![California ISO]

# Business Requirements Specification

## Commitment Cost Default Energy Bid Enhancements (CCDEBE)

**Document Version: 1.6**

# Date Created: 9/2/2020

## Revision History

| Date | Version | Description | Author |
|------|---------|-------------|--------|
| 1/18/2019 | 1.1 | BRQ117: Added note for which intervals this applies to. <br><br> BRQ121: Clarification on startup points. <br><br> BRQ053: Remove verbiage pertaining to replacing ex-ante adjustments.  This information is found in other requirements. <br><br> Added BRQ214: Requirement for a market rate authority. <br><br> Added BRQ215: Validation requirement for ex-ante. <br><br> Added BRQ216: Validation requirement for ex-ante. <br><br> Added BRQ217: Validation requirement for ex-ante. <br><br> Added BRQ218: Scenario when operator blocks a commitment. <br><br> Added BRQ219: UI for fuel region specific volatility scalar. <br><br> Added BRQ220-222 to cover Integration requirements associated with Clean bid set and Minimum load <br><br> BRQ050: Reworded for clarity. <br><br> BRQ041: Reworded for clarity. <br><br> BRQ028: Reworded for clarity. | Andrew Owens |

| Date | Version | Description | Author |
|---|---|---|---|
| | | BRQ033: Removed, duplicate information found in other requirements. | |
| | | BRQ014: Removed due to wording that was in BRQ008. Since BRQ008 was removed this wording no longer has meaning. | |
| | | BRQ016: Duplicate requirement, removed | |
| | | BRQ026: Removed because imports won't have to submit into the ex-ante tool. | |
| | | BRQ022: Removed Participating load and NGR because they aren't modeled as having commitment costs. | |
| | | BRQ201: Removed because feedback loop scalar should not be visible within the RDT (per Policy). | |
| | | BRQ207: Modified verbiage per Policy/Legal review of document. | |
| | | BRQ130: Clarified the impacted market runs | |
| | | BRQ093: Removed the word default | |
| | | BRQ205: Removed participating load and NGRs | |
| | | BRQ008: Removed BRQ008, ex-ante tool will not perform this function. Already captured within the SIBR rule section. | |
| | | BRQ010: Changed from SIBR requirement to Master File. | |
| | | BRQ030: Removed BRQ because BRQ010 is moved to Master File. | |
| | | BRQ200: We will use a flag not calendar. | |
| | | BRQ085: Needed to be reworded for clarity | |
| | | BRQ086: Removed the word "default" | |
| | | BRQ105: Impacted system changed from PCA to IFM/RTM based on Siemens discussion. Reworded requirement based on change. | |
| | | BRQ123: Removed final default. | |
| | | BRQ127: This is a BPM requirement not a core requirement (adjusted accordingly) | |
| | | BRQ132: Removed default from requirement | |
| | | BRQ134: Removed default and replaced updated with potentially mitigated | |
| 1/18/2019 | 1.1 | Per CR 2: | Andrew Owens |

| Date | Version | Description | Author |
|---|---|---|---|
| | | New Requirements:<br><br>• Added BRQ223 to make change to IFM/RTM related to minimum load costs.<br><br>• Added BRQ224 for broadcasting to downstream systems for DA and RTM.<br><br>• Added BRQ211 for fuel region and market (DA/RT) as fields to broadcast.<br><br>• Added BRQ225 for ineligibility for manual consult.<br><br>Removal of Requirements:<br><br>• Removed BRQ062 as team feels this is covered by other requirements.<br><br>• Removed BRQ110 as team feels this is covered by other requirements.<br><br>Clarifications:<br><br>• BRQ061: Moved this requirement to the retention section. | |
| 1/18/2019 | 1.1 | Clarifications:<br><br>• BRQ079: Updated requirement for MSG resources.<br><br>• BRQ210: Added implementation note to specify ability to adjust resource-level scalar. Defines what feedback loop is based on.<br><br>• BRQ214: Changed resource to BAA. Removed RDT reference.<br><br>• BRQ111: Specifies which market runs requirement would apply to.<br><br>• BRQ116: Specifies this requirement is for purposes of commitment cost mitigation.<br><br>• BRQ121: Add note to not consider Pmin rerates.<br><br>• BRQ124: Changes integration requirement from hourly to interval basis.<br><br>• BRQ131: Specifies which number will apply to energy bid mitigation vs. commitment bid mitigation.<br><br>• Appendix A/B: Updates to Reference level calculations and Reasonableness Threshold | Andrew Owens |

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|------|---------|-------------|--------|
| | | calculations. Simplified equation examples and defined variables.<br><br>Removed:<br><br>• BRQ219<br><br>• BRQ070<br><br>Added:<br><br>• BRQ227 | |
| 3/7/2019 | 1.2 | Added:<br><br>• BRQ228 – Specify that DEBs and DCBs shall be received at an hourly granularity.<br><br>• BRQ229 – Specify reasonableness threshold costs shall be received at an hourly granularity.<br><br>• BRQ230 and BRQ231 added to Master File section as there were no numbers assigned to these requirements.<br><br>Added market simulation requirements (BRQ232-245) | Andrew Owens |
| 4/5/2019 | 1.3 | Addition of Reasonableness Threshold Update (Local Market Power Mitigation Enhancements scope).<br><br>Addition of Manage Markets & Grid (MMG) business process.<br><br>Removal of BRQ027,032 | Andrew Owens |
| 7/16/2019 | 1.4 | Addition of CCDEBE Tariff references.<br><br>Language clarifications: BRQ001, BRQ021, BRQ022, BRQ039, BRQ046, BRQ048, BRQ050, BRQ067, BRQ319, BRQ148, BRQ214<br><br>Removal of BRQs: BRQ017, BRQ202<br><br>Addition of BRQs: BRQ338, BRQ334, BRQ342, BRQ339, BRQ340, BRQ341, BREQ335, BRQ326 | Andrew Owens |
| 9/3/2019 | 1.5 | Language clarification:<br>• BRQ046 (The term demand in this BRQ is referring to the Tariff definition of demand bid. The ISO will revise the BRQ to include the word "bid").<br>• BRQ035 The ISO will remove the implementation note because it is confusing to the reader and not related to the BRQ.<br>• BRQ127 moved to phase 2 per policy direction<br>• Addition of BRQ343 | Program Management Office |

| Date | Version | Description | Author |
|---|---|---|---|
| 9/2/2020 | 1.6 | CCDEBE Phase 2 requirements removed from this BRS. <br><br> The follow changes have occurred based upon the tariff amendment: <br><br> Language clarifications: BRQ007, BRQ023, BRQ036 (removed note on commitment cost multiplier at 125%), BRQ037 (removed reference to headroom scalar), BRQ337 (new language added), BRQ048 (reworded note), BRQ341 (reworded for clarity), BRQ065 (reworded for clarity), BRQ067 (reworded for clarity),  BRQ068 (reworded for clarity), BRQ077 (reworded for clarity), BRQ304 (changed to a business process requirement), BRQ303 (language addition relates to BRQ345), BRQ311 (added reference to Appendix B), BRQ315 (verbiage added and appendix corrected), BRQ319 (reworded for clarity), BRQ320 (reworded for clarity), BRQ234 (updated with new upper limit), BRQ148 (reworded for clarity), Appendix A (note added to explain about formulas originally established being out of date.  Appendix B provides a full set of updated reference level and reasonableness threshold calculations), Appendix B (updated to reflect latest calculations from tariff amendment). <br><br> Removal of BRQs: BRQ339, BRQ333, BRQ327, BRQ326, BRQ246 <br><br> Addition of BRQs: BRQ348, BRQ342, BRQ040,BRQ345 | Andrew Owens |

# Table of Contents

## *Disclaimer*

All information contained in this draft Business Requirements Specification (BRS) as provided by the California Independent System Operator Corporation (ISO) is prepared for discussion and information purposes only. The draft BRS is provided "as is" without representation or warranty of any kind, including, without limitation, a representation or warranty as to accuracy, completeness, or appropriateness for any particular purpose. The draft BRS shall be revised as the development and review of the business requirements progresses. The ISO assumes no responsibility for the consequences of any errors or omissions. The ISO may revise or withdraw all or part of this information at any time at its discretion without notice.

## 1.1 Purpose

The purpose of this document is to capture and record a description of what the Users and Business Stakeholders of the project wish to obtain by providing high-level business requirements. This document establishes the basis for the agreement between the initiators and implementers of the project. The information in this document serves as input to determining the scope of projects and to all Business Process Modeling and System Requirements Specifications efforts.

Business requirements are what must be delivered to provide value for the Users and Business Stakeholders. Systems, software, and processes are the ways (how) to delivery, satisfy or meet the business requirements (what). The Initial BRS will provide sufficient information to determine the scope of the project and will provide the functional business requirements so that the Architecture Decision can be made. Following the Architecture Decision, the remaining non-functional business requirements, such as data, performance, web services, and security can be added to complete the Final BRS.

Due to Stakeholder concerns, there has been increasing need for the ISO to enhance its market rules to support Bidding Flexibility and also comply with FERC order 831. Based on the Second Revised Draft Final Proposal posted on 3/2/2018, the following are the major scope items for this initiative:

- Support integration of renewable resources through incentivizing flexible resources participation during tight fuel supply
- Account for costs of flexible resources (gas and non-gas) to reduce risk of insufficient cost recovery
- Encourage participation of non-RA and voluntary EIM resources
- ISO needs to comply with FERC Order 831
- Requires supporting verified costs of energy bids above $1,000/MWh (Phase 2)

# 2 Intellectual Property Ownership

Intellectual property covers a broad array of information and materials, including written works, computer programs, software, business manuals, processes, symbols, logos, and other work products. Determining ownership of intellectual property is very important in preserving rights of the California ISO and helps to avoid intellectual property infringement issues. In considering the business requirements or service requirements to be performed, the business owner of the project must determine intellectual property Ownership.

## 2.1 Guidelines

Intellectual property ownership must be considered by all applicable stakeholders before the services are performed. The level of analysis is two-fold. One, the business owner must determine if the intellectual property necessary to perform the services is owned by the California ISO or whether it must be obtained from a third party. Once it has been determined that the California ISO has secured the proper intellectual property rights to perform the services (i.e., the intellectual property is owned by the California ISO or we have licensed it from a third party), then the second step in the analysis is to consider whether new intellectual property will be created as a result of the business requirements or service requirements to be performed and how that intellectual property will be owned and protected by the California ISO. In order to assist the business owner in the analysis previously described, refer to the California Intellectual Property Policy available at http://www.caiso.com/rules/Pages/LegalPoliciesNotices/Default.aspx, which provides a brief tutorial on what Intellectual Property is and how the California ISO can go about protecting its intellectual property. Please contact the Legal Department if you have any questions regarding intellectual property.

# 3 Business Impacts

## 3.1 High Level Description of Business Process

| Related Business Process (Level II) | Impact Description |
|---|---|
| Maintain Major Maintenance Adders (MMG LIII) | Yes |
| Maintain Negotiated Default Energy Bids (MMG LIII) | Yes |
| Maintain Negotiated O_Ms (MMG LIII) | Yes |
| Manage Day Ahead Market (MMG LII) | Yes |
| Manage Market Billing Settlements (MOS LII) | Yes |
| Manage Real Time Hourly Market (RTPD) (MMG LII) | Yes |
| Manage Real Time Operations – Maintain Balance Area (MMG LII) | Yes |

## 3.2 Business Practice Manual (BPM)

| BPM | Description of Impact(s) |
|---|---|
| Managing Full Network Model | N/A |
| Congestion Revenue Rights | N/A |
| Market Instruments | Yes |
| Outage Management | N/A |
| Reliability Requirement | N/A |
| Market Operations | Yes |
| Compliance Monitoring | N/A |
| Metering | N/A |
| Scheduling Coordinator Certification & Termination | N/A |
| Rules of Conduct Administration | N/A |
| BPM Change Management | N/A |
| Definitions & Acronyms | Yes |

Owner: Program Management Office                                    Program Office

| BPM | Description of Impact(s) |
|---|---|
| **Settlements & Billing** | N/A |
| **Credit Management** | N/A |
| **Candidate CRR Holder** | N/A |
| **Transmission Planning Process** | N/A |
| **Direct Telemetry** | N/A |
| **Distributed Generation for Deliverability** | N/A |
| **Energy Imbalance Market (EIM)** | N/A |
| **Generator Interconnection Procedure  (GIP)** | N/A |
| **Generator Interconnection and Deliverability Allocation Procedures** | N/A |
| **Generator Management** | N/A |
| **Managing Full Network Model** | N/A |

## 3.3  Other

| Impact: | Description: |
|---|---|
| **Market Simulation** | Yes |
| **Market Participant Impact** | Yes |
| **External Training** | Yes |
| **Policy Initiative** | Yes |
| **Vendor** | Yes- Siemens |

# 4 Business Requirements

The sections below describe the Business Processes and the associated Business Requirements involved in the project. These may represent high level functional, non-functional, reporting, and/or infrastructure requirements. These business requirements directly relate to the high level scope items determined for the project.

