



California ISO

Gas Resource Management: Straw Proposal scoping and alignment

Sylvie Spewak

Sr. Policy Developer, Policy Development

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Gas resource management working group progress to date

- The gas resource management (GRM) issue paper detailed the potential approaches for policy development based on working group recommendations
- The ISO received stakeholder feedback on the issue paper identifying priorities for policy development
- The ISO will be seeking stakeholder feedback prior to publishing the GRM straw proposal to ensure alignment;
 - Scope based on stakeholder priorities is an accurate reflection of stakeholder intent, and
 - timeline for development is reasonable based on expected next steps

Goals for today's working group on scoping and alignment

- Review policy development objectives, and approaches stakeholders identified as preferred near term priorities
- Discuss next steps, process, and timeline for policy development
- Review 'parking lot' and plans for revisiting
- *Is this scope missing any high priority objectives?*
- *Given the prospective process, is the target timeline feasible?*
- *Should any of these scope items be re-considered for near term policy development?*

Comments indicate stakeholder alignment on a focused set of objectives

D+2 Assessment and Coordination

- Build on approach outlined in the issue paper for assessing inputs and model assumptions
- Identify additional information valuable for fuel procurement multiple days ahead of real-time

Gas volatility and reference level changes

- Focus on defining and accommodating exceptional circumstances
- Design process enhancements to streamline cost adjustments

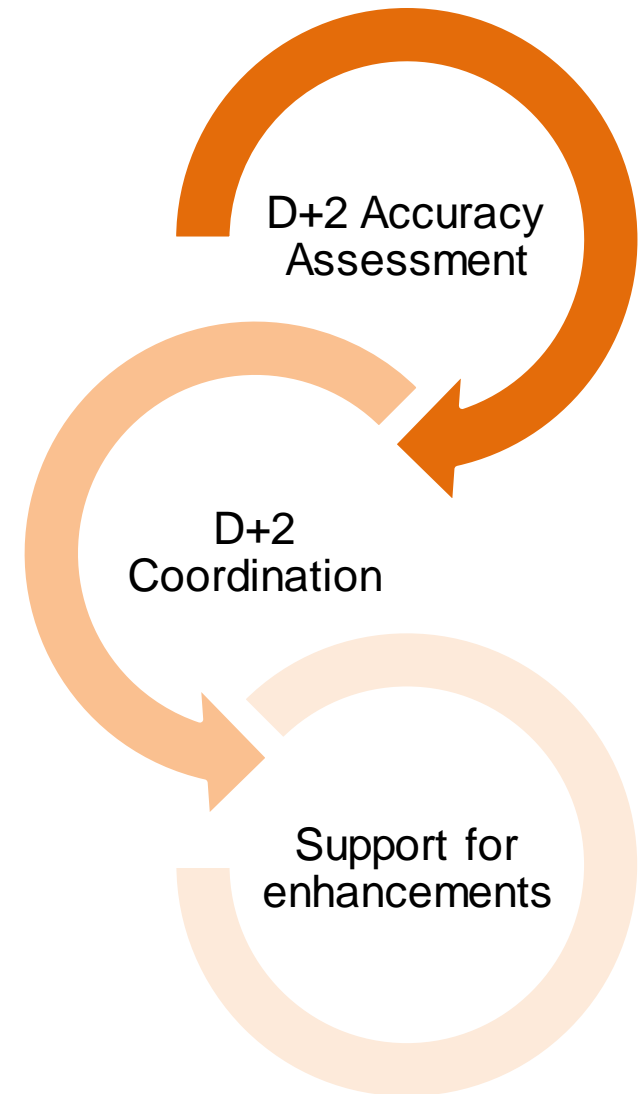
Gas burn limitations (OFOs)

- Provide clear expectations for gas resources managing OFOs or other gas system limitations
- Define goals for coordination efforts necessary to support market design

