California ISO | WESTERN ENERGY MARKETS

Memorandum

To: Western Energy Markets Governing Body
ISO Board of Governors

From: Anna McKenna, Vice President, Market Design and Analysis

Date: December 10, 2025

Re: **Decision on gas resource management proposal**

This memorandum requires action by the Western Energy Markets Governing Body (primary authority) and the ISO Board of Governors (consent agenda).

EXECUTIVE SUMMARY

Management proposes enhancements to policies and processes that support efficient use of gas generation resources and ensure fair compensation for their participation across the Western market footprint. These policy enhancements will: 1) provide gas resources in the day-ahead and real-time markets with adequate opportunities to reflect and recover their fuel costs, and 2) extend access to existing procedures that safeguard gas and electric system reliability. Management is also pursuing process improvements to better align gas supply procurement practices with market needs.

Gas resources face unique challenges in managing uncertainty across independent but linked gas and electric markets. Typically, gas resources procure fuel through contracts and transactions in the gas market before they know how much fuel they will need to support their electricity market commitments. They can manage this uncertainty by reflecting the expected cost of resolving differences between procured and required gas volumes in their energy bids. However, when gas prices are volatile or the gas system experiences constraints, energy offers from gas resources can quickly become obsolete if those bids do not adequately account for price uncertainty.

The ISO uses reference levels — proxy but verifiable cost estimates — to ensure efficient scheduling and mitigate market power. These tools provide flexibility and allow cost verification, but they may not fully address variability in gas systems across the Western footprint.

In the Western Energy Imbalance Market (WEIM), participants manage their fuel cost procurement risk by submitting hourly base schedules and only bid for real-time dispatch based on the availability and cost of gas imbalances. Under the Extended Day-Ahead Market (EDAM), base scheduling is not available, and resources rely instead on market offers for day-ahead commitments. This increases the need for accurate cost reflection in

bids, as reference levels and cost-based offers must capture fuel costs precisely to balance reliability and economic efficiency.

Therefore, Management proposes the following policy enhancements:

1. **Expand opportunities to verify unique cost conditions:** Broaden opportunities for gas resources to customize cost inputs, access cost adjustment mechanisms, and recover costs – particularly in response to unique supply arrangements and gas price volatility.

2. **Ensure equitable access to reliability tools:** Guarantee that all gas systems, regardless of location within the Western footprint, have equitable access to market operator procedures that support gas and electric system reliability.

Management will also pursue process changes within its existing tariff authority that would improve certainty for fuel procurement by enhancing advisory market runs. These changes will generate more precise and actionable advisory schedules, helping gas resources better align fuel procurement with expected market conditions.

Moved, that the Western Energy Markets Governing Body approves the gas resource management final proposal as described in the memorandum dated December 10, 2025, and requests that Management place this initiative on the ISO Board of Governors' consent agenda; and

Moved, that the Western Energy Markets Governing Body authorizes Management to make all necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the changes proposed in this memorandum, including any filings to incorporate Commission guidance in any initial ruling on the proposed tariff amendment.

BACKGROUND

Resources participating in energy markets must be ready to deliver. For gas-fired generators, this means securing sufficient fuel and reserving (or "nominating") pipeline capacity from trading hubs to the plant.

This process begins with "next-day" gas trading, which offers the best opportunity to secure deliverable gas at cost-efficient prices, but concludes before the ISO's day-ahead market publishes results. "Same-day" gas purchases are possible, but often come with cost premiums, limited liquidity, or deliverability constraints. Gas resource energy offers may reflect both procured fuel and the anticipated costs of procuring additional supply.

Managing uncertainty in next-day fuel procurement

Gas pipeline operators maintain gas system reliability by balancing scheduled pipeline capacity with actual gas demand. For resources within the existing day-ahead market footprint, the ISO, as the Market Operator, supports this process by sharing forecasted gas burn with gas pipeline operators prior to the next day. If gas nominations deviate from expected demand, pipeline operators may issue notifications to their customers to help resolve imbalances.

Gas generators may experience a mismatch between nominated fuel and the actual fuel needed to meet electric market schedules. They can address these imbalances by 1) revising nominations or securing transportation on different pipelines – an option that carries financial and operational risks, or 2) using "imbalance capacity" services to take more gas or less gas from the pipeline than planned. Availability of imbalance capacity service largely depends on whether the gas system has physical gas storage infrastructure.