## 4.1 Business Process: Manage Markets & Grid (MMG) - SIBR

### 4.1.1 Business Requirements

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| CCDEBE-BRQ001 | System shall receive DEB values (can be either variable, negotiated, LMP, manual consult, or hydro when the LMPM Enhancements initiative is implemented), reasonableness threshold DEB values, and gas price indices (existing) and a field to indicate whether the gas price index is current. For each set of values, system shall receive the origin information (negotiated, LMP, proxy, manual consult). These values shall be received daily for the DAM and for RTM. | Core Phase 1 | SIBR |
| CCDEBE-BRQ003 | An external facing system shall perform an ex-ante validation of market participant requests to adjust reference level cost (default startup cost bids, default minimum load cost bids, and default energy bids). | Core BPM Market Instruments Phase 1 | SIBR |

| CCDEBE-BRQ004 | System shall store ex-ante default bid adjustment requests for auditing.  This data includes requested cost component, approved cost, timestamp, market type, SCID, login ID, and reasonableness threshold cost (upper bound).  This shall include all requests if there are multiple requests for the same market and time period. | Core Phase 1 | SIBR |
|---|---|---|---|
| CCDEBE-BRQ005 | System must have a UI for SCs to submit default start-up cost bid, default minimum load cost bid, and default energy bid adjustments. | Core Phase 1 | SIBR |
| CCDEBE-BRQ006 | System must have an automated interface for market participants to submit default commitment cost bid and default energy bid adjustments. | Core Phase 1 | SIBR |
| CCDEBE-BRQ007 | System shall be capable of handling adjustments for resources with existing reference level costs (both DEBS and default commitment cost) (e.g. generators, all resource specific system resources). | Core BPM Market Instruments Phase 1 | SIBR |
| CCDEBE-BRQ212 | System shall consume ineligibility list from Master File. Note: This list shall be used to prevent users from submitting ex-ante adjustment requests. | Core Phase 1 | SIBR |
| CCDEBE-BRQ011 | System shall allow submission of reference level adjustments only for resources associated with the Market Participant (including | Core BPM Market Instruments Phase 1 | SIBR |

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| | | | |
|---|---|---|---|
| | EIM Entity) user. Market participants with active ineligible status shall not be allowed access to display. All resources shall be provided collectively as a list. ISO users shall have access to all resources. | | |
| CCDEBE -BRQ012 | User shall be able to select a resource from the list and be presented with a list of data entry fields giving an opportunity to enter the following:<br><br>• **Default start-up cost bids adjustment**<br><br>   o Start Date<br>   o End Date<br>   o Adjusted Proxy Cost Based Default start-up cost bid (for hot, medium, and cold starts, separately)<br>   o Market Type (DA, RT)<br><br>• **Default minimum load cost bids adjustment**<br><br>   o Start Time (hourly granular)<br>   o End Time (hourly granular) | Core Market Instruments BPM Phase 1 | SIBR |

- o Adjusted Proxy Cost Based Default minimum load cost bid (may vary by hour throughout trade day). For phase 1, this value cannot vary by hour.

- o Market Type (DA, RT)

- **Default Energy Bid Adjustment** (Variable , Negotiated, LMP)

  - o Start Time (hourly granular)

  - o End Time (hourly granular)

  - o Adjusted Variable Cost Based Default Energy Bid for each bid segment (may vary by hour throughout trade day)

  - o Market Type (DA, RT)

| CCDEBE -BRQ013 | System shall apply basic validation rules to reference level cost adjustment entry, such as:<br><br>• date verification<br><br>• start time must be prior to end time<br><br>• adjustment values must be non-negative<br><br>• default bid values shall be subject to existing SIBR basic validations | Core Phase 1 | SIBR |
|---|---|---|---|
| CCDEBE -BRQ015 | Opportunity to adjust Day-Ahead and Real-Time default bids will be allowed for any open market. | Core Phase 1 | SIBR |
| CCDEBE -BRQ018 | For reasonableness threshold, for gas resources - fuel price scalar (Appendix 2, D.2 Scaled Gas Price Index in Reasonableness Threshold) shall be set at 125% (configurable) for days in which a gas price is determined to be not current (e.g. the day after a holiday) and 110% (configurable) for other days. | Core Phase 1 | SIBR |
| CCDEBE -BRQ019 | For reasonableness threshold, for non-gas resources - volatility scalar shall be set at 110% (configurable) fuel price scalar. For default minimum load cost bids - fuel price scalar is multiplied by the Master File average cost field at segment 1 to get scaled fuel equivalent cost. For default start-up cost bids - fuel price scalar is multiplied by the Master | Core Phase 1 | SIBR |

| | File strt_startup_cost field to get scaled fuel equivalent cost. | | |
|---|---|---|---|
| CCDEBE-BRQ208 | For reasonableness threshold, system must have the ability to support resource-specific scalars (feedback loop scalar). These scalars will be initially set to 100% for every resource. CAISO will have the ability to adjust the resource-level scalar based on need to tune the fuel-region volatility scalars to better approximate the resource-specific cost expectations.<br>Note: Feedback loop is based on systematic positive differences between resources' actual incurred costs (verified through ex post review) versus the fuel-region fuel price scalars. | Core Phase 1 Market Instruments BPM | SIBR |
| CCDEBE-BRQ348 | System shall associate a new flag (Same Day Update Flag) with the resource specific Reasonableness Threshold Gas Price Index. The flag shall be set to "NO" when a regional gas price is received from the regular reasonableness threshold payload. The flag shall be set to "YES" when a regional gas price is received from the ad hoc reasonableness threshold payload. | Core Phase 1 | SIBR |

| CCDEBE-BRQ021 | Validation shall consist of comparing the submitted cost to the reasonableness threshold cost. Submitted costs that are greater than the reasonableness threshold shall be capped at the reasonableness threshold cost. The capped values shall then be considered as accepted. Submitted costs that are less than or equal to the reasonableness threshold cost shall be accepted. Note: For energy bids the comparison is to the lower of the reasonableness threshold cost and the hard cap. | Core Phase 1 | SIBR |
|---|---|---|---|
| CCDEBE-BRQ215 | For default startup cost bid adjustment requests, system shall validate that the down time breakpoints submitted by the SC match those in the originally calculated default startup bid. | Core Phase 1 | SIBR |
| CCDEBE-BRQ216 | For default energy bid adjustment requests, system shall validate that the megawatt breakpoints submitted by the SC match those in the originally calculated default energy bid. | Core Phase 1 | SIBR |
| CCDEBE-BRQ217 | For default energy bid adjustment requests, system shall validate that the bid submitted by the SC is monotonically increasing. | Core Phase 1 | SIBR |

| CCDEBE-BRQ022 | System shall calculate reasonableness threshold default commitment cost bids. System shall calculate reasonableness threshold default commitment cost bids for all resources except for non-resource specific system resources. | Core Phase 1 | SIBR |
|---|---|---|---|
| CCDEBE-BRQ023 | <span style="color:red">For gas-fired resources, that HAVE NOT received a resource specific gas price (i.e. GPI with SOURCE <> MANUAL_CONSULT),</span> system shall calculate reasonableness threshold default commitment cost bids using the appropriate <span style="color:red">fuel price scalar and commitment cost multiplier</span> for each resource and time period. See Appendix B, D.2 Scaled Gas Price Index in Reasonableness Threshold equation. | Core Phase 1 | |
| SCCDEBE-BRQ336 | For gas-fired resources, that HAVE received a resource specific gas price (i.e. GPI with SOURCE = MANUAL_CONSULT), the reasonableness threshold should be calculated as the maximum of the Revised Commitment Cost or the reasonableness threshold calculated using the appropriate fuel price scalar and the commitment cost multiplier if the GPI has SOURCE = SAME_DAY or VOL_WTD_AVG). | Core Phase 1 | SIBR |

| CCDEBE-BRQ024 | For non-gas-fired resources, system shall calculate reasonableness threshold default commitment cost bids using the appropriate fuel price scalar and commitment cost multiplier for each resource and time period. See Appendix B. | Core Phase 1 | SIBR |
|---|---|---|---|
| CCDEBE-BRQ025 | System shall perform a segment by segment validation of ex-ante adjustments for DEBs. | Core Phase 1 | SIBR |
| CCDEBE-BRQ334 | System shall assume a reasonableness threshold value for energy of $1,000/MWh for generating resources without a DEB. | Core Phase 1 | SIBR |
| CCDEBE-BRQ027 | Ex ante DEB adjustment requests shall be rejected for costs with an origin of Hydro DEB. | Core Phase 1 | SIBR |
| CCDEBE-BRQ028 | Requests shall not be allowed for ex-ante adjustments of default commitment cost bids for resources that have selected the registered bids option.  These same resources shall be eligible for adjustment of their DEBs however. | Core Phase 1 | SIBR |
| CCDEBE-BRQ029 | Reference level adjustment results shall be displayed to users after completion of validation.  Displays must clearly indicate the amount accepted and the amount above the cap which was not accepted. | Core Phase 1 | SIBR |
| CCDEBE-BRQ031 | For approved adjusted DEBs, when replacing | Core Phase 1 | SIBR |

| | the original DEB values, the entire bid stream must be replaced. | | |
|---|---|---|---|
| CCDEBE -BRQ034 | System shall calculate reference level default commitment cost bids for the Day-Ahead Market based on the gas price indices for the day of the market close. Implementation Note: There will be minor changes to the reference level default commitment cost bids formula and the resources types that are to be considered.  See Appendix B. | Core Phase 1 | SIBR |
| CCDEBE -BRQ035 | System shall calculate reference level default commitment cost bids for the real-time markets based on the gas price indices for the hour of the market close. Implementation Note: There will be minor changes to the reference level default commitment cost bids formula and the resources types that are to be considered.  See Appendix B. | Core Phase 1 | SIBR |
| CCDEBE -BRQ036 | Reference level default commitment cost bids formulas under the proxy cost methodology shall include a uniform configurable commitment cost multiplier. ~~Note: This stays at 125% for phase 1 of CCDEBE.~~ | Core Phase 1 | SIBR |
| CCDEBE -BRQ037 | The commitment cost multiplier ~~headroom scalar~~ shall be initialized at 125% | Core Phase 1 | SIBR |

| CCDEBE-BRQ337 | For calculating reference level default commitment cost bids for gas fired resources that HAVE received a resource specific gas price (i.e. GPI with SOURCE = MANUAL_CONSULT), the updated default commitment cost (called Revised Commitment Costs [CCs]) shall be calculated using the formulas described in Appendix B to this BPM. No commitment cost multiplier shall be applied to the calculation of the Revised CC. | Core Phase 1 | SIBR | |
|---|---|---|---|---|
| CCDEBE-BRQ039 | System business rules must be changed to use default energy bids received from upstream systems in lieu of system generated energy bids. Notes: This does not impact existing bid insertion rules. | Core Phase 1 | SIBR | |
| CCDEBE-BRQ342 | System business rules must be changed to calculate the generated commitment cost bids as follows: Startup cost = startup cost + startup opportunity cost (if applicable) Minimum load cost = minimum load cost + minimum load opportunity cost (if applicable) Transition cost = transition cost + Transition Opportunity Costs (if applicable) No commitment cost multipliers shall be | Core Phase 1 | SIBR | |

| | | | |
|---|---|---|---|
| | applied to these generated bids. | | |
| CCDEBE -BRQ040 | In the event that the day-ahead gas price is not available system shall fall back to the last day-ahead gas price (normally the 2:30 AM price). In addition, the price shall be considered to be non-current. | Core Phase 1 | Internal ISO System |
| CCDEBE -BRQ344 | System must calculate and/or store default energy bids, and default commitment cost bids separately by market. This includes inputs such as gas prices, major maintenance adders, greenhouse gas adders, opportunity cost adders, etc. | Core Phase 1 | SIBR |
| CCDEBE -BRQ043 | The existing real-time market re-bidding rules for commitment costs shall remain in place. | Existing Requirement | SIBR |
| CCDEBE -BRQ044 | The CAISO shall have a resource type based energy bid cap. | Core Phase 1 | SIBR |
| CCDEBE -BRQ045 | The energy bid cap on convergence bids and non-resource specific system resources shall be configurable. | Core Phase 1 | SIBR |
| CCDEBE -BRQ046 | For convergence bids, non-resource specific system resources, and demand, the energy bid cap shall be set to uniform hard cap. Note: The term demand in this BRQ is referring to the Tariff definition of demand bid. The ISO will revise the BRQ to include the word "bid". | Core Phase 1 | SIBR |

