


Business Requirements Specification

Day-Ahead Market Enhancements


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Revision History


| Date | Version | Description |
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| 7/25/2023 | 1.0 | Initial Document Release. |
| 12/22/2023 | 1.1 | Updated for the following <ul style="list-style-type: none"> • Clarified, corrected typos and cleaned up the document. • Moved some requirements from DAME BRS to EDAM BRS and vice versa. • Updated business requirement to match filed Tariff and/or clarified policy. <ul style="list-style-type: none"> ○ Restored back RCU/RCD bid caps to \$250. ○ Set MSS-specific annual RUC participation flag to always Opt-In. ○ Netted RCU/RCD Overlapping RA Capacity from RUC BCR calculations. ○ Updated for not assessing RAAIM to IR and RC awards for generic and Flex RA. ○ Extended the DA and Base Schedule Forecast Movement to virtual supply and demand resources. ○ Extended the FMM deviation settlements to virtual supply and demand resources. ○ Accounted for virtual FM in allocation of residual Forecasted Movement Settlements. ○ Made the LSE-Resource Pair True-Up flag on LSE-Resource Pair instead of LSE-only and updated its logic and submission system from Master File to CIRA. ○ Set UEL to 0 for System Resources, if e-tag validation fails. ○ Required that resources with RCU Award that submitted a DA Energy Bid to export outside the EDAM Area must provide a decremental RT Energy Bid to dispatch down the export schedule in the FMM. ○ Updated for not mitigating RCU Bids that are submitted on behalf of imports from outside the EDAM Area. ○ Published IRU/IRD and RCU/RCD Overlapping RA Capacity in CMRI reports. ○ Changed calculation of ramp rate segment for IRU and IRD to correspond to DAES instead of DAES+IRU and DAES-IRD. ○ Removed the requirement of intertie congestion components being included in RCU/RCD marginal prices. ○ Updated AS SOC formulation constraints formulation. ○ Accounted for Imbalance Reserve Surplus in market optimization, Settlements and reporting. ○ Allowed bid daily min energy limit positive or negative in SIBR, consistent with market. ○ Expand Imbalance Reserve Requirement input model to cover Trading Day+1, +2 for market and reporting. ○ Added formulas for Certified Capacity for IRU and IRD. ○ Replaced Proxy RCU Flag with Proxy RCU MW, as applicable. |

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| | | <ul style="list-style-type: none"> ○ Marked all days as Weekdays Day Type for BARC's IR quantile regression model. ○ Updated formulation of: IRx BAA Average Price, IRx BAA Derived Price, Tier-2 IRx BAA Allocation Cost for Settlements. |
| 4/25/2024 | 1.2 | <p>Updated for the following:</p> <ul style="list-style-type: none"> □ Clarified, corrected typos and cleaned up the document. □ Updated business requirement to per feedback from CAISO SMEs and market participants. <ul style="list-style-type: none"> ● DAME-BRQ-01160 <ul style="list-style-type: none"> ○ Added to define Surplus zones in a BAA. ● DAME-BRQ-01180 <ul style="list-style-type: none"> ○ Deleted and moved to Internal ISO System (DAME-BRQ-02005) ● DAME-BRQ-01200 <ul style="list-style-type: none"> ○ Added for EDAM participation Flag in MF. ● DAME-BRQ-02010 <ul style="list-style-type: none"> ○ Updated to move the setting of sampling scheme parameters to separate BRQ (DAME-BRQ-02011) ● DAME-BRQ-02011 <ul style="list-style-type: none"> ○ Added for the moved functionality of setting the sampling scheme parameters (moved from DAME-BRQ-02010). ○ Marked this BRQ for Production-Track implementation (ahead of DAME Go-Live date) ● DAME-BRQ-02005 <ul style="list-style-type: none"> ○ Moved from MF (DAME-BRQ-01180). ● DAME-BRQ-02040 <ul style="list-style-type: none"> ○ Updated to remove storing uncertainty. ● DAME-BRQ-02060, DAME-BRQ-02070, DAME-BRQ-02090, DAME-BRQ-02100, DAME-BRQ-02110, DAME-BRQ-02120, DAME-BRQ-02130, DAME-BRQ-02140, DAME-BRQ-02150, DAME-BRQ-02310, DAME-BRQ-02320, DAME-BRQ-02340, DAME-BRQ-04140, DAME-BRQ-10280, DAME-BRQ-10300, DAME-BRQ-10320, DAME-BRQ-10340, DAME-BRQ-10360, DAME-BRQ-11420 <ul style="list-style-type: none"> ○ Updated to remove D+2 calculation, broadcast and consume for ISO-Internal System, DAM, OASIS, Internal ISO System (for IRR Thresholds, IRR Input Polynomials, IRR Uncertainty Histograms, IR |

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| | | <p>Forecasts, IR Demand Curves and only keep IRR, IRS and RC Awards).</p> <ul style="list-style-type: none"> • DAME-BRQ-02300, DAME-BRQ-02310, DAME-BRQ-02320, DAME-BRQ-03070, DAME-BRQ-04080, DAME-BRQ-04090, DAME-BRQ-04134, DAME-BRQ-05002 <ul style="list-style-type: none"> ○ Updated to add “/MWh” for “\$55, \$247, \$250, \$150, \$300, \$0” to align with Tariff Compliance Filing. • DAME-BRQ-04030 <ul style="list-style-type: none"> ○ Updated the note about extension of RCU/RCD bid for VERs to clarify it is in RUC. • DAME-BRQ-04134A, DAME-BRQ-04135, DAME-BRQ-04136, DAME-BRQ-04137 <ul style="list-style-type: none"> ○ Added to model multiple IR zones in a BAA in the Market • DAME-BRQ-04150 <ul style="list-style-type: none"> ○ Updated to split calculations of IRUR/IRDR for D+2 and D+3 to a separate BRQ (DAME-BRQ-04155). • DAME-BRQ-04155 <ul style="list-style-type: none"> ○ Added for the calculations of IRUR/IRDR for D+2 and D+3 as a separate BRQ (split from DAME-BRQ-04150). • DAME-BRQ-10260, DAME-BRQ-11420 <ul style="list-style-type: none"> ○ Updated to add D+3. • DAME-BRQ-04331, DAME-BRQ-04331A <ul style="list-style-type: none"> ○ Updated to correct ASSOC formulas to replace $SOC_{i,t-1}$ index with $SOC_{i,t}$. • DAME-BRQ-04334, DAME-BRQ-04337, DAME-BRQ-06075 <ul style="list-style-type: none"> ○ Deleted from this BRS and moved to ESE3 project’s BRS. • DAME-BRQ-04454 <ul style="list-style-type: none"> ○ Updated to clarify access of IR surplus zones and their associated Apnodes from MF. ○ Updated to clarify that IRU/IRD Surplus is on Apnode associated with each IR surplus zone and aggregated on BAA level on Imbalance Demand Hub Apnode. • DAME-BRQ-05000 <ul style="list-style-type: none"> ○ Updated to apply insertion logic to non-VERs and replaced UEL with VER forecast with lower of energy bid range and RCU Certified Capacity. |

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| | | <ul style="list-style-type: none"> ○ Updated to add extension logic for non-VERs. ● DAME-BRQ-05005 <ul style="list-style-type: none"> ○ Updated to remove first two bullets regarding extension/insertion of RCU bids to Forecast output and change the system from SIBR to RUC. ● DAME-BRQ-05090 <ul style="list-style-type: none"> ○ Updated to clarify the 2nd bullet to apply to online physical resources. ● DAME-BRQ-05130 <ul style="list-style-type: none"> ○ Updated to clarify resource types applicability. ● DAME-BRQ-05144 <ul style="list-style-type: none"> ○ Updated to remove the reference to DAME-BRQ-04334 ● DAME-BRQ-06065 <ul style="list-style-type: none"> ○ Deleted. ● DAME-BRQ-07860, DAME-MSIM-15020 <ul style="list-style-type: none"> ○ Updated to add IR Surplus Zone associated Apnodes to Imbalance Hub Demand Apnode. ● DAME-BRQ-09160 <ul style="list-style-type: none"> ○ Updated logic/formula that calculates IRx BAA Average Price, and IRx BAA Derived Price. ○ Updated to add logic formula for IRx BAA Allocation Cost and replaced several terms with the defined IRx BAA Allocation Cost for clarity (contents moved and modified from DAME-BRQ-09530). ○ Updated to add formula for IRX Surplus Adjustment. ○ Updated Tier-2 IRx BAA Allocation Cost to remove "max (0)" to allow positive and negative values. ● DAME-BRQ-09180 <ul style="list-style-type: none"> ○ Updated logic/formula that calculates RCx BAA Average Price, and RCx BAA Derived Price. ○ Updated to add logic formula for RCx BAA Allocation Cost and replaced several terms with the defined RCx BAA Allocation Cost for clarity. ○ Updated Tier 2 to remove the max (0,). ● DAME-BRQ-09380 |

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| | | <ul style="list-style-type: none"> ○ Updated to replace RA showing with monthly Generic and Flex (across all categories) RA showing in the pro-rata allocation. ● DAME-BRQ-09530 <ul style="list-style-type: none"> ○ Deleted and moved the contents to DAME-BRQ-09160. ● DAME-BRQ-09535 <ul style="list-style-type: none"> ○ Deleted as it is duplicate of contents within DAME-BRQ-09160. ● DAME-BRQ-09540 <ul style="list-style-type: none"> ○ Updated logic to use separate MCC prices for IRx Requirement and Surplus. ● DAME-BRQ-09610 <ul style="list-style-type: none"> ○ Added for Apply HASP Reversal to CAISO BAA IFM Intertie Schedule. ● DAME-BRQ-10160, DAME-BRQ-11420 <ul style="list-style-type: none"> ○ Updated to clarify processing of nodal IRUMP/IRDMP prices for Apnodes associated with IR surplus zones. ● DAME-BRQ-10160, DAME-BRQ-10180, DAME-BRQ-10200, DAME-BRQ-10220, DAME-BRQ-10260 <ul style="list-style-type: none"> ○ Split OASIS reports (one BRQ for each OASIS report). ● DAME-BRQ-10160A, DAME-BRQ-10160B, DAME-BRQ-10180A, DAME-BRQ-10180B, DAME-BRQ-10200A, DAME-BRQ-10200B, DAME-BRQ-10200C, DAME-BRQ-10220A, DAME-BRQ-10260A <ul style="list-style-type: none"> ○ Added for Split OASIS BRQs into separate BRQs (one BRQ for each OASIS report). ● DAME-BRQ-10260, DAME-BRQ-11420 <ul style="list-style-type: none"> ○ Updated to add publishing of IRUS/IRDS and associated Apnode on IR Surplus Zone level within each BAA. ● DAME-BRQ-10380 <ul style="list-style-type: none"> ○ Deleted as OASIS report that publish aggregated BAA Forecasted Movement Data by resource category. ● DAME-BRQ-10700 <ul style="list-style-type: none"> ○ Clarified publishing by IFM-MPM and RUC-MPM. ● DAME-BRQ-10730 <ul style="list-style-type: none"> ○ Added to publish REN (aka RUC schedules) to Forecasted Generation report (existing). ● DAME-BRQ-10810 |

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| | | <ul style="list-style-type: none"> ○ Added for CMRI to publish nodal by SC DA Schedule Virtual Forecasted Movement. ● DAME-BRQ-10880 <ul style="list-style-type: none"> ○ Added for MPP publishing Shift Factors (SF) for IRU/IRD. ● DAME-BRQ-11420 <ul style="list-style-type: none"> ○ Updated to add publishing of monthly Generic RA Showing for each mapped LSE and monthly Flex (for all categories) RA Showing for each mapped LSE. ○ Updated to delete publishing Deployment Scenario Deliverability Inclusion Constraints Flag due RCU/RCD Awards since these flags does not apply to RCU/RCD. ○ Updated to add nodal by SC DA Schedule Virtual Forecasted Movement. ○ Updated to remove aggregated BAA Forecasted Movement Data by resource category. ● DAME-MSIM-15020 <ul style="list-style-type: none"> ○ Updated to remove OASIS IFM Forecasted Movement. ○ Updated to add CMRI DA Schedule Virtual Forecasted Movement Data. ○ Updated OASIS, CMRI and MPP publishing lists. |
| 8/2/2024 | 1.3 | <p>Updated business requirement to per feedback from CAISO SMEs and market participants.</p> <ul style="list-style-type: none"> ● DAME-BRQ-01220 <ul style="list-style-type: none"> ○ Added for GMC rate updates. ● DAME-BRQ-03070 <ul style="list-style-type: none"> ○ Updated to add a clarifying note that NDAB for IRD/RCD should be consistent with those of IRU/RCU, respectively. ● DAME-BRQ-03090 <ul style="list-style-type: none"> ○ Added for calculations update of Variable-Cost-based DAM and RTM DEBs to use updated GMC rates. ● DAME-BRQ-07600 <ul style="list-style-type: none"> ○ Updated to revise formulas for IRx award 5-min ramp capable portion to account for DA Schedule Forecasted Movement. ● DAME-BRQ-09250 |

