Gas Resource Management
Working Group 3

September 18, 2023

Housekeeping reminders

- This call is being recorded for informational and convenience purposes only. Any related transcriptions should not be reprinted without ISO's permission.
- These collaborative working groups are intended to stimulate open dialogue and engage different perspectives.
- Please keep comments professional and respectful.

Instructions for raising your hand to ask a question

- If you are connected to audio through your computer or used the “call me” option, select the raise hand icon located on the top right above the chat window. **Note**: #2 only works if you dialed into the meeting.
  - Please remember to state your name and affiliation before making your comment.
- If you need technical assistance during the meeting, please send a chat to the event producer.
- You may also send your question via chat to either Isabella Nicosia or to all panelists.

Reminder: Goals of the GRM Working Group

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

1. **Form Problem Statements:**
   - Define and illustrate principles for market design
   - Form draft problem statements reflecting stakeholder concerns
2. **Illustrate/Justify problem statements:**
   - **Identify the root cause of stakeholder problem statements. If stakeholders do not know the root cause:**
     - Explore how current ISO market policy and processes reflect principles and support market objectives
     - Determine how these policies and processes may not meet their intended goals
   - **Asses the impact of identified policy problems on market outcomes** by developing methodology for analysis, define data needs

What we heard from stakeholder comments

- Accounting for OFO's and Entitlements on various pipelines
- Real-Time market volatility
- Illiquidity in the evening nomination cycle for gas market

Cataloging known challenges to-date based on stakeholder feedback

Challenges expressed to date

1. Insufficient information for procurement stemming from gas and energy market timelines alignment
   - Participants do not have certainty in the DA advisory awards and forecasts to utilize as procurement targets and therefore do not have sufficient information to participate timely in the nomination cycle
     - Things we have heard
       - New 5am advisory run
       - Gas spot market price visibility

2. Cost recovery process is too burdensome and timely
   - Current process for a manual reference level change request is on a resource by resource basis and has an 8:00am deadline that conflicts with gas trader activities
     - Things we have heard
       - Provide ability for participants to submit at fuel zone level or (SCID level?); covering all units mapped to that zone
       - Remove assigned deadline so that traders can submit requests accordingly as the need arises

Challenges expressed to date continued…

3. Bidding flexibility restricts the capability for participants to reflect costs
   - Day-Ahead (DA) commitment costs do not accurately reflect appropriate gas price for full 24 hour horizon
     - Things we have heard
       - HE1-7 and HE8-24 gas costs captured in DA
   - Masterfile utilizes static heat rates for calculating commitment costs
     - Things we have heard
       - Provide ability for resources to reflect a more accurate, or multiple heat rates more timely
   - Real-Time (RT) commitment costs are fixed in RT once committed for remainder of trading day; volatility and potential OFO exposure
     - Things we have heard
       - Allow for different commitment costs to be reflected regardless of previous RT commitments
       - Current commitment cap(s) to restrictive, adjust default %
       - Bid mitigation changes during periods of gas volatility

Challenges expressed to date continued…

4. Resource specific limitations
   - Participants are unable to reflect or switch fuel zones easily and timely
     - Things we have heard
       - Provide flexibility for participants to switch fuel zones easily to the extent it is pre-established and appropriately demonstrated
   - Use-limitation qualifications are too restrictive
     - Things we have heard
       - Qualification needs to account for each unique BAA's reliability needs (ancillary services)
5. Gas system limitations
   - Gas burn limitations not taken into account when ordered
     - Things we have heard
       - Provide ability for BAA to set burn limitations on specific gas lines

Data analysis needs

- Identify outstanding CCDEBE enhancements yet to be delivered
- Forecast accuracy in the D+2 for both Load and VER
- Forecast accuracy in the D+1 for both Load and VER
- Aggregate representation of how often current caps get utilized

Reference Level Overview
Gas Resource Management WG #3

Katie Wikler
Sr. Market Engineering Specialist
September 18, 2023

Overview Agenda

- Fuel Regions
- Default Energy Bids and Commitment Costs
- Reference Level Change Requests
- Use Limits and Opportunity Costs