| CCDEBE -BRQ047 | For other resources, the energy bid cap shall be in the form of min (max (soft cap, reference level), hard cap). | Core Phase 1 | SIBR |
|---|---|---|---|
| CCDEBE -BRQ340 | For purposes of calculating the energy bid cap in BRQ047, if a resource does not have a reference level (e.g. NGR, PDR, RDRR) assume $0 for that specific reference level. | Core Phase 1 | SIBR |
| CCDEBE -BRQ335 | For generating resources, User shall be allowed to submit bids above the cap defined in BRQ047.  System shall then reject that bid submittal, but a record of the attempted submittal shall be retained. Implementation Note: System shall not reject bids that are above the cap. | Core Phase 1 | SIBR |
| CCDEBE -BRQ048 | The initial value of the soft cap shall be set to $1000/MWh and the hard cap shall be set at $1000/MWh. Note:  With the implementation of FERC No. 831 requirements, the hard cap will be set at $2,000/MWh. | Core Phase 1 | SIBR |
| CCDEBE -BRQ339 | System shall cap the default minimum load cost and the reasonableness threshold minimum load cost at a value equivalent to $2,000/MWh based on the resource's default minimum load cost divided by the resource's Pmin.  If the resource's Pmin is below 1 MW, a Pmin | Core Phase 1 | SIBR |

| | ~~value of 1 MW will be used for this calculation.~~ | | |
|---|---|---|---|
| CCDEBE-BRQ049 | System shall apply cap to SCs without market-based rate authority so that market-based energy and default commitment cost bids are capped to DEB or reference level default commitment cost bids (including adjustments as applicable). | Core Phase 1 | SIBR |
| CCDEBE-BRQ050 | System shall calculate proxy transition cost reference level on upward transition cost bids as the difference between the two configuration proxy start up bids cost reference level and the from configuration proxy start up bids reference level . | Core Phase 1 | SIBR |
| CCDEBE-BRQ341 | System shall calculate the default transition cost as the proxy transition cost times the <span style="color:red">commitment cost multiplier, plus the Transition opportunity costs (if applicable). This is existing functionality of SIBR. This requirement is simply clarifying the terms used to describe the calculations.</span> | Core Phase 1 | SIBR |
| CCDEBE-BRQ053 | Default commitment cost bids and DEBs that are replacing the original default commitment cost bids and DEB values shall be specifically identified within the payload. | Core Phase 1 | SIBR |
| CCDEBE-BRQ206 | System shall broadcast resource-specific default commitment cost bids and default energy bid values to downstream | Core Phase 1 | SIBR |

| | systems for each Day-Ahead and Real-Time Market. | | |
|---|---|---|---|
| CCDEBE -BRQ228 | System must be capable to receive Default Energy Bids at an hourly granularity for a single trade date. | Core Phase 1 | SIBR |
| CCDEBE -BRQ229 | System must be capable to receive reasonableness threshold costs. | Core Phase 1 | SIBR |

## 4.2 Business Process: Manage Markets & Grid (MMG) - (Negotiated Commitment Costs)

### 4.2.1 Business Requirements

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|-----|------------------|------------------|-----------------------------------|
| CCDEBE-BRQ063 | System shall calculate reasonableness threshold DEB costs for all resources that have DEBs, regardless of the resource ranking of available DEB options. Note: This should apply to the cost based DEB formula and is applicable to all resources regardless of ranking. The reasonableness threshold formulas can be referenced in Appendix B.2. | Core Phase 1 | INTERNAL ISO SYSTEM **Module :** Reasonable Threshold |
| CCDEBE-BRQ064 | For gas resources - the fuel price scalar shall be set at 125% (configurable) for days for which a next day index is not published the day before (i.e. the day after a holiday) or a Monday-only index is not published, and 110% (configurable) for other days. | Core Phase 1 | INTERNAL ISO SYSTEM **Module :** Reasonable Threshold |
| CCDEBE-BRQ065 | For non-gas resources - fuel price scalar shall be set at 110% (configurable). For energy - volatility scalar is multiplied by the Master File average cost field to get the scaled fuel equivalent cost. System will replace the scaled fuel equivalent costs in the variable cost formulas for energy cost reasonableness threshold. Note: Please reference Appendix B for GPI formula. | Core Phase 1 | INTERNAL ISO SYSTEM **Module :** Reasonable Threshold |

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| ~~CCDEBE-BRQ333~~ | ~~If the last segment of the reasonableness threshold for energy is lower than the last segment of the generated DEB, the system shall set the reasonableness threshold curve for energy at the generated DEB curve values.~~ | ~~Core~~ | ~~INTERNAL ISO SYSTEM~~ |
| CCDEBE-BRQ209 | System must have the ability to support resource-specific scalars (feedback loop scalar). These scalars will initially be set to 100% for every resource. CAISO will have the ability to adjust the resource-level scalar based on need to tune the fuel-region volatility scalars to better approximate the resource-specific cost expectations. Note: Feedback loop is based on systematic positive differences between resources' actual incurred costs (verified through ex post review) versus the fuel-region fuel price scalars. | Core Phase 1 | INTERNAL ISO SYSTEM **Module :** Reasonable Threshold |
| CCDEBE-BRQ067 | For gas-fired resources that HAVE NOT received a resource specific gas price (i.e. GPI with SOURCE <> MANUAL_CONSULT), system shall calculate reasonableness threshold DEB costs using the appropriate fuel price scalar and DEB Multiplier for each resource and time of use (on and off peak). This shall calculated per trade date per market. Please reference Appendix B. | Core Phase 1 | INTERNAL ISO SYSTEM **Module :** Reasonable Threshold |

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| CCDEBE-BRQ068 | For non-gas-fired resources that HAVE NOT received a resource specific fuel price (i.e. HEAT_AVG_COST with SOURCE <> MANUAL_CONSULT), system shall calculate reasonableness threshold DEB costs using the appropriate fuel price scalar and DEB Multiplier for each resource and time period. | Core Phase 1 | INTERNAL ISO SYSTEM<br><br>**Module :** Reasonable Threshold |
| CCDEBE-BRQ345 | For gas resources that HAVE received a resource specific gas price (i.e. GPI with SOURCE = MANUAL_CONSULT), the reasonableness threshold should be calculated as the maximum of: 1) the Revised DEB or 2) the reasonableness threshold, only if the reasonableness threshold is calculated using a GPI with SOURCE = SAME_DAY or VOL_WTD_AVG).  If the GPI SOURCE = ALL_SOURCES or WEB_ICE the reasonableness threshold shall be equal to the Revised DEB. | Core Phase 1 | INTERNAL ISO SYSTEM<br><br>**Module :** Reasonable Threshold |
| CCDEBE-BRQ346 | For non-gas resources that HAVE received a resource specific fuel price (i.e. HEAT_AVG_COST with SOURCE = MANUAL_CONSULT) - the reasonableness threshold should be calculated as the Revised DEB. | Core Phase 1 | INTERNAL ISO SYSTEM<br><br>**Module:** Reasonable Threshold |

| CCDEBE-BRQ069 | System must have the following fields to track the approved manual consultation:<br><br>• Resource ID [generating units only, no Non-Generating Resource (NGRs)]<br><br>• Configuration ID (for applicable MSG resources)<br><br>• Trade Date start time / trade date end time [trade date start time must be in the future and trade date end time must be greater than or equal to trade date start time].<br><br>• Market [DAM or RTM]<br><br>• Override value(s) [MW price curve with the MW between Pmin and Pmax as registered in Master File (MVQA to input the collapsed bid)]<br><br>• Update user<br><br>• Update timestamp<br><br>• Comment [250 character limit]<br><br>Note: Business unit must have the ability to upload the approved manual consultation values via file upload and a user interface.  CIDI shall accept the Manual Consultation submissions and MVQA shall input the approved manual consultation within INTERNAL ISO | Core Phase 1 Tariff 30.13.2.5.1 | INTERNAL ISO SYSTEM<br><br>**Module :** Manual Consulted Bids |
|---|---|---|---|

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| | SYSTEM or the user interface. | | |
| CCDEBE-BRQ071 | Override shall occur only for time periods that are applicable. Overrides shall be published for future dates as applicable. | Core Phase 1 | INTERNAL ISO SYSTEM  **Module :** Manual Consulted Bids |
| CCDEBE-BRQ072 | For any manual consultation that have been approved, system shall provide a means for internal user to enter override reference level for costs (energy). | Core Phase 1 | INTERNAL ISO SYSTEM  **Module :** Manual Consulted Bids |
| CCDEBE-BRQ074 | System shall identify the source of the DEB (negotiated [existing], LMP [existing], cost based [existing], and manual consult [new]) when broadcasting. | Core Phase 1 | INTERNAL ISO SYSTEM  **Module**: Broadcast DEBs |
| CCDEBE-BRQ075 | System shall broadcast resource-specific DEB cost values. | Existing | INTERNAL ISO SYSTEM  **Module**: Broadcast DEBs |
| CCDEBE-BRQ224 | System shall broadcast reasonableness threshold DEB cost values to downstream systems for each Day-Ahead and Real-Time Market. | Core Phase 1 | INTERNAL ISO SYSTEM  **Module**: Broadcast: Reasonable Threshold DEBs  1. |

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| CCDEBE-BRQ077 | For resources that have approved manual consultation values, system shall result in recalculated DEBs (called Revised DEBs) using the formulas described in Appendix B.1 to this BPM. No DEB Multiplier shall be applied to the calculation of the Revised DEB. The Revised DEB shall override any reference level costs [negotiated or cost based LMP] that are broadcasted to downstream systems. | Core Phase 1 | INTERNAL ISO SYSTEM  **Module :** Manual Consulted Bids |
| CCDEBE-BRQ211 | For gas resources, system must broadcast gas price indices (existing), fuel region, market (DA/RT), commodity price, total transportation cost, and a field to indicate if the gas price is current. | Core Phase 1 | INTERNAL ISO SYSTEM |
| ~~CCDEBE-BRQ246~~ | ~~Ineligibility for manual consult:~~  ~~If a resource SCID is on the ineligibility list, system shall not send manual consult reference level for that period in which the resource is ineligible. Instead, system must broadcast the original reference level. Implementation Note: INTERNAL ISO SYSTEM shall source ineligibility list of SCIDs from Master File.~~ | ~~Core Phase 1~~ | ~~INTERNAL ISO SYSTEM~~  ~~**Module :** Manual Consulted Bids~~ |
| CCDEBE-BRQ343 | For the purposes of calculating Reasonableness Threshold or Hydro DEB, if the fuel region gas price changes based on manual consult prices or same day update then the generic hub must be recalculated. | Core Phase 1 | INTERNAL ISO SYSTEM |

## 4.3 Business Process: Same Day Reasonableness Threshold Update (new business process)

### 4.3.1 Business Requirements

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| CCDEBE-BRQ300 | System shall update the reasonableness thresholds based on the same-day gas price information on ICE or through individual reference level adjustment requests received from resource owners.<br>Note: Updates to the reasonableness thresholds used by the real-time market shall occur in the morning for days in which there is trading on ICE (i.e. non-holiday weekdays). | Core Phase 1 | INTERNAL ISO SYSTEM |
| CCDEBE-BRQ301 | MV&A shall review same-day gas prices on ICE each morning and individual reference level adjustment requests each morning. | Business Process Phase 1 | Business process: Same Day Reasonableness Threshold Update |
| CCDEBE-BRQ302 | MV&A shall upload same-day gas prices each morning if available. Implementation Note (optional scope, dependent on AD): A user interface with file upload capabilities would be the preferred method to upload same-day gas prices. | Core Phase 1 | INTERNAL ISO SYSTEM |

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Owner: Program Management Office                                   Program Office

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| CCDEBE-BRQ303 | System shall automatically recalculate all resources' reasonableness thresholds in the applicable fuel regions (available and sufficiently liquid) when the Same-day gas prices are 10% more than the next-day gas price index based on the indices used that are calculated the prior evening. In calculating the reasonableness thresholds for gas-fired resources with approved manual consults, an additional calculation step is required prior to sending the reasonableness threshold downstream, as explained in BRQ345. | Core Phase 1 | INTERNAL ISO SYSTEM |
| CCDEBE-BRQ304 | The automatic recalculation of reasonableness thresholds based on same-day gas prices on ICE shall only be applied to fuel regions with sufficient liquidity. | Business Process Core Phase 1 | Business process: Same Day Reasonableness Threshold Update |
| CCDEBE-BRQ305 | Reasonableness thresholds that have been updated shall persist throughout the remainder of the day for the real-time market. Implementation Note: Reasonableness threshold calculation shall be scheduled base vs event based. The ISO is not setting a strict processing time limitation to the calculation. | Core Phase 1 | INTERNAL ISO SYSTEM |