INFORMING PROCUREMENT

Stakeholder identified objectives for informing fuel procurement

- Improve market participants ability to anticipate fuel targets, and align fuel procurement with market awards, to reduce un-hedged exposure to operational uncertainty
- Support economic participation for WEIM-only participants, ensure equitable treatment of day-ahead and real-time-only entities in policy development priorities



D+2 accuracy assessment

- **Asses D+2 to DA, D+2 to RT to**
 - improve confidence in using D+2 results as fuel procurement targets during the Timely gas nomination cycle
 - Reveal opportunities to improve D+2 alignment with the day-ahead market and real-time markets
- Future goals:
 - Identify market inputs that could be improved by more contemporaneous information via a 'D+1.5' market run

Stakeholder feedback on using a D+2 accuracy assessment for regional market participants

- Today, the D+2 generates advisory schedules for current day ahead participating entities (CAISO BA)
 - **Potential challenge:** Can we extrapolate how accurate the D+2 will be for new day-ahead market participants (ie non-CAISO BA) from an assessment of the D+2 to date?
- Stakeholders generally see value in an assessment based on the CAISO BA to make progress on GRM objectives
- Stakeholders request the ISO provide more details around the inputs and assumptions used in the D+2 today to inform feedback

Stakeholder feedback on using a D+2 accuracy assessment for regional market participants

- PAC: A direct comparison won't be helpful because base scheduling practices will be too different from how the market will optimize day-ahead schedules
- SRP: More clarity around how WEIM market participants are accounted for in the D+2 (and DA) market run would be helpful
- PAC, SRP, SDG&E: understanding the accuracy of discrete inputs, like forecasting error, would be valuable

D+2 accuracy assessment plan

- **ISO recommended base analysis:**

- Average daily gas burn forecasted in D+2 compared to the DAM for CAISO BA resources
- D+2 vs DAM MWh awards for CAISO BA resources
- Net load forecasting error for CASIO BA resource

- **Stakeholder recommended additions:**

- Add a RT comparison to base analysis (for CAISO BA resources)
- Identify and focus on different periods like stressed conditions, pipeline restrictions, specific weather events



Need more specificity to define exceptional circumstances

D+2 coordination efforts

- Align the D+2 (D+X) as closely as possible with the next day's day-ahead market run to
 - Produce data valuable for planning, anticipating fuel needs, and managing operational uncertainty
 - Reduce potential for unhedged gas procurement based on D+2 advisory schedules
- **D+2 coordination efforts will include:**
 - Enhancements to the market model and assumptions
 - Identifying market outputs valuable for supporting fuel procurement decisions

