISO should calculate the amount of electric generation curtailment needed to accomplish the gas curtailment based on the actual heat rates of the involved generators and communicate those curtailments simultaneously to the gas company and affected generators. This will ensure that both the gas and electric distribution systems remain as reliable as possible. Further, the amount of curtailed generation due to pipeline pressure should be published by the ISO.