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| CCDEBE-BRQ306 | Resource owners shall have the ability to request a manual consultation (for reference level adjustment) when the gas prices for the current trade date are 10% or $0.50 (whichever is higher) more than the next-day gas price index calculated the prior evening. | Core Phase 1 | CIDI |
| CCDEBE-BRQ307 | When resource owners submit their manual consultation request, resource owners must provide cost justification supporting an adjustment greater than a resource's calculated reference level. | Core Phase 1 | CIDI |

| CCDEBE-BRQ308 | Acceptable documentation to justify a supplier's increased real-time natural gas costs shall include the following:<br>- Invoices for gas purchased in real-time that demonstrate an incremental gas costs above the gas price that was used to develop a supplier's reference levels.<br>- Quotes from gas suppliers for real-time gas that demonstrate an incremental gas cost above gas price that was used to develop a supplier's reference levels.<br>- Evidence of other deals transacted in real-time at a price above the gas price that was used to develop reference levels.<br>- An offer to buy gas in real-time on a trading platform at or above the gas cost that was used to develop reference levels, where the offer was posted for reasonable period of time but was not accepted. The documentation required would include the name of the trading platform, the price offered to buy the gas, the time the offer was placed and the time the offer was removed or rescinded.<br>- Other evidence of real-time gas costs temporarily above the gas reference index will also be considered.<br>- Suppliers may propose other methods of demonstrating temporarily increased gas costs to the CAISO.<br>If the above documentation appears to reflect current costs, the CAISO shall approve the manual reasonableness threshold adjustment request. | Core<br>Phase 1<br>BPM Market Instruments | CIDI |
|---|---|---|---|

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| CCDEBE-BRQ328 | Upon approval of a manual consult request for a SC's gas fired resource, the SC must have the ability to request to modify the DEBs of any Hydro resource on the Hydro DEB option whose fuel region is associated with the same hub as the gas fired resource used in the manual consult request. | Business Process Phase 1 | Business Process |
| CCDEBE-BRQ309 | System must have the ability to accept a resource specific gas commodity price. The following fields must be accepted: <br> - SCID <br> - Resource name <br> - Commodity price <br> - Effective start and end trade date <br> - Applicable market type <br> - Audit columns <br> - Comments <br> Implementation Note: A UI with file upload capability is being requested for the update of resource specific gas commodity prices. <br> Implementation Note: This shall include Hydro DEB resources. | Core Phase 1 | INTERNAL ISO SYSTEM |
| CCDEBE-BRQ310 | System must have the ability to recalculate a resource specific gas price index with transportation costs included. | Core Phase 1 | INTERNAL ISO SYSTEM |

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| CCDEBE-BRQ329 | System must have the ability to recalculate the DEBs of any Hydro resource on the Hydro DEB option given a cost provided on a UI (Reference BRQ309). For Hydro DEB resources in the applicable fuel regions with approved manual consult gas prices, the Hydro DEB will be calculated using the maximum of the resource specific fuel price (see BRQ 309, 310), same-day ICE price, and the volume weighted average fuel region price. | Core Phase 1 | INTERNAL ISO SYSTEM |
| CCDEBE-BRQ330 | Same day reasonableness threshold calculations and reference level DEB calculations for the verified manual consult resources (entered within the UI) shall be initiated by a CAISO user. Implementation Note: This shall apply to Hydro DEB, gas, and non-gas resources. | Core Phase 1 | INTERNAL ISO SYSTEM |
| CCDEBE-BRQ331 | System shall automatically recalculate all Hydro DEBs in the applicable fuel regions (available and sufficiently liquid) when the Same-day gas prices are 10% more than the next-day gas price index based on the indices used that are calculated the prior evening. | Core Phase 1 | INTERNAL ISO SYSTEM |

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| CCDEBE-BRQ332 | Based on the manual consultation requests, system must have the ability to calculate a volume weighted average of the gas prices submitted.  If the volume weighted average is greater than the same-day ICE price, this volume weighted average shall be used in the Hydro DEB calculation for all Hydro DEB resources belonging to that fuel region. | Core Phase 1 | INTERNAL ISO SYSTEM |
| CCDEBE-BRQ311 | For resources with updated resource specific fuel region price, system must recalculate the default energy bid using the variable cost based formula without applying the DEB multiplier, consistent with the formulas for the Revised DEB in Appendix B.  This new DEB shall be classified as manual consult (under DEB type field). | Core Phase 1 | INTERNAL ISO SYSTEM |
| ~~CCDEBE-BRQ327~~ | ~~System shall recalculate reasonableness threshold energy cost as necessary using the maximum of the resource specific fuel price and the reasonableness threshold fuel region price for the manual consult resource.~~ | ~~Core Phase 1~~ | ~~INTERNAL ISO SYSTEM~~ |
| CCDEBE-BRQ312 | System shall broadcast resource specific fuel region prices, effective trade dates, manual consult DEB cost curve, and market type to SIBR. | Core Phase 1 | INTERNAL ISO SYSTEM |
| CCDEBE-BRQ313 | System shall broadcast manual consult DEB cost curve, effective trade date, and market type to downstream systems. | Core Phase 1 | INTERNAL ISO SYSTEM |

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| CCDEBE-BRQ314 | System shall receive resource specific fuel region prices, effective trade dates, manual consult DEB cost curve, and market type from INTERNAL ISO SYSTEM. | Core Phase 1 | SIBR |
| CCDEBE-BRQ315 | System shall recalculate commitment cost reference level for resources with resource specific fuel prices without applying the Commitment Cost multiplier, consistent with the formulas for the Revised Commitment Costs in Appendix B. System shall revalidate the bids submitted by the resource against the new reference level. | Core Phase 1 | SIBR |
| ~~CCDEBE-BRQ326~~ | ~~System shall recalculate reasonableness threshold commitment cost as necessary using the maximum of the resource specific fuel price and the reasonableness threshold fuel region price for the manual consult resource.~~ | ~~Core Phase 1~~ | ~~SIBR~~ |
| CCDEBE-BRQ316 | System shall receive manual consult DEB cost curve, effective trade, and market type. The DEBs shall remain effective for the remainder of the applicable trade date. | Core Phase 1 | IFM/RTM |
| CCDEBE-BRQ317 | System shall store the manual consult DEB cost curve, resource specific fuel price, effective trade date, audit column, and market type. The retention for this data shall be consistent with how existing DEBs are stored. | Core Phase 1 | INTERNAL ISO SYSTEM |

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| CCDEBE-BRQ318 | System must have the ability to accept and store the manual consultation request data in the event that three or more different gas price update requests from three different sources have been made.  This shall be used to calculate the fuel region gas price index for reasonableness threshold. Implementation Note: Manual consult elements: SCID, gas price index hub, volume, price, comments, current trade date, and audit column. | Core Phase 1 | INTERNAL ISO SYSTEM |
| CCDEBE-BRQ319 | For resources which do not have an updated resource specific fuel region price, based on the manual consultation requests, system must have the ability to calculate a volume weighted average of the gas prices submitted. If the volume weighted average is greater than the same-day ICE price, this volume weighted average shall be used in the reasonableness threshold calculation for all resources belonging to that fuel region. System shall recalculate reasonableness threshold energy cost as necessary using the maximum of the same day ICE price, volume weighted average fuel region price, and the price previously used to calculate DEBs based on external feed data. | Core Phase 1 | INTERNAL ISO SYSTEM |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| CCDEBE-BRQ320 | System shall automatically adjust reasonableness thresholds for the resources that do not have an updated resource specific fuel region price in the same fuel region if sufficient information exists through manual consultations. | Core Phase 1 | INTERNAL ISO SYSTEM |
| CCDEBE-BRQ321 | System shall adjust its use of the gas price index in the real-time market for Mondays by including Ice's Monday-only index (when available and sufficiently liquid). Note:  Ice only publishes this index when there is significant trading on Friday's for gas deliveries on Monday only.  This is typically for Monday's when gas demand is anticipated to be significantly higher than normal.  Otherwise, gas trading for Mondays is typically conducted as part of a Saturday-Sunday-Monday package. | Core Phase 1 | INTERNAL ISO SYSTEM |
| CCDEBE-BRQ322 | For Monday trade dates for which an ICE Monday only index is published, system shall calculate reasonableness thresholds by using a 110% fuel price scalar.  The system shall still use fuel price scalar of 125% for other days without an index published in the real-time frame (days after holidays and Monday without ICE index). | Core Phase 1 | INTERNAL ISO SYSTEM |

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| CCDEBE-BRQ323 | As a result of the same-day ICE update and/or manual consult process, if the fuel regions prices are updated for reasonableness threshold calculation, system shall broadcast the fuel region prices to SIBR for commitment cost Reasonableness Threshold recalculation. Implementation note: Any updated price shall be indicated as "current". Implementation note: Real Time reasonableness threshold shall broadcast at the same time as RTRLC broadcasts additionally potentially incremental payload at 9 AM. | Core Phase 1 | INTERNAL ISO SYSTEM |
| CCDEBE-BRQ324 | System shall receive updated fuel region prices based on same-day and/or manual consult update and recalculate commitment cost reasonableness thresholds. Reasonableness threshold fuel region price data may be incremental (e.g. not all fuel prices may change) after the data is published for the first time for a trade date. Implementation note: Real Time reasonableness threshold shall broadcast at the same time as RTRLC broadcasts additionally potentially incremental payload at 9 AM. | Core | SIBR |

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| CCDEBE-BRQ325 | System shall broadcast two sets of gas prices for each region.  One shall be intended for default commitment cost bids and the other for reasonableness threshold. Each set shall consist of commodity price and transportation cost. Implementation note: The two gas price sets may not be sent out at the same time.  System shall be capable of taking action after receiving just a reasonableness threshold gas price. | Core | INTERNAL ISO SYSTEM |

## 4.4 Business Process: Manage Market & Reliability Data & Modeling (MMR) -Master File

### 4.4.1 Business Requirements

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|---|---|---|---|
| CCDEBE-BRQ210 | System must provide means of maintaining resource specific scalars (feedback loop scalar). These scalars shall be initially set to 100% for every resource. Note: CAISO must have the ability to adjust the resource-level scalar based on the need to tune the fuel-region volatility scalars to better approximate the resource-specific cost expectations.  Feedback loop is based on systematic positive differences between resource's actual incurred costs (verified through ex post review) versus the fuel-region fuel price scalars. | Core Phase 1 | Master File |
| CCDEBE-BRQ081 | System shall retain the registered cost option for historical review. | Existing | Master File |
| CCDEBE-BRQ010 | System shall provide means of maintaining an ineligibility list of market participants not allowed to make adjustments (either ex-ante or ex-post) to reference level costs. Ineligibility status shall have an associated effective date range. Example:  Ineligibility SCID ABD which is tied to caisoresource1070 shall be ineligible from 5/1/17 to 6/30/17 (60 day case) or 5/1/17 to 10/31/17. | Core BPM Market Instruments Phase 1 | Master File |

## 4.5 Business Process: Support Customers & Stakeholders (SCS) - CIDI

### 4.5.1 Business Requirements

| ID# | Business Feature | Requirement Type | Business Unit(s) Affected | Potential Application(s) Impacted |
|---|---|---|---|---|
| CCDEBE-BRQ106 | System must have the ability for SCs to submit request for manual consultation along with the supporting documentation as defined within the Market Instruments BPM. | Core BPM – Market Instruments Phase 1 | Corporate Systems | CIDI |
| CCDEBE-BRQ107 | System must provide the ability for the user to enter the following information for the manual consultation or for ex-post verification:<br><br>• Resource ID<br><br>• Trade date<br><br>• Market<br><br>• Adjustment parameters<br><br>• Adjustment value<br><br>• Field to describe change<br><br>Manual consultation or ex-post verification | Core Market Instruments Phase 1 | Corporate Systems | CIDI |
| CCDEBE-BRQ108 | System must allow for the user to attach supporting documentation to the manual consultation or ex-post adjustment request.<br>Note: Sufficient documentation shall be spelled out within the Market Instruments BPM. | Core BPM – Market Instruments Phase 1 | Corporate Systems | CIDI |

## 4.6 Business Process: Manage Markets & Grid (MMG) - CMRI

### 4.6.1 Business Requirements

| ID# | Business Feature | Requirement Type | Business Unit(s) Affected | Potential Application(s) Impacted |
|---|---|---|---|---|
| CCDEBE-BRQ109 | System shall receive resource-specific reference level cost values for each Day-Ahead and Real-Time Market. | Core Phase 1 | ITPD; ITPM; Operations Readiness | CMRI |
| CCDEBE-BRQ112 | Reference level costs shall be retained for external reporting in accordance with CMRI standards. | Existing | MVQA | CMRI |
| CCDEBE-BRQ113 | System shall display the origin of DEBs and default commitment cost bids. This includes original, adjusted ex-ante, and manual. | Core Phase 1 | ITPD; ITPM; Operations Readiness | CMRI |

## 4.7 Business Process: Market/Business Simulation

This section shall provide a basis for the development of the Market/Business Simulation Structured Scenarios. These requirements will provide guidance on the market participant impacts, inputs into the Structured Scenarios, endpoints to the Structured Scenarios, and reasons for potential Structured Scenarios. The guidance on market participant impacts shall be gathered from the requirements that impact rules, interfaces, applications/reports, new system processes, new/modified data models, and new user roles. The source and sink systems shall be determined through the development of the system context diagram and the web service requirements. The Reason for the Potential Structured Scenario column will be to offer guidance regarding what potential Structured Scenarios, and their context, may be needed for this project. This section applies to all policy development projects, market enhancements, technology enhancements, operation enhancements, Energy Imbalance Market (EIM) implementations, and Reliability Coordination (RC) service implementations.

