



California ISO

Gas Resource Management Working Group
Discussion Paper
October 4, 2023

California Independent System Operator

Table of Contents

Executive Summary	1
Introduction.....	2
Background.....	2
Gas Resource Management Working Group Process.....	2
Gas Resource Management Working Group Deliverables	3
Gas Resource Management Working Group Action Plan.....	4
Discussion Paper Summary	5
Gas Resource Management Working Group Topics	5
Gas Resource Management Working Group Principles.....	5
Gas Resource Management Working Group Problem Statements	6
Discussion Topics.....	6
1. Alignment of Electric and Gas Market Timelines	6
2. Cost Recovery Mechanisms	8
3. Bidding Flexibility.....	9
4. Resource Specific Limitations	10
5. Gas System Limitations.....	11
Proposed Problem Statements	12
Appendix.....	14
Revision Tracking	14
Action Items.....	16

Executive Summary

The Gas Resource Management (GRM) Working Group is designed to explore with stakeholders the gas management challenges they face in their participation in the Western Energy Imbalance Market (WEIM) and potentially the extended day-ahead market (EDAM). The ISO anticipates the GRM Working Group will give stakeholders a more active role in informing the policy vision and direction for gas resource management. The resulting work product will identify scope, prioritization, and ultimately develop a GRM Action Plan for a future policy initiative.

This paper provides stakeholders with an overview of the upcoming ISO-hosted and stakeholder-driven GRM Working Group meetings. Specifically, the paper discusses the background on the working group effort. As the working group process proceeds, the paper will offer a strawman for the structure of the GRM Working Group and a synthesis of the GRM stakeholder comments on the proposed topics the working group should consider. This paper is a tool to assist the GRM Working Group participants in organizing discussions and a means of accelerating collaboration between stakeholders. A recommended output of this effort is a “GRM Action Plan,” containing recommendations to the ISO for a future GRM policy initiative to support GRM designs that are durable and meet the needs of stakeholders.

This document outlines proposed topics for the working group based on comments received through the stakeholder initiative page to date. The second working group discussion coalesced around scope areas: a) alignment of gas market timelines, b) existing cost recovery mechanisms, c) bidding flexibility, d) ensuring resource specific limitations are considered, and e) appropriate reflection of gas limitations within the market. This document tracks additional scope items and the development of related problem statements.

Introduction

Background

During the early stages of WEIM expansion, the California ISO and stakeholders explored market functionality to support gas resource management. A series of Commitment Cost Enhancement initiatives¹ provided more flexibility for participants to represent gas costs, a more accurate representation of actual gas costs being utilized for the resource by the market, and adequate accounting for opportunity costs. The CAISO developed further enhancements to market participation mechanisms through the Bidding Rules Enhancements² and Commitment Costs and Default Energy Bid Enhancements³ initiatives conducted respectively in 2017 and 2020. These efforts enhanced inputs to calculated cost parameters and provide an avenue for cost adjustments based on gas market volatility.

The growth of the WEIM and the efforts of the Extended Day Ahead Market (EDAM) initiative have highlighted a need to revisit resource modeling in both the day-ahead and real-time market horizons from a more diverse regional perspective. Specifically, the supply commitment and resource sufficiency evaluation working group of the EDAM highlighted the need to continue to consider gas management challenges⁴. The GRM working group effort is intended to extend a forum for stakeholders to assess existing market functionality and bring forth new and persistent challenges for community consideration.

Gas Resource Management Working Group Process

The working group process reflects general stakeholder feedback and incorporates this input before the initiative process, which can lead to more alignment on the scope of an initiative and proposed design.

Stakeholders have the opportunity to provide input on key components leading up to proposal development;

1. Define and illustrate principles for market design and gas resource management.

¹ CCE1: <http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=d64f16be-45f4-4c71-a44a-4f2d958fd047>; CCE2: <http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=61e75ea2-85ea-4a2a-a0ac-de3b24eb57eb>; CCE3:

<http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=a2844d76-b015-4094-aa74-caba0e46fea4>

² <http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=511740b8-6a9a-4d1c-b4c4-65af45799d4b>

³ <https://stakeholdercenter.caiso.com/StakeholderInitiatives/Commitment-costs-and-default-energy-bid-enhancements>

⁴ Gas Resource Management was also discussed during the WEIM Regional Issues Forum in June 2023.

