

Comments on Aliso Canyon Gas-Electric Coordination Straw Proposal

Department of Market Monitoring

April 21, 2016

The Department of Market Monitoring (DMM) appreciates the opportunity to review and comment on the ISO's Straw Proposal for Aliso Canyon Gas-Electric Coordination.

Analysis of gas burn

Before providing DMM's comments on specific items in the Straw Proposal, we first present a brief background analysis. To better understand the nature and magnitude of gas burn differences caused by electric generation, DMM has analyzed the causes of changes in gas burn by units served by the SoCalGas and SDG&E pipelines based on the resources real-time dispatch level compared to their day-ahead schedule. Results highlight that unit commitments (versus mitigated or unmitigated energy dispatches) have historically accounted for about three-quarters of increases in real-time gas requirements, while changes due to energy bid mitigation have accounted for only about 3 percent of increased gas usage.

For this analysis, we first calculate each unit's gas requirement to meet its day-ahead schedule based on its day-ahead schedule and heat rate at that level. This reflects the assumption that most or all of the gas needed to meet this schedule could be nominated in advance of the operating day. We then calculate each unit's gas requirement to meet its real-time dispatch level based on its real-time dispatch level and heat rate at that level. The difference represents the potential increase (or decrease) in gas required in the same day relative to gas needed to meet day-ahead schedules.

The change in each unit's gas requirement is then classified into four categories: (1) changes in unit commitment, (2) transitions of multi-stage units from one configuration to another, (3) changes in energy dispatches (above minimum operating level) of units not subject to potential bid mitigation, and (4) changes in energy dispatches (above minimum operating level) of units subject to potential bid mitigation.

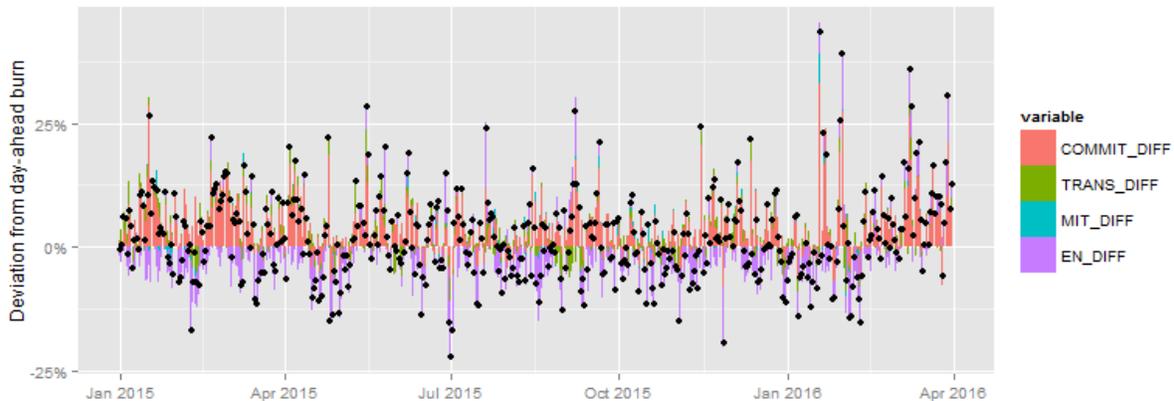
We then sum up the total daily total sum of the change in gas burn in each of these categories for all units, and compare this to the total gas burn for all units based on day-ahead schedules. Burn, real-time burn and burn difference is calculated. Results are presented in terms of the percentage increase (or decrease) in gas burn due to real-time dispatches. DMM notes that this analysis covers a period prior to any major restrictions, penalties, or gas price volatility due to Aliso Canyon that might change or reduce changes in gas usage due to real-time dispatches.

The black dots in Figure 1 show the difference between real-time burn and day-ahead burn as a percent of the day-ahead burn for each day between January 1, 2015 and March 31, 2016. The colored bars show the breakdown of this difference into the four categories noted above. Figure 1 shows that:

- Substantial deviations from the day-ahead burn are common. Real-time burn deviated from the day-ahead burn by more than 5 percent on 54 percent of days and by more than 15 percent on 8 percent of days during the sample period.
- On days with higher burn in real-time, the incremental burn is usually a result of additional real-time commitments (red color).