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| | | <ul style="list-style-type: none"> ○ Added for GMC Charge Code updates. ● DAME-BRQ-10160B, DAME-BRQ-10200B, DAME-BRQ-10200C, DAME-BRQ-10220, DAME-BRQ-10220A ○ Updated to remove OASIS publishing corrected IFM-MPM or RUC-MPM nodal prices, shadow prices and competitive paths data. |
| <u>12/23/2024</u> | <u>1.4</u> | <p><u>Updated business requirement to per feedback from CAISO SMEs and market participants.</u></p> <ul style="list-style-type: none"> ● <u>General cleanups throughout the document.</u> ● <u>DAME-BRQ-01135</u> <ul style="list-style-type: none"> ○ <u>Added Process BRQ to toggle MF RUC Participation Flag for LESRs to Yes.</u> ● <u>DAME-BRQ-04080</u> <ul style="list-style-type: none"> ○ <u>Clarified to replace “registered quantities from MF” with “registered IR Certified Capacity quantities from MF”.</u> ● <u>DAME-BRQ-04130</u> <ul style="list-style-type: none"> ○ <u>Deleted (penalty price for IR.)</u> ● <u>DAME-BRQ-04132</u> <ul style="list-style-type: none"> ○ <u>Updated to remove displaying (internal to ISO) IRU/IRD demand price curve.</u> ● <u>DAME-BRQ-04135</u> <ul style="list-style-type: none"> ○ <u>Updated the 4th bullet to match the formulation to limit the IRU/IRD surplus to IRU/IRD requirements on BAA level instead of surplus zone.</u> ● <u>DAME-BRQ-04200</u> <ul style="list-style-type: none"> ○ <u>Updated to correct verbiage about LDF to use SYS LFZ (renormalized with respect to current topology).</u> ● <u>DAME-BRQ-04390, DAME-BRQ-04400</u> <ul style="list-style-type: none"> ○ <u>Updated to move resource SP-Tie IRU/IRD marginal price (IRUMP/IRDMP) in DAM to separate BRQ (DAME-BRQ-04395 / DAME-BRQ-04405, respectively) and revise shadow prices adjustments for the calculations of nodal SP-Tie IRU/IRD marginal price (IRUMP/IRDMP) in IFM, IFM-MPM.</u> ○ <u>Clarified to account for import/export direction for IRUMP/IRDMP SP-Tie prices</u> ● <u>DAME-BRQ-04395, DAME-BRQ-04405</u> |

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| | | <ul style="list-style-type: none"> ○ <u>Added for resource SP-Tie IRU/IRD marginal price (IRUMP/IRDMP), including shadow prices adjustments (moved from DAME-BRQ-04390 / DAME-BRQ-04400, respectively) in IFM, IFM-MPM.</u> ○ <u>Clarified to account for import/export direction for IRUMP/IRDMP SP-Tie prices</u> ● <u>DAME-BRQ-05002</u> <ul style="list-style-type: none"> ○ <u>Corrected to remove duplicate wording.</u> ● <u>DAME-BRQ-05030</u> <ul style="list-style-type: none"> ○ <u>Updated to remove use of unmitigated bids for RUC 48 and 72 hours as RUC will only run for 24 hours ahead now.</u> ● <u>DAME-BRQ-05160</u> <ul style="list-style-type: none"> ○ <u>Clarified to replace REN with RCU.</u> ● <u>DAME-BRQ-05170</u> <ul style="list-style-type: none"> ○ <u>Clarified to replace REN with RCD.</u> ● <u>DAME-BRQ-05180, DAME-BRQ-05182</u> <ul style="list-style-type: none"> ○ <u>Updated to move resource SP-Tie RCU/RCD marginal price (RCUMP/RCDMP) in DAM to separate BRQ (DAME-BRQ-05181/ DAME-BRQ-05183, respectively) and revise shadow prices adjustments for the calculations of nodal SP-Tie RCU/RCD marginal price (RCUMP/RCDMP) in RUC, RUC-MPM.</u> ○ <u>Clarified to account for import/export direction for RCUMP/RCDMP SP-Tie prices</u> ● <u>DAME-BRQ-05181, DAME-BRQ-05183</u> <ul style="list-style-type: none"> ○ <u>Added for resource SP-Tie RCU/RCD marginal price (RCUMP/RCDMP), including shadow prices adjustments (moved from DAME-BRQ-05180/ DAME-BRQ-05182, respectively) in RUC, RUC-MPM.</u> ○ <u>Clarified to account for import/export direction for RCUMP/RCDMP SP-Tie prices</u> ● <u>DAME-BRQ-06100</u> <ul style="list-style-type: none"> ○ <u>Added to revise shadow prices adjustments for the calculations of nodal SP-Tie FRU/FRD marginal price (FRUMP/FRDMP) in RTM.</u> ○ <u>Clarified to account for import/export direction for FRUMP/FRDMP SP-Tie prices</u> ● <u>DAME-BRQ-06120</u> |

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| | | <ul style="list-style-type: none"> ○ <u>Added to include shadow prices adjustments for the calculations of resource SP-Tie FRU/FRD marginal price (FRUMP/FRDMP) in RTM (existing).</u> ● <u>DAME-BRQ-07265</u> <ul style="list-style-type: none"> ○ <u>Updated to add details for the calculation of monthly RA Showing Capacity.</u> ● <u>DAME-BRQ-10160, DAME-BRQ-10160B</u> <ul style="list-style-type: none"> ○ <u>Clarified the price breakdown for nodal IRUMP/IRDMP to be (total, capacity, congestion but no loss)</u> ○ <u>Clarified the price breakdown for nodal RCUMP/RCDMP to be (total, capacity, congestion and loss)</u> ○ <u>Updated to exclude sub-components of MCC prices (by BAA) for nodal RCUMP/RCDMP</u> ● <u>DAME-BRQ-10160A</u> <ul style="list-style-type: none"> ○ <u>Clarified the price breakdown for nodal IRUMP/IRDMP to be (total, capacity, congestion but no loss)</u> ○ <u>Clarified to account for import/export direction for IRUMP/IRDMP SP-Tie prices.</u> ○ <u>Clarified the price breakdown for nodal RCUMP/RCDMP to be (total, capacity, congestion and loss)</u> ○ <u>Updated to exclude sub-components of MCC prices (by BAA) for nodal RCUMP/RCDMP</u> ○ <u>Clarified to account for import/export direction for RCUMP/RCDMP SP-Tie prices</u> ● <u>DAME-BRQ-10160AA</u> <ul style="list-style-type: none"> ○ <u>Added for OASIS to publish RTM Flexible Ramp Scheduling Point/Tie Nodal Prices by Direction (Import/Export).</u> ○ <u>Clarified to account for import/export direction for FRUMP/FRDMP SP-Tie prices</u> ● <u>DAME-BRQ-10740</u> <ul style="list-style-type: none"> ○ <u>Clarified the price breakdown for resource IRUMP/IRDMP to be (total, capacity, congestion but no loss)</u> ○ <u>Clarified the price breakdown for resource RCUMP/RCDMP to be (total, capacity, congestion and loss)</u> |

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| | | <ul style="list-style-type: none"> ○ <u>Updated to exclude sub-components of MCC prices (by BAA) for resource RCUMP/RCDMP</u> ● <u>DAME-BRQ-11420</u> <ul style="list-style-type: none"> ○ <u>Clarified the price breakdown for nodal and resource IRUMP/IRDMP to be (total, capacity, congestion but no loss).</u> ○ <u>Clarified the price breakdown for nodal and resource RCUMP/RCDMP to be (total, capacity, congestion and loss).</u> ○ <u>Updated to include sub-components of MCC prices (by BAA) for resource IRUMP/IRDMP and RCUMP/RCDMP.</u> ○ <u>Clarified to account for import/export direction for IRUMP/IRDMP, RCUMP/RCDMP SP-Tie prices.</u> ○ <u>Updated to publish FRUMP/FRDMP SP-Ties by direction.</u> |

Disclaimer and Understanding

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.




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1 Introduction

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 determine the scope of projects and 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 deliver, satisfy or meet the business requirements (what).

The objective of this initiative is to enhance the California ISO's (CAISO's) day-ahead market by: (BOG: May 2023, In production: Fall 2026)

- Introducing an imbalance reserve (IRU/IRD) product to provide flexible capacity to account for real-time ramping needs that are greater than accounted for in hourly day-ahead market schedules and to account for real-time net load uncertainty:
- Enhancing the residual unit commitment process to also ensure there is sufficient downward dispatch capability (RCU/RCD) in the event real-time load is less than scheduled in the integrated forward market.

The CAISO proposes to preserve the sequential integrated forward market and residual unit commitment process (IFM, RUC)


1.2 Conventions

- None

1.3 Scope

High level Impact analysis:


- **MF:** Define and consume IRU/IRD and RCU/RCD related data.
- **Market products IRU/IRD, RCU/RCD:** Suppliers will provide price and quantity bids for capacity availability in both the upward and downward direction that the market will use to award both imbalance reserves (IRU/IRD, 15-minute ramp dispatchable in IFM) and reliability capacity (RCU/RCD, hourly dispatchable in RUC). Set resource eligibility of IRU/IRD, RCU/RCD in MF.

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- **IRU/IRD requirement:** An imbalance reserves up and down product to the integrated forward market with a requirement based on historical uncertainty between the day-ahead and real-time markets using quantile regression (Internal ISO System, DAM)
- **ISO Internal System:** Setting IR/RC DAB for Calculated and Negotiate Rate Ranking Option.
- **Co-optimization IRU/IRD** products with energy and ancillary services to schedule resources (MPM, IFM, SIBR)
 - Set up IRU/IRD procurement constraints
 - Apply market power mitigation to IRU in the same manner for energy
 - An imbalance reserve award will obligate a supplier to provide economic energy bids in the real-time market (RTM, SIBR)
 - Ensure imbalance reserves are deliverable using IRU/IRD deployment scenario.
 - Modeling these transmission constraints including IRU/IRD, using same DF as energy of the resource, no incremental transmission losses, have MP for IRU/IRD (MPM,IFM)
 - Publish IRU/IRD (CMRI, OASIS)
- **Optimize RCU/RCD** products in RUC with energy, IRU/IRD and ancillary services award/schedule from IFM (RUC)
 - Apply market power mitigation to RCU
 - RCU/RCD will obligate to provide economic energy bids in the real-time market (RTM, SIBR)
 - Modeling transmission constraints that have MP for RCU/RCD (MPM/RUC)
 - Publish RCU/RCD (CMRI, OASIS)
- Enhance the residual unit commitment (RUC) process to establish the binding configuration for multi-stage generating (MSG) resources. (RUC, CMRI)
- RTM run with IRU/IRD, RCU/RCD awards must offer obligation and price bid cap.
- **Settlement for IRU/IRD, RCU/RCD payment, cost allocation, Unavailability No Pay, BCR and GMC**
 - Resources awarded IRU/IRD, RCU/RCD will be paid a day-ahead payment at the marginal price for the relevant product.
 - Ramping provided by imbalance reserve awards and forecasted movement in the day-ahead market will be settled against forecasted movement and flexible ramping product in the real-time market.
 - Resource economic limit not support IRU/IRD, exclude 5 minute uncertainty, subject to No Pay,
 - Resource economic limit not support RCU/RCD subject to No Pay
 - The market will recover the costs of these products through a cost allocation that collects payments from entities based on their contribution to the need to procure the product.
 - BCR: IRU/IRD for DAM BCR, RCU/RCD for RTM BCR
 - GMC: GMC market service charge apply to IRU/IRD, RCU/RCD
- **CMRI/OASIS:** report IRU/IRD, RCU/RCD
- **FODD:** Publish IRU/IRD, RCU/RCD related data to FERC

1.4 Acronym and Terms Definitions

Refer to **Appendix-A – Acronym Definition**


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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 the 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 Checklist


All information in this document is the Intellectual Property (copyright, trademark, patent, and/or trade secret) of the California ISO.

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3 Details of Business Need/Problem

3.1 Description


| Business Opportunity/Problem Statement: | |
|--|---|
| What: | <p>The objective of this initiative is to enhance the California ISO’s (CAISO’s) day-ahead market by:</p> <ul style="list-style-type: none"> * Introducing an imbalance reserve (IRU/IRD) product to provide flexible capacity to account for real-time ramping needs * Enhancing the residual unit commitment process to also ensure there is sufficient downward dispatch capability (RCU/RCD) * Enhancing the day-ahead market to maximize benefits of greater West-wide diversity in the day-ahead optimization for Western Energy Imbalance Market participants |
| When: | Fall 2026 |
| Why do we have this opportunity/problem: | Imbalance reserves will ensure the day-ahead market schedules sufficient real-time dispatch capability to meet net load imbalances and ramping needs that materialize between the day-ahead and real-time markets. These imbalances have increased in recent years because of increasing amounts of weather - dependent supply and load resources on the CAISO grid. |
| Who does this opportunity/problem impact: | <ul style="list-style-type: none"> • Real-Time Operations • MAF • <u>Market Performance and Advanced Analytics</u> • <u>STF</u> • Market Services • Market Participants • Customer Service • Policy • Legal |

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4 Business Impacts


4.1 Business Practice Manual (BPM)

| BPM | Description of Impact(s) |
|--------------------------|--------------------------|
| Definitions and Acronyms | Yes |
| Market Instruments | Yes |
| Market Operations | Yes |
| Settlements and Billing | Yes |

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4.2 Other

| Impact | Description (optional) |
|---|------------------------|
| Market Simulation | Yes |
| Market Participant Impact | Yes |
| External Bid Publication | Yes |
| User Acceptance Testing (UAT) | Yes |
| Operational Procedures | Yes |
| Customer Readiness Impact | |
| 1. External Communication Needed | Yes |
| 2. External Onboarding and Maintenance | No |
| • External Training | Yes |
| • External Computer Based Training | Yes |
| Policy Initiative | Yes |

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5 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.