Gas resources in the newly expanded day-ahead market may face greater uncertainty than they do submitting base schedules ahead of and in alignment with gas nominations. In the WEIM, participants procure fuel knowing what they need to support the base schedule. With the launch of the EDAM, the market will determine unit commitment and energy schedules in the day-ahead timeframe for a broader set of market participants. Resources will receive energy market awards that may require a different amount of gas than could have been reasonably anticipated during the next-day gas procurement and nomination process.

Resources within the ISO balancing authority area benefit from significant gas storage infrastructure on pipelines, which provides those resources more flexibility. In contrast, resources in the broader Western market region may have more limited gas storage. Without the flexibility to manage imbalances, these resources must rely more heavily on same-day gas procurement, exposing them to higher costs and operational risks.

Managing cost uncertainty in bids

Resources bidding into the market submit bids for both energy and commitment costs, which include start-up, minimum load, and transition costs for multi-stage generating units. In each case, these bids reflect the price at which the resource is willing to be dispatched.

The market's automated market power mitigation relies on pre-defined estimates of a resource's verifiable operating costs. These costs, called reference levels, include default energy bids and the proxy cost used to cap commitment cost bids. The Market Operator calculates reference levels for each gas resource using a formula that accounts for fuel costs, gas pipeline transportation costs, and other cost information that reflects the resource's unique characteristics.

The Market Operator calculates the fuel cost in reference levels using the gas price index at the gas trading hub selected by the resource. The index price does not

represent a resource's specific procurement costs but serves as a reasonable proxy. A default multiplier is used to allow gas resources the flexibility to account for a range of potential costs. The multiplier serves as a safe harbor because resources can use this headroom to account for cost variation without requesting a cost adjustment or demonstrating actual costs. Today, the default multipliers are 110 percent for default energy bids and 125 percent for commitment costs.

Resources can also provide updated fuel cost information when gas price volatility pushes costs beyond the range of costs covered by the default multipliers. The reference level change request process allows resources to update their reference levels through two options: 1) an automated request for instant validation when costs fall within a pre-defined range without prior documentation, subject to after-the-fact auditing, or 2) a manual request that Market Operator staff review which has no upper limit on validated costs but requires supporting documentation of fuel costs in advance of the market run.

The automated process approves costs that are less than or equal to a modified version of the resource's reference level, called the reasonableness threshold. The Market Operator calculates the reasonableness threshold with fuel costs that are scaled to reflect additional fuel volatility. The fuel volatility scalar is currently set at 125 percent of the gas price index used in the reference levels on days when there is no published gas price index and 110 percent on other days.

Resources have an incentive to update their reference levels to ensure their costs can be recovered from the market, which also supports market efficiency. The reference level change request process unlocks eligibility to seek cost recovery through the after-the-fact cost recovery process, a safety net for unrecovered actual costs. Together, the default reference level calculations, the reference level change request process, and after-the-fact cost recovery give market participants multiple avenues to reflect reasonable cost assumptions and to recover actual costs incurred.

As the regional market expands, the wider variety of gas market infrastructure and fuel supply arrangements over the regional footprint needs consideration. Stakeholders provided evidence that unique gas market drivers and constraints can drive fuel cost volatility even under normal conditions, not just in exceptional circumstances. Limited liquidity and physical system limitations can create greater fuel cost variation than current mechanisms were designed to handle.

Base schedules used in the WEIM minimize a resource's exposure to financial risk from fuel cost uncertainty because they allow a participant to directly control how its resource is scheduled, instead of bidding economically and allowing the market to schedule the resource.

In contrast, participating in the EDAM allows resources to participate economically in the day-ahead market, and optimized day-ahead market schedules are a key benefit of the EDAM. The EDAM will consider resources' offers to determine feasible and economic day-ahead commitments and schedules, which heightens the need to ensure that resources can reliably reflect their costs in the market. When resources are limited to their reference levels,

it is critical that fuel costs used in reference levels are as accurate as possible to ensure economic and efficient market solutions that support reliable operations.

Managing reliability risks due to gas system limitations

In response to the 2015 Aliso Canyon gas storage facility leak, the Market Operator developed a "gas nomogram constraint," a reliability tool that reflects gas system limitations in electricity market operations. A nomogram is a specialized constraint in the market software that defines a linear relationship between power system variables. The "constraint" caps the combined gas use of a group of gas resources to align with pipeline limits and dynamically adjusts as system conditions change. This dynamic market instrument can more efficiently manage a gas system limitation than manual intervention.