2. Form problem statements reflecting stakeholder concerns.
3. Align on priorities and establish cadence to balance staff and stakeholder bandwidth.
4. Illustrate problem statements by exploring current ISO market operations, functionality, and processes, and developing a methodology for assessment.
5. Determine action items for each problem statement to provide a bridge between working groups and proposal development.

Should subject matter be identified as technically complex and require further discussion, the ISO is open to hosting additional stakeholder workshops or providing additional background and education on key elements of the proposal.

Gas Resource Management Working Group Deliverables

Evolving This Discussion Paper

The GRM discussion paper will serve as a resource for stakeholders by reflecting the discussion and decisions that occur during the working group process. After each working group meeting, ISO facilitators and scribes will provide notes, key decisions, and action items identified by stakeholders. The ISO will post these notes for review between working group meetings.

[22] Stakeholders will work to build problem statements based on the scope items identified in this paper. To best inform solution development, problem statements should:

- Reflect principles by describing how basic principles of market design are not being met
- Identify the root cause of problem in terms of existing CAISO market design and processes meant to achieve desired market outcomes
- Justify or illustrate how problems might impact the market's ability to achieve desired outcomes

[1] Revision tracking in the appendix of the Discussion Paper provides a transparent record of changes to ensure stakeholders understand how their input informs the stakeholder process. The Action Items are tracked in the appendix to ensure stakeholder requested action items are recorded and resolved. The ISO encourages stakeholders to clarify input through comments should their feedback not be accurately or comprehensively reflected.

Gas Resource Management Working Group Action Plan

The final discussion paper is intended to serve as a “GRM Action Plan” that reflects the outcome of stakeholder discussions during the working group process. The recommendations in the GRM Action Plan will ensure that ISO initiative process reflects the stakeholder determined vision and roadmap.

Discussion Paper Summary

Gas Resource Management Working Group Topics

The topics proposed in the first iteration of the Discussion Paper are designed to synthesize stakeholder feedback from the July 27th GRM Meeting and submitted comments prior to the call.

1. Alignment of Electric and Gas Market Timelines
2. Existing Cost Recovery Mechanisms
3. Bidding Flexibility
4. Resource Specific Limitations
5. Gas System Limitations

[1] The following topics were raised in subsequent working groups for group consideration, and are reflected in more detail within associated discussion topic areas:

1. Gas transportation rate accounting
2. Commitment Cost Default Energy Bid Enhancements (CCDEBE) interplay
3. Bid mitigation in the context of cost recovery
4. Existing issues with the Multi-Stage Generator (MSG) model
5. Increased Operation Flow Orders (OFOs) resulting in higher gas price volatility than in the past
6. Registration of different heat rates reflecting resource operating parameters throughout the year
7. Impact of bid mitigation in real-time during gas volatility
8. 5am/4am advisory day-ahead market run to help inform more accurate gas procurement
9. Gas burn limitations as a market input
10. Expansion of use limitation qualification

Gas Resource Management Working Group Principles

Throughout the working group process, stakeholders will consider how problem statements relate to market design principles to facilitate assessment of prioritization and potential trade-offs between approaches. The ISO encourages feedback on these principles.

[2Y] During the July 27th working group, stakeholders suggested additional principles related to the basic principles of market design that should broadly apply to gas resource management:

1. Efficiency
 - Basic market design principles: Incentive compatibility, dispatch on offered prices will minimize actual system production costs, assets want to produce awarded amount
 - GRM principle: Incentives to reflect verifiable cost expectations
2. Simplicity
 - Basic market design principles: simple logic that applies broadly like uniform pricing
 - GRM principles: Reasonable accommodation for cost adjustments that apply broadly, minimize accommodations for edge case scenarios
3. Transparency
 - Basic market design principle: Market prices are transparent and known to participants
 - GRM principles: Sufficient information is available when making bidding and procurement decisions
4. Feasibility
 - Basic market design principle: prescribed process is operationally feasible, the market can resolve with prescribed timelines
 - GRM principle: Participant data confidentiality is respected

Gas Resource Management Working Group Problem Statements

Identified problem statements should offer a clear path toward analysis and proposal development that honor and consider the principles. These were discussed during the July 27th call and were further developed during the August 22nd GRM meeting.