- However, on days with lower burns in real time, the lower burn is typically a result of resources operating at lower energy levels (purple color), i.e. a negative energy difference.
- Energy subject to mitigation (blue color) and transition difference (green color) appear to have played a very limited role in terms of increasing daily gas burn in real-time.

Figure 1 Daily gas burn difference for SoCalGas resources by category



The data illustrated in Figure 1 are further summarized in Figures 2 and 3. Figure 2 shows the breakdown between the four categories for daily upward differences. Figure 3 show the same breakdown for daily downward differences.¹ These figures show that about 74 percent of the upward difference is due to commitments, while 72 percent of the downward difference is due to energy not subject to mitigation. The figures further show that differences from resources subject to mitigation account for only 2 to 3 percent of the difference.

This analysis shows that commitment is a key issue in managing upward gas burn. This implies that any proposals affecting the ability to reflect gas procurement costs must recognize the limitations associated with the limited ability for resources to rebid their commitment costs within the day.

DMM also notes that this analysis illustrates how the incremental amount and cause of changes in gas usage in real-time relative to gas needed to meet day-ahead schedules can be calculated for use in regulatory or market design options – such as after-the-fact cost recovery or adjustment of any gas balancing penalties.

¹ The breakdowns in Figures 2 and 3 are calculated by first taking the sum of burn differences across resources for each day, then separating positive values from negative and finally computing an average of each variable across days. Note that this does not yield the same result as if the separation of positive values from negative is done before summing across resources.

Figure 2 Average daily gas burn differences by category (increased usage)