To effectuate use of this tool, the Market Operator coordinated with the gas pipelines serving the southern region of the ISO's balancing area and agreed on the need for market intervention and the circumstances that would trigger that intervention. The critical component of this policy is the communication protocol that describes the steps that the balancing authority, the Market Operator, and gas pipeline each must take to activate a constraint in the market. The Market Operator will only activate a gas nomogram constraint in coordination with the gas pipeline operator.

Currently, the Market Operator only has authority to activate a gas nomogram constraint on the Southern California Edison and San Diego Gas & Electric Company gas pipeline systems.

PROPOSAL

The robust stakeholder process produced a set of five proposed changes collectively designed to provide gas resources in the energy markets with greater flexibility in reflecting their expected fuel costs in the market and recovering actual fuel costs, greater information to better prepare for operational day fuel burns, and market tools to coordinate gas fuel burn with the gas pipeline operators.

1. Customized fuel price volatility accounting in reference levels

Gas resource reference levels use a standard formula that accounts for the operating costs common to most gas resources but includes resource-specific information such as a resource's chosen fuel price index. A safe harbor provision gives all resources the same amount of flexibility to account for additional costs not captured by this formula. No single uniform change to this formula can equitably accommodate the diversity of supply arrangements that exist across the region.

Resources can use the existing reference level change request process to adjust their fuel costs on any given day to deal with exceptional circumstances. However, as raised by the stakeholder working group preceding this proposal, resources may need to submit multiple temporary requests, creating an unnecessary burden. The working group prioritized

changes that reduce reliance on these temporary adjustments and instead account for systematic drivers of higher cost volatility.

Consistent with this request, Management proposes a customizable multiplier on the gas price index to account for the fact that some gas resources face more gas price volatility than others. The proposed multiplier will cover volatility tied to a resource's specific circumstances and will apply on a going-forward basis. Applying this multiplier directly to the gas price ensures that reference levels and the reasonableness threshold all reflect a resource's adjusted gas price volatility.

To request such a customized multiplier, a resource owner must demonstrate the need by showing that its actual costs exceeded reference level calculations over the last year. The Market Operator will verify how frequently a resource's costs have historically fallen outside the default range. If this frequency meets a "minimum threshold requirement," which reflects the frequency with which other resources in more stable conditions require cost adjustments, the Market Operator will conduct a comprehensive analysis to customize the resource's gas price index.

The minimum threshold requirement is meant to distinguish between: 1) a reasonable level of reliance on the daily reference level change request process for capturing more volatile fuel costs during unexpected events, and 2) systematic conditions that mean resources are forced to more frequently use daily requests to reflect their actual fuel costs. Resources in more stable fuel cost regions, aside from pipeline outages and winter storms, can generally rely on the safe harbor to accommodate cost variation. This proposal recognizes that some resources experience more volatility than others, reduces administrative burden on market participants, and ensures all gas resources have the same amount of flexibility regardless of their supply conditions.

2. Additional flexibility to reflect expected costs when conditions change

Management proposes giving gas resources more flexibility to reflect gas price volatility in certain conditions when the Market Operator can reasonably anticipate a significant change in gas demand from one day to the next. This is different from the element of the proposal described above, which accounts for a wider range of potential costs by default. This element of the proposal targets the range of costs within which the Market Operator will automatically validate reference level change requests. Specifically, Management proposes to temporarily adjust the reasonableness threshold used to validate automated adjustments to reference levels. This adjustment will give gas resources more flexibility to dynamically update their costs.

This proposal directly addresses stakeholders' recommendation to expand flexibility to manage circumstances in which "everyone moving in the same direction" drives price changes. Management proposes targeting temporary adjustments to reasonableness thresholds when the Market Operator observes market conditions that will increase fuel demand:

- **Day-ahead market adjustment**: Management proposes increasing the day-ahead reasonableness threshold when, prior to running the day-ahead market, the Market Operator observes a significant change in variable energy and demand forecasts. Because these demand forecasts are a key driver of market results, the Market Operator can use forecast changes to indicate when aggregate day-ahead gas burn may be higher than the gas burn that was forecasted two days ahead. In this case, gas resources that used two-day-ahead advisory results to inform fuel purchases will have to secure additional fuel to meet their day-ahead market commitments. This change will support efficient day-ahead unit commitment and associated next-day gas procurement.