Stakeholder recommendations for D+2 coordination

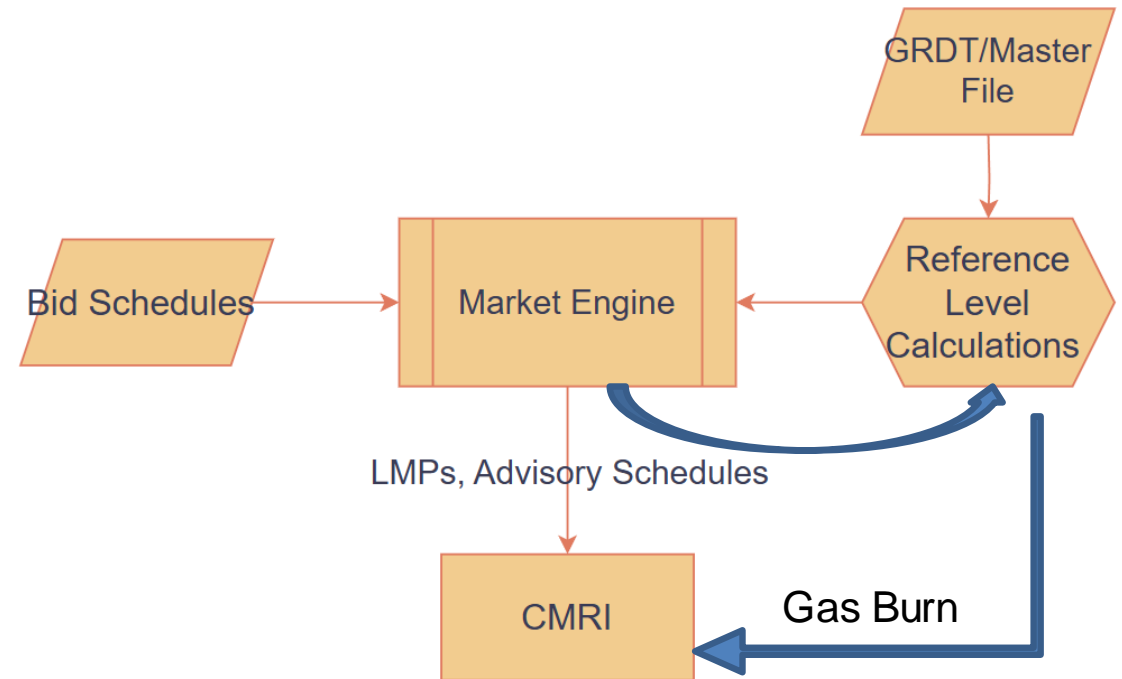
Today	Stakeholder Recommendations
<p>Modeling assumptions: use historic bids from 7 days prior to the relevant trade-day</p> <ul style="list-style-type: none">• Ex: D+2 is being run today (4/16) for RT on 4/18, we'd use bids submitted for the RT market on 4/11	<p>PAC: Use submitted bids for the relevant trade day if available, and previous day's if not</p> <ul style="list-style-type: none">• Ex: D+2 is being run today (4/16) for RT on 4/18, we'd use bids submitted for the DAM on 4/17 or RTM on 4/18
<p>Policy: SCs for gas resources participating in the day-ahead market may receive 2 day ahead advisory schedules via CMRI</p>	<p>PAC: Expand the advisory horizon to include future days, D+3, which may better align with the gas trading timeline</p> <p>PAC: Provide LMPs in addition to advisory schedules</p> <p>SDG&E: resource-specific gas burn information in MMBtus</p>

ISO calculated gas burn based on MW output level is an approximation

- A scheduling coordinator submits information stored in the master file that forms the average heat rate curve
- The ISO uses the average heat rate curve to calculate an incremental heat rate at a given operating point
 - Two average heat rates yields one incremental cost segment
 - The incremental heat rate is the change between the two segments
- DEBs include this approximate incremental heat rate, as well as a 110% multiplier to account for differences between the ISO calculation and precise resource parameters