In the Reason for Potential Structured Scenario column, the Business Analyst must select one or more of the following reasons:

**1. Rule Impacts**: Generalized changes in market rules, bidding rules, settlements rules, market design changes, or other business rules.

**2. Interface changes**: Changes that impact templates (e.g. the Resource Adequacy (RA) supply plan), user interface (UI), and application programming interface (API) (e.g. retrievals of new shadow settlement data).

**3. New application/report**: Changes that cause addition/modification of market software or reports, especially when market data input is required by the market participant.

**4. New system process**: Modification of data flow in systems, especially if the new process requires the market participant to demonstrate proficiency prior to production.

**5. New/Modified model data**: Addition or substantial modification of model data as a market solution provided by the ISO (e.g. BANC split into SMUD and non-EIM BAAs, PowerEx Overlapping Resource Aggregation).

**6. New user role**: The addition or modification of access permissions for a user role applied to specific business units within an EIM entity or market participant organization (e.g. Load Serving Entity (LSE) as a Local Regulatory Authority (LRA) role). Structured Scenarios would be beneficial for market participants taking on a new function or process within their organization.

**The following business requirements apply to Phase 1.**

### 4.7.1 Business Requirements

| ID# | Guidance on Market Participant Impacts | Source System | Sink System | Reason for Potential Scenario |
|---|---|---|---|---|
| CCDEBE-BRQ232 | Market participants will have the ability to submit adjustment requests to their commitment and energy costs via an ex-ante process. System will validate that the costs are not higher than a reasonable value per the requirements contained within this document. | Market Participant | SIBR | Rule Impacts; New system Process |

| ID# | Guidance on Market Participant Impacts | Source System | Sink System | Reason for Potential Scenario |
|---|---|---|---|---|
| CCDEBE-BRQ233 | Ex-ante adjustments will not be allowed for manually consulted bids, registered costs, or costs calculated for RMR resources. Ex-ante adjustments will not be allowed for resources that are on the ineligibility list (per the requirements contained within this document). | Market Participant | SIBR | Rule Impacts; New system Process |
| CCDEBE-BRQ234 | Market participants will have the ability to submit their commitment bids with an upper limit of 125% of their proxy based commitment costs. | Market Participant | SIBR | Rule Impacts |
| CCDEBE-BRQ236 | Market participants without market rate based authority must submit bids at their costs. | Market Participant | SIBR | Rule Impacts |
| CCDEBE-BRQ238 | Market participants will have the ability to view their negotiated costs daily on CMRI. Market Participants will have the ability to view their negotiated cost basis type for commitment cost within the RDT. | Market Participant to negotiate with ISO | CMRI/RDT | Rule Impacts |
| CCDEBE-BRQ239 | Market participants will have the ability to view their manually consulted costs daily on CMRI. | CIDI | CMRI | Rule Impacts |
| CCDEBE-BRQ240 | Market participants will have the ability to view an approved minimum load cost value associated with a zero MW output. Cost will be included within the optimization and will be qualified for bid cost recovery purposes. | Market Participant | CMRI/RDT | Rule Impacts; Interface changes |
| CCDEBE-BRQ241 | In the event of an exceptional dispatch instruction commitment bids will be frozen at the value that existed at the time that the exceptional dispatch was initiated. | Market Participant | CMRI | Rule Impact |
| CCDEBE-BRQ244 | RTUC/IFM will now have a process that mitigates commitment bids for a resource when local market power is present. | Market Participant | CMRI | Rule Impact; Interface Changes; Report; New System Process |

## 4.8  Business Process: Regulatory & Business Practice Impacts

### 4.8.1   Business Requirements

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted | Tariff |
|---|---|---|---|---|
| CCDEBE-BRQ146 | Extend filing right to MPs at FERC for fuel procurement costs in its incremental energy costs. | Tariff Phase 1 | N/A | 30.12 30.12.5 |
| CCDEBE-BRQ147 | The CAISO shall continue to send D+2 RUC report to SCs.  The tariff plans to make this provision permanent. | Tariff Phase 1 | N/A | 6.5.2.2.3 |
| CCDEBE-BRQ148 | The ISO shall use the webICE Volume Weight Average Price (VWAP) of the next day gas product pull between 8-9AM (ICE calculated midpoint made available prior to official index publication) in the CAISO's day-ahead gas price index formulation.  If no webICE value is submitted, the system will fallback to the most recent next day gas product index available that is based on the average of the published commodity price indices available the night prior to the day-ahead market. Note: Tariff change will make this provision permanent. | BPM- Market Instruments Tariff Phase 1 | N/A | 39.7.1.1.1.3 |

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted | Tariff |
|---|---|---|---|---|
| CCDEBE-BRQ149 | If flagged verified, MVQA shall send a correction request to revise costs in uplift calculations which will be at resource and supply offer component level (resource id, energy cost; resource id, default minimum load cost bids cost; resource id, default start-up cost bids; resource id, transition cost). | Business Process Phase 1 | N/A | |
| CCDEBE-BRQ150 | If flagged unverified, CAISO will notify the MP that the reference level adjustment was rejected for levels above the soft cost cap for each component. | Business Process Phase 1 | N/A | |
| CCDEBE-BRQ151 | MVQA will identify if rejected requests failed to submit accurate cost information as determined by through the ISO audit. If yes, MVQA will add resource to list of ineligible resources for a period of 60 days (BPM). If no, then no additional action is needed. | Business Process BPM – Market Instruments Phase 1 | N/A | 30.11.3.4 |
| CCDEBE-BRQ152 | MVQA would audit to verify that the ex-ante submissions were a reasonable reflection of cost expectations at the time submitted given available information to the SC. | Business Process BPM – Market Instruments Phase 1 | N/A | 30.11.3.4 |

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted | Tariff |
|---|---|---|---|---|
| CCDEBE-BRQ153 | If flagged unverified, MVQA shall submit correction request to Market Service Production. MVQA will send a correction request to revise costs in uplift calculations will be at resource and supply offer component level (resource id, energy cost; resource id, default minimum load cost bids cost; resource id, default start-up cost bids; resource id, transition cost). | Business Process Phase 1 | N/A | |
| CCDEBE-BRQ154 | MVQA shall identify if a SC fails its audit. If yes, MVQA shall add the scheduling coordinator to list of ineligible scheduling coordinator for a period of 60 days. | Business Process BPM – Market Instruments Phase 1 | N/A | 30.11.3.4 |
| CCDEBE-BRQ155 | Approved ex-post cost updates shall be communicated to Settlements in a file for uploads to PCA. | Business Process Phase 1 | N/A | |

# Appendix A: Reference Level Calculations

This section is a leftover remnant from the CCDEBE policy papers. The formulas in this section are no longer accurate based on changes and clarifications made during the implementation process. See Appendix B for the full set of updated reference level and reasonableness threshold calculations.

This section provides proposed formulations for the calculation of start-up and minimum load cost reference levels.

The gas price index is the delivered gas price estimate based on next day gas commodity price indices, transportation rates, cap-and-trade credits, etc. California ISO calculates day-ahead and real-time GPIs.

**Gas Price Index**

$$GPI_{DA} = Commodity\ Price_{DA,DAFallBack} + Transportation\ Rate + Shrinkage\ Allowance_{DA} + Cap\ \&\ Trade\ Credit + Miscellaneous$$

$$GPI_{RT} = Commodity\ Price_{RT} + Transportation\ Rate + Shrinkage\ Allowance_{RT} + Cap\ \&\ Trade\ Credit + Miscellaneous$$

**Where:**

$Commodity\ Price_{DA} = ICE_{GD2,8-9AM}$ (ICE calculated midpoint made available prior to official index publication)

$$Commodity\ Price_{DAFallBack} = average(SNL_{GD1}, Platts_{GD1}, ICE_{GD1}, NGI_{GD1})$$

$$Commodity\ Price_{RT} = average(SNL_{GD2}, Platts_{GD2}, ICE_{GD2}, NGI_{GD2})^{28}$$

$$Shrinkage\ Allowance_{DA,RT} = Commodity\ Price_{GD2} * \frac{Fuel\ Reimbursement\ Rate}{1 - Fuel\ Reimbursement\ Rate}$$

Transportation Rate is the approved gas pipeline shipping company rates on the company's electric supplier rate for that region.

Cap & Trade Credit (neg. value) is the approved CARB-jurisdictional gas pipeline shipping company rates on the company's electric supplier rate for that region that are only eligible to resources on the CARB covered entities list or to those who opt-in to the CARB list.

Miscellaneous costs will be defined specific to the fuel region.

Minimum load costs are costs incurred per hour to maintain the resource at the minimum operating point as specified by the minimum load value in the Master File. These costs do not require having a minimum operating point above zero since it could include short-term fixed costs incurred for a run hour or variable costs for power production at minimum load.

**Default Minimum Load Cost Bid**
= (Minimum Load Fuel Cost + VOM + GMC Adder +GHG Cost + MMA) * Commitment Cost Multiplier + OC Adder

If Gas Resource:
Minimum Load Fuel Cost = Min_Load_Cost + (Unit Conversion * Incremental heat rate * Pmin * GPI)
Where:
Headroom scalar = 1.25.
MIN_LOAD_Cost is a new Master File attribute ($ value).  See BRQ079.

If non-gas resource:
Minimum Load Fuel Cost = Average Cost * Pmin

**Inputs:**

Master File Registered Values: $HEAT\_HEAT\_RATE_{Point1}$, $HEAT\_AVG\_COST_{POINT1}$[30], $MIN\_LOAD\_COST$[31], $MIN\_GEN$, GHG_EMISSION_RATE, GHG_COMPLIANCE_OBLIG (i.e. $GHG_{Flag}$).

Start-up (or shutdown) cost is a cost incurred per start-up event that is the cost of bringing the resource into a mode by which it can operate hourly and to a given dispatch level. The cost does not vary with the number of hours the resource is kept online

**Start-up Cost Reference Level:**
Start-up Cost Reference Level = (Start-up Fuel Cost + Start-up Energy Cost + GMC Adder + GHG Cost + MMA) * Headroom Scalar + OC Adder.

If gas resource:
Where Start-up Fuel Cost = STRT_STARTUP_FUEL * GPI

If non-gas resource:
Start-up Fuel Cost = STRT_STARTUP_COST

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[31] California ISO will revise the definition of this field to make clear that for variable cost units the registered values should only be the run hour costs expected outside of energy production costs up to Pmin.
[30] First segment in the average heat rate field in Master File where segment 1 must be the Pmin (i.e. minimum load).

**Inputs:**

Master File Registered Values: STRT_STARTUP_FUEL, STRT_STARTUP_COST, STRT_STARTUP_AUX, $STRT\_STARTUP\_TIME_{Point2}$, MIN_GEN, GHG_EMISSION_RATE, GHG_COMPLIANCE_OBLIG (i.e. $GHG_{Flag}$).

California ISO Calculated Inputs: $GPI_{DA,RT}$, $EPI$, GHG Allowance Rate, calculated opportunity cost for eligible start limitations.

California ISO Defined or Negotiated Values: GMC (BPM), STRT_STARTUP_MMA, negotiated opportunity cost for eligible start limitations.

Transition cost is a cost incurred per event of the resource that is the cost of moving from one state of operation ("From Configuration") to another state of operation ("To Configuration"). The cost does not vary with the hours the resource is called on or at what dispatch level. California ISO views these costs as similar to starting up a higher configuration and is the difference in start-up costs between the two configurations. See Tariff section 30.4.1.1.5.

**Transition Cost Reference Level:**
Transition Cost Reference Level = [Proxy Startup Costs (ToConfig) – Proxy Startup (FromConfig)] * Headroom Scalar + OC Adder

Where headroom scalar is equal to 1.25.

# Appendix B:  Proposed guidelines for ex ante adjustment requests and verification processes

This appendix provides the details for the proposed guidelines for the California ISO proposal to support supplier submitted ex ante reference level adjustments subject to verification.

## 4.9  B.1 Proposed reference level calculations

A supplier must use the existing reference level calculation and will be allowed to submit a request for reference level adjustment based on their reasonable expectations of fuel (or fuel-equivalent) related costs. Suppliers will be expected to calculate the reference level adjustment requests using the formulas under the estimated variable cost option. The Supplier will be able to revise the values of fuel (or fuel-equivalent) related costs using these formulas.