- **Real-time market adjustment**: Management proposes increasing the real-time reasonableness threshold when gas burn, determined by the binding day-ahead market run, significantly exceeds the two-day-ahead advisory. This change supports efficient incremental real-time dispatch and associated incremental gas procurement.

The actual adjustment values to the day-ahead and real-time reasonableness thresholds will be based on market data, which the ISO will vet with stakeholders and memorialize in the business practice manuals. This proposal will strengthen market participants' confidence in using two-day-ahead advisory information, discussed further below, by ensuring that any situations in which such information may lead to higher costs are balanced with added flexibility.

3. After-the-fact cost recovery for physical supply disruptions

Currently, the Market Operator requires resources to have submitted a reference level change request for costs to be eligible for after-the-fact cost recovery on a given day. This prerequisite is an important safeguard against resources submitting bids below cost to get a market award, then later requesting cost recovery for higher costs.

However, physical supply disruptions may occur after the deadline for submitting reference level change requests has passed. To address this gap, Management proposes allowing resources to seek after-the-fact cost recovery if they can demonstrate that a physical gas disruption occurred, even if they did not submit a reference level change request in advance.

4. Expanding access to gas nomogram constraints as a reliability tool

Management proposes using existing gas-electric coordination processes to identify and assess a new gas nomogram constraint procedure for a gas pipeline's service area. Management is seeking authority to file revisions to its tariff to implement a gas nomogram constraint after determining, in coordination with the affected electric balancing authority whose gas service area is impacted and the affected gas pipeline operator, that the constraint will serve as an appropriate tool to mitigate reliability risks.

In such cases, the Market Operator would be authorized to file with the FERC tariff language that enables the activation of the gas nomogram constraint.

The tariff filing would assign clear roles and responsibilities for balancing areas and gas pipeline operators and specify criteria that would need to be met to adhere to prior FERC guidance. These criteria include: 1) establishing a relationship between the balancing area, gas pipeline operator, and the Market Operator; 2) showing that a specific gas system limitation can impact electric reliability; 3) showing that the gas nomogram constraint is needed and reasonable in these circumstances; and 4) confirming consistency with established procedures. The Market Operator will provide the nomogram constraint as a reliability tool for a balancing authority, as the NERC-defined reliability authority, to maintain reliable operations.

Management is not proposing any changes to the existing gas-electric coordination process other than extending consideration to the broader region to use the current gas nomogram constraint.

5. Improve multi-day-ahead advisory information to address day-ahead fuel procurement uncertainty

Management plans to leverage existing processes that produce advisory market results two days ahead of the operating day to provide more information to gas resources regarding expected fuel needs. Two-day-ahead advisory information is based on forecasts and other inputs available two days ahead of the operating day. The Market Operator shares the gas burn forecast from the two-day-ahead market run with gas pipeline operators to support reliability.

Once EDAM is operational, the two-day-ahead market run will also serve as a source of additional information for market participants. This market run is configured today to support system reliability needs but may not offer valuable resource-level information. Market participant input is critical for identifying improvements to the market process.

Management has identified three improvements to advisory market runs in order to enhance their usefulness for informing gas procurement in EDAM. These improvements are not a decisional item because they are within existing tariff authority, but Management shares this element of the policy work as important context. The three areas of improvement are:

1. Increase accuracy of two-day-ahead advisory results by using updated bids for the relevant market day, if available.
2. Increase transparency by publishing energy schedules separately from reliability-related unit commitments.
3. Extend advisory information beyond two days ahead to support fuel planning over weekends and holidays.

These process enhancements are expected to improve the quality and usefulness of the two-day-ahead information, offering gas resource owners a valuable data point to better anticipate gas needs before receiving their day-ahead market results. Management will re-evaluate the accuracy of the two-day-ahead market run once planned changes are implemented and data becomes available for regional market participants.

POSITIONS OF THE PARTIES

The Gas Resource Management effort was initiated in response to concerns raised by the Regional Issues Forum regarding misalignment between gas and electric market timelines. The stakeholder working group identified three key areas for policy development: accommodating fuel cost volatility, managing gas system limitations, and informing fuel procurement. Stakeholders delivered a set of recommendations for policy development in each of these areas, which were refined for Management's proposal.