Three-Part Bid

Generators must submit a three-part bid to SIBR which includes:

1. Start-Up Cost Bid
   - *Transition Cost Bids (MSGs)*
2. Minimum Load Cost Bid
3. Energy Bid

Commitment costs

Commitment costs are limited by commitment cost bid caps

Energy bids can be submitted between bid floor and bid cap, and can be mitigated to the Default Energy Bid or competitive LMP, *if* market power is detected

FUEL REGIONS

Natural Gas Prices in the CAISO Market

- Natural gas prices are sourced and calculated daily per market from external vendor data
  - DAM: price trading on WebICE, sourced between 8-9AM PST
    - Not posted externally
  - RTM: settled index prices using one to three vendors' prices (simple average of index's weighted average price), calculated at 10PM PST
    - Posted to OASIS for each fuel region

Fuel Region Selection

- Each resource has a fuel region mapped to their resource ID in the Masterfile
  - –Fuel region changes will follow typical Masterfile update process
- SCs can opt to use established fuel regions within their BAA, or create their own (CIDI request to CAISO)
- SCs must actively elect a fuel region mapping for new resources, otherwise the default/generic region is assigned

List of Existing Fuel Regions:
http://www.caiso.com/Documents/FuelRegion_ElectricRegionDefinitions.xlsx

Fuel Region Composition

- The daily fuel region price is the sum of the following two components:
  1. Natural Gas Pricing Hub Index ($/MMBtu) – updated daily, per market
  2. Transportation Cost ($/MMBtu) – updated monthly
     - Marginal Transportation Rates
     - Fuel Reimbursement Rate adjustments to the base natural gas transportation rate
     - Miscellaneous costs including taxes
- Fuel region price used in the calculation of DEBs and Default commitment costs
- Currently, fuel regions can only utilize one gas pricing hub

Example: Fuel Region Price

- El Paso South Mainline commodity hub price = $3.09/MMBtu
- Total transportation Cost = $1.74/MMBtu

Fuel Region Price = $3.09 + $1.74 = $4.83/MMBtu

DEFAULT ENERGY BIDS

Default Energy Bids

- The CAISO calculates Default Energy Bids (DEBs) for resources to be used when Market Power Mitigation is triggered

- There are 5 calculation options for DEBs:
  - Variable Cost DEB
  - LMP-Based DEB
  - Negotiated DEB
  - Hydro DEB
  - Storage DEB (CISO only)

Additional registration required

For more information, refer to the BPM for Market Instruments, Attachment D

Variable Cost-Based DEB – Gas unit

*Variable-Cost DEB = 1.1 * [(Incremental Heat Rate*0.001 x Gas Price) + Energy O&M + GMC adder] + Energy OC**

Example: Gas unit with a 7600 Btu/KWh heat rate at 140 MW and 8900 Btu/KWh at 150 MW:

Incremental Heat Rate = $[(MW_2*HR_2)-(MW1*HR_1)]/(MW_2-MW_1)$

=[(8900*150)-(7600*140)]/(150-140) = 27,100 Btu/kWh

Fuel = (27,100 Btu/kWh*0.001)*$2.65/MMBtu = $71.815/MWh

Energy O&M = $2.80 /MWh

GMC Adder = WEIM Mkt Service + WEIM Sys Ops + (Bid Seg/(MW_2-MW_1)) = $0.196

DEB = 1.1 * ($71.815 + $2.80 +$0.196)

= $82.29/MWh for segment from 140 MW to 150 MW

* *If applicable*

Energy Bid Caps

- Per FERC Order 831, Soft Energy Bid Cap is $1,000/MWh
- Generators must submit cost-verification in order to submit energy bids above $1,000/MWh (not to exceed $2,000/MWh Hard Energy Bid Cap)
  - Reference Level Change Request process is the CAISO's mechanism for cost-verification