California ISO will expect the supplier to submit the total reference level value including the variable operations and maintenance cost, grid management charge adder, greenhouse gas compliance costs (if appropriate), frequently mitigated adders (if appropriate), negotiated major maintenance adders (if appropriate), and opportunity cost adders (if appropriate) but that those values will be static and consistent with California ISO existing calculations. Further, the resource characteristics that feed into these equations will be required to be consistent with Master File registered values or as revised through outage management system. For example, the supplier may request a reference level adjustment, based on fuel cost or fuel cost equivalent component variations from the costs the California ISO uses in its calculations by including their expectation of fuel or fuel equivalent cost in a recalculated cost-based bid that the supplier will submit and if verified then used as an adjusted reference level.

The reference levels that can be updated via the reference level adjustment process are the Variable Cost Default Energy Bid and the Default Startup Bid and Default Minimum Load Bid under the Proxy Cost Option. The reference levels calculated below will apply in most situations, with the exception being cases in which a manual reference level change request has been made. We show the formulas for both situations below:

*In cases when **NO** manual reference level change request has been made:* ~~The individual components that a supplier is allowed to adjust the values of within the formula for reference levels are limited to:~~
~~Gas Price Index for gas resources~~
~~Average cost curve for non-gas resources~~
~~GHG allowance rate for resources where GHG flag in Master File is "On"~~
~~Minimum load cost registered for variable cost units expected run hour costs not associated with any energy production up to minimum load~~

**Variable Cost Default Energy Bid:**

(Segment Fuel Cost + VOM + GMC Adder + GHG Cost) * DEB Multiplier + FMU Adder + OC Adder

If Gas Resource:
Where Segment Fuel Cost = Unit Conversion * Incremental Heat Rate * GPI (where GPI = Commodity price + Total transportation cost)

If Non-Gas Resource:
Where Segment Fuel Cost = Incremental Average Cost
Where Incremental Average Cost = [Average Cost (i+1) * MW (i+1) – Average Cost (i) * MW (i)] / (MW (i+1) – MW (i))

Where DEB Multiplier is equal to 1.10

**Default Minimum Load Bid:**
(Minimum Load Fuel Cost + VOM + GMC Adder +GHG Cost + MMA) * Commitment Cost Multiplier + OC Adder

Where Commitment Cost Multiplier is equal to 1.25.

If gas resource:
Minimum Load Fuel Cost = Min_Load_Cost + (Unit Conversion * Incremental heat rate * Pmin * GPI)
Where GPI = Commodity price + Total transportation cost

If non-gas resource:
Minimum Load Fuel Cost = Average Cost

**Default Start-up Bid:**
(Start-up Fuel Cost + Start-up Energy Cost + GMC Adder + GHG Cost + MMA) * Commitment Cost Multiplier + OC Adder.

Where Commitment Cost Multiplier is equal to 1.25.

If gas resource:
Where Start-up Fuel Cost = STRT_STARTUP_FUEL * GPI
Where GPI = Commodity price + Total transportation cost

If non-gas resource:
Start-up Fuel Cost = STRT_STARTUP_COST

_In cases when a manual reference level change request **HAS BEEN MADE**:_

The calculation of reference levels will change for resources where a manual reference level change request has been made. In these cases, the CAISO systems will recalculate the reference levels and the new values will be referred to as the resource's revised reference level (i.e. its Revised Default Energy Bid). Non gas-fired resources may submit manual reference level change requests only for Default energy bids – hence there are no Revised formulas for those reference levels. The revised reference level differs from the normal reference in two important ways: 1) for gas resources, the fuel cost will be the value approved by the CAISO during the manual reference level change request process (i.e. "manual consult price") and 2) the revised reference level value will not include the DEB multiplier currently set at 110%.

<u>Revised</u> **Variable Cost Default Energy Bid:**

Segment Fuel Cost + VOM + GMC Adder + GHG Cost + FMU Adder + OC Adder

If Gas Resource:
Where Segment Fuel Cost = Unit Conversion * Incremental Heat Rate * GPI (where GPI = manual consult price] + Total transportation cost)

If Non-Gas Resource:
Where Segment Fuel Cost = Incremental Average Cost
Where Incremental Average Cost = [Average Cost (i+1) * MW (i+1) – Average Cost (i) * MW (i)] / (MW (i+1) – MW (i))


*Equation 6: Default Energy Bid Variable Cost Calculation*

~~Below shows the proposed formulation for the estimated variable cost option for minimum load reference levels. The individual components that an SC is allowed to adjust the values within the formula are limited to:~~

- ~~Gas Price Index for gas resources~~
- ~~Average cost segment 1 for non-gas resources~~
- ~~GHG allowance rate for resources where GHG flag in Master File is "On"~~

*Equation 7: Variable Minimum Load Costs*

~~Equation 8 below shows the proposed formulation for the estimated variable cost option for start-up reference levels. The individual components that a supplier is allowed to adjust the values within the formula are limited to:~~

- ~~Gas Price Index for gas resources~~
- ~~Start-up fuel cost for non-gas resources~~
- ~~Electricity price index~~
- ~~GHG allowance rate for resources where GHG flag in Master File is "On"~~

## 4.10 B.2 Proposed Reasonableness Threshold

California ISO will evaluate the reference level adjustment request through an automated screen comparing the adjusted value against a reasonableness threshold. California ISO proposes the reasonableness threshold should be a threshold calculated to represent a reasonable cost-based bid that can be calibrated to a specific resources' costs. The reasonableness thresholds calculated below will apply in most situations, with the exception being cases in which a manual reference level change request has been made. We show the formulas for both situations below:

*In cases when **NO** manual reference level change request has been made:*

~~For gas-fired resources, the reasonableness threshold will be a calculation using the reference level calculations with a scaled next day gas commodity price in the gas price index. The California ISO proposes~~

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~~to scale the gas price indices as shown in Equation 9. Then the California ISO will calculate the energy, minimum load and start-up reasonableness thresholds using the reference level formulas with the scaled gas price index in place of the standard gas price index (formulas used shown in Equation 6, Equation 7, and Equation 8).~~

**Default Energy Bid Reasonableness Threshold:**

(Segment Fuel Cost + VOM + GMC Adder + GHG Cost) * DEB Multiplier + FMU Adder + OC Adder

If Gas Resource:
Where Segment Fuel Cost = Unit Conversion * Incremental Heat Rate * Scaled GPI (where scaled GPI = [Commodity price * Fuel volatility scalar * Feedback loop scalar] + Total transportation cost)

If Non-Gas Resource:
Where Segment Fuel Cost = Incremental Average Cost * Fuel volatility scalar * Feedback loop scalar
Where Incremental Average Cost = [Average Cost (i+1) * MW (i+1) – Average Cost (i) * MW (i)] / (MW (i+1) – MW (i))

Where DEB Multiplier is equal to 1.10

**Minimum Load Cost Reasonableness Threshold:**
(Minimum Load Fuel Cost + VOM + GMC Adder +GHG Cost + MMA) * Commitment Cost Multiplier  + OC Adder

Where Commitment Cost Multiplier is equal to 1.25.

If gas resource:
Minimum Load Fuel Cost = Min_Load_Cost + (Unit Conversion * Incremental heat rate * Pmin * Scaled GPI)
Where scaled GPI = [Commodity price * Fuel volatility scalar * Feedback loop scalar] + Total transportation cost

If non-gas resource:
Minimum Load Fuel Cost = Average Cost * Pmin * Fuel volatility scalar * Feedback loop scalar

**Start-up Cost Reasonableness Threshold:**
(Start-up Fuel Cost + Start-up Energy Cost + GMC Adder + GHG Cost + MMA) * Commitment Cost Multiplier + OC Adder.

Where Commitment Cost Multiplier is equal to 1.25.

If gas resource:
Where Start-up Fuel Cost = STRT_STARTUP_FUEL * Scaled GPI
Where scaled GPI = [Commodity price * Fuel volatility scalar * Feedback loop scalar] + Total transportation cost

If non-gas resource:
Start-up Fuel Cost = STRT_STARTUP_COST * Fuel volatility scalar * Feedback loop scalar

<span style="color:red">In each of the cases above, the term "commodity price" refers to the price of natural gas in $/MMBtu. The commodity price is typically gathered from external vendors prior to the market run. The CAISO will refer to</span>

this price as the "standard gas price". However, under the CCDEBE business rule changes, the CAISO may update the commodity price used in the calculation of reference levels from the standard gas price. There are two situations where this may occur: 1) when the gas trading on the Intercontinental Exchange (ICE) Same-Day market is 10% than the standard gas price or, 2) when the CAISO accepts 3 or more manual reference level change requests for a gas trading hub. The CAISO will refer to the commodity price in situation (1) as the "same day gas price" and the commodity price in situation (2), as the "volume-weighted average gas price".

Using this terminology, the commodity price used in the calculation of reference levels is:

Max (Standard gas price, same day gas price, volume-weighted average gas price)

*In cases when a manual reference level change request **HAS BEEN MADE***:

The calculation of reasonableness thresholds will change for resources where a manual reference level change request has been made. In these cases, the reasonableness thresholds will be set at the resource's revised reference level (i.e. its Revised Default Energy Bid) with one exception for gas resources. This exception is in cases where the CAISO has updated the commodity price to set it at the same day gas price or volume-weighted average gas price <u>and</u> the resulting reasonableness threshold is greater than the resource's revised reference level. Non gas-fired resources may submit manual reference level change requests only for default energy bids – hence there are no revised formulas for those reasonableness thresholds.

Formulaically this can be presented as:

**Default Energy Bid Reasonableness Threshold:**

Max (Revised Default Energy Bid, updated Default Energy Bid Reasonableness Threshold)

Where updated Default Energy Bid Reasonableness Threshold is calculated using the same day gas price or the volume-weighted average gas price.

**Minimum Load Cost Reasonableness Threshold:**

No changes from the formula for when a manual reference level change request has not been made.

**Start-up Cost Reasonableness Threshold:**

No changes from the formula for when a manual reference level change request has not been made.

~~*Equation 9: Scaled Gas Price Index in Reasonableness Threshold*~~
~~For non-gas fired resources the reasonableness thresholds will be calculated for energy, minimum load, and start-up reference levels by applying a 110% fuel equivalent volatility scalar to the fuel equivalent cost component. Then the California ISO will calculate the energy, minimum load and start-up reasonableness thresholds using the reference level formulas with the scaled fuel equivalent costs in place of the registered fuel equivalent costs (formulas used shown in Equation 6, Equation 7, and Equation 8).~~

*Equation 10: Scaled Minimum Load Fuel Equivalent Cost in Reasonableness Threshold*

*Equation 11: Scaled Start-up Fuel Equivalent Cost in Reasonableness Threshold.*

If the adjustment request falls below the reasonableness threshold, the California ISO will accept the reference level adjustment automatically. If the adjustment is higher than lower of the reasonableness threshold or cost-based cap if applicable[39], the California ISO will adjust the reference level adjustment to the reasonableness threshold – capping the adjustment at a reasonable rate and sending the original adjustment request to the ex post verification process.

## 4.11 B.3 Proposed ex post verification and auditing

For both commitment cost and energy reference level adjustments, California ISO proposes to perform ex post verification of actual incurred costs.

- Unverifiable reference level adjustments based on reasonableness thresholds, and
- Verified or unverifiable energy reference level adjustments greater than $2,000/MWh

If successfully verified, California ISO proposes to re-calculate the supplier's uplift settlement with the verified cost-based adjustment to the reference level(s) and if market revenues are insufficient to cover their costs (i.e., revenue shortfall) will be eligible for uplift.

If the California ISO identifies in its ex post verification process that supplier submitted reference level adjustments did not follow the established principles then the California ISO proposes to render the supplier ineligible to submit reference level adjustments until a defined amount of time has elapsed. This authority is essential as an additional measure to protect against artificial price impacts. California ISO proposes a stepped penalty approach.

The California ISO also proposes to add audit authority to allow it to audit automatically approved adjustments if it identifies that a supplier has frequently submitted and been frequently approved for these requests. This is necessary to ensure the adjustment requests were submitted with cost-based bids consistent with the rules.

The California ISO may render suppliers ineligible either through the ex post verification or through a failed audit. The first instance the California ISO determines the supplier failed to follow the guidelines, the California ISO will render the supplier ineligible for reference level adjustments for 60 days. The 60 day period shall start two business days after the date that the ISO provides written notice of its determination that the supplier did not follow the guidelines. The second time California ISO determines the same supplier failed to follow the guidelines, the California ISO will render the supplier ineligible for 180 days.

If failure to follow the rules appears to become a pattern of strategic bidding behavior or false or misleading information, the California ISO or its Department of Market Monitoring may refer behavior to the Federal Energy Regulatory Commission for a more detailed review of compliance with market behavior rules 35.41(b).

# 5    Appendix C:  Details on local market power mitigation

The purpose of this appendix is to provide the details on the proposed changes to commitment cost bidding rules and mitigation design under Commitment Cost and Default Energy Bid Enhancements.
CAISO proposes to allow market-based bids for each component of the supply bid subject to mitigation where minimum load cost component is treated hourly and start-up and transition costs remain event-based costs at daily values. Proposed enhancements to dynamic market power mitigation will test binding constraints for energy mitigation and test all critical constraints for commitment cost mitigation.