ISO calculated gas burn for advisory schedules is an approximation

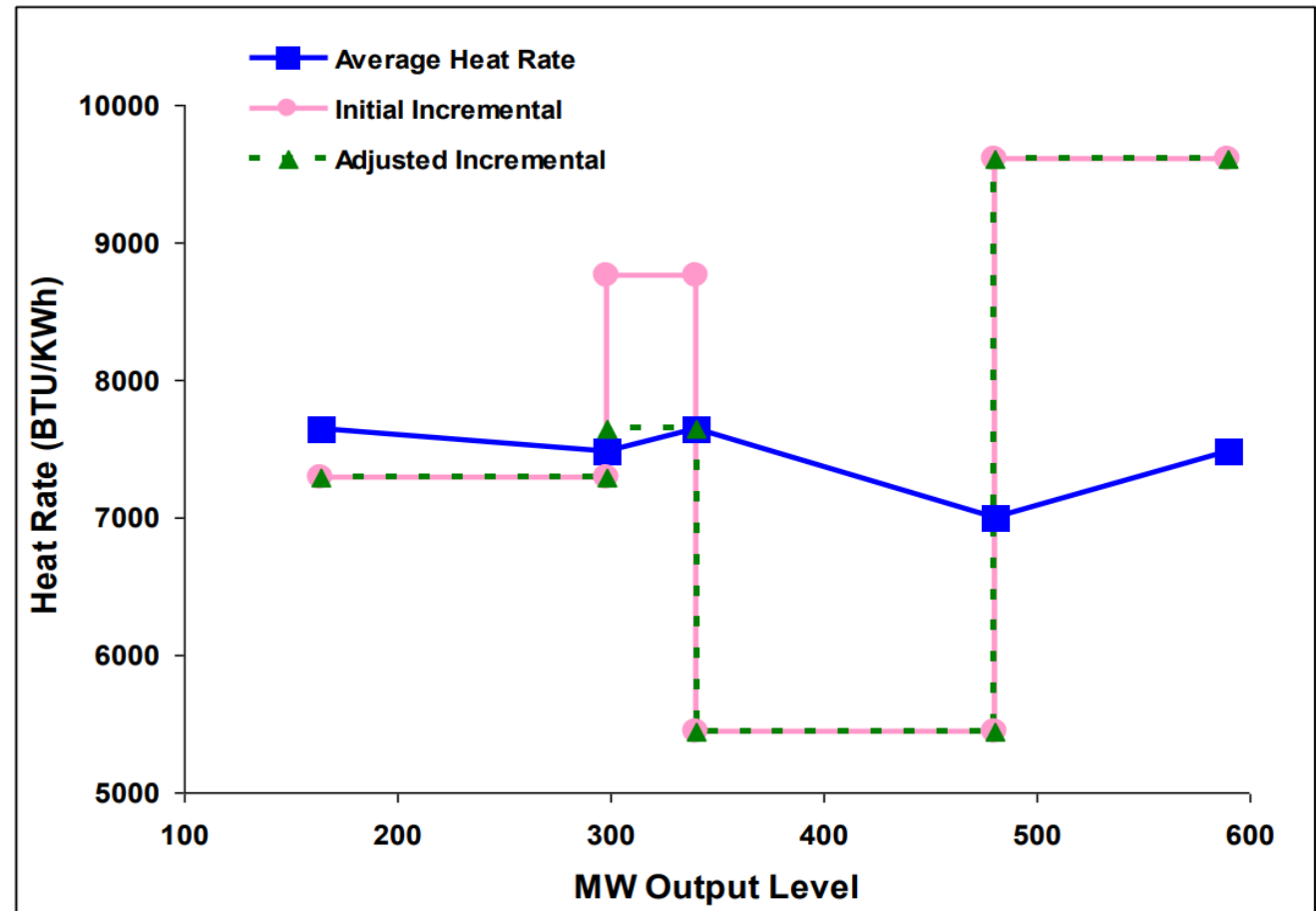
- Advisory schedules published to CMRI are an output of the market engine (\$, MWh, \$/MWhs)
- To publish the gas burn (MMbtu), the ISO would use the market output and Master File parameters to provide an approximation
- This process is feasible but the ISO is concerned that the approximation could be misleading



Example of ISO calculated incremental heat rate based on average heat rate per segment

Resource submits average heat rate curve through GRDT:

Operating Point (n)	Operating Level	Average Heat Rate
1	164	7643
2	298	7485
3	340	7643
4	480	7000
5	590	7485



Source: BPM for Market Instruments Attachment F

The ISO is seeking stakeholder feedback on including this recommendation in scope

1. Keep in scope to discuss further

- Is the heat rate information resources submit sufficiently precise for this purpose?
- Is an approximation based on the average heat rate valuable for informing fuel purchases? Compared to what a resource manager could back out of MWh schedules using precise operating parameters?
- Should the ISO consider a separate process or methodology to provide resource level gas burn based on advisory schedules?