For more information, refer to the BPM for Market Instruments, Attachment P

COMMITMENT COSTS

Options for Calculating Commitment Costs

There are two calculation methodologies for Minimum Load and Start-Up Costs

- Proxy Cost: available to all generators
- Registered Cost: only available to use-limited resources with fewer than 12 months of historical LMP data

For more information, refer to the BPM for Market Instruments, Attachment G

Proxy Minimum Load Cost – Gas Unit

*Proxy Minimum Load Cost = (Minimum Load Heat Rate*0.001 x Pmin x Gas Price) + (Energy O&M x Pmin) + (GMC adder x Pmin)*

Example: Gas generator with a 7,633 Btu/KWh heat rate, 140 MW, Pmin, Min Load O&M adder of $50/hour, Energy O&M adder of $2/MWh, GMC adder of $0.20/MWh, gas price of $2.65/MMBtu

Fuel = (7,633 Btu/kWh * 0.001) * 140 MW * $2.65/MMBtu = $2832/hour

Energy O&M = $2/MWh * 140 MW = $280/hour

GMC = $0.20/MWh * 140 MW = $70/hour

Minimum Load O&M = $50/hour

Total Proxy Minimum Load Cost = $3,232/hour

Proxy Start-Up Cost – Gas Unit

Proxy Start-Up Cost = (Start-Up Fuel x Gas Price) + (Start-Up Energy x Electricity Price Index) + (Pmin x Start-Up Time Period x GMC adder / 2)

Example: Gas generator with a start-up fuel amount of 1200 MMBtu/start, start-up energy of 2 MWh/start, start-up time of 60 min, Pmin of 140MW, Start-Up O&M adder of $500/start, GMC adder of $0.20/MWh, gas price of $2.65/MMBtu, EPI of $126/MWh

Start-up Fuel Cost = 1200 MMBtu/start * $2.65/MMBtu = $3180/start

Start-up Energy Cost = 2 MWh * $126/MWh = $252/start

GMC = 140 MW *(60 min/60 * ($.20/MWh/2) = $14/start

Start-Up O&M = $500/start

Total Proxy Start-up Cost = $3,946/start

Commitment Cost Bid Caps

- Commitment cost bids submitted by Scheduling Coordinators are capped at the Default value, or 125% of the Proxy Cost value plus any applicable opportunity cost adder
- 125% multiplier intended to account for fuel price variations and other incidental/hard-to-quantify costs not included in Proxy calculations

*Default Minimum Load Bid = (1.25 * Proxy Min Load Cost) + Run-hour Opp Cost*

*Default Start-Up Bid = (1.25 * Proxy Start-Up Cost) + Start-Up Opp Cost*

*Default Transition Bid = (1.25 * Proxy Transition Cost) + Transition Opp Cost*

REFERENCE LEVEL CHANGE REQUESTS

Reference Level Change Requests

- CAISO calculates “reference levels” (DEBs, Default SUC and Default MLC) using gas prices and resource parameters
- SCs who expect to have fuel/fuel-equivalent costs greater than the costs used by CAISO to calculate reference levels may submit a Reference Level Change Request (RLCR) to update their reference levels
  - If approved, reference levels will be re-calculated prior to market close
- Requests can either be manual or automated (two separate processes)

Manual Reference Level Change Request Process

- SC submits CIDI ticket with requested fuel cost *and supporting documentation* by 8AM PST on the day the market is executed, for both DAM and RTM requests
- Price must be at least 10% and $0.50 greater than what CAISO is using in its calculations
- If approved, CAISO will recalculate DEBs and Default commitment cost caps with the approved fuel price
- Cutoff time is necessary to enable adequate time for manual review of ticket *and* for systems to recalculate values with enough time before market closes

Automated Reference Level Change Request Process

- SC submits adjustments to their DEB and commitment cost bid caps directly in SIBR
  - 125% commitment cost/110% DEB multipliers cannot be included in submitted adjustments
- Adjustments are capped at a CAISO-calculated "reasonableness threshold"
- Unrecovered costs above the threshold may be eligible for cost-recovery after the fact
- SC must retain supporting documentation in case of audit by the CAISO
  - If audited, failure to properly justify adjustments may result in temporary ineligibility to submit future adjustments