The proposal will apply consistently to internal constraints in the California ISO and Energy Imbalance Market Balancing Authority Areas and to the BAA level net transfer constraints where these constraints will either be binding or non-binding based on the flow. For commitment cost mitigation, the CAISO will apply the calculations for binding constraints to the BAA level net transfer constraints that have a positive shadow price (import congestion). The BAA level net transfer constraints are performed using a power balance constraint which requires generation to equal demand, due to the equality constraint this constraint will always be binding. For mitigating commitment cost bids, the CAISO will apply the non-competitive commitment mitigation criterion for binding constraints to any non-competitive net power balance constraints.

## 5.1  C.1 Potentially pivotal or fringe competitive supplier

Identification of the top three potentially pivotal suppliers in the day-ahead market will be based on the available effective supply that can be withheld by each supplier. In the day-ahead this is the total effective counterflow supply. In real-time, it will be the ramp-constrained capacity including the minimum load energy a supplier could withhold.

The revised real-time withheld capacity calculations applied in both the energy test and the commitment cost test will have conditional logic so that the market removes the floor used to limit ramp capable movement to the minimum operating level. In real-time, the lowest output level for a resource will account for the ability to de-commit or shutdown the resource by including conditional logic whereby if ramp capable, past its minimum run time, and not must run resource then the minimum load energy will be reflected. Moreover, the ramp capability in the real-time calculations for energy mitigation is based on the previous interval schedule as opposed to the initial condition, whereas the ramp capability in the real-time calculations for commitment cost mitigation is based on the initial condition.

### 5.1.1    C.1.1 Binding constraint calculations – WC

For each binding transmission constraint and critical corrective capacity constraint, suppliers are ranked on withheld capacity (WC) from highest to lowest and the top three suppliers are identified as within the set of potentially pivotal suppliers for that constraint and the remainder are identified as fringe competitive suppliers.  For determining the array of potentially pivotal suppliers and fringe competitive suppliers for binding transmission or corrective capacity constraints, CAISO will continue to default net buyers to fringe competitive suppliers.

Today in HASP, for a unit that is offline in the previous interval and has a startup time of 60 minutes or less, then WC = Pmin. For RTUC, the startup time to be used is reduced to 15 minutes or less.  Under

policy this will be generalized to allow resources with feasible start-up bids in that unit commitment to be included in WC or supply of counterflow of fringe competitive suppliers.

Withheld Capacity (WC) shall not consider pump storage resources; demand side of PDR, RDRR, Dispatched Pump resources, and NGR; and any external resources to the BAA under evaluation are excluded (consistent logic to existing MPM).

### 5.1.2 C.1.2 Critical constraint calculations – WC

For each critical transmission constraint and critical corrective capacity constraint (includes binding and non-binding), suppliers are ranked on withheld capacity (WC) from highest to lowest and the top three suppliers are identified as within the set of potentially pivotal suppliers for that constraint and the remainder are identified as fringe competitive suppliers. For determining the array of potentially pivotal suppliers and fringe competitive suppliers on all critical transmission or corrective capacity constraints, CAISO will not default net buyers to fringe competitive suppliers.

Today in HASP, for a unit that is offline in the previous interval and has a startup time of 60 minutes or less, then WC = Pmin. For RTUC, the startup time to be used is reduced to 15 minutes or less. Under policy this will be generalized to allow resources with feasible startup bids in that unit commitment to be included in WC or supply of counterflow of fringe competitive suppliers.

Withheld Capacity (WC) shall not consider pump storage resources; demand side of PDR, RDRR, Dispatched Pump resources, and NGR; and any external resources are excluded (consistent logic to existing MPM).

## 5.2 C.2 Counterflow supply from potentially pivotal suppliers

Effective supply of counterflow to a binding or non-binding constraint in the critical constraint set from a physical resource i belonging to a *potentially pivotal supplier* is the lowest output this supplier can achieve given the dispatch operating point in prior interval (energy mitigation) or initial condition (commitment cost mitigation), resource ramp rates in MW/min, and minimum output limits. In the day-ahead, this is the total effective supply without ramp constraints versus real-time which is ramp-constrained supply including minimum load energy.

The revised real-time supply of counterflow from potentially pivotal suppliers' calculations applied in both the energy test and the commitment cost test will have conditional logic so that the market removes the floor used to limit ramp capable movement to the minimum operating level. In real-time, the lowest output level for a resource will account for the ability to de-commit or shutdown the resource by including conditional logic whereby if ramp capable, past its minimum run time, and not must run resource then the minimum load energy will be reflected.

## 5.3 C.3 Counterflow supply from fringe competitive suppliers

Effective supply of physical counterflow (SPCF) to binding or non-binding constraints in the critical constraint set from a physical resource i belonging to *fringe competitive supplier* (FCS) is the highest possible output from the fringe competitive suppliers. Fringe competitive suppliers do not withhold any capacity. In the day-

ahead, this is the total effective supply without ramp constraints versus real-time which is ramp-constrained supply.

## 5.4  C.4 Demand for counterflow

The demand for counterflow to binding or critical constraint in the critical constraint set is the sum of all dispatched energy that will flow in the counterflow direction.    In the DAM, scheduled energy from both physical and virtual supply resources included as eligible resources.  The set of resources will not include virtual supply in real-time since virtuals are liquated prior to the real-time market runs.

### 5.4.1  C.4.1 Binding constraint calculations – DCF

No changes are being proposed to the demand for counterflow.

### 5.4.2  C.4.1 Critical constraint calculations – DCF

The supply from pump storage and NGR resources shall be included in the counter flow calculation. The demand side of pump storage and NGR resources shall be excluded from the flow calculation. The NGR, demand side of PDR, RDRR, Dispatched Pump resources, and NGR shall be excluded from the flow calculation.  The external resources will be excluded from the flow calculation.

## 5.5  C.5 DCPA Formulae

This section includes the Dynamic Competitive Path Assessment (DCPA) formulae comprehensively for all resources in the DAM and RTM.

### 5.5.1  C.5.1  Notation

The following notation is used in this section:

| | |
|---|---|
| $i$ | Resource index |
| $t$ | Time interval index |
| $t0$ | Initial condition |
| $T$ | Time interval duration |
| UOL | Upper Operating Limit |
| URL | Upper Regulating Limit |
| UEL | Upper Economic Limit |
| LOL | Lower Operating Limit |
| LRL | Lower Regulating Limit |
| LEL | Lower Economic Limit |
| ESS | Energy Self-Schedule for Generating Resource (GR) |
| GSS | Generating Self-Schedule for Non-Generator Resource (NGR) |
| LSS | Load Self-Schedule for NGR |
| EN | Energy Schedule |
| RU | Regulation Up self-schedule |
| RD | Regulation Down self-schedule |

| | |
|---|---|
| SR | Spinning Reserve self-schedule |
| NR | Non-Spinning Reserve self-schedule |
| DOT(t) | Optimal dispatch at interval t |
| RRU(DOT(t),τ) | Upward ramp capability from DOT(t) for ramping period τ |
| RRD(DOT(t), τ) | Downward ramp capability from DOT(t) for ramping period τ |
| EDMAX | MAXGOTO ED/MD |
| EDMIN | MINGOTO ED/MD |
| SF | Shift factor of the resource to the constraint under evaluation |
| δ | Binary option to adjust ED/MD for AS |
| η | Binary variable that is set if the resource is must-run because of ESS or spin self-provision |
| ⬚⬚ | Withheld capacity |
| SCFPPS | Supply counterflow from potential pivotal supplier |
| SCFFCS | Supply counterflow from fringe competitive supplier |
| DCF | Demand for counterflow |
| RSI | Residual supply index |
| F | Constraint scheduled flow |
| FL | Constraint flow limit |

**Note:** NGR and virtual supply/demand are continuous resources without intertemporal constraints, hence commitment cost mitigation does not apply to them. Algebraic notation is used, thus downward variables (LSS, RD, RRD) are non-positive. Virtual demand is negative virtual supply.

### 5.5.2   C.5.2   Resource DCPA contributions for Energy mitigation

The resource contributions to DCPA formulae for the evaluation of a binding constraint for energy mitigation at interval t are as follows:

| **Generating Resource contributions for Energy mitigation** | |
|---|---|
| **On Regulation** | **DAM** |
| WC | $-\min(0,SF)*(\min(\min(UOL,URL)-RU-SR-NR,UEL)-\max(\max(LOL,LRL)-RD,ESS))$ |
| SCFPPS | $-\min(0,SF)*\max(\max(LOL,LRL)-RD,ESS)$ |
| SCFFCS | $-\min(0,SF)*\min(\min(UOL,URL)-RU-SR-NR,UEL)$ |
| DCF | $-\min(0,SF)*EN$ |
| **Off Regulation** | **DAM** |
| WC | $-\min(0,SF)*(\min(UOL-SR-NR,UEL)-\eta*\max(LOL,ESS))$ |
| SCFPPS | $-\min(0,SF)*\eta*\max(LOL,ESS)$ |
| SCFFCS | $-\min(0,SF)*\min(UOL-SR-NR,UEL)$ |
| DCF | $-\min(0,SF)*EN$ |
| **On Regulation** | **RTM** |
| WC | $-\min(0,SF)*(\min(DOT(t-1)+RRU(DOT(t-1),T),\min(UOL,URL)-RU-SR-NR,UEL-SR-NR,EDMAX-\delta*(RU+SR+NR))-\max(DOT(t-1)+RRD(DOT(t-1),T),\max(LOL,LRL)-RD,ESS,EDMIN-\delta*RD))$ |

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| | |
|---|---|
| SCFPPS | $-\min(0,SF)*\max(DOT(t-1)+RRD(DOT(t-1),T),\max(LOL,LRL)-RD,ESS,EDMIN-\delta*RD)$ |
| SCFFCS | $-\min(0,SF)*\min(DOT(t-1)+RRU(DOT(t-1),T),\min(UOL,URL)-RU-SR-NR,UEL-SR-NR,EDMAX-\delta*(RU+SR+NR))$ |
| DCF | $-\min(0,SF)*DOT(t)$ |
| **Off Regulation** | **RTM** |
| WC | $-\min(0,SF)*(\min(DOT(t-1)+RRU(DOT(t-1),T),\min(UOL,UEL)-SR-NR,EDMAX-\delta*(SR+NR))-\max(DOT(t-1)+RRD(DOT(t-1),T),LOL,ESS,EDMIN))$ |
| SCFPPS | $-\min(0,SF)*\max(DOT(t-1)+RRD(DOT(t-1),T),LOL,ESS,EDMIN)$ |
| SCFFCS | $-\min(0,SF)*\min(DOT(t-1)+RRU(DOT(t-1),T),\min(UOL,UEL)-SR-NR,EDMAX-\delta*(SR+NR))$ |
| DCF | $-\min(0,SF)* DOT(t)$ |
| **NGR contributions for Energy mitigation** | |
| **On Regulation** | **DAM** |
| WC | $-\min(0,SF)*(\min(\min(UOL,URL)-RU-SR-NR,UEL,LSS)-\max(\max(LOL,LRL)-RD,LEL,GSS))$ |
| SCFPPS | $-\min(0,SF)*[\max(\max(LOL,LRL)-RD,LEL,GSS)-LOL]$ |
| SCFFCS | $-\min(0,SF)*[\min(\min(UOL,URL)-RU-SR-NR,UEL,LSS)-LOL]$ |
| DCF | $-\min(0,SF)*(EN-LOL)$ |
| **Off Regulation** | **DAM** |
| WC | $-\min(0,SF)*(\min(UOL-SR-NR,UEL,LSS)-\max(LOL,LEL,GSS))$ |
| SCFPPS | $-\min(0,SF)*[\max(LOL,LEL,GSS)-LOL]$ |
| SCFFCS | $-\min(0,SF)*[\min(UOL-SR-NR,UEL,LSS)-LOL]$ |
| DCF | $-\min(0,SF)*(EN-LOL)$ |
| **On Regulation** | **RTM** |
| WC | $-\min(0,SF)*(\min(DOT(t-1)+RRU(DOT(t-1),T),\min(UOL,URL)-RU-SR-NR,UEL-SR-NR,EDMAX-\delta*(RU+SR+NR))-\max(DOT(t-1)+RRD(DOT(t-1),T),\max(LOL,LRL)-RD,ESS,EDMIN-\delta*RD))$ |
| SCFPPS | $-\min(0,SF)*[\max(DOT(t-1)+RRD(DOT(t-1),T),\max(LOL,LRL)-RD,ESS,EDMIN-\delta*RD)-LOL]$ |
| SCFFCS | $-\min(0,SF)*[\min(DOT(t-1)+RRU(DOT(t-1),T),\min(UOL,URL)-RU-SR-NR,UEL-SR-NR,EDMAX-\delta*(RU+SR+NR))-LOL]$ |
| DCF | $-\min(0,SF)*(DOT(t)-LOL)$ |
| **Off Regulation** | **RTM** |
| WC | $-\min(0,SF)*(\min(DOT(t-1)+RRU(DOT(t-1),T),\min(UOL,UEL)-SR-NR,EDMAX-\delta*(SR+NR))-\max(DOT(t-1)+RRD(DOT(t-1),T),LOL,ESS,EDMIN))$ |
| SCFPPS | $-\min(0,SF)*[\max(DOT(t-1)+RRD(DOT(t-1),T),LOL,ESS,EDMIN)-LOL]$ |

| SCFFCS | $-\min(0,SF)*[\min(DOT(t-1)+RRU(DOT(t-1),T),\min(UOL,UEL)-SR-NR,EDMAX-\delta*(SR+NR))-LOL]$ |
|---|---|
| DCF | $-\min(0,SF)*(DOT(t)-LOL)$ |

Note that the DCPA formulae for corrective contingency constraints in RTM include additional ramping for the post-corrective contingency time, as described in the CME BRS. The shift factors of all EIM BAA resources when testing the competitiveness of the net EIM transfer constraint is one.