5.1 Business Process: Resource Management (Master File)


- Define Resource IRU and IRD eligibility
- Define Resource RCU and RCD eligibility
- Define and Consume IR and RC DAB Ranking Options
- Set MSS-Specific Annual RUC Participation Flag to Always Opt-In
- Set RUC Participation Flag for LESRs to Y
- Define Imbalance demand Hub Apnode
- Define IR Surplus Zones and associated Apnodes
- Define EDAM BAA Participation and Date
- Update GMC rates

5.1.1 Business Requirements

| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|---|------------------|-----------------------------------|
| DAME-BRQ-01000 | <p>Define Imbalance Reserve Up (IRU) and Imbalance Reserve Down (IRD) eligibility for the resource in DAM:</p> <ul style="list-style-type: none"> • Define resource and intertie eligibility for Imbalance reserve product (IR): <ul style="list-style-type: none"> ○ Separate flag for upper (IRU), down (IRD) for all upper eligible registered resources ○ Certified Capacity (MW) for IRU and IRD (IRU_{max}, IRD_{max}), calculated by System based on 30-minute ramp, capped by Pmax/Pmin, using the below formulas. ○ For NGR, the IRU eligibility and Certified Capacity are limited to positive (discharging) range, and the IRD eligibility and Certified | Core | Master File RDT |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|---|------------------|-----------------------------------|
| | <p style="text-align: center;">Capacity are limited to the negative (charging) range.</p> <ul style="list-style-type: none"> Pass the IRU, IRD flags and Certified Capacity MW to the downstream systems <p>Formulas:</p> <ul style="list-style-type: none"> For IRU: <ul style="list-style-type: none"> If SUT ≤ 15': <ul style="list-style-type: none"> $IRU_{max} = \text{Max}\{ \text{Min}[(P_{min} + [(15' - SUT) * RR]), P_{max}], \text{Min}[(30' * RR), (P_{max} - P_{min})] \}$ If SUT > 15': <ul style="list-style-type: none"> $IRU_{max} = \text{Min}\{ (30' * RR), (P_{max} - P_{min}) \}$ For IRD: <ul style="list-style-type: none"> $IRD_{max} = \text{Min}\{ (30' * RR), (P_{max} - P_{min}) \}$ Where RR is highest value among operational ramp rate segments in MW/min. <p>Note: Resource provide the capacity product must register in MF The IRU/IRD eligibility flags and corresponding <i>Certified Capacity</i> MW quantities should be added to GRDT as read-only.</p> <p>Note:</p> <ul style="list-style-type: none"> Refer to Resource Eligibility Table in Appendix-B: Formulas, Calculation Details, and Examples | | |
| DAME-BRQ-01010 | <p>Define Reliability Capacity Up (RCU) and Reliability Capacity Down (RCD) eligibility:</p> <ul style="list-style-type: none"> Define physical market resource eligibility for Reliability Capacity (RC): <ul style="list-style-type: none"> Separate flag for upper (RCU), down (RCD) Certified Capacity (MW) for RCU and RCD (RCU_{max}, RCD_{max}), calculated based on 60-minute ramp, capped by Pmax/Pmin, using the below formulas. | Core | Master File RDT |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|-----|---|------------------|-----------------------------------|
| | <ul style="list-style-type: none"> ○ For NGR, the RCU eligibility and Certified Capacity are limited to positive (discharging) range, and the RCD eligibility and Certified Capacity are limited to the negative (charging) range ● Pass the RCU, RCD flags and Certified Capacity MW to the downstream systems <p>Formulas:</p> <ul style="list-style-type: none"> ● For RCU: <ul style="list-style-type: none"> ○ If SUT ≤ 60': <ul style="list-style-type: none"> ▪ $RCU_{max} = \text{Max}\{ \text{Min}[(P_{min} + [(60' - SUT) * RR]), P_{max}] , \text{Min}[(60' * RR) , (P_{max} - P_{min})] \}$ ○ If SUT > 60': <ul style="list-style-type: none"> ▪ $RCU_{max} = \text{Min}\{ (60' * RR) , (P_{max} - P_{min}) \}$ ● For RCD: <ul style="list-style-type: none"> ○ $RCD_{max} = \text{Min}\{ (60' * RR) , (P_{max} - P_{min}) \}$ ● Where RR is highest value among operational ramp rate segments in MW/min. <p>Note: The RCU/RCD eligibility flags and corresponding Certified Capacity MW quantities should be added to GRDT as read-only</p> <p>Note:</p> <ul style="list-style-type: none"> ● Resources/MSG configurations will only get awarded RCU or RCD, not both. ● Long Start Units are eligible to participate in RUC and bid for RCU/RCD. ● Refer to Resource Eligibility Table in Appendix-B: Formulas, Calculation Details, and Examples | | |




| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|--|------------------|---|
| DAME-BRQ-01040 | <p>Define IR and RC DAB Ranking Options</p> <ul style="list-style-type: none"> System shall define the following <u>separate</u> resource-specific fields, for all resources, including NGRs: <ul style="list-style-type: none"> IRU DAB Options Ranking IRD DAB Options Ranking RCU DAB Options Ranking RCD DAB Options Ranking Supported possible numeric rankings are for: <ul style="list-style-type: none"> Null (for IR/RC non-eligible resources) (1 or 2) Calculated (for IR/RC eligible resources) (1 or 2) Negotiated Rate (for IR/RC eligible resources) | Core | <ul style="list-style-type: none"> MF |
| DAME-BRQ-01060 | <p>Consume IR and RC DAB Ranking Options from Resources' SCs</p> <ul style="list-style-type: none"> System shall consume the following <u>separate</u> resource-specific fields from resources' SCs, respectively, for all resources, including NGRs: <ul style="list-style-type: none"> IRU DAB Options Ranking IRD DAB Options Ranking RCU DAB Options Ranking RCD DAB Options Ranking Supported possible numeric rankings are for: <ul style="list-style-type: none"> Null (for IR/RC non-eligible resources) (1 or 2) Calculated (for IR/RC eligible resources) (1 or 2) Negotiated Rate (for IR/RC eligible resources) <p>Notes</p> <ul style="list-style-type: none"> If Negotiated Rate Option is ranked as 1, but no Negotiated Rate process was in place, CAISO will revert to the next ranking option, which is the Calculated option. For the first year from Go-Live, the Negotiated Rate option for IRU/IRD and RCU/RCD will not be supported, until CAISO gains more operational experience with associated bid and costs. Rankings should be consistent across up and down products; i.e. if Calculated is ranked 1 for IRU, it should also be ranked 1 for IRD. | Core | <ul style="list-style-type: none"> MF RDT |
| DAME-BRQ-01080 | <p>Default IR and RC DAB Ranking Options</p> <p>System shall use the following default numeric values for resource-specific IRU/IRD and RCU/RCD DAB Options Ranking, for all resources, including NGRs:</p> | Core | <ul style="list-style-type: none"> MF |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|-----------------------|---|-----------------------|---|
| | <ul style="list-style-type: none"> Null (for non-eligible resources) (1) Calculated (for eligible resources) (2) Negotiated Rate (for eligible resources) | | |
| DAME-BRQ-01130 | <p>Set MSS-Specific Annual RUC Participation Flag to Always Opt-In</p> <ul style="list-style-type: none"> MSS-specific Annual RUC participation flag shall be set to always Opt-In, regardless of their MSS election type, starting from Tariff activation date. This annual flag setting shall override the previous annual flag setting for the remainder of the year. <p>Notes</p> <ul style="list-style-type: none"> For this project, Tariff activation date is same as Go-Live date. | Core | <ul style="list-style-type: none"> MF |
| <u>DAME-BRQ-01135</u> | <p><u>Set RUC Participation Flag for LESRs to Yes</u></p> <ul style="list-style-type: none"> <u>RUC participation flag for LESRs shall be set to Yes, starting from Tariff activation date.</u> <u>This participation flag setting shall override the previous flag setting for the remainder of the year.</u> <p><u>Notes</u></p> <ul style="list-style-type: none"> <u>For this project, Tariff activation date is same as Go-Live date.</u> | <u>Process</u> | <ul style="list-style-type: none"> <u>MF</u> |
| DAME-BRQ-01150 | <p>Define Imbalance Demand Hub for each BAA</p> <ul style="list-style-type: none"> Define Anode for the BAA Imbalance demand Hub, include load nodes, solar resource Cnodes and Wind resource Cnodes. The Anode associated APnode shall have type same as LAP. Define default Distribution factors for Imbalance Demand Hub, normalize the default LDF and Solar and Wind resource GDF based on Pmax. | Core | <ul style="list-style-type: none"> MF |
| DAME-BRQ-01160 | <p>Define IR surplus zones for an EDAM BAA, consistent with FRP surplus zones for the same BAA</p> | Core | <ul style="list-style-type: none"> MF |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|---|------------------|--|
| | <ul style="list-style-type: none"> • The IR/FRP Surplus Zones shall be used in the market to distribute IR Surplus variables in DAM and distribute FRP surplus variables in RTM. • Each surplus zone shall have its associated Apnode. | | |
| DAME-BRQ-01200 | <p>Define EDAM BAA Participation and Date</p> <ul style="list-style-type: none"> • Define BAA with EDAM participation flag • Define activate date <p>Note: EDAM participation requirement also in EDAM-BRQ-02020 that link to the EDAM Tariff section.</p> | Core | <ul style="list-style-type: none"> • MF |
| DAME-BRQ-01220 | <p>Update GMC Rates Effective January 1, 2026</p> <ul style="list-style-type: none"> • The following GMC rate shall be terminated: <ul style="list-style-type: none"> ○ System Operations (SYSOPR) • The following GMC rates shall be created: <ul style="list-style-type: none"> ○ System Operations Real-Time Dispatch (SYSOPRTD) <ul style="list-style-type: none"> ▪ Applies to EDAM, CAISO BAA. ○ System Operations Balancing Authority Area Services (SYSOPBAA) <ul style="list-style-type: none"> ▪ Applies to CAISO BAA. • The following existing GMC rate shall be updated: <ul style="list-style-type: none"> ○ WEIM System Operations (ESYSOPR) GMC rate shall be set equal to System Operations Real-Time Dispatch (SYSOPRTD) GMC rate. <ul style="list-style-type: none"> ▪ WEIM System Operations (ESYSOPR) GMC rate is already defined in MF. ▪ The only change is re-setting its value. ▪ This GMC rate will apply to WEIM-only BAAs. <p>Note</p> <ul style="list-style-type: none"> • For more <i>details</i> regarding the GMC rate, see the new Cost of Service Initiative. | Core | <ul style="list-style-type: none"> • MF |

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5.2 Business Process: Manage the Balancing Authority Requirements Calculator

For IRU/IRD requirement forecast parameters estimation use quantile regression model:


- Mark all days as Weekdays Day Type for IR Quantile Regression Model
- Calculate (DA-RTPD) forecast up/down extreme variation
- Calculate the second-order polynomial coefficients of the High/Low Percentile quadratic quantile regression for uncertainty of demand, solar, wind and MOSAIC
- Calculate High/Low Percentile forecast uncertainty histogram for Load, wind, Solar, net load *and maximum boundary for IRU/IRD*
- Calculate IRU/IRD demand price curve