Discussion Topics

As part of ISO's role facilitating these discussions, the ISO gathered proposed problem statements that will be utilized as discussion topics to further understand and ask the group "what is the problem statement with this issue?" to help inform direction of policy. This section synthesizes those points below.

1. Alignment of Electric and Gas Market Timelines

This topic reflects stakeholders' interest in exploring the trade-offs associated with aligning the day-ahead electricity market with the existing gas market timelines.

In past stakeholder discussions, the ISO explored with stakeholders the potential of aligning the day-ahead electric market with existing gas markets. The ISO has also contributed to FERC and NAESB proceedings. Background on the stakeholder initiatives, related proceedings, and the specific issues discussed can be found in Appendix A.

This working group topic offers stakeholders an opportunity to review past proceedings to support their own assessment of previously identified trade-offs. This topic offers a venue to explore the challenges stakeholders have identified in association with the difference in timelines, and will facilitate the identification or development of market mechanisms or tools to mitigate these issues.

Stakeholders identified the following issues associated with the gas and electricity market timelines:

1. Market participants do not have sufficient information to make gas procurement decisions [\[2\]](#)
 - a. Gas procurement takes place before 8am for the forward market cycle leaving potentially large exposure
 - b. Two-Day Ahead advisory schedule is not sufficient due to volatility
 - i. A brief comment was made around having a 5am energy advisory schedule run for following trade date
 - c. Weekend cycle where gas needs to be procured for potentially up to four days presents challenges
 - d. RUC awards that are not binding require RT offers which leads to potential of getting picked up in RT
 - e. Need for a fuel burn advisory
2. Recent increases in variable energy resource capacity has increased forecast uncertainty in determining gas procurement [\[2A\]](#)
 - f. Visibility to the gas spot market price isn't apparent/available for some participants [\[2A\]](#)
 - g. Operational flow orders for both min and max need to be accounted for and represented in market
 - h. Illiquidity in evening nomination [\[2B\]](#)
3. Participants do not have certainty in the DA+2 advisory results, made available by 13:00 two days prior to real-time dispatch, to inform gas procurement targets and therefore do not have sufficient information to participate in the Timely nomination cycle which is the most liquid procurement and nomination cycle.
 - a. Stakeholders suggested that a new 5am advisory run would provide more certainty [\[3\]](#)

- i. Stakeholders noted that needs to be an “advisory market run” that is published by 4am would provide the optimal window to prepare for gas procurement by 7:00am [3Y]
- ii. Stakeholders considered that there may be a risk of deviations between an earlier advisory market results and RT dispatch given the accuracy of available information at that time
- b. Gas spot market price visibility when submitting energy bids [2]
 - i. Stakeholders noted services external to the ISO that provide participants with these prices [3]

2. Cost Recovery Mechanisms

Stakeholders identified the following issues associated with the current cost recovery mechanisms:

1. Current process for a manual reference level change request⁵ is burdensome
 - a. Current deadline (8am) for manual reference level adjustments causes a workload challenge for traders attempting to set up their positions prior to the bidding deadlines due to known information at that time [2]
 - i. Stakeholders noted that timing coincides with the Intra-day 1 nomination deadline
 - ii. Stakeholders believe a later time would alleviate the staffing concern [3]
 - iii. Stakeholders are concerned that they will not have the relevant information to make a reference level change request given nomination notification times
 - b. Submitting per resource is just not easy and takes too long [2B]
 - i. Stakeholders noted that functionality allowing change requests to be submitted at the fuel zone level would allow a single change request to accommodate multiple resources [3, 3Y]

⁵ The manual reference level change request process is available when a resource’s fuel or fuel-equivalent cost expectations are greater than the fuel cost used by the CAISO to calculate the resource’s reference levels. Scheduling Coordinators may submit their higher fuel costs to the CAISO for manual review. Manual reference level change requests must be submitted via CIDI by 8:00 AM PST. Please refer to the BPM for Market Instruments, Attachment O.1.3 for more details.