### 5.5.3   C.5.3  Resource DCPA contributions for Commitment Cost mitigation

The resource contributions to DCPA formulae for the evaluation of a critical constraint for commitment cost mitigation at interval t are as follows:

| **Generating Resource contributions for Commitment Cost mitigation** | |
|---|---|
| **On Regulation** | **DAM** |
| WC | $-\min(0,SF)*(\min(\min(UOL,URL)-RU-SR-NR,UEL)-\max(\max(LOL,LRL)-RD,ESS))$ |
| SCFPPS | $-\min(0,SF)*\max(\max(LOL,LRL)-RD,ESS)$ |
| SCFFCS | $-\min(0,SF)*\min(\min(UOL,URL)-RU-SR-NR,UEL)$ |
| DCF | $-\min(0,SF)*EN$ |
| **Off Regulation** | **DAM** |
| WC | $-\min(0,SF)*(\min(UOL-SR-NR,UEL)-\eta*\max(LOL,ESS))$ |
| SCFPPS | $-\min(0,SF)*\eta*\max(LOL,ESS)$ |
| SCFFCS | $-\min(0,SF)*\min(UOL-SR-NR,UEL)$ |
| DCF | $-\min(0,SF)*EN$ |
| **On Regulation** | **RTM** |
| WC | $-\min(0,SF)*(\min(DOT(t0)+RRU(DOT(t0),(t-t0)*T),\min(UOL,URL)-RU-SR-NR,UEL-SR-NR,EDMAX-\delta*(RU+SR+NR))-\max(DOT(t0)+RRD(DOT(t0),(t-t0)*T),\max(LOL,LRL)-RD,ESS,EDMIN-\delta*RD))$ |
| SCFPPS | $-\min(0,SF)*\max(DOT(t0)+RRD(DOT(t0),(t-t0)*T),\max(LOL,LRL)-RD,ESS,EDMIN-\delta*RD)$ |
| SCFFCS | $-\min(0,SF)*\min(DOT(t0)+RRU(DOT(t0),(t-t0)*T),\min(UOL,URL)-RU-SR-NR,UEL-SR-NR,EDMAX-\delta*(RU+SR+NR))$ |
| DCF | $-\min(0,SF)*DOT(t)$ |
| **Off Regulation** | **RTM** |
| WC | $-\min(0,SF)*(\min(DOT(t-1)+RRU(DOT(t0),(t-t0)*T),\min(UOL,UEL)-SR-NR,EDMAX-\delta*(SR+NR))-\max(DOT(t0)+RRD(DOT(t0),(t-t0)*T),LOL,ESS,EDMIN))$ |
| SCFPPS | $-\min(0,SF)*\max(DOT(t0)+RRD(DOT(t0),(t-t0)*T),LOL,ESS,EDMIN)$ |
| SCFFCS | $-\min(0,SF)*\min(DOT(t0)+RRU(DOT(t0),(t-t0)*T),\min(UOL,UEL)-SR-NR,EDMAX-\delta*(SR+NR))$ |
| DCF | $-\min(0,SF)* DOT(t)$ |
| **NGR contributions for Commitment Cost mitigation** | |

| On Regulation | DAM |
|---|---|
| WC | $-\min(0,SF)*(\min(\min(UOL,URL)-RU-SR-NR,UEL,LSS)-\max(\max(LOL,LRL)-RD,LEL,GSS))$ |
| SCFPPS | $-\min(0,SF)*[\max(\max(LOL,LRL)-RD,LEL,GSS)-LOL]$ |
| SCFFCS | $-\min(0,SF)*[\min(\min(UOL,URL)-RU-SR-NR,UEL,LSS)-LOL]$ |
| DCF | $-\min(0,SF)*(EN-LOL)$ |

| Off Regulation | DAM |
|---|---|
| WC | $-\min(0,SF)*(\min(UOL-SR-NR,UEL,LSS)-\max(LOL,LEL,GSS))$ |
| SCFPPS | $-\min(0,SF)*[\max(LOL,LEL,GSS)-LOL]$ |
| SCFFCS | $-\min(0,SF)*[\min(UOL-SR-NR,UEL,LSS)-LOL]$ |
| DCF | $-\min(0,SF)*(EN-LOL)$ |

| On Regulation | RTM |
|---|---|
| WC | $-\min(0,SF)*(\min(DOT(t0)+RRU(DOT(t0),(t-t0)*T),\min(UOL,URL)-RU-SR-NR,UEL-SR-NR, EDMAX-\delta*(RU+SR+NR))-\max(DOT(t0)+RRD(DOT(t0),(t-t0)*T),\max(LOL,LRL)-RD,ESS, EDMIN-\delta*RD))$ |
| SCFPPS | $-\min(0,SF)*[\max(DOT(t0)+RRD(DOT(t0),(t-t0)*T),\max(LOL,LRL)-RD,ESS,EDMIN-\delta*RD)-LOL]$ |
| SCFFCS | $-\min(0,SF)*[\min(DOT(t0)+RRU(DOT(t0),(t-t0)*T),\min(UOL,URL)-RU-SR-NR,UEL-SR-NR, EDMAX-\delta*(RU+SR+NR))-LOL]$ |
| DCF | $-\min(0,SF)*(DOT(t)-LOL)$ |

| Off Regulation | RTM |
|---|---|
| WC | $-\min(0,SF)*(\min(DOT(t0)+RRU(DOT(t0),(t-t0)*T),\min(UOL,UEL)-SR-NR,EDMAX-\delta*(SR+NR))-\max(DOT(t0)+RRD(DOT(t0),(t-t0)*T),LOL,ESS,EDMIN))$ |
| SCFPPS | $-\min(0,SF)*[\max(DOT(t0)+RRD(DOT(t0),(t-t0)*T),LOL,ESS,EDMIN)-LOL]$ |
| SCFFCS | $-\min(0,SF)*[\min(DOT(t0)+RRU(DOT(DOT(t0),(t-t0)*T),(t-t0)*T),\min(UOL,UEL)-SR-NR, EDMAX-\delta*(SR+NR))-LOL]$ |
| DCF | $-\min(0,SF)*(DOT(t)-LOL)$ |

Note that the DCPA formulae for corrective contingency constraints in RTM include additional ramping for the post-corrective contingency time, as described in the CME BRS. The shift factors of all EIM BAA resources when testing the competitiveness of the net EIM transfer constraint is one.

## 5.6  C.6 Residual supply index

Residual supply index is the metric according to which a critical transmission constraint or critical corrective contingency constraint is considered competitive or uncompetitive. The RSI metric for a critical constraint is as follows:

$$RSI=\Sigma(SCFPPS_i-SCFFCS_i)/[\Sigma(DCF_i)-(FL-F)]$$

If RSI<1, the constraint is deemed uncompetitive, otherwise it is deemed competitive.

## 5.7  C.6 LMPM mitigation criteria

### 5.7.1  C.6.1 Binding constraint calculations – mitigation criterion

First, the CAISO will test for a resources' locational advantage to withhold to impact energy and mitigate the energy bid if the resource fails.  For each interval within the optimization horizon, system will assess if the mitigation criterion is met.  The mitigation criterion for mitigating energy bid is a positive non-competitive congestion component at the resource's LMP (LMP decomposition).

Given the mitigation reference bus, the analysis finds the binding constraints in AC run, and decomposes the locational marginal price (LMP) for every pricing node location I to identify what portion of the marginal congestion component (MCC, $LMP_i^{NC}$) comes from congestion costs associated with non-competitive constraints.  Every unit with $LMP_i^{NC} > 0$ will be flagged for mitigation - a zero tolerance criterion.

LMP decomposition breaks out the contribution to marginal congestion component from the non-competitive constraints[3]:

$$LMP_i = LMP_i^{EC} + LMP_i^{LC} + LMP_i^{CC} + LMP_i^{NC}$$

Where:

$LMP_i^{EC}$ = the energy component of $LMP_i$

$LMP_i^{LC}$ = the loss component of $LMP_i$

$LMP_i^{CC}$ = the congestion component of $LMP_i$ due to the competitive constraints where $RSI_k \geq 1$ or $RSI_{ckc} \geq 1$

$LMP_i^{NC}$ = the congestion component of $LMP_i$ the non-competitive constraints where $RSI_k < 1$ or $RSI_{ckc} < 1$

### 5.7.2  C.6.2 Critical constraint calculations – mitigation criterion

The CAISO will calculate additional criteria for mitigating only the commitment cost components if the resource has locational advantage to inflate uplift due to non-competitive critical transmission or critical corrective capacity constraints.  The non-competitive commitment mitigation criterion ($DOP_i^{NC}$) would be determined as follows for resources with negative shift factors to the constraint:

- For binding constraints mitigate if $SF_{l,i} < 0$ or $SF_{clc,i} < 0$ and l or ckc has an $RSI_k < 1$ or $RSI_{ckc} < 1$.
- For non-binding constraints mitigate if  $DOP_i \geq (Limit_l - Flow_l)$ or $DOP_i \geq (Limit_{clc} - Flow_{clc})$ for where l or clc has an $RSI_k < 1$ or $RSI_{ckc} < 1$.

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[3] The ISO has a shift factor effectiveness threshold of 0.02, which means that any shift factor with absolute values less than 0.02 will not be considered in the decomposition.

The non-competitive commitment mitigation criterion for binding constraints is the shift factor of any non-exempt resource. If a non-exempt resource has a negative shift factor to any non-competitive constraint it would fail the resource test. This is also a zero tolerance criterion.

The non-competitive commitment mitigation criterion for non-binding constraints is whether the resource has a dispatch that is greater than or equal to the unloaded capacity. If a non-exempt resource with a negative shift factor to each non-competitive constraint has a dispatch that provides counterflow that is greater than the unloaded capacity. This does not account for the exact sensitivity of the resource's injection to the non-competitive constraint. This is performed for each non-competitive, critical constraint.

## 5.8  C.7 Mitigated values

As result of dynamic mitigation, minimum load bids will be mitigated at higher of the market revenues for minimum load energy (product of the LMP and the lower operating limit) and the lower of the minimum load cost bid or the minimum load reference level). Where start-up or transition cost bids will be mitigated at lower of the commitment cost bid of the commitment cost reference level. Mitigated reference levels regardless of which commitment cost component can be one either an estimated or negotiated reference level option or adjusted through the reference level adjustment request tool.

Demand response, participating load, non-generator resources and virtual supply are included in power balance constraint but are exempt from mitigation. Mitigation will not be applied to these types of resources (tariff requirement).

## 5.9  C.8 Applying mitigation to commitment cost bids

LMPM applies mitigation to the commitment cost components as follows if the resource failed any of the mitigation criteria: non-competitive congestion component, non-competitive commitment on binding constraints, or non-competitive commitment on non-binding constraints.

Bid mitigation will be applied based on current bid mitigation rules if the non-competitive congestion component fails. Bid mitigation will be applied differently to the minimum load and the start-up/transition cost components if either the non-competitive commitment criterions fail. For minimum load bids, the California ISO will evaluate each interval within an impact window defined as the range of intervals tested (i+MUT). For start-up or transition bids, the California ISO will evaluate each interval within the optimization horizon (T).

LMPM applies mitigation to minimum load bids by:

- Day-ahead market: bids mitigated for the hour the resource failed

- Real-time market: bids mitigated for the range of intervals tested (impact window) if the criteria are met in any interval within the impact window

LMPM applies mitigation to start-up and transition cost bids by:

- Day-ahead market: bids mitigated for the set of intervals of the optimization window T if the criteria are met in any interval within the horizon T
- Real-time market: bids mitigated for the set of intervals of the optimization window T if the criteria are met in any interval within the horizon T