5.2.1 Business Requirements


| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|---|------------------|-----------------------------------|
| DAME-BRQ-02000 | <p>General statement:</p> <p>Extend FRP requirements forecast quantile regression model to Imbalance Reserve requirement forecast and demand price curve</p> <p>The system stores the historical data and estimate the parameters of the statistic forecast model.</p> | Process | Internal ISO System |
| DAME-BRQ-02005 | <p>Mark all days as Weekdays Day Type for BARC's IR Quantile Regression Model</p> <p>Day Types calendar that are used by BARC for IR quantile regression model calculations shall mark all days starting from Go-Live date as one type (Weekday).</p> | Process | Internal ISO System |
| DAME-BRQ-02010 | <p>Set the configurable parameters for the quantile regression for IR</p> <p>The system shall have a set of system-wide configurable initialization parameters (separate set for FRP and IR) for Imbalance Requirement (IR) :</p> <ul style="list-style-type: none"> ○ the High Percentile, initially set to 97.5% (0.975) | Core | Internal ISO System |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
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| | <ul style="list-style-type: none"> ○ the Low Percentile, initially set to 2.5% (0.025) ○ for the High Percentile Threshold, initially set to 99% (0.99) ○ the Low Percentile Threshold, initially set to 1% (0.01) | | |
| DAME-BRQ-02011 (Production-Track) | <p>Set Configurable Sampling Scheme Parameters for the Quantile Regression for IR</p> <p>The system shall have a set of system-wide configurable sampling scheme parameters (separate set for FRP and IR) for Imbalance Requirement (IR) :</p> <ul style="list-style-type: none"> ○ Data Retention Period, initially set to 365 days ○ Configurable parameter to select Sampling Scheme: <ul style="list-style-type: none"> ○ Rolling sampling (current) ○ Symmetrical sampling (backward/forward) for matching day and month (default option) ○ Set configurable sample days (if Symmetrical sampling option is selected, default this parameter to 90 days backward and 90 days forward) <p>Note</p> <ul style="list-style-type: none"> ○ This BRQ will be implemented in production track ahead of the DAME Go-Live. | Core | Internal ISO System |
| DAME-BRQ-02012 | <p>Access EDAM BAAs</p> <ul style="list-style-type: none"> ● Access DAM BAA definition from MF ● Access the EDAM_AREA definition from MF | Core | Internal ISO System (from MF) |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|--|--------------------------------------|-----------------------------------|
| DAME-BRQ-02020 | <p>Consume and store the trading day DAM forecast data of demand(d) /solar(s)/wind(w) for each BAA and aggregate for the entire DAM area</p> <p>At the end of each DAM, the system shall consume the following data for each Trading Hour in the previous Trading Day for each BAA in the DAM Area:</p> <ul style="list-style-type: none"> • DAM binding total demand forecast(d) • DAM binding total solar forecast(s) for each 60min interval • DAM binding total wind forecast(w) for each 60min interval <p>The system shall store this hourly forecast for demand/solar/wind for the Data Retention Period by BAA, Trading Day, Day Type, Trading Hour and market DAM.</p> <p>Notes</p> <ul style="list-style-type: none"> • lowercase (d, s, w) is for independent forecast data • uppercase (D, S, W) is the dependent uncertainty data • Refer to DAME-BRQ-02010 for data retention business requirement. | Core | Internal ISO System (from IFM) |
| DAME-BRQ-02030 | <p>Consume and store the demand(d)/solar(s)/wind(w) trading day RTPD forecast data</p> <p>At the end of each Trading Day, the system shall consume the following data for each Trading Hour in that Trading Day for each BAA in the DAM area:</p> <ul style="list-style-type: none"> • FMM binding demand forecast for each 15 min interval • FMM binding solar forecast for each 15 min interval • FMM binding wind forecast for each 15 min interval | Existing System Functionality | Internal ISO System |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|---|------------------|-----------------------------------|
| | The system shall store this information for the Data Retention Period by Trading Day, Day Type, Trading Hour, and DAM/FMM Trading Interval. | | |
| DAME-BRQ-02040 | <p>Calculate uncertainty as hourly maximum and minimum differences (two samples) between RTPD and DAM for the demand/solar/wind binding forecasts</p> <p>After each Trading Day, the system shall calculate the uncertainty for each 60min period of each Trading Hour in that Trading Day, for each BAA in the DAM Area, for the entire DAM Area:</p> <ul style="list-style-type: none"> the algebraic difference between the <i>maximum/minimum demand</i> forecast of the four binding 15 minute RTPD intervals in that 60min period and the corresponding DAM hourly forecast in that 60min period the algebraic difference between the <i>maximum/minimum solar</i> forecast of the four binding 15 minute RTPD intervals in that 60min period and the corresponding DAM hourly forecast in that 60min period the algebraic difference between the <i>maximum/minimum wind</i> forecast of the four binding 15 minute RTPD intervals in that 60min period and the corresponding DAM hourly forecast in that 60min period The system shall calculate hourly maximum and minimum difference values of demand, solar and wind for the Data Retention Period by Trading Day, Day Type, Trading Hour of DAM horizon. | Core | Internal ISO System |
| DAME-BRQ-02050 | <p>Manage rolling day of retention period for DAM</p> <p>The system shall roll the Data Retention Period at the end of each Trading Day by one Trading Day, deleting the data for the first Trading Day in the Data Retention Period.</p> | Core | Internal ISO System |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|--|------------------|-----------------------------------|
| DAME-BRQ-02060 | <p>Retrieve the total maximum capacity of solar/wind for each BAA and aggregate for the entire DAM area</p> <p>After rolling the Data Retention Period, the system shall</p> <ul style="list-style-type: none"> Retrieve the maximum capacity of VER resources by solar/wind at any given Trading Day (D+1) for each BAA and then aggregate for the entire DAM Area. Store this information for the Data Retention Period by Trading Day and Day Type. | Existing | Internal ISO System (from MF) |
| DAME-BRQ-02070 | <p>Adjust solar/wind forecast and uncertainty for each day in retention period:</p> <p>After rolling the Data Retention Period, For each trading day in the Data Retention Period for the Day Type of the next Trading Day (D+1), for each BAA and DAM Area system shall calculate</p> <ul style="list-style-type: none"> The solar/wind capacity factor as the ratio of the total solar/wind capacity in the next Trading Day (D+1) over the total solar/wind capacity in the Trading Day in the Data Retention Period. Adjust the solar/wind forecast and uncertainty data by multiplying the data with the solar/wind capacity factor of the Trading Day (D+1) in the Data Retention Period. | Core | Internal ISO System |
| DAME-BRQ-02080 | <p>Calculate and store net demand uncertainty as maximum/minimum net demand difference between RTPD and DAM for retention period</p> <p>After rolling the Data Retention Period, For each Trading Hour in each Trading Day in the Data Retention Period for the Day Type of the next Trading Day (D+1), for each BAA and the DAM Area</p> <ul style="list-style-type: none"> Calculate the net demand forecast (nd) as the demand forecast minus the adjusted solar forecast minus the adjusted wind forecast for each hour in DAM and each binding 15 minute intervals in RTPD | Core | Internal ISO System |

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| | <ul style="list-style-type: none"> Calculate the hourly net demand forecast uncertainty (ND) as the algebraic difference between the <i>maximum/minimum</i> net demand forecast of the 4 binding RTPD intervals and DAM in the corresponding hour (two samples). | | |
| DAME-BRQ-02090 | <p>Calculate and store the Hourly High/lower percentile of histogram(H) for uncertainty of Demand(D) /Solar(S) /Wind(W) /Net demand(ND)</p> <p>After rolling the Data Retention Period, for each Trading Hour in the Data Retention Period for the Day Type of the next Trading Day (D+1), for each BAA and DAM Area</p> <p>Calculate and store:</p> <ul style="list-style-type: none"> the High/Low Percentile demand forecast uncertainty histogram $(D_{60}^{H97.5}) / (D_{60}^{H2.5})$ the High/Low Percentile adjusted solar forecast uncertainty histogram $(S_{60}^{H97.5}) / (S_{60}^{H2.5})$ the High/Low Percentile adjusted wind forecast uncertainty histogram $(W_{60}^{H97.5}) / (W_{60}^{H2.5})$ the High/Low Percentile net demand forecast uncertainty histogram $(ND_{60}^{H97.5}) / (ND_{60}^{H2.5})$ | Core | Internal ISO System |
| DAME-BRQ-02100 | <p>Calculate and store the hourly second-order polynomial coefficients of the High /Low Percentile quadratic quantile regression for uncertainty of Demand(D)/Solar(S)/Wind(W)</p> <p>After rolling the Data Retention Period, for each Trading Hour in the Data Retention Period for the Day Type of the next Trading Day (D+1), for each BAA and DAM Area</p> <p>Calculate and store the second-order polynomial coefficients of the High/low Percentile quadratic quantile regression of uncertainty of forecast of:</p> <ul style="list-style-type: none"> Demand: $(A_{60}^{D97.5}, B_{60}^{D97.5}, C_{60}^{D97.5}) / (A_{60}^{D2.5}, B_{60}^{D2.5}, C_{60}^{D2.5})$ through regression | Core | Internal ISO System |

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| | $D_{60}^{P97.5}(d) \equiv A_{60}^{D97.5} d^2 + B_{60}^{D97.5} d + C_{60}^{D97.5}$ $D_{60}^{P2.5}(d) \equiv A_{60}^{D2.5} d^2 + B_{60}^{D2.5} d + C_{60}^{D2.5}$ <ul style="list-style-type: none"> • Solar: $(A_{60}^{S97.5}, B_{60}^{S97.5}, C_{60}^{S97.5}) / (A_{60}^{S2.5}, B_{60}^{S2.5}, C_{60}^{S2.5})$ through regression $S_{60}^{P97.5}(s) \equiv A_{60}^{S97.5} s^2 + B_{60}^{S97.5} s + C_{60}^{S97.5}$ $S_{60}^{P2.5}(s) \equiv A_{60}^{S2.5} s^2 + B_{60}^{S2.5} s + C_{60}^{S2.5}$ • Wind: $(A_{60}^{W97.5}, B_{60}^{W97.5}, C_{60}^{W97.5}) / (A_{60}^{W2.5}, B_{60}^{W2.5}, C_{60}^{W2.5})$ through regression $W_{60}^{P97.5}(w) \equiv A_{60}^{W97.5} w^2 + B_{60}^{W97.5} w + C_{60}^{W97.5}$ $W_{60}^{P2.5}(w) \equiv A_{60}^{W2.5} w^2 + B_{60}^{W2.5} w + C_{60}^{W2.5}$ <p><i>Note:</i></p> <p><i>lowercase (d, s, w) is for independent variables for forecasts</i></p> <p><i>uppercase (D, S, W) is the dependent variables for calculated uncertainty data, difference between DAM and RTPD</i></p> <p><i>to estimate A,B,C, use historical forecast and uncertainty data (historical uncertainty data will have 2 samples for each hour with max/min)</i></p> <p><i>2 samples of uncertainty will be used in both high/low percentile regression, meaning same sample set for High/low percentile parameter estimation.</i></p> | | |
| DAME-BRQ-02110 | <p>Construct input of mosaic for high/low percentile mosaic regression</p> <p>After rolling the Data Retention Period, for each Trading Hour in the Data Retention Period for the Day Type of the next Trading Day (D+1), for each BAA and DAM Area</p> <p>Based on Histogram and quadratic Quantile Regression estimates uncertainty of load, wind, and solar</p> | Core | Internal ISO System |

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|----------------|---|------------------|-----------------------------------|
| | <p><i>Calculate:</i></p> <ul style="list-style-type: none"> ○ <i>Input (m=uncertainty of net load) for High percentile mosaic regression:</i> $m_{60}^{P97.5}(nd, d, s, w) \equiv ND_{60}^{H97.5} - (D_{60}^{H97.5} - S_{60}^{H2.5} - W_{60}^{H2.5}) + (D_{60}^{P97.5}(d) - S_{60}^{P2.5}(s) - W_{60}^{P2.5}(w))$ <ul style="list-style-type: none"> ○ <i>Input (m) for Low percentile mosaic regression:</i> $m_{60}^{P2.5}(nd, d, s, w) \equiv ND_{60}^{H2.5} - (D_{60}^{H2.5} - S_{60}^{H97.5} - W_{60}^{H97.5}) + (D_{60}^{P2.5}(d) - S_{60}^{P97.5}(s) - W_{60}^{P97.5}(w))$ <p><i>Note:</i></p> <p><i>There will be 2 samples of variable m created for each hour.</i></p> | | |
| DAME-BRQ-02120 | <p>Calculate and store the hourly second-order polynomial coefficients of the High /Low Percentile quadratic quantile regression for mosaic (M)</p> <p>After rolling the Data Retention Period, for each Trading Hour in the Data Retention Period for the Day Type of the next Trading Day (D+1), for each BAA and DAM Area</p> <p>Calculate and store the second-order polynomial coefficients of the High/low Percentile quadratic quantile regression of uncertainty of forecast of:</p> <ul style="list-style-type: none"> • Mosaic (Net Demand): $(A_{60}^{M97.5}, B_{60}^{M97.5}, C_{60}^{M97.5}) / (A_{60}^{M2.5}, B_{60}^{M2.5}, C_{60}^{M2.5}) \text{ through regression}$ $M_{60}^{P97.5}(m) \equiv A_{60}^{M97.5} m^2 + B_{60}^{M97.5} m + C_{60}^{M97.5}$ $M_{60}^{P2.5}(m) \equiv A_{60}^{M2.5} m^2 + B_{60}^{M2.5} m + C_{60}^{M2.5}$ <p><i>Note:</i></p> <p><i>In Quantile regression for Mosaic</i></p> | Core | Internal ISO System |