After-Market Cost Recovery

- Resources who have submitted a RLCR may be eligible for after-market cost recovery if criteria in BPM are met:
  - Automated request was capped at reasonableness threshold
  - Manual request was not approved prior to close of market's bidding window (note that the manual request must meet previously-described criteria)
- SC submits CIDI ticket to CAISO with after-market recovery request and supporting documentation within 30 business days
- If approved, CAISO will modify reference levels using revised fuel cost in post-processing settlements system
- Not intended as a process to recover *any* costs that were not recovered in CAISO markets

Training for Reference Level Change Requests

- Training for Reference Level Change Requests:

http://www.caiso.com/Documents/Presentation-CommitmentCosts-DefaultEnergyBidEnhancements.pdf

- BPM for Market Instruments, Attachment O contains extensive detail on each part of the RLCR process to aid SCs in navigating these processes

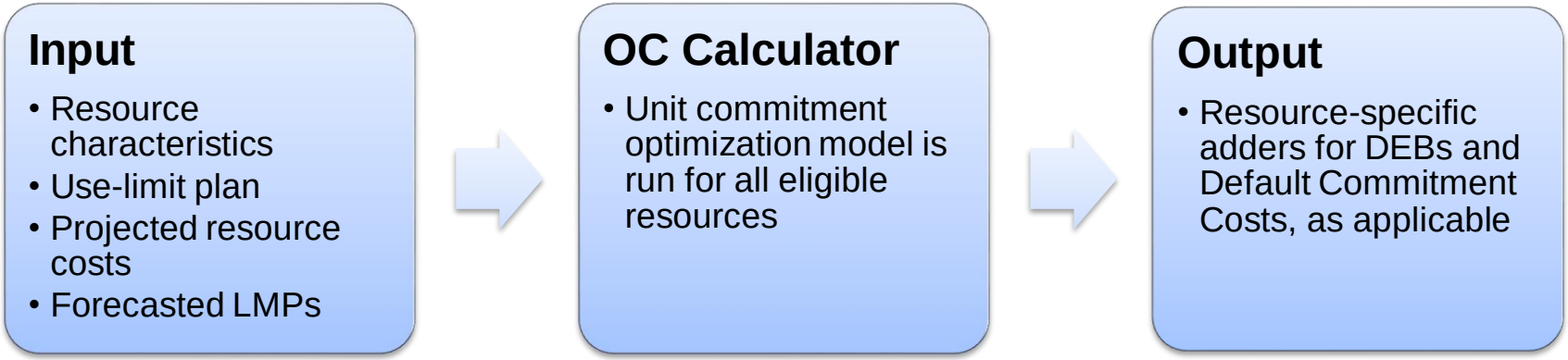
USE LIMITS AND OPPORTUNITY COSTS

Use-Limited Resource Criteria

- In order to be Use-Limited, a resource must meet all 3 criteria:
  1. Has one or more limitations affecting starts, run-hours, or energy output due to design considerations or environmental restrictions on operations,
  2. Cannot reflect the limitation within the market optimization horizon, and
  3. Can select hours of operation, and is not dependent on an energy source outside of the resource's control.
- Use limits are registered in Masterfile (ULPDT)
  - Limits with granularities greater than a day are eligible to receive an opportunity cost adder

Opportunity costs for eligible use limitations

- On a monthly basis, CAISO runs an optimization model that estimates the foregone profits if the resource has one less start, run hour, or MWh to generate → results in an Opportunity Cost Adder
- Depending on optimization, a $0 adder may be valid for the forward month
- Results published monthly on CMRI



Next Steps

- Discussion Paper will be posted on the Gas Resource Management stakeholder page: California ISO - Gas resource management working group (caiso.com)

- Survey?

- Working Group Meeting #4 – End of September?
  - Review Discussion Paper, stakeholder submitted topics and scope items
  - Stakeholder presentations on problem statements