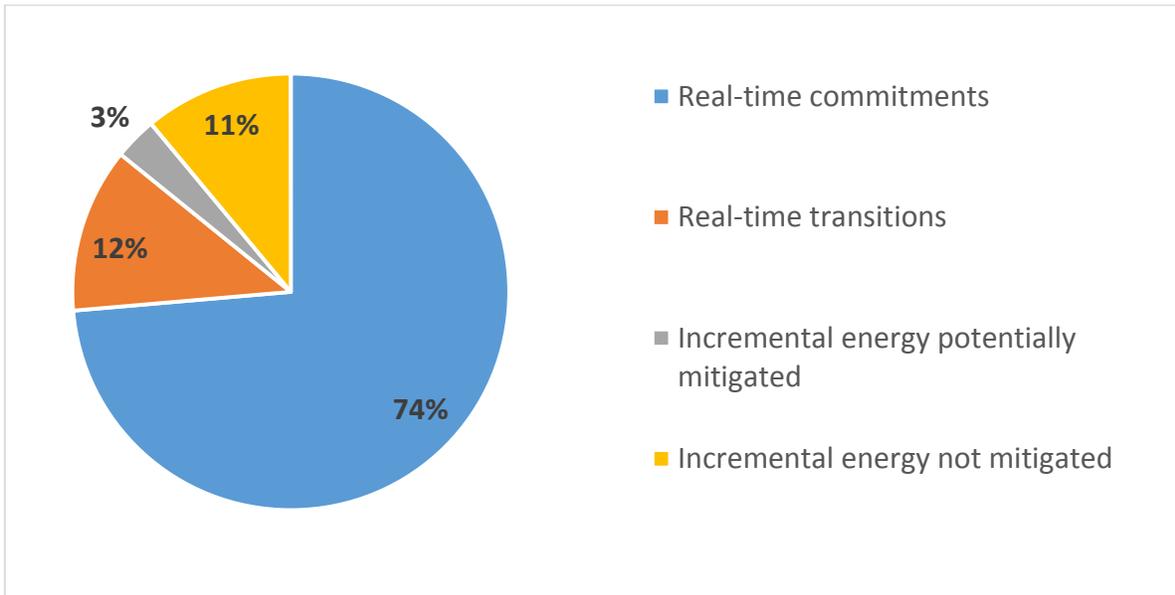
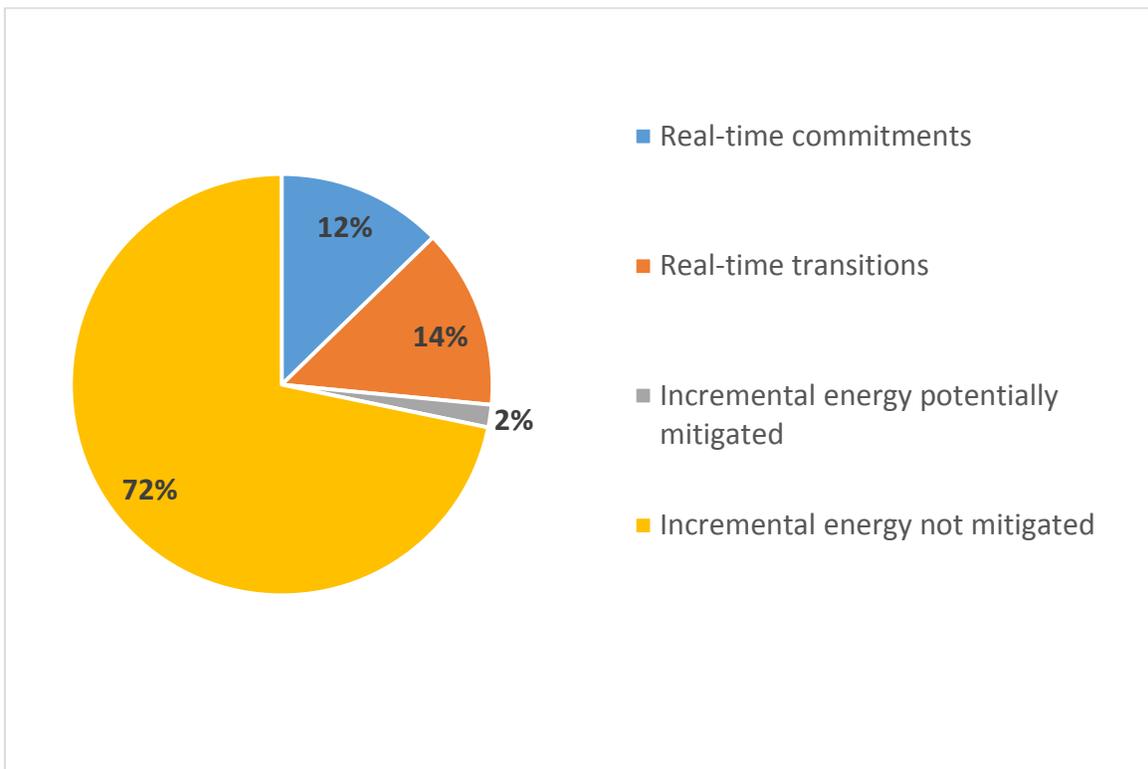


Figure 3 Average daily gas burn differences by category (decreased usage)



Introduction of a gas availability constraint (Section 5.1)

The ISO is proposing to implement a gas availability constraint to limit the amount of gas burned over a day from generators in the SoCalGas and SDG&E areas. This constraint would be a function of planned or forced outages in the gas system, and would be enforced in both real time and day-ahead (provided that information about the outage is available on time for the day-ahead run). DMM understands that such a constraint may be necessary to ensure gas system reliability in case of significant outages on the gas system.

To minimize differences between day-ahead and real-time markets, the ISO should strive to include this constraint in both day-ahead and real time whenever possible. If the constraint is included in the real-time market but not in the day-ahead, it may conflict with the real-time gas balancing constraint discussed in Section 6.2 and may also have an impact on real-time congestion imbalance offset costs. It is therefore important that the ISO carefully considers the relative penalty prices associated with these constraints.

The introduction of a gas availability constraint in the day-ahead market could also create problems in the congestion revenue rights (CRR) market. Whenever the gas availability constraint binds, the nodes that are tied to gas generators in the affected area will have lower prices than other nearby nodes that are not tied to gas generators. If the price differences due to the gas constraint are included in the CRR payouts, this could lead to significant amounts of revenue for CRR holders, without those CRR holders paying an appropriate cost in the CRR auction. This might be mitigated by excluding the gas constraint from the CRR payments. However, this would require defining the constraint clearly for this purpose and likely changing the tariff to reflect the different nature of this constraint.