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| | <ul style="list-style-type: none"> <i>m</i> include $m_{60}^{p97.5}$ and $m_{60}^{p2.5}$ for each hour calculated for historical data according to BRQ1110 <i>M</i> include calculation of Net Load uncertainty max/min for historical data according to BRQ1080 2 samples of <i>m</i> and 2 samples of <i>M</i> will be used in both high/low percentile regression for parameter A,B,C estimation for <i>M</i> | | |
| DAME-BRQ-02130 | <p>Calculate High/low percentile threshold for uncertainty of net demand (ND)</p> <p>After rolling the Data Retention Period, the system shall calculate and store the hourly High/low Percentile Threshold net demand forecast uncertainty histogram (ND_{60}^{H99})/ (ND_{60}^{H1}) for each Trading Hour in the Data Retention Period for the Day Type of the next Trading Day (D+1), for each BAA and DAM Area.</p> | Core | Internal ISO System |
| DAME-BRQ-02140 | <p>By 6:00am of DAM each Trading Day, the system shall broadcast the following hourly data</p> <p>For each Trading Hour in the next Trading Day for the Day Type of that Trading Day (D+1), for each BAA and DAM Area:</p> <ul style="list-style-type: none"> the High/low Percentile hourly forecast uncertainty histogram for: <ul style="list-style-type: none"> net demand: $(ND_{60}^{H97.5})/(ND_{60}^{H2.5})$ demand: $(D_{60}^{H97.5})/(D_{60}^{H2.5})$ adjusted solar: $(S_{60}^{H97.5})/(S_{60}^{H2.5})$ adjusted wind: $(W_{60}^{H97.5})/(W_{60}^{H2.5})$ the second-order polynomial coefficients of the High/low Percentile quadratic quantile regression of hourly forecast uncertainty <ul style="list-style-type: none"> demand: $(A_{60}^{D97.5}, B_{60}^{D97.5}, C_{60}^{D97.5})/(A_{60}^{D2.5}, B_{60}^{D2.5}, C_{60}^{D2.5})$ Solar: $(A_{60}^{S97.5}, B_{60}^{S97.5}, C_{60}^{S97.5})/(A_{60}^{S2.5}, B_{60}^{S2.5}, C_{60}^{S2.5})$ Wind: $(A_{60}^{W97.5}, B_{60}^{W97.5}, C_{60}^{W97.5})/(A_{60}^{W2.5}, B_{60}^{W2.5}, C_{60}^{W2.5})$ Mosaic (net load) $(A_{60}^{M97.5}, B_{60}^{M97.5}, C_{60}^{M97.5})/(A_{60}^{M2.5}, B_{60}^{M2.5}, C_{60}^{M2.5})$ | Core | Internal ISO System |

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| | <ul style="list-style-type: none"> • the hourly High/low Percentile Threshold forecast uncertainty histogram <ul style="list-style-type: none"> ○ net demand $(ND_{60}^{H99})/(ND_{60}^{H1})$ <p>Note: Market DAM will consume data to forecast the IRU and IRD requirements (IRUR/IRDR). CMRI or OASIS will report the data</p> | | |
| DAME-BRQ-02150 | <p>Set, Store and broadcast IRU/IRD Requirement Threshold</p> <ul style="list-style-type: none"> • Set and store configurable threshold to allow settings of the max/min IRU/IRD requirement for each BAA and DAM_AREA. If the threshold value is not provided, then 9999/0 is assumed. • Broadcast max/min IRU/IRD requirement thresholds for the next Trade Day (D+1) <p style="text-align: center;">$(IRUR_{60}^{max})/(IRUR_{60}^{min}); IRDR_{60}^{max})/(IRDR_{60}^{min})$</p> <p style="text-align: center;">for each BAA and DAM area</p> <p>Note:</p> <ul style="list-style-type: none"> • The threshold value will be used by DAM to cap the IRU/IRD requirement. • The threshold values should be positive. | Core | Internal ISO System |
| DAME-BRQ-02300 | <p>Set configurable IRU and IRD price cap for the DAM</p> <p>Set configurable parameters for capping IRU and IRD demand curve respectively apply to every BAA. These parameters are subject to be scaled just like other penalty prices. Default parameters for</p> <ul style="list-style-type: none"> • IRU price cap is \$55/MWh • IRD price cap is \$55/MWh | Core | Internal ISO System |
| DAME-BRQ-02310 | <p>Consume DAM hourly forecast for demand, solar and wind for each BAA after 9 am</p> | Core | Internal ISO System |

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| | Consume the hourly demand, solar and wind forecast for DAM time horizon, aggregated for each BAA for next Trade Day (D+1). | | (from IFM [Pre-DAM]) |
| DAME-BRQ-02320 | <p> Calculate hourly demand price curve for IRU and IRD for each BAA using latest forecast following the completion of [IFM pre-DAM] run, with avoidance cost of \$247/MWh for IRU and -\$150/MWh for IRD, and an administration cap of \$55/MWh for both IRU/IRD </p> <p> At 10 am, calculate hourly demand price curve for IRU/IRD by BAA for next Trade Day (D+1), based on the latest hourly forecast data: </p> <p style="padding-left: 40px;"> Monotonically decreasing stepwise price curve with N segments. </p> <p style="padding-left: 40px;"> Equidistant percentile selection from P_0 to $P_N^{(-)}$ (0.025) and from P_0 to $P_N^{(+)}$ (0.975): </p> $\left\{ P_n^{(-)} = P_{n-1}^{(-)} - \frac{P_0 - P_N^{(-)}}{N}, n = 1, 2, \dots, N \right\} \text{ and } \left\{ P_n^{(+)} = P_{n-1}^{(+)} + \frac{P_N^{(+)} - P_0}{N}, n = 1, 2, \dots, N \right\}, \text{ where } P_0 = P_0^{(-)} = P_0^{(+)}$ <p style="padding-left: 40px;"> The price curve quantities are the quantiles of the selected percentiles: </p> $Q(P_0 = P_0^{(-)} = P_0^{(+)}) \equiv 0, \{Q(P_n^{(-)}), n = 1, 2, \dots, N\}, \text{ and } \{Q(P_n^{(+)})\}, n = 1, 2, \dots, N\}.$ <p style="padding-left: 40px;"> These can be determined from the MOSAIC polynomial evaluation grid via linear interpolation. </p> <p style="padding-left: 40px;"> The price curve segment prices are the products of the probability of uncertainty materializing beyond the start of each segment and the relevant energy price cap: </p> $\left\{ P_n^{(-)} ENPF, n = 0, 1, \dots, N - 1 \right\} \text{ and } \left\{ (1 - P_n^{(+)}) ENPC, n = 0, 1, \dots, N - 1 \right\}, \text{ where } ENPF \text{ is the}$ | Core | Internal ISO System |

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| | <p>avoidance cost floor ($-\\$150/\text{MWh}$) and $ENPC$ is the avoidance cost ceiling [$\\$247/\text{MWh}$ for IRU and $-\\$150/\text{MWh}$ for IRD]).</p> <ul style="list-style-type: none"> For IRU demand price curve for each hour interval for each BAA in the EDAM Area: $\left\{ Q \left(P_n^{(+)} \right), \left(1 - P_n^{(+)} \right) ENPC, \right\}$ $\left(n = 0, 1, 2, \dots, N - 1 \right)$ <p>Where:</p> <p>N is the Price Curve Segment Count</p> <p>$ENPC$ is the avoidance cost ceiling</p> <p>P_0 is the percentile with zero quantile</p> <p>P_N^+ is the high percentile</p> $Q \left(P_n^{(+)} \right) = A_{60}^{MP_n^+} \left(M_{60}^{PP_n^+} \right)^2 + B_{60}^{MP_n^+} M_{60}^{PP_n^+} + C_{60}^{MP_n^+}$ <p>Where: $M_{60}^{PP_n^+} \equiv ND_{60}^{HP_n^+} - \left(D_{60}^{HP_n^+} - S_{60}^{H(1-P_n^+)} - W_{60}^{H(1-P_n^+)} \right) + \left(D_{60}^{PP_n^+}(d) - S_{60}^{P(1-P_n^+)}(s) - W_{60}^{P(1-P_n^+)}(w) \right)$</p> For IRD demand price curve for each hour interval for each BAA in the EDAM Area: $\left\{ Q \left(P_n^{(-)} \right), P_n^{(-)} ENPF, \right\}$ $\left(n = 0, 1, 2, \dots, N - 1 \right)$ <p>Where:</p> <p>$ENPF$ is the avoidance cost floor</p> <p>P_0 is the percentile with zero quantile</p> <p>$P_N^{(-)}$ is the low percentile</p> | | |

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| | <ul style="list-style-type: none"> no steps of the demand curve will exceed the administrative ceiling of \$55/MWh for the imbalance reserve product <p>Note</p> <p style="margin-left: 40px;"><i>d – latest demand forecast for each BAA</i></p> <p style="margin-left: 40px;"><i>w – latest wind forecast for each BAA</i></p> <p style="margin-left: 40px;"><i>s – latest solar forecast for each BAA</i></p> | | |
| DAME-BRQ-02340 | <p>Broadcast IRU and IRD demand price curve before 10 am</p> <p>Broadcast demand price curve for</p> <ul style="list-style-type: none"> IRU each hour each EDAM BAA for the DAM horizon (D+1) before 10 am $\left\{ Q \left(P_n^{(+)} \right), \left(1 - P_n^{(+)} \right) ENPC, \right\}$ <p style="margin-left: 40px;"><i>n = 0, 1, 2, ..., N - 1</i></p> <ul style="list-style-type: none"> IRD each hour each EDAM BAA for the DAM horizon before 10 am $\left\{ Q \left(P_n^{(-)} \right), P_n^{(-)} ENPF, \right\}$ <p style="margin-left: 40px;"><i>n = 0, 1, 2, ..., N - 1</i></p> | Core | Internal ISO System |


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5.3 Business Process: Calculate & Monitor Energy Costs & Indices


- Setting IR/RC DAB for Calculated Ranking Option
- Negotiated Rate IR/RC DAB (NDAB)
- Process for Establishing an NDAB for IRU or RCU
- Setting IR/RC DAB for Negotiated Option (NDAB)
- Replace SYSOPR GMC Rate with (SYSOPRTD+SYSOPBAA) GMC Rate in the Calculation of Variable-Cost-Based DAM and RTM DEBs

5.3.1 Business Requirements


| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted | | | | | | | | | | |
|----------------|--|------------------|-----------------------------------|-----|----------|-----|----------|-----|----------|-----|----------|------|---|
| DAME-BRQ-03040 | <p>Setting IR/RC DAB for Calculated Ranking Option</p> <ul style="list-style-type: none"> • For resources (including NGRs) that have market product DAB Options Ranking set to “Calculated” as first option, System shall automatically set the DAB for these resources for that market product to a configurable values (initially set as below): <table border="1" style="margin-left: 40px;"> <thead> <tr> <th style="text-align: center;">Market Product</th> <th style="text-align: center;">DAB</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">IRU</td> <td style="text-align: center;">\$55/MWh</td> </tr> <tr> <td style="text-align: center;">IRD</td> <td style="text-align: center;">\$55/MWh</td> </tr> <tr> <td style="text-align: center;">RCU</td> <td style="text-align: center;">\$55/MWh</td> </tr> <tr> <td style="text-align: center;">RCD</td> <td style="text-align: center;">\$55/MWh</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • There shall be separate DAB for IRU, IRD, RCU and RCD. • The IRU/IRD and RCU/RCD DAB shall have single segment. • The x-axis of all DABs shall be set to the entire Registered MW Capacity of the eligible resource, specifically calculated as: <ul style="list-style-type: none"> ○ Registered Max Capacity (Pmax) minus Registered Min Capacity (Pmin). | Market Product | DAB | IRU | \$55/MWh | IRD | \$55/MWh | RCU | \$55/MWh | RCD | \$55/MWh | Core | <ul style="list-style-type: none"> • Internal ISO System |
| Market Product | DAB | | | | | | | | | | | | |
| IRU | \$55/MWh | | | | | | | | | | | | |
| IRD | \$55/MWh | | | | | | | | | | | | |
| RCU | \$55/MWh | | | | | | | | | | | | |
| RCD | \$55/MWh | | | | | | | | | | | | |

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| | <ul style="list-style-type: none"> The IRU/IRD and RCU/RCD DAB shall be resource-specific daily granularity. The DAB value shall be applied to all the EDAM resources, include CASIO and EDAM BAAs. <p>Note:</p> <ul style="list-style-type: none"> The resource-specific daily DAB for IRU and RCU market products are needed for market power mitigation of IRU and RCU bids, respectively, as well as IRU and RCU bid insertion/creation in SIBR, respectively. The resource-specific daily DAB for IRD and RCD market products are needed for IRD and RCD bid insertion/creation in SIBR, respectively. Registered Pmin is negative for NGRs. | | |
| DAME-BRQ-03060 | <p>Negotiated Rate IR/RC DAB (NDAB)</p> <p>System shall process IRU, IRD, RCU, and RCD DAB if all the following conditions are met:</p> <ul style="list-style-type: none"> Their resources elect Negotiated Rate DAB (NDAB) (for IRU, IRD, RCU, and RCD, respectively) as rank "1" If the requested Negotiated Rate DAB (NDAB) is greater than the corresponding Calculated DAB (currently defaulted at \$55/MWh) (business process). <p>Notes</p> <ul style="list-style-type: none"> Resources' SCs shall be responsible of negotiating the IRU/IRD and RCU/RCD NDAB if that option is applicable and will initiate the negotiation process. The ability for an SC to negotiate for an NDAB is suspended until CAISO issues a market notice it has gained the required operational experience about IR and RC NDAB. If CAISO does not issue market notice, the suspension period will end after 18 months from Tariff activation date (Go-Live date). | Core | <ul style="list-style-type: none"> Internal ISO System |