2. Scope out

Proposed parking lot for D+2 coordination: D+1.5

- The ISO and stakeholders agree with the importance of focusing on D+2 assessment and coordination in the near term
- Stakeholder support:
 - NVE: this would provide a better estimate of the next day's market results, as the potential to reduce reliability concerns and realize consumer savings
- The ISO supports consideration of a new market run after assessment of the D+2 and operational experience in the extended day ahead market

ACCOMMODATING COST VARIATION

Stakeholder identified objectives for enhancements to reference levels and the cost adjustment process

- Policy should incentivize resources to procure gas at least cost, act prudently
- Resources should have an incentive to come to the table and provide accurate cost information to ensure they are dispatched economically, even in uncompetitive conditions
 - Design of the cost adjustment process should not impede generators ability to provide updated information to the market
- Resources should be able to fully recover expenses accrued during intra-day gas purchases, or made outside active fuel zones, *under extreme conditions*

Stakeholder recommended proposals primarily focus on exceptional circumstances

Stakeholders describe exceptional circumstances in which market participants have faced challenges, or expect to face challenges, managing gas price volatility. Information available and accessible to the ISO that indicates an exceptional event can trigger an exceptional process.

Exceptional circumstances defined by	Observable trigger(s) based on	Develop enhancements to provide
<ul style="list-style-type: none">• Hub specific, regional, market-wide events• Resource-specific arrangements• Physical disruptions, maintenance and outages	<ul style="list-style-type: none">• Gas market conditions, gas system operator information• Weather, forecasts• Market participant submitted information, ISO market conditions	<ul style="list-style-type: none">• Additional bidding flexibility• Exemptions from or alternative options to today's cost adjustment process requirements

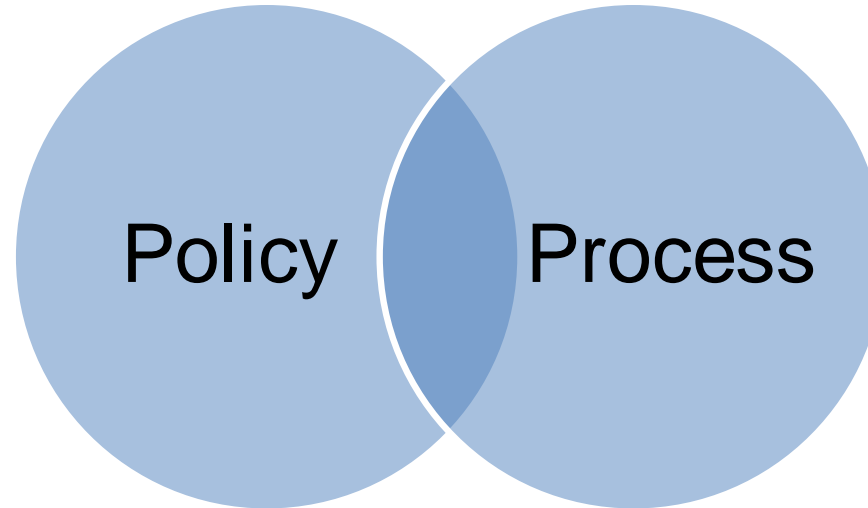
Stakeholder recommendations to date

- Weather triggered scarcity protocol to temporarily adjust threshold values
- Proxy GPI value when weighted average index price is unavailable (Mondays, intra-day gas cycles)
- Temporary modifications to the manual RLCR process
- Alternative cost recovery process for losses due to unpredictable, physical disruptions
- Negotiated commitment cost option for unique supply arrangements

Stakeholder proposals to date may be considered a policy or process enhancement

Proposals that require consideration through the stakeholder policy process:

- Additional bidding flexibility in exceptional circumstances
- Changes to the manual RLCR process
- Alternative options for cost adjustments and recovery in exceptional circumstances



Proposals without policy/tariff implications:

- SIBR changes to streamline automated RLCRs

Process for developing process enhancements

- Modifications to the automated RLCR process:
 - Allow requests through SIBR to be made at the fuel region level and update the reference levels for all resources mapped to that fuel region
 - Allow SCs to select multiple resources to request an adjustment for at a time
- Potential next steps:
 - Education and testing
 - Develop sufficiently detailed request for the implementation teams