Reserve internal transfer capability (Section 5.2)

To ensure that sufficient flexibility is available in Southern California to meet a contingency or an unanticipated net load deviation, the ISO may need to reduce the available transfer capability on Path 26. In effect, this would likely lead to an increased commitment of gas-fired resources in SP26, freeing up space on the transmission into Southern California.

DMM understands that this constraint is important to ensure reliability given the limited flexibility provided by gas-fired resources subject to the gas balancing constraint discussed in Section 6.2.

As described in the Straw Proposal, the available transfer capability that is set aside would only be released in the real-time market if “needed to deliver energy to Southern California.” If this is interpreted that the transmission capacity would only be released in case of very tight system conditions in Southern California, then the predictable price difference between day-ahead and real time is likely to be smaller. However, it would also mean that the ISO would forego economically efficient re-dispatch whenever system conditions are not strained.

However, it is important to consider the potential systematic price differences between day-ahead and real time that this constraint can create. If the release of this constraint in real time was frequent enough to create differences in real-time vs. day-ahead prices, and virtual bidders responded to price differences induced by this constraint, these virtual bids could undermine the effectiveness of the constraint and elevate system costs

For example, if real-time prices tended to be lower than day-ahead prices due to this constraint (or any of the proposed gas constraints), it may be profitable to submit virtual supply in Southern California. Even if virtual supply is “backfilled” by the residual unit commitment (RUC) process, RUC is a much less efficient mechanism for maximizing use of limited gas supply. This process does not consider energy bid prices and places a \$0/MW on all resource adequacy capacity (beyond start-up and minimum load costs). Also, since RUC energy schedules are not financially binding, it is unclear if generators receiving these schedules would procure gas in the next day market to meet these schedules.

Thus, DMM recommends that the ISO carefully monitor price trends and virtual bidding, and be prepared to suspend virtual bidding if any of the steps being taken create a systematic price difference that triggers virtual bidding in a way that undermines the basic reliability and efficiency goals of this initiative.

DMM further recommends that the ISO consider the impact that this transmission reservation will have on CRR revenue adequacy. If the reservation of this transmission causes CRR revenue inadequacy, these extra costs would be allocated to load-serving entities. To manage these costs, the ISO should seek to limit the degree to which transmission on Path 26 is limited in the day-ahead market to no more than needed. *DMM also recommends the ISO limit any additional CRRs sold on Path 26 in future monthly auctions.*

DMM also notes that congestion into and within the SCE area may be much more likely with this transmission de-rate. However, if this occurs while any of the gas constraints are being enforced in any part of the Southern California region, the calculation of available counter-flow to a binding constraint could be incorrect. The method used to determine the competitiveness of binding transmission constraints (and therefore if energy bid mitigation is triggered) relies on an accurate accounting of the supply of counter-flow. When any of the gas availability or balancing constraints are binding, the local market power mitigation procedure will tend to overestimate the actual amount of supply in Southern California that can relieve this congestion since it will not account for generation that cannot run due to gas limitations. This could prevent mitigation from being triggered when the actual supply of counter-flow in Southern California is non-competitive.

Increased access to information prior to day ahead (Section 6.1)

The ISO proposes to release the 2DA advisory results to market participants to improve market participants’ ability to plan. DMM has no objections to this proposal in principal, but believes that the added value of providing this information will be limited at best and potentially misleading should bidding patterns or conditions change the next day. In stakeholder discussions, it seemed to DMM that stakeholders did not view this a very high value measure.

Furthermore, the issue has been raised of whether increased access to this information could facilitate manipulative scheduling or bidding, since participants can change bids and schedules after these results are released. It would be very difficult to take action on this as manipulation behavior under FERC market rules. DMM notes that the ISO must weigh this against the potential benefits of releasing this information. The ISO should also monitor for manipulative behavior and have the authority to suspend the release of the information if it determined the benefits of this information was outweighed by the impact of any gaming/manipulative behavior.