- c. Reexamining the automated reference level adjustments “reasonableness thresholds”⁶ may prevent the need for manual adjustments all together [3]
2. After-market cost recovery process is burdensome and may necessitate FERC filings [2]

3. Bidding Flexibility

Stakeholders expressed a desire for more bidding flexibility to better reflect their verifiable cost expectations in the market. Stakeholders identified the following issues associated and related to bidding flexibility:

- 1. Default commitment cost cap percentages⁷ are too restrictive
 - a. Caps do not allow generators to represent OFOs exposure and are based on outdated market conditions (higher number of OFOs in today’s market) [2]
 - i. Stakeholders noted an increase in OFOs, a trend which implies an increased reliability risk. [3]
 - ii. One stakeholder noted that an alternative to an economic adjustment to avoid reliability issues would be to mitigate reliability risk through volumetrically constraining gas burn, and topic covered in section 4. [3]
 - b. Allow for multiple RT commitment costs to be reflected in different hours through-out the trading day to better represent costs [2]
 - i. Stakeholders raised concerns that once real-time commitment costs are locked, they cannot be changed despite incidences of high intraday volatility.
 - ii. Stakeholders raised concerns with allowing this given the potential for inflating costs after unit commitment [3]
- 2. Ability to reflect different resource heat rates across periods or conditions [3A]
 - a. Stakeholders noted that ambient temperatures in western regions may vary more frequently and across a wider range than can be factored into standard reference level calculations.

⁶ Reasonableness threshold describes a resource-specific and reference level-specific parameter that is used when a Scheduling Coordinator submits an automated reference level change request directly in the bidding platform. Automated reference level change requests will be accepted up to the value of the reasonableness threshold for the corresponding reference level. Please refer to the BPM for Market Instruments, Attachment O.1.1 and O.1.2 for more details.

⁷ Currently set at 125% of the resource’s calculated proxy commitment cost value. Please refer to the BPM for Market Instruments, Attachment G.2.1 for more details.

- b. Stakeholders agreed this can be accommodated through existing functionality with the current ability to update master file seasonally or monthly if need be to reflect more accurate heat rates under different conditions [\[3Y\]](#)
- 3. Generator reference levels used to determine default energy bids and commitment costs are calculated for the electric day, not gas day.
 - a. Reference levels in HE1 through HE7 do not reflect appropriate gas day's cost even though more up to date information on gas prices is available
 - i. A proposed remedy is to utilize the appropriate gas day's costs for HE1 – HE7 [\[2, 3Y\]](#)
 - 1. Stakeholders all agreed that this would more accurately reflect costs based on available data [\[3\]](#)
- 4. Energy bid mitigation during periods of gas price volatility [\[2\]](#)
 - a. Stakeholders noted that bid mitigation could be correlated with periods of high gas price volatility, during which times the default energy bid may not be sufficient to represent a resources' true marginal costs.
 - b. Default Energy Bids would need to commensurately increase to reflect sudden changes in gas prices [\[3, 3A\]](#)

4. Resource Specific Limitations

Stakeholders expressed interest in considering how market processes can better accommodate resource specific limitations and their associated costs.

Stakeholders identified the following challenges associated and related to resource specific limitations:

- 1. Ability to map multiple gas hubs to a specific gas resource that is able to draw gas from multiple hubs.
 - a. Stakeholders expressed the need to easily transition the gas price used in resource reference levels to a different pre-established gas fuel region on a quicker timeline than current Masterfile process, which requires 5 days to update, allows for resources that are connected to multiple gas systems [\[2\]](#)
 - i. Stakeholders agreed with the need to represent the correct cost associated with potentially multiple fuel sources in order to fully recover costs [\[3A, 3Y\]](#)

2. Gas resource use limitations should account for additional limitations like reliability based limitations, which can be eligible for a calculated opportunity cost.⁸ [2B]
 - a. Current rules have explicit categories of acceptable limitation criteria to establish use-limited status. One stakeholder suggested that the limitation criteria should explicitly consider a reliability-based limitation for when a gas resource provides ancillary services in their balancing area [3]
 - i. Suggestion to re-examine the use-limited eligibility criteria to consider reliability-based use limitations [3Y]
3. Gas transportation rates impact on bidding and the setting of a system marginal price [2C]
 - a. Stakeholders discussed how regional differences in gas transportation rates can be accounted for through custom fuel region creation to accurately reflect the costs incurred by the generator [2]