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| DAME-BRQ-03070 | <p>Process for Establishing an NDAB for IRU or RCU</p> <p>The following process shall be adhered to for establishing NDAB for IRU or RCU:</p> <ul style="list-style-type: none"> • SC submits proposed NDAB along with supporting documentation via CIDI. • CAISO will provide written response within 10 business days of the SC's submitted application. • If CAISO accepts the SC-proposed NDAB, it will be effective within 11 business days of the date of acceptance until: <ul style="list-style-type: none"> ○ FERC modifies NDAB ○ CAISO and SC mutually agree to modify NDAB. ○ NDAB expires, get terminated, or modified by FERC order. • If CAISO rejected the SC-proposed NDAB, CAISO and SC will negotiate agreeable NDAB within 60 days negotiation period and it will become effective within 11 business days of the date of acceptance. If no agreement by end of 60 days, SC can file proposed NDAB with FERC and the DAB for IRU and RCU will be set to \$55/MWh until negotiation between SC and FERC is completed. • CAISO may require renegotiation the NDAB if the negotiated values become outdated, or erroneous, or if the SC has changed and may request the SC to provide more information. • CAISO shall make informational filing with FERC for any NDAB no later than 7 days after the end of the month in which CAISO approved the NDAB. <p>Notes</p> <ul style="list-style-type: none"> • The negotiated values will apply to the downward products (IRD and RCD) but will need to be consistent with whatever was negotiated for the upward products (IRU and RCU, respectively). | Business Process | <ul style="list-style-type: none"> • Internal ISO System • CIDI |
| DAME-BRQ-03080 | <p>Setting IR/RC DAB for Negotiated Option (NDAB)</p> <p>For resources (including NGRs) that have market product DAB Options Ranking set to "Negotiated" as first option, System shall</p> | Core | <ul style="list-style-type: none"> • Internal ISO System |

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| | automatically set the NDAB for these resources based on the value or formulation that was negotiated with the SC. <ul style="list-style-type: none"> • There shall be separate NDAB for IRU, IRD, RCU and RCD. • The IRU/IRD and RCU/RCD NDAB shall have single segment. • The IRU/IRD and RCU/RCD NDAB shall be resource-specific daily granularity. | | |
| DAME-BRQ-03090 | <p>Replace SYSOPR GMC Rate with (SYSOPRTD+SYSOPBAA) GMC Rate in the Calculation of Variable-Cost-Based DAM and RTM DEBs</p> <p>Effective January 1, 2026</p> <ul style="list-style-type: none"> • System shall replace System Operations (SYSOPR) GMC rate with the sum of System Operations Real-Time Dispatch (SYSOPRTD) GMC rate and System Operations Balancing Authority Area Services (SYSOPBAA) in the calculations of Variable Cost-based DAM and RTM DEBs for CAISO BAA resources. | Core | <ul style="list-style-type: none"> • Internal ISO System |


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5.4 Business Process: Manage DAM – IFM


- Setup the configurable set of transmission constraints activate in IRU/IRD deployment scenarios
- Set up the configurable parameter for specify the IRU/IRD deployment scenarios percentage of contribution towards the transmission constraint
- Accept and validate IRU/IRD bids, MOO apply to Flex RA
- Accept and validate RCU/RCD bids, MOO apply to RA
- Consume hourly Histogram and second-order polynomial coefficients for IRU/IRD
- Calculate/broadcast 6&9 am hourly IRU/IRD requirements (IRUR/IRDR)
- Set IRU demand price curve
- Distribute IRUR/IRDR to load and VER nodes
- Include IRU/IRD deployment scenarios, use same SF as case cases
- Apply LMPM for energy bid by Including IRU and IRD deployment scenario in DCPA counter flow calculation and Energy LMP calculation
- Apply LMPM for IRU bid by including IRU deployment scenario in DCPA counter flow calculation and IRU nodal price calculation
- Procure IRU/IRD through co-optimization with energy and AS
- Calculate LMP for energy and IRU/IRD

5.4.1 Business Requirements


| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|--|------------------|-----------------------------------|
| DAME-BRQ-04004 | <p>Specify the set of transmission constraints for IRU/IRD deployment scenarios</p> <ul style="list-style-type: none"> • Setup the configurable set of transmission constraints activate in IRU or IRD deployment scenarios <ul style="list-style-type: none"> ○ By individual constraint: enable or disable the constraints in IRU/IRD deployment scenarios, provide ability to group the constraints ○ The changes should persistent , default is to enforce all critical constraints ○ A constraint can't be activated for deployment scenarios only; if the constraint is not activated in base scenario, the activation in deployment scenario won't be in effect. • Build Operator display for control the activate transmission constraint in deployment scenarios | Core | DAM |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
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| | <ul style="list-style-type: none"> The same set of constraints in deployment scenarios apply to all the IFM passes, in MPM,GHG pass, IFM | | |
| DAME-BRQ-04005 | <p>Specify configurable IRU and IRD deployment factors (DIRU/DIRD) configure portion of power flow related the IRU and IRD deployment scenarios</p> <ul style="list-style-type: none"> Set up the configurable deployment factors between 0 to 1 for specify the IRU/IRD deployment scenarios percentage of contribution on power flow towards the transmission constraint. Default value is 1 <p>Note:</p> <ul style="list-style-type: none"> The deployment factors (DIRU/DIRD) will affect IR MCC, consider the deployment factor in MPM, CRR 1B The product of DIRU/DIRD and shift factor should be higher than Shift Factor tolerance | Core | DAM |
| DAME-BRQ-04008 | <p>Allow eligible resource to submit one-segment bid for Imbalance Reserve upward and downward: IRU, IRD</p> <ul style="list-style-type: none"> Access MF defined resource eligibility for IR, each flag for each corresponding product: IRU,IRD, Access MF defined resource Certified Capacity MW for IRU and IRD Access MF defined BAA-Specific EDAM Participation Flag. Allow the eligible resource, include intertie resource, with resource ID defined in MF to submit one-segment bid of the IRU and/or IRD for the resource associated eligible flag Transaction ID (not pre-registered in MF) are not allowed to bid for IRU/IRD Not allow the following resource types to bid for IRU/IRD. <ul style="list-style-type: none"> The non-participating load Virtual supply/demand Hourly block import/export 60-minute PDR 60-minute RDRR <p>Note:</p> <ul style="list-style-type: none"> Refer to Resource Eligibility Table in Appendix-B: Formulas, Calculation Details, and Examples | Core | SIBR (from MF) |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
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| DAME-BRQ-04010 | <p>Set up configurable value for ramp intervals eligible for IRU/IRD , initial 30 minute</p> <ul style="list-style-type: none"> System shall allow the market engineer to configure the ramp intervals eligible for IRU/IRD, initial value is 30 minute. System shall use the latest configured the ramp interval in DAM. | Core | DAM |
| DAME-BRQ-04020 | <p>Allow eligible resource to submit one-segment bid for Reliability Capacity (RC) upward and downward: RCU, RCD</p> <ul style="list-style-type: none"> Access MF defined resource eligibility in RUC each flag for each corresponding product: RCU, RCD. Access MF defined resource Certified Capacity MW for RCU and RCD. Allow the resource with resource ID defined, include inertie resource in MF to submit one-segment bid of the RCU and/or RCD product that is associated eligible flag Not allow 15 minute and 60 minute dispatch-able inertie import/export resources with transaction ID (not pre-registered in MF) to bid for RCU/RCD Not allow the following resource type to bid for RCU/RCD. <ul style="list-style-type: none"> The non-participating load Virtual supply/demand <p>Note:</p> <ul style="list-style-type: none"> Refer to Resource Eligibility Table in Appendix-B: Formulas, Calculation Details, and Examples | Core | SIBR (from MF) |
| DAME-BRQ-04030 | <p>Allow eligible VER to bid for IRU, IRD, RCU, RCD</p> <ul style="list-style-type: none"> Allow VERs with relevant IR and RC eligibility flags to bid IRU and/or IRD same as other resources Allow VERs with eligible flags to bid RCU and RCD, <ul style="list-style-type: none"> VER can bid any price for RCU/RCD, same as other resource If VER is RA, RA resource SIBR rule apply <p>Notes</p> | Core | SIBR |

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| | <ul style="list-style-type: none"> Restrict all VERs upper economic limit in IFM/RUC to their VER forecast Extending the RCU/RCD bid in RUC up to VER forecast In settlement remove VERs from RCU/RCD cost allocation. RMR resources shall be treated as generating resources. | | |
| DAME-BRQ-04031 | Apply VER bid obligation for RCU up to certified capacity <ul style="list-style-type: none"> Inserting a RCU bid using DAB for VERs up to their certified RCU capacity if they do not bid Extending a submitted RCU bid for VERs up to their certified RCU capacity if bid not cover the applicable capacity. | Core | SIBR |
| DAME-BRQ-04040 | Enforce Flex RA resource Must Offer Obligation (MOO) for Energy <ul style="list-style-type: none"> Only allow Flex RA to submit self-schedule energy at Pmin For Flex RA capacity, MOO and bid insertion for energy: <ul style="list-style-type: none"> resource shall submit both economic energy bids for full flex RA capacity in DAM Insert DEB for energy for the flex RA capacity without economic bids Extend the last bid segment for energy if the economic bids not cover the full flex RA capacity <p>Note: Any resources that are awarded IRU/IRD shall be subject to MOO in RTM.</p> | Core | SIBR (from CIRA) |
| DAME-BRQ-04060 | All the RA resources have MOO for RCU, optional for RCD and allow non-zero bid <ul style="list-style-type: none"> Resource adequacyRA resources (Generic and Flex) will be able to bid non-zero prices for reliability capacity RCU/RCD. <ul style="list-style-type: none"> Note: This shall also apply to NGRs without REM too. For all RA capacity, MOO and bid insertion for RCU apply up to UEL. Resource can optional bid for RCD. | Core | SIBR |

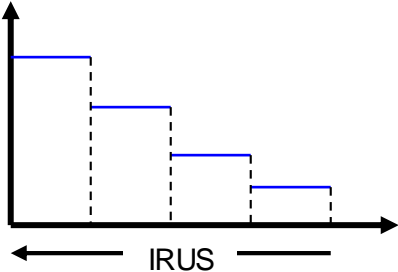
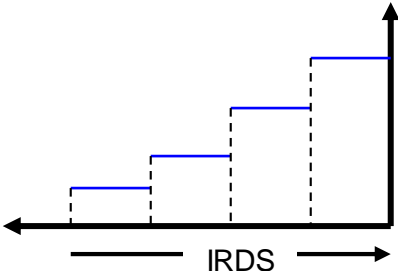
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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
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| | <ul style="list-style-type: none"> • If RA capacity has no economic RCU bids, system shall insert RCU DABs for RCU in DAM <ul style="list-style-type: none"> ○ Note: RMR resources shall be treated as generating resources. ○ If RA capacity has no energy bids or self-schedule insert default energy bid (DEB) (existing) | | |
| DAME-BRQ-04070 | <p>Supporting supply resource bid for RCU for PT-Export Incorporate Summer readiness 2021 rule for supporting the PT-export for RCU</p> <ul style="list-style-type: none"> • Non-RA supply resources designated to support a PT export shall bid for RCU to the quantity being used to support the PT export, resource is allowed to bid non-zero prices • If the supporting supply resource has no RCU bid, system shall insert DAB to cover the range that that supports sum of PT-exports associate with the supporting resource | Core | SIBR |
| DAME-BRQ-04072 | <p>Supporting supply resource submit positive or negative bid component for Daily Minimum Energy Limit System shall support supply resource submittal of positive or negative bid component for Daily Minimum Energy Limit.</p> | Core | SIBR |
| DAME-BRQ-04080 | <p>Accept and validate IRU/IRD bid</p> <ul style="list-style-type: none"> • Market participants will submit separate IR bids for IRU, IRD • IRU/IRD bids shall be a single segment (\$/MWh) of capacity products. IRU/IRD bids can have different hourly bids. • IRU/IRD bids shall have energy bids cover the IRU/IRD range • The IRU, IRD bids will subject to corresponding IRU, IRD bid price configurable Caps \$55/MWh as default , floor \$0/MWh as default • The capacity bid MW quantity must be greater than zero and will be capped by the minimum of associated registered <u>IR Certified Capacity</u> quantities from MF and Pmax, forecast • Modify the Raw Bids and Clean Bids include market product type IRU and IRD | Core | SIBR |
| DAME-BRQ-04090 | <p>Accept and validate RCU/RCD capacity bids</p> <ul style="list-style-type: none"> • Market participants will submit separate bids for RCU, RCD | Core | SIBR |



| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
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| | <ul style="list-style-type: none"> A single segment (\$/MWh) for capacity products RCU, RCD. RCU/RCD bids can have different hourly bids. Energy bids shall be required to cover for RCU/RCD bids range (except for VER, since they don't have to bid En for RCU). RCU/RCD will subject bid cap \$250/MWh, floor \$0/MWh The capacity bid MW quantity must be greater than zero and will be capped by the minimum of associated certification quantities and Pmax Modify the Raw Bids and Clean Bids replace market product RUC with RCU and RCD <p>Notes</p> <ul style="list-style-type: none"> In SIBR, no forecast is consumed in current design, so the VER forecast limit will be enforced in IFM and RUC. Reliability capacity up and down bid prices will be capped at \$250/MWh. | | |
| DAME-BRQ-04130 | <p>Set configurable parameters for Imbalance Reserve Penalty Prices in DAM</p> <ul style="list-style-type: none"> For IRU, define single penalty cost for that higher than the LPT self-schedule export in schedule run and price run separately <p>Note: use penalty cost in EDAM DA RSE for IRU/IRD resource sufficiency evaluation of the BAA.</p> | Core | {IFM pre-DAM} |
| DAME-BRQ-04131 | <p>IRU/IRD Requirements (IRUR/IRDR) subjects to demand price curve</p> <ul style="list-style-type: none"> Apply the demand price curve to the relax variable for the IRU/IRD Requirement (IRUR/IRDR). <p>Note: no calculation change for demand price curve for ISO and other EDAM BAAs</p> | Core | DAM |
| DAME-BRQ-04132 | <p>Consume and Display IRU/IRD demand price curve</p> | Core | DAM |