Introduction of a gas balancing constraint in real time (Section 6.2)

To limit the daily deviations between day-ahead and real-time gas burn, the ISO is proposing to introduce a daily gas burn deviation constraint in the real-time market. The constraint would limit generation from the affected gas-fired resources around their day-ahead schedules. As with the other transmission and gas constraint options under consideration, DMM believes that the ISO should be prepared to closely monitor the impact of this constraint on day-ahead vs. real-time prices, assess the degree to which virtual bids induced by these price differences may be undermining the efficiency and reliability goals of these measures, and be prepared to suspend virtual bidding as appropriate to ensure system reliability and market efficiency.

DMM supports the proposed dynamic updating of the constraint over the course of the day, which would take into account burn deviations that occurred in previous hours. Such updating should allow for much needed flexibility, especially later in the day when additional gas procurement in the same day markets may be impossible.

The ISO believes that SoCalGas noncompliance charges provide no additional benefit under this constraint. However, in absence of such charges, market participants may not have sufficiently strong incentives to procure gas in the next day market to cover all of their expected next day gas burn on every day. DMM therefore believes that noncompliance charges should only be waived if the market participant procured gas to cover their expected gas burn, based on their day-ahead IFM (and, for long-start resources, RUC) schedules.

Further, DMM notes that, to the extent that this constraint may increase the amount of congestion in the real-time market, it may affect the real-time energy imbalance offset charges.

As previously noted, DMM also notes that this constraint could make the method used to determine the competitiveness of transmission constraints (used to determine if energy bid mitigation is triggered) overestimate the actual amount of supply in Southern California that can relieve this congestion since it will not account for generation that cannot run due to gas limitations. This could prevent mitigation from being triggered when the actual supply of counter-flow in Southern California is non-competitive.

Use of real-time gas price information (Sections 7.1 and 7.2)

The ISO emphasizes the importance of generators to be able to reflect same day gas prices in their real-time energy and commitment cost bids. To allow such flexibility, two possible approaches are suggested for incorporating same day gas price information in default energy bids and commitment cost bid caps:

1. Each generator would submit their own gas price quote, or
2. A rolling weighted average of same day and intra-day trades would be computed.

Given the short timeframe for this proposal, DMM believes that the ISO's ability to implement any of these changes is a key concern for this proposal. The ISO's current processes for calculating proxy start-up and minimum load costs is not sufficiently dynamic to allow for updates in real time. Further, market participants are unable to rebid commitment costs for committed resources within the day. While allowing for increased real-time commitment cost bidding flexibility may be beneficial, DMM is concerned that the ISO will not be able to implement such significant software changes before the summer in a reliable way.

Even if the implementation issues could be overcome, DMM believes that both the first and second proposals listed above are problematic. The first proposal (having market participants submit their own gas costs subject to potential audits) is problematic for several reasons.

- First, although the ISO has indicated it envisions that this cost review would be done by a consultant with gas expertise, the complexities and challenges of validating gas costs have been specifically noted by the ISO in several recent FERC filings on the issue of gas costs,² as well as the recent bidding rules initiative.
- Second, with this approach, even if gas costs were later determined to be inaccurate, the impact of these prices on the market commitment and prices could not be adjusted.
- Finally, since no guidelines have been developed for this process, DMM believes this approach could also be perceived as risky by generators, since they might face penalties and referral to FERC if gas cost estimates were later deemed inaccurate.

DMM also views the need for resources to submit transportation costs in addition to gas commodity costs as a temporary solution until enhanced bidding rules are implemented. The enhanced bidding rules process will allow for different transportation costs to be added directly to master file and will include a verification process. DMM recognizes that this may not be available by June and so a temporary approach, as outlined by the ISO, may be necessary. However, having participants submit transportation costs daily does not seem to add much value as, in most cases, they do not vary much from day-to-day.

The second proposal (a weighted average of observed same-day and intraday trades) would likely be problematic due to lack of liquidity in same-day markets on most days. Table 1 shows historical levels of liquidity for same-day trading on ICE at the SoCal Citygate and PG&E Citygate. The “Number of trades” section shows the minimum, mean and maximum number of same-day trades on days where there was at least one same-day trade. The “Days with no trades” column show the percent of trade days (i.e. excluding weekends and holidays) when there were no same-day trades.