5. Gas System Limitations

Stakeholder expressed a desire to account for additional gas system limitations that are not fully accounted for in today's design. The below challenges are associated and related to gas system limitations:

1. Accounting for differences in gas systems and storage capabilities
 - a. Generators pulling for local system have competitive issues within the EN market due to the utilization of volumetric rate causing lack of EN awards [2]
 - i. Through discussion, transportation rates are accounted for and reflected in costs and accurately reflected [2]
2. Gas Burn limitations taken into account
 - a. Participants need a way to reflect gas burn limitations issued by the gas company for a set of generators on a given pipeline [2]
 - i. Stakeholder discussion shifted from a focus on individual participants identifying gas burn limitations and informing the market (citing manipulation concerns), to the ability for the ISO Market to treat these limitations as an input informed by the gas company [3]

⁸ Current criteria for qualifying use limitations are outlined in the BPM for Market Operations, Section 2.1.15. Details on the opportunity cost calculation can be found in the BPM for Market Instruments, Attachment N.

Proposed Problem Statements

[3X] This section is intended to capture proposed problem statements under discussion, track the topics and principles related to each problem statement, and help identify action items that will help develop and refine each statement. Stakeholders are encouraged to submit feedback on these proposed problem statements by helping identify what policy or process is relevant, describing the market outcomes and principles.

Proposed problem statement 1 (alignment of markets): Participants do not have enough certainty in the accuracy of 2 day ahead advisory awards and forecasts to confidently utilize this information as a procurement target for gas in the more liquid Timely nomination cycle.

Proposed problem statement 2 (alignment of markets): Because the Electric Day-Ahead results are not published until 1pm during Gas Day 1, participants do not have sufficient information about their own dispatch schedules to make confident and risk-informed gas procurement decisions (7am day ahead) to support those market schedules.

Proposed problem statement 3 (alignment of markets, bidding flexibility): During episodes of natural gas system constraints and volatility, especially when participants are issued OFOs, generators encounter difficulties in representing their costs within the Energy Market because bid caps may be too restrictive and there may be a higher likelihood of being mitigated down.

Proposed problem statement 4 (cost recovery): The reference level change request processes are too burdensome because the automated process can only be submitted for one resource at a time, and the 8am deadline to submit a change request through the manual process conflicts with other trading activities. These restrictions limit their intended usefulness for cost recovery.

Proposed problem statement 5 (bidding flexibility, cost recovery): The current Default Commitment Costs and Default Energy Bids limit generators from reflecting actual gas costs.

Proposed problem statement 6 (cost recovery): The reasonableness thresholds used to assess automated reference level change requests are too low given the increasing volatility in today's gas market.

Proposed problem statement 7 (cost recovery): Heat rates used for reference level calculations do not account for greater heat rate variation from larger temperature ranges in diverse western climates.

Proposed problem statement 8 (bid flexibility): Energy markets do not reflect the appropriate gas day's cost that are used in Default Commitment Cost and Default Energy Bid formulation for HE1 through HE7 despite the fact that this cost information is available.

Proposed problem statement 9 (use limitations): Generators are unable to reflect accurate costs in the market due to a limitation on the number of gas hubs that can be reflected in the calculation of their reference levels.

Proposed problem statement 10 (use limitations): Use-limited registration criteria does not explicitly recognize certain reliability-based limitations of gas resources in a balancing area and as a result, renders resources ineligible for the opportunity cost calculation.

Proposed problem statement 11 (gas burn): Gas burn limitations are not reflected in the market for WEIM balancing areas, which may lead to inaccurate or infeasible unit commitment or dispatch instructions.

Appendix

1. Gas and Electric Market Alignment

The existing timing of the day-ahead electric market is intentionally run between the timely and evening nomination cycles, allowing market participants to optimize their gas procurement between the two cycles with knowledge of fixed prices during the timely cycles and fixed quantity during the evening cycle.