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| | <p>At 10 am, the system shall consume and display the IRU and IRD demand price curves $\{Q_k, P_k, k = 1, 2, \dots, n\}$ for each hour interval of the DAM market horizon for each BAA in the EDAM Area.</p> <p>Note:</p> <p>Same as FRU, the IRU demand price curve has increasing positive quantities (an <u>ascending</u> ordering shall be performed on the quantities to ensure the MW quantities monotonically increasing) and decreasing positive prices:</p>  <p>Same as FRD, the IRD demand price curve has decreasing negative quantities (a <u>descending</u> ordering shall be performed on the quantities to ensure the MW quantities monotonically decreasing) and decreasing positive prices:</p>  | | (from Internal ISO System) |
| DAME-BRQ-04134 | <p>Apply IRU/IRD demand price curve on IRU/IRD surplus variables in optimization to procure IRU/IRD</p> <ul style="list-style-type: none"> Cover the IRUR/IRDR range: system shall extend or prune the end of the IRU/IRD demand price curve for each BAA | Core | DAM |

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| | <p>in the EDAM Area to match the corresponding IRU/IRD Requirement (IRUR/IRDR) distributed to that BAA:</p> $Q_n = IRUR \text{ for IRU}$ $Q_n = -IRDR \text{ for IRD}$ <ul style="list-style-type: none"> • Transform demand price curve to monotonic increase price curve for surplus variables for IRU/IRD for each hour each BAA <ul style="list-style-type: none"> ○ Flip the monotonically decreasing IRU demand price curve form the monotonically increasing price curve for the IRU surplus that varies from zero to <i>IRUR</i>. All q_i capped by Q_n. ○ Offset the IRD demand price curve by <i>+IRDR</i> to form the monotonically increasing price curve for the IRD surplus that varies from zero to <i>IRDR</i>. All Q_i shall be capped by Q_n • Limit from above all segments of the IRU/IRD price curve by the IRU/IRD configurable cap price \$55/MWh. | | |
| DAME-BRQ-04134A | <p>Apply IRU/IRD demand price curve to IRU/IRD surplus in proportion to IRUR/IRDR in that surplus zone</p> <p>The system shall allocate the IRU/IRD demand price curve for each interval of the market horizon for each BAA in the EDAM Area to the IRUS/IRDS of Surplus Zones of that BAA in proportion to the distributed IRU/IRD requirement in that zone.</p> $\sum_{t=1}^N \sum_{j \in EIM} IRUS_{j,t} \sum_{z \in Z_j} IRUS_{z,j,t} + \sum_{t=1}^N \sum_{j \in EIM} IRDSP_{j,t} \sum_{z \in Z_j} IRDS_{z,j,t}$ | Core | DAM |
| DAME-BRQ-04135 | <p>BAA IRU/IRD Procurement constraints include IRU/IRD surplus in the BAA IR surplus zones</p> <ul style="list-style-type: none"> • The system shall retrieve all defined IR Surplus Zones and their BAA association from Master File | Core | DAM |



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| | <ul style="list-style-type: none"> BAA IRU/IRD procurement constraints include multiple IRUS/IRDS for multiple IR surplus zones in the BAA $\sum_{i \in BAA_j} IRU_{i,t} + \sum_{z \in Z_j} IRUS_{z,j,t} = IRUR_{j,t}$ $0 \leq IRUS_{z,j,t}, \forall z \in Z_j$ $\sum_{i \in BAA_j} IRD_{i,t} + \sum_{z \in Z_j} IRDS_{z,j,t} = IRDR_{j,t}$ $0 \leq IRDS_{z,j,t}, \forall z \in Z_j$ The system shall distribute the IRU/IRD surplus in each interval of the market horizon in the IRU/IRD deployment scenario as negative load to the load and VER nodes in the respective IR Surplus Zone with the same distribution factors used for distributing the IRU/IRD requirement in that zone. $IRUS_{i,z,j,t} = \frac{\Delta L_{i,t}^{(u)}}{\sum_{i \in S_z} \Delta L_{i,t}^{(u)}} IRUS_{z,j,t}, \forall i \in S_z, \forall z \in Z_j$ $IRDS_{i,z,j,t} = \frac{\Delta L_{i,t}^{(d)}}{\sum_{i \in S_z} \Delta L_{i,t}^{(d)}} IRDS_{z,j,t}, \forall i \in S_z, \forall z \in Z_j$ The <u>total</u> IRU/IRD surplus in each <u>surplus zone within each</u> BAA in the EDAM Area shall be limited to the <u>distributed IRU/IRD requirement, respectively</u>, in that <u>surplus zone BAA</u>. $\sum_{z \in Z_j} IRUS_{z,j,t} \leq \widehat{IRUR}_{j,t} \equiv \sum_{z \in Z_j} \sum_{i \in S_z} \Delta L_{i,t}^{(u)}$ $\sum_{z \in Z_j} IRDS_{z,j,t} \leq \widehat{IRDR}_{j,t} \equiv - \sum_{z \in Z_j} \sum_{i \in S_z} \Delta L_{i,t}^{(d)}$ | | |
| DAME-BRQ-04136 | <p>Transmission Constraints with IR surplus zones Include the IRUS/IRDS nodal contribution on constraint, using IRUS nodal shift factor for the IR surplus zone</p> $\widehat{LFL}_{m,t} \leq \widehat{F}_{m,t} + \sum_i (\Delta EN_{i,t} + DFIRU IRU_{i,t} + \Delta VS_{i,t} - \Delta VD_{i,t} - \Delta L_{i,t}) SF_{i,m,t}$ $+ DFIRU \left(\sum_{j \in EDAM} \sum_{z \in Z_j} IRUS_{z,j,t} SF_{z,j,m,t}^{(u)} - IRUR_t SF_{m,t}^{(u)} \right) \leq \widehat{UFL}_{m,t}$ | Core | DAM |



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| | $\overline{LFL}_{m,t} \leq \tilde{F}_{m,t} + \sum_i (\Delta EN_{i,t} - DFIRD IRU_{i,t} + \Delta VS_{i,t} - \Delta VD_{i,t} - \Delta L_{i,t}) SF_{i,m,t} - DFIRD \left(\sum_{j \in EDAM} \sum_{z \in Z_j} IRDS_{z,j,t} SF_{z,j,m,t}^{(d)} - IRDR_t SF_{m,t}^{(d)} \right) \leq \overline{UFL}_{m,t}$ | | |
| DAME-BRQ-04137 | <p>Include the APnode of surplus zones shift factors in shift factor set in each market pass</p> <p>System shall include the APnode of surplus zones shift factors in shift factor set in each market pass.</p> | Core | DAM |
| DAME-BRQ-04140 | <p>Consume Histogram and the second-order polynomial coefficients for DAM hourly (60min) IRU and IRD</p> <p>for each Trading Hour of the next Trading Day (D+1), for each BAA and DAM Area:</p> <ul style="list-style-type: none"> the High/low Percentile hourly forecast uncertainty histogram for: <ul style="list-style-type: none"> net demand: $(ND_{60}^{H97.5}) / (ND_{60}^{H2.5})$ demand: $(D_{60}^{H97.5}) / (D_{60}^{H2.5})$ adjusted solar: $(S_{60}^{H97.5}) / (S_{60}^{H2.5})$ adjusted wind: $(W_{60}^{H97.5}) / (W_{60}^{H2.5})$ the second-order polynomial coefficients of the High/low Percentile quadratic quantile regression of hourly forecast uncertainty <ul style="list-style-type: none"> demand: $(A_{60}^{D97.5}, B_{60}^{D97.5}, C_{60}^{D97.5}) / (A_{60}^{D2.5}, B_{60}^{D2.5}, C_{60}^{D2.5})$ Solar: $(A_{60}^{S97.5}, B_{60}^{S97.5}, C_{60}^{S97.5}) / (A_{60}^{S2.5}, B_{60}^{S2.5}, C_{60}^{S2.5})$ Wind: $(A_{60}^{W97.5}, B_{60}^{W97.5}, C_{60}^{W97.5}) / (A_{60}^{W2.5}, B_{60}^{W2.5}, C_{60}^{W2.5})$ Mosaic (net load) $(A_{60}^{M97.5}, B_{60}^{M97.5}, C_{60}^{M97.5}) / (A_{60}^{M2.5}, B_{60}^{M2.5}, C_{60}^{M2.5})$ the hourly High/low Percentile Threshold forecast uncertainty histogram <ul style="list-style-type: none"> net demand $(ND_{60}^{H99}) / (ND_{60}^{H1})$ Threshold value of IRU and IRD requirements $(IRUR_{60}^{max}) / (IRUR_{60}^{min}); IRDR_{60}^{max} / (IRDR_{60}^{min})$ <p>Note:</p> | Core | DAM [pre-DAM close] (from Internal ISO System) |

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| | <p>General rule: For IRU, using P97.5 for load, P2.5 for solar and wind, for IRD, using P2.5 for load P97.5 for solar and wind</p> | | |
| DAME-BRQ-04150 | <p>Calculate the hourly IRU/IRD requirements (IRUR/IRD) every time [IFM pre-DAM] runs for D+1</p> <p>For each Trading Hour of the next Trading Day (D+1) of the day type, for each BAA and DAM Area</p> <p>use the corresponding parameters from D+1 to calculate:</p> <ul style="list-style-type: none"> Imbalance reserve upper requirement (IRUR): $IRUR_{60} = A_{60}^{M97.5} (M_{60}^{P97.5})^2 + B_{60}^{M97.5} M_{60}^{P97.5} + C_{60}^{M97.5}$ <p>Where:</p> $M_{60}^{P97.5}(nd, d, s, w) \equiv ND_{60}^{H97.5} - (D_{60}^{H97.5} - S_{60}^{H2.5} - W_{60}^{H2.5}) + (D_{60}^{P97.5}(d) - S_{60}^{P2.5}(s) - W_{60}^{P2.5}(w))$ $D_{60}^{P97.5}(d) \equiv A_{60}^{D97.5} d^2 + B_{60}^{D97.5} d + C_{60}^{D97.5}$ $S_{60}^{P2.5}(s) \equiv A_{60}^{S2.5} s^2 + B_{60}^{S2.5} s + C_{60}^{S2.5}$ $W_{60}^{P2.5}(w) \equiv A_{60}^{W2.5} w^2 + B_{60}^{W2.5} w + C_{60}^{W2.5}$ <ul style="list-style-type: none"> Imbalance reserve down requirement (IRD): $IRD_{60} = A_{60}^{M2.5} (M_{60}^{P2.5})^2 + B_{60}^{M2.5} M_{60}^{P2.5} + C_{60}^{M2.5}$ <p>Where:</p> $M_{60}^{P2.5}(nd, d, s, w) \equiv ND_{60}^{H2.5} - (D_{60}^{H2.5} - S_{60}^{H97.5} - W_{60}^{H97.5}) + (D_{60}^{P2.5}(d) - S_{60}^{P97.5}(s) - W_{60}^{P97.5}(w))$ $D_{60}^{P2.5}(d) \equiv A_{60}^{D2.5} d^2 + B_{60}^{D2.5} d + C_{60}^{D2.5}$ $S_{60}^{P97.5}(s) \equiv A_{60}^{S97.5} s^2 + B_{60}^{S97.5} s + C_{60}^{S97.5}$ $W_{60}^{P97.5}(w) \equiv A_{60}^{W97.5} w^2 + B_{60}^{W97.5} w + C_{60}^{W97.5}$ <p>Notes</p> <ul style="list-style-type: none"> d – latest demand forecast for each BAA and DAM Area w – latest wind forecast for each BAA and DAM Area s – latest solar forecast for each BAA and DAM Area | Core | IFM [pre-DAM close] |