² See *Comments by the California Independent System Operator Corporation on Technical Workshops, Price Formation in Energy and Ancillary Services Markets Operated by Regional Transmission Organizations and Independent System Operators*, Docket No. AD14-14, March 6, 2015, p. 5:
http://www.caiso.com/Documents/Mar6_2015_CAISOCComments_onTechnicalWorkshops_AD14-14.pdf.

Table 1 Same-day trade liquidity

Trading Hub	Year	Number of trades			Total volume traded (MMBtu)			Days with no trades
		Minimum	Mean	Maximum	Minimum	Mean	Maximum	
SoCal Citygate	2010	1	5.4	23	600	46,041	270,500	17%
	2011	1	7.5	39	500	66,370	334,000	9%
	2012	1	10.7	41	2,400	108,937	409,400	2%
	2013	1	8.3	52	2,000	82,118	637,000	15%
	2014	1	7.5	70	2,000	63,781	757,500	8%
	2015*	1	8.3	27	3,000	61,285	245,000	11%
PG&E Citygate	2010	1	7.4	35	2,000	54,912	285,500	10%
	2011	1	7.2	52	1,100	54,276	449,500	15%
	2012	1	6.4	48	300	54,244	359,000	22%
	2013	1	6.7	75	100	64,474	643,100	18%
	2014	1	7.2	43	200	58,119	272,100	11%
	2015*	1	5.6	33	1,000	48,324	308,200	29%

* January 1 - November 5

As seen in Table 1, same-day markets are highly illiquid on most days. This is problematic for at least two reasons:

1. Illiquid markets are easier to manipulate. Market participants could easily influence the VWAP with just a few transactions.
2. An average that is based on very few observations will have a higher variance compared to an average based on more liquid next-day trading. Such an average may therefore be less indicative of the true marginal cost, even if it is based on more recent trades.

Due to the lack of liquidity in same-day markets on most days, DMM believes that same-day price information should only be considered for ISO proxy costs and DEBs on days where a significant liquidity is observed and same-day prices deviates substantially from the next-day trading.

Other Real-Time Gas Cost Options

In practice, DMM believes it is highly likely that both the methods suggested by the ISO for improving real-time gas cost estimates will not be feasible due to software limitations. If this is the case, DMM notes that all real-time bids for commitment costs and DEBs must currently be calculated starting about 8 pm the night before the operating day. This also means that even if the ISO could make modifications needed to allow generators to submit their own gas costs in this current process, they would need to do this by about 8 pm the night before the operating day.

This would mean that generators would not have any actual information on same day trading conditions, quotes from brokers, etc. This will also make after-the-fact review of this very problematic. How will the ISO assess the accuracy or reasonableness of a same day gas cost estimate provided at 8 pm the night before the operating day?

One option might be for the ISO to use its own estimate of potential gas prices in the same day market, based on observed differences in same day vs. next day prices. Historically, gas price spikes in the same day have not been systematic or predictable. However, if the Aliso Canyon conditions create a systematic and predictable difference in next day and same day gas prices, this might be feasible. The ISO could make adjustments based on observed trends. However, to what extent the same day natural gas market will be affected by changes by SoCalGas operations cannot be known at this time. Moreover, given the physical limitations on gas supply in real time, DMM questions the extent to which a “market” for same day gas will really exist.

A second option that DMM believes the ISO may find to be one of the only feasible options is to increase the headroom commitment cost bid caps (25 percent for non-use limited) and default energy bids (10 percent). If the ISO ultimately resorts to this approach, DMM recommends that the degree to which the headroom on commitment cost bid caps (25 percent for non-use limited) and default energy bids should be based to the extent possible on empirical data and analysis rather than basically arbitrary levels. Two types of such empirical data and analysis include the following:

- **Actual recent same-day price data.** As noted above, historically gas price spikes in the same day market in Southern California have not been systematic or predictable. However, if the Aliso Canyon conditions create a systematic and predictable difference in next day and same day gas prices, this approach might be feasible.
- **Relative commitment and energy costs.** DMM also notes that in order to avoid commitment and dispatch of resources within a gas constrained area for system needs that could be met by other resources, it is only necessary that commitment costs and DEBs for resources in the gas constrained area to be marginally higher than commitment costs and DEBs for resources in the non-gas constrained areas. Thus, we believe that it is important to differentiate resources by area or fuel region. For instance, if real-time commitment and default energy bids in both Northern California the affected areas of Southern California were allowed increase by 150 percent of cost-based bids based on the next day gas index currently used, then this would have a much lower effect in terms of avoiding commitment and dispatch of resources within a gas constrained area for system needs that could be met by other resources. In addition, it is unclear what cost justification might exist for raising the current bid caps in areas outside of Southern California. One option would be to analyze the relative costs of units outside vs. inside the affected areas to assess the degree that cost-based bids in the affected areas in Southern California might need to be increased to ensure these units are slightly higher in the economic merit order than other units that could be dispatched to meet system needs instead of units in the gas-constrained area.

While both the above approaches might provide a frame of reference for determining how much the headroom on cost-based bids in Southern California might be allowed to increase, DMM believes that in practice the ISO should have the flexibility to set and modify the headroom on bid caps within a reasonable range based on observed market conditions.

Accelerated implementation of commitment cost bidding items (Section 8)

The ISO is asking FERC for an expedited treatment of two items from the Commitment Cost Bidding Improvements proposal. DMM supports this effort.

Routine use of updated day-ahead gas price index (Section 9)

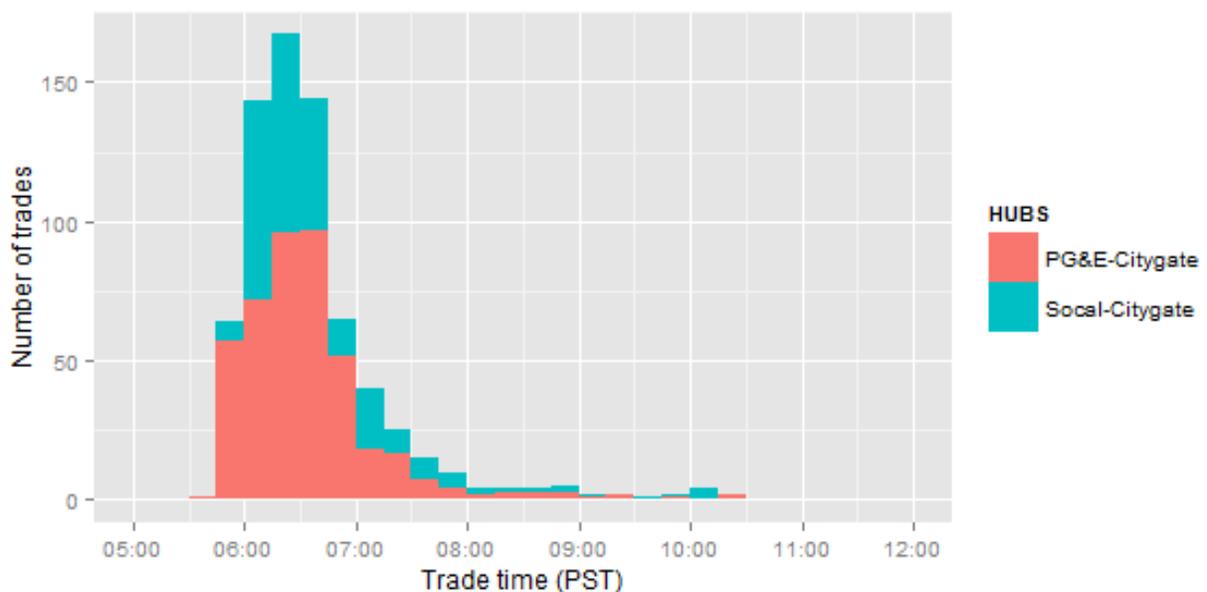
The ISO is proposing to use information from the timely next-day gas trading (which traded in the morning of the day-ahead run) for use in the day-ahead market. Two possible approaches are suggested:

1. Each generator would submit their own gas price quote, or
2. A weighted average. The proposal here refers to same-day and intraday trading, but DMM assumes that this is a typo and should refer to next-day timely trading.