1. Accommodating fuel cost volatility

Stakeholders discussed how regional differences in gas storage capacity and market conditions across the West make it more difficult for some participants to reflect expected fuel costs in their reference levels. Stakeholders proposed two approaches for addressing volatility unique to a resource's supply conditions. Management's proposal for a customized reference level adjustment combines the stakeholder endorsed design elements from each. Notably, Management's proposed enhancements continue to rely on market participants managing gas costs through supply offers rather than, as some stakeholders suggested, developing new tools to manage gas usage via constraints in the market.

While stakeholders support the overall process proposed for customizing fuel volatility covered in reference levels, some raised concerns about certain design details. The Department of Market Monitoring (DMM) cautioned that frequent cost adjustment requests could be subject to gaming. Management agrees and highlights that the audit process is an important feature of this proposal. NV Energy recommended reconsidering the one-year restriction on re-requesting adjustments, citing seasonal variability. Management revised the proposal to allow market participants to request adjustments after four months so that the process can consider the most recent, seasonal information in forward-looking adjustments.

Stakeholders broadly supported targeted enhancements to increase bidding flexibility in exceptional circumstances, such as extreme weather conditions that drive additional commitments compared to those anticipated the day before. Stakeholders appreciated the design element of Management's proposal that provides for additional flexibility when conditions change and requested more detail on how the triggers for more flexibility will be defined. Management plans to determine how to measure forecast changes that show strong predictive values for changes in two-day-ahead advisory results to day-ahead fuel requirements once EDAM operational data is available to analyze.

Management will evaluate how changes in demand and variable renewable energy forecasts that inform the two-day-ahead to the day-ahead market runs relate to changes in fuel requirements. NV Energy recommends analyzing forecasts at both the market footprint level and at the balancing authority area level. Management plans to incorporate both considerations into the assessment. Pacific Gas & Electric raised concerns about potential gaming if the two-day-ahead advisory results are used as a basis for the real-time cost adjustments. Management will monitor whether market participants routinely modify their bids to create large real-time market payouts.

2. Managing gas system limitations

Stakeholders broadly recommended that the Market Operator develop market-based tools to manage gas system limitations and sought clarity on expected actions during gas system limitations the gas nomogram constraint tool. During a technical workshop stakeholders reviewed the tool, provided feedback on potential gaps in existing practices, and identified potential barriers to developing market-based tools. They appreciated the workshop and supported the focused scope of Management's proposal for gas nomogram constraints.

3. Informing fuel procurement

Stakeholders recommended improving information that the Market Operator makes available to inform fuel procurement. They requested that the Market Operator assess the potential accuracy of advisory information, and recommended enhancements to improve market participants' confidence in using forward market data to inform gas procurement. Stakeholders broadly support Management's proposed changes and identified specific metrics to evaluate the two-day-ahead advisory tool and guide future improvements.

4. Commitment cost bidding flexibility

Stakeholders recommended more flexibility for commitment cost bidding. Today, commitment cost bids are capped at the reference level based on the product of the reference level commitment costs and the commitment cost multiplier. In 2018, the ISO Board of Governors approved an alternative dynamic market power mitigation policy in the Commitment Cost and Default Energy Bid Enhancements initiative. This policy, not yet implemented, would allow more commitment cost bidding flexibility by allowing commitment cost offers up to 300 percent of the Market Operator calculated commitment cost when commitment cost mitigation is determined to be unnecessary. Management will pursue implementation of this policy.

However, when bids are subject to mitigation, reference levels should reflect accurate fuel costs to the extent possible. Therefore, Management considers the proposals herein necessary and complementary enhancements to ensure efficient market outcomes. Stakeholders broadly recommended that enhancements apply to reference levels for both reference-level bid components, not just commitment costs.

CONCLUSION

Management recommends that the WEM Governing Body approve, under its primary authority, and that the ISO Board of Governors approve on its consent agenda, the proposed changes described in this memo. Providing more flexibility for gas resources to reflect and recover costs — and ensuring equitable access to reliability tools to manage gas pipeline constraints if needed — will strengthen the ability for gas resources and their balancing areas to participate in the Western Energy Imbalance Market and Extended Day Ahead Market.