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| | <ul style="list-style-type: none"> There shall be no dependency between DAME and EDAM; the IRU/IRD Requirements (IRUR/IRDR) shall be calculated even if EDAM RSE is not yet available. | | |
| DAME-BRQ-04155 | <p>Calculate the hourly IRU/IRD requirements (IRUR/IRDR) for D+2 and D+3</p> <p>For each Trading Hour of the next Trading Days (D+2 and D+3) of the day type, for each BAA and DAM Area</p> <p>use the corresponding parameters from D+1 to calculate:</p> <ul style="list-style-type: none"> Imbalance reserve upper requirement (IRUR): Imbalance reserve down requirement (IRDR): <p>Notes</p> <ul style="list-style-type: none"> IRUR/IRDR shall be calculated for D+2 and D+3 using same formulation as the ones used for D+1 (refer to DAME-BRQ-04150). There shall be no dependency between DAME and EDAM; the IRU/IRD Requirements (IRUR/IRDR) shall be calculated even if EDAM RSE is not yet available. | Core | IFM [pre-DAM close] |
| DAME-BRQ-04160 | <p>The system shall bound the hourly IRU/IRD Requirements (IRUR/IRDR)</p> <p>for each Trading Hour of the next Trading Day, for each BAA and DAM Area</p> $IRUR_{60} = \max \left(\begin{array}{c} IRUR_{60}^{min}, ND_{60}^{H1}, \\ \min(ND_{60}^{H99}, IRUR_{60}, IRUR_{60}^{max}) \end{array} \right)$ $IRDR_{60} = \min \left(\begin{array}{c} -1 * IRDR_{60}^{min}, ND_{60}^{H99}, \\ \max(ND_{60}^{H1}, IRDR_{60}, -1 * IRDR_{60}^{max}) \end{array} \right)$ | Core | IFM [IFM pre-DAM close] |
| DAME-BRQ-04180 | <p>The system shall calculate the IRU requirement allocation factors to demand, solar, and wind for each hour of the trading day for ISO BAA:</p> | Core | DAM |




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| | <ul style="list-style-type: none"> $IRUDF_{60}(d, s, w) \equiv \frac{ D_{60}^{P97.5}(d) }{ D_{60}^{P97.5}(d) + S_{60}^{P2.5}(s) + W_{60}^{P2.5}(w) }$ $IRUSF_{60}(d, s, w) \equiv \frac{ S_{60}^{P2.5}(s) }{ D_{60}^{P97.5}(d) + S_{60}^{P2.5}(s) + W_{60}^{P2.5}(w) }$ $IRUWF_{60}(d, s, w) \equiv \frac{ W_{60}^{P2.5}(w) }{ D_{60}^{P97.5}(d) + S_{60}^{P2.5}(s) + W_{60}^{P2.5}(w) }$ | | |
| DAME-BRQ-04190 | <p>The system shall calculate the IRD requirement allocation factors to demand, solar, and wind for each hour of the trading day for ISO BAA,</p> <ul style="list-style-type: none"> $IRDDF_{60}(d, s, w) \equiv \frac{ D_{60}^{P2.5}(d) }{ D_{60}^{P2.5}(d) + S_{60}^{P97.5}(s) + W_{60}^{P97.5}(w) }$ $IRDSF_{60}(d, s, w) \equiv \frac{ S_{60}^{P97.5}(s) }{ D_{60}^{P2.5}(d) + S_{60}^{P97.5}(s) + W_{60}^{P97.5}(w) }$ $IRDWF_{60}(d, s, w) \equiv \frac{ W_{60}^{P97.5}(w) }{ D_{60}^{P2.5}(d) + S_{60}^{P97.5}(s) + W_{60}^{P97.5}(w) }$ | Core | DAM |
| DAME-BRQ-04200 | <p>The system shall distribute the IRU/IRD Requirement (IRUR/IRDR) allocated to demand nodes, superimposed on the load schedule</p> <p>For each hour of the trading day in the IR deployment scenario, with the same distribution factors (LDF) used for distributing the demand forecast in RUCSYS LFZ (renormalized with respect to current topology).</p> <ul style="list-style-type: none"> Allocate IRU as positive load to the load nodes: $\Delta L_{i,t}^{(u)} = (LDF_{i,t} * IRUR_{60} * IRUDF_{60}(d, s, w))$ Allocate IRD as negative load to the load nodes: $\Delta L_{i,t}^{(d)} = (-LDF_{i,t} * IRDR_{60} * IRDDF_{60}(d, s, w))$ | Core | DAM |
| DAME-BRQ-04210 | <p>Calculate solar and wind distribution Factors of each VER nodes proportion to the forecasts:</p> <p>Solar Resource distribution factor:</p> $SDF_{i,t} = \frac{FS_{i,t}}{\sum_i FS_{i,t}}$ <p>Wind Resource distribution factor:</p> $WDF_{i,t} = \frac{FW_{i,t}}{\sum_i FW_{i,t}}$ | Core | DAM |

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| DAME-BRQ-04220 | <p>Distribute the IRU/IRD Requirement (IRUR/IRD) to VER nodes, superimposed on the VER schedule</p> <ul style="list-style-type: none"> Distribute IRU as positive load to the Solar and wind VER nodes: $\Delta L_{i,t}^{(u)} = (SDF_{i,t} * IRUR_{60} * IRUSF_{60}(d,s,w))$ $\Delta L_{i,t}^{(w)} = (WDF_{i,t} * IRUR_{60} * IRUWF_{60}(d,s,w))$ Distribute IRD as negative load to the solar and wind VER nodes: $\Delta L_{i,t}^{(d)} = (-SDF_{i,t} * IRDR_{60} * IRDSF_{60}(d,s,w))$ $\Delta L_{i,t}^{(d)} = (-WDF_{i,t} * IRDR_{60} * IRDWF_{60}(d,s,w))$ | Core | DAM |
| DAME-BRQ-04230 | <p>IRU/IRD additional deployment scenarios use same topology as base case and base with contingencies in NA, apply DIRU/DIRD on the specified set of transmission constraints</p> <ul style="list-style-type: none"> No additional AC power flow runs for IRU/IRD deployment scenarios, instead use same base cases and contingencies cases shift factors set to calculate the transmission constraints for IRU, and for IRD deployment scenarios for each intervals (DAME-BRQ-04310) Apply the DIRU/DIRD contribution of IRU/IRD deployment scenarios (parameter defined in DAME-BRQ-04005) in the transmission constraints Only enforce the set transmission constraints (specified in DAME-BRQ-04004) in IRU/IRD deployment scenarios | Core | DAM |
| DAME-BRQ-04232 | <p>Identify the critical constraints for IRU/IRD deployment scenarios</p> <p>Determine the critical set in the deployment scenarios superimposing the linear IR flows from UC</p> <p>Note</p> <ul style="list-style-type: none"> Refer to DAME-BRQ-06070 for RTM. | Core | DAM |
| DAME-BRQ-04235 | <p>Calculate Shift Factors for base case and base case with contingencies</p> <p>Calculate Shift factor based on AC power flow runs:</p> <ul style="list-style-type: none"> Shift Factor $SF_{i,m,t}$ for the node i on transmission m and hour t of base case Shift Factor $SF_{i,m,t}^{(k)}$ for N-1 preventive transmission contingencies | Core | DAM |

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| | <ul style="list-style-type: none"> Shift Factor $SF_{i,m,t}^{(g)}$ for GCARM generation/transmission contingencies Adjusted Shift Factor $SF'_{i,m,t}^{(g)}$ for GCARM generation/transmission contingencies with post-contingency correction Store the calculated the shift factors. <p>Note: The same Shift factors will apply to the base scenario, IRU/IRD deployment scenarios in IFM, and RUC RCU/RCD procurement</p> | | |
| DAME-BRQ-04240 | <p>Apply LMPM for energy bid by Including IRU and IRD deployment scenario in DCPA counter flow calculation and Energy LMP calculation</p> <ul style="list-style-type: none"> For IRU deployment scenario: To calculate counter flow for the binding transmission constraint from the resource shall be the product of negative shift factor and energy schedule plus IRU award For IRD deployment scenario: To calculate counter flow for the binding transmission constraint from the resource shall be the product of negative shift factor and energy schedule minus IRD award; no mitigation for IRD bid, but still should be considered for En bid mitigation To calculate the Energy competitive LMP for each node, <ul style="list-style-type: none"> Calculate LMP's congest cost MCC that include energy, IRU deployment scenario and IRD deployment scenario Break the LMP congestion cost MCC into two components: non-competitive component (based on DCPA uncompetitive paths that include IRU/IRD deployment scenarios in the counter-flow) and a competitive component. Calculate the nodal competitive LMP that exclude the non-competitive MCC. | Core | IFM-MPM |

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| | <ul style="list-style-type: none"> Apply the LMPM for the applicable resource's energy bid mitigate it to the higher of the default energy bid (DEB) and its competitive LMP | | |
| DAME-BRQ-04250 | <p>Apply LMPM for IRU bid by Including IRU deployment scenario in DCPA counter flow calculation and IRU nodal price calculation</p> <ul style="list-style-type: none"> Build Activation switch for turn on/off of IR LMPM function In DCPA process, the counter flow calculation, to determine the uncompetitive paths: For IRU deployment scenario: same uncompetitive paths as in DCPA with IRU deployment for energy LMPM To calculate the IRU competitive nodal price for each node, <ul style="list-style-type: none"> Calculate IRU nodal price congest cost MCC that include energy, IRU deployment scenario Break the IRU nodal price congestion cost MCC into two components: non-competitive component (based on DCPA uncompetitive paths that include IRU deployment scenarios in the counter-flow) and a competitive component. Calculate the nodal competitive IRU price that exclude the non-competitive MCC. Apply the existing LMPM for the applicable resource's IRU bid mitigate it to greater of (its nodal competitive IRU price and IRU DAB) if it below submitted bid. <p>Note: LMPM applies to IRU only, not for IRD.</p> | Core | IFM-MPM |
| DAME-BRQ-04260 | <p>System shall procure IRU/IRD through co-optimization with energy and AS</p> <p>Objective function:</p> <ul style="list-style-type: none"> Include IRU/IRD bid costs in Objective function. IRU can be provided by offline 15min-start units IRD can only be provided by online resources MSG configuration in transition cannot provide IRU/IRD | Core | IFM, IFM-MPM |
| DAME-BRQ-04280 | <p>Procurement constraints for IRU/IRD in co-optimization energy, AS and IR</p> | Core | IFM, IFM-MPM |

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| | <ul style="list-style-type: none"> Keep power balance constraint unchanged, include losses Keep ancillary services procurement constraints unchanged Add IRU/IRD procurement constraints to meet IRU/IRD Requirements (IRUR/IRDR) for each hour for each BAA and for EDAM area in DAM. | | |
| DAME-BRQ-04290 | <p>Capacity constraints for IRU/IRD in co-optimization energy, AS and IR</p> <ul style="list-style-type: none"> Include IRU/IRD upper/lower bound constraints for each resource by certified quantities. Include IRU/IRD with energy and AS in resource upper/lower bound capacity constraint Include IRU/IRD with AS capacity awards in resource upper/lower bound adjusted economic limit constraint <p>For VER:</p> <ul style="list-style-type: none"> VER for IRU/IRD, UOL/UEL limited by VER forecast | Core | IFM, IFM-MPM |
| DAME-BRQ-04300 | <p>Ramp capability constraints for IRU/IRD in co-optimization energy, AS and IR</p> <ul style="list-style-type: none"> Include IRU/IRD with energy and AS in resource ramp capability constraint The ramp capability constraint for offline start up at beginning of the hour to support IRU and upward AS The ramp capability constraint for the resource shut down at the end of hour to support IRD and downward AS Use dynamic ramp capability on IRU/IRD awards. <ul style="list-style-type: none"> For resource remain on-line, AS and IRU/IRD Capacity awards and day ahead energy schedule changes across hours share the resource dynamic ramp capability, use granularity adjustment factor 2 converts 30-min IRU/IRD awards to the hourly. For resource start up use configurable granularity adjustment factor (defaulted to 2) for IRU For resource shut down use configurable granularity adjustment factor (defaulted to 2) for IRD. (same factor as the one used for IRU) <p>Note:</p> | Core | IFM, IFM-MPM |

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| | With the adjustment factor, there is no need to develop 15min dynamic ramp for IRU/IRD | | |
| DAME-BRQ-04310 | <p>Transmission constraints in co-optimization energy, AS and IRU/IRD</p> <p>From base case</p> <ul style="list-style-type: none"> Enforce transmission constraints for energy and virtual energy base case, the incremental energy injections are multiplied by the corresponding shift factors $SF_{i,m,t}$ for the relevant network constraint to account for changes in the active power flow from the AC power flow solution <p>From base case with contingencies</p> <ul style="list-style-type: none"> Enforce transmission constraints for energy and virtual energy base case with N-1 transmission contingencies using shift factor $SF_{i,m,t}^{(k)}$ Enforce transmission constraints for energy and virtual energy base case with GCARM generation/transmission contingencies using adjusted shift factor $SF_{i,m,t}^{(g)}$ <p>From IRU/IRD deployment scenarios</p> <ul style="list-style-type: none"> Enforce additional transmission constraints that add IRU deployment scenario in upper active power limits Enforce additional transmission constraints that add IRD deployment scenario in lower active power limits The shift factors in the IRU/IRD deployment scenarios are the same as the ones in the base scenario $SF_{i,m,t}$. <p>From IRU/IRD deployment scenarios with contingencies</p> <ul style="list-style-type: none"> Enforce transmission constraints in IRU/