Through both CAISO-run stakeholder process as well as CAISO participation in FERC and NAESB proceedings, the CAISO has considered aligning the day-ahead electric market to the timely gas nomination cycle. During these endeavors, the CAISO identified a number of potential issues that lead it to determining aligning the market timelines was not in the best interest of CAISO market participations.

Complications relating to market efficiency due to unknown gas prices, changes to business process, and increased forecast inaccuracy due to earlier timelines were identified as just reasons to not move the day-ahead market clearing timelines.⁹

The CAISO is planning to work with its internal Scheduling Coordinators to revisit if present market conditions erase these concerns, but ask that stakeholders consider the following in their own assessment.

Revision Tracking

The table below summarizes changes made to this document based on working group discussions and comments.

Revision #	Category	Revision Summary
1	Process	Revision tracking is new to this iteration of the Discussion Paper, updated after the September 18 th working groups.
Working Group 1 - July 27, 2023		
	Topics	Initial Discussion Paper topics reflect those in the original discussion paper.
Working Group 2 - August 22, 2023		
2	Topics	The August 22 nd GRM meeting continued further discussion on the initial topics outlined in the discussion paper. Stakeholders brought up additional scope items for consideration and review during a facilitated

⁹ [CAISO Bidding Rules Enhancements - FERC Order 809](#)

		discussion of defining and illustrating potential problem statements.
2A	Topics	Reflects comments submitted by SRP.
2B	Topics	Reflects comments submitted by NVE.
2C	Topics	Reflects comments submitted by NCGC.
2Y	Principles	The community, through comments on the first discussion paper and verbal confirmation during the meeting, agree with these principles and believe they adequately incorporate the foundational principles that the GRM working group should keep in mind while they work through the definition of problem statements.
2Z	Process	In recognition that problem statement building is meant to be an iterative process, working group participants reviewed key elements of a problem statement. The ISO included these elements in the discussion paper to facilitate stakeholder's identification of what additional information they might need to develop and refine problem statements.
Working Group 3 - September 18, 2023		
3	Topics	The September 18 th GRM meeting continued further discussion on scope items under consideration, and reviewed what has been heard to-date in the working groups. Stakeholders refined these scope items by identifying underlying issues market participants are facing and uncovering potential root causes. Through consideration of previously introduced solutions, stakeholders identified potential trade-offs associated with potential paths forward. ISO subject matter experts presented on existing functionality salient to stakeholder concerns in the Discussion Paper to help educate market participants on tools available today, and to facilitate discussion of how these tools may fall short of resolving the outstanding issues.
3A	Topics	Reflects comments submitted by Idaho.
3X	Process	A Proposed Problem Statements section will help track cross-topic problem statements
3Y	Topics	Stakeholders considered potential pathways and associated implications to resolving or mitigating some of the challenges arising from the misalignment of the gas and electric market timelines.

Action Items

Action Item	Assigned Party	Progress/Resolution
Working Groups 1-3, August 2023		
Vistra recommended the group revisit principles from CCDEBE	ISO	The ISO plans to publish a CCDEBE summary matrix for working group consideration as participants develop and refine problem statements. In general, working group principles will continue to evolve with problem statement definition.
Review history of aligning gas and energy Markets	Community	Stakeholders to review history of the exploration of aligning Gas and Electric Market timelines (<i>see Appendix for link</i>)
Define inputs for the D+2 market run	ISO	ISO will provide details to stakeholders for the associated D+2 market run inputs.
Pacifcorp asks for analysis on accuracy of VER and Load forecast	ISO	ISO to determine best approach in providing analysis of accuracy for targeted period of data requested.
How often 125% cap utilized	ISO	ISO to review peak gas day(s) and provide aggregated data
The Energy Authority suggested review of past FERC cost recovery filings	ISO	In reference to Topic 2, FERC filing cost recovery process, stakeholder recommended a look at the last FERC gas recovery filing and review how the process played out with participants and the ISO to inform potential enhancements. ISO to review past filings to determine any areas of enhancement to the process.
Review of proposed problem statements	Community	Community to review proposed problem statements and provide direct comments.
Survey working group	ISO	ISO to provide a survey to get a sense of priority as suggested by Pacificorp via comments.