Approaches that did not receive stakeholder support for immediate consideration

- **General modifications to the reasonableness threshold**; comprehensive assessment of regular volatility and broad changes to threshold values
- **‘Use the right price’**; use different reference level values for different times of the day
- **Blended fuel region methodology**; static, standardized fuel calculation methodology to account for multiple fuel hubs
- **Market-based commitment costs**; a dynamic market power mitigation procedure to detect market power exercise through commitment cost bids

Parking lot

Approach and stakeholder feedback	Next steps/alternatives
General modifications to the reasonableness threshold <ul style="list-style-type: none">• SDG&E expressed support for this approach but only in so far as more targeted options could not be identified• DMM similarly supports focus on targeted enhancements as simply increasing the reasonableness threshold may be inefficient• Analysis from working groups did not indicate widespread issues under normal conditions	<ul style="list-style-type: none">• Reasonableness threshold adjustments under exceptional circumstances
“Use the right price” <ul style="list-style-type: none">• Received no stakeholder support• The ISO and DMM acknowledge the potential for improved outcomes, but value may be difficult to empirically support	<ul style="list-style-type: none">• Enhancements to the automated RLCR process

Parking lot

Next steps/alternatives	Next steps/alternatives
Blended fuel region methodology <ul style="list-style-type: none">• DMM: using the highest cost fuel region disincentives competitive behavior, but generally supports GPI enhancements to better reflect multiple fuel regions• Idaho: NDEB is a good first step but it does not extend to commitment costs	<ul style="list-style-type: none">• Compare with negotiated commitment cost option
Market-based commitment costs <ul style="list-style-type: none">• NVE: supports efforts to build on the dynamic MPM design developed through CCDEBE such that it can support market-based commitment costs	<ul style="list-style-type: none">• Prioritize other proposals on the table, discuss target conditions for re-visiting

MANAGING GAS BURN LIMITATIONS

Stakeholder identified objectives for managing gas burn limitations

- Establish clear processes and expectations for gas resources that are managing gas system limitations
- Reflect gas pipeline conditions, and incentives intended by gas pipeline operators to maintain system balance, in relevant electric market price signals
- Ensure policy does not disincentive resources from following gas pipeline instructions

Stakeholders support a market-based approach

- Stakeholders and the ISO support pursuing a market-based approach to reduce inefficiencies and reliability risks from managing gas supply limitations
- Prior efforts to reflect OFOs in reference levels and market prices revealed challenges that still need to be resolved to move forward with policy development
- Some regulatory and technical challenges might be resolved through more targeted gas-electric coordination efforts

Lessons learned from prior efforts

Proposal

Allow resources to include OFO penalties in reference level calculations

Allow resources to reflect their risk of incurring a penalty in reference levels under pre-defined conditions that present a reliability risk to the electric system

Develop a methodology for the ISO to calculate a scarcity value based on gas system conditions

Direction from FERC

- Generators cannot reflect ex-ante or recover OFO penalties as this would mute the incentive to follow gas operator instructions that support gas system reliability
- DEBs, which are cost-based offers, should not reflect a generator's financial strategy or assumption of risk
- Specific value would require supporting documentation
- ISO and stakeholders would need to prove methodology would not pose reliability risk to gas system
- ISO does not have sufficient visibility into how specific resources are situated, how actions might impact efficiency and reliability

Gas-electric coordination has proven to be a necessary bridge to market-based solutions

- The ISO coordinates directly with gas pipeline companies serving CAISO BA resources today
- The ISO provides gas burn reports based on forward looking market results
 - Ensures sufficient gas pipeline capacity is available to meet expected commitments
 - Allows gas pipeline operators to take proactive measures if nominations do not align with expectations
 - OFOs issued in advance are captured in next day gas prices
- Coordination is required to initiate and activate gas constraint nomograms
 - Gas system operator may specify the zone and conditions for activating a constraint

Stakeholder recommended approaches capture gas limitations in price formation

- SRP: Improve pricing, match constraints with specific resources, align GPI with gas pipeline conditions
- NVE: Use a constraint to create a price signal that indicates how much up or downward capacity is available
- SRP, PAC: Reflect costs in the DEB
 - OFO specific opportunity cost component