DMM strongly prefers Option 2 over Option 1 (assuming that Option 2 refers to next-day trading). Option 1 would be subject to the same type of difficulties as discussed for Section 7 above.

The viability of Option 2 hinges on the ISO being able to acquire trade-level data before the end of the timely trading cycle and before the publication of indices. If the ISO can obtain such data in a reliable way before 10 am, a close approximation of the relevant next-day index could be calculated. This is illustrated by Figure 4, which shows the distribution of trade times for next-day trading on ICE at the PG&E and SoCal Citygates for a few sample days in early April 2016. As seen, most trading takes place before 8 am Pacific Time. If the ISO can get access to price and volume data for these trades, a good approximation of the next-day index should be obtainable.

Figure 4 Timing of next-day trades on ICE (April 1 - April 8, 2016)



Given that there may be difficulties in implementing Option 2 on a routine daily basis, at a minimum, the ISO should consider this as an alternative approach to its current manual 125 percent price spike procedures. Since ICE has moved the timing of its publication of its next day natural gas index prices from 10 am to 11:30 am Pacific Time, this has created a challenge in incorporating price spikes above 125 percent in the day-ahead market in a timely manner. This could end up jeopardizing the ability of participants to procure gas before the evening nomination cycle should the ISO delay its market runs to accommodate the new ICE index publication time.

Implementing Option 2 for the manual gas price procedure would allow the ISO to incorporate the best known information at the time and would allow the ISO to be better prepared to publish the day-ahead market results in a timely manner to allow gas generators to meet the evening natural gas nomination cycle. From an ISO implementation perspective, this would be less difficult than attempting to implement a permanent procedure for all days, and would address the challenges that have been created by the change in the ICE natural gas index publication.

Other Recommendations

Limiting provisions

The ISO is undertaking this expedited stakeholder process to address issues related to current Aliso Canyon limitations, which are expected to be temporary. As such, DMM views much of what is being developed as part of this process as temporary, though some elements of the ISO's proposal could translate into more permanent changes. Thus, we recommend that the ISO incorporate provisions in its proposal that limit and reevaluate the use of any of these policy and market changes when conditions created by the Aliso Canyon outage have changed. The ISO used such limitations after the extraordinary gas events that occurred in February 2014. During that period the ISO asked for and received only temporary authority to address the conditions, and later evaluated through several stakeholder processes how to better modify market design to address the gas conditions experienced during that period. This approach resulted in several thoughtful market design and rules changes through several stakeholder processes including the commitment cost enhancements and bidding rules initiatives.

Conclusions

While DMM is supportive of several elements of the ISO's proposal, DMM also has significant concerns around many elements of the ISO's proposal. DMM believes that the ISO should best focus its time and efforts around items that can be implemented in the few weeks prior to this summer. Specifically, with respect to increased bidding flexibility, DMM believes that increasing bid limits are highly likely to be the most – or only – feasible short-term approach to increasing bidding flexibility by this summer.

Without any historic information to frame how much flexibility would be necessary, at a minimum it would be important to ensure that resources within a gas constrained area were marginally higher than commitment costs and DEBs for resources in the non-gas constrained areas. However, if the Aliso Canyon conditions create a systematic and predictable difference in intra-day and same day gas prices, the ISO should have the flexibility to make adjustments to bid limits based on observed trends.

In addition, as noted in this paper, DMM recommends that the ISO:

- Limit any additional CRRs sold on Path 26 in future monthly auctions.
- Carefully monitor price trends and virtual bidding, and be prepared to suspend virtual bidding if any of the steps being taken create a systematic price difference that triggers virtual bidding in a way that undermines the basic reliability and efficiency goals of this initiative.
- Investigate the option of obtaining ICE price data (or other data on next day gas prices) before 10 am and utilize this to develop an estimate of next day gas that could be used in the ISO's day-ahead market in the event there are indications that gas indices from the prior day currently used may significantly under-estimate actual next day prices. If the ISO can get access to price and volume data for these trades, a good approximation of the next-day index should be obtainable.