Developing these proposals fully will require gas-electric coordination efforts

Stakeholders request clarity around expected behavior and potential risks

- Provide guidelines for WEIM/EDAM BAAs that want to initiate development of gas nomogram constraint
- Define circumstances and relevant regional pipeline practices that create inefficient outcomes or unavoidable risks to electric system reliability
- Establish clear processes and expectations for managing intra-day gas limitations using tools available today



The ISO plans to develop a 'User's Guide' to address immediate stakeholder requests and provide a basis for discussion

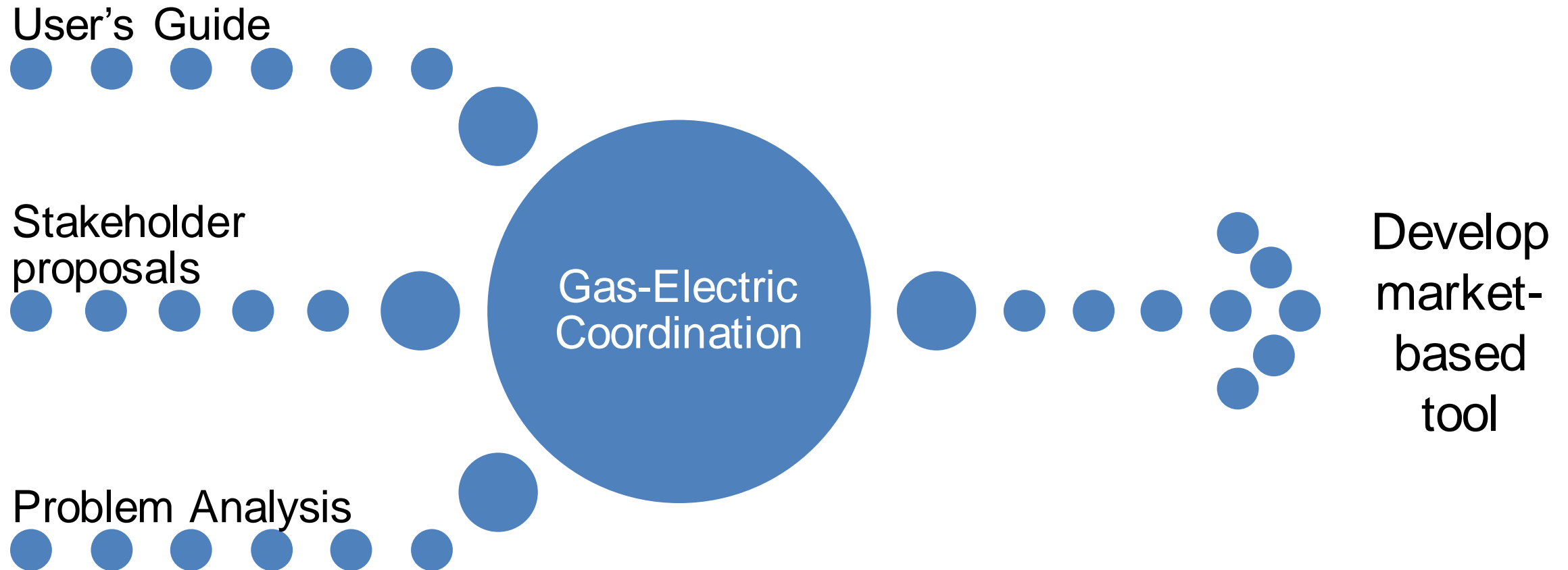
Stakeholder recommended problem analysis

- Frequency with which there is insufficient gas in RT to meet DAM awards
- Frequency and degree of real-time imbalances
- Correlation between OFOs and high demand
- Risk of being dispatched higher after being mitigated



Analysis can narrow the scope or conditions in which market enhancements are valuable and appropriate

Target outcome: define gas-electric coordination goals that will get us to the next phase



Next Steps

- Stakeholder comments due April 30th.
- Straw Proposal target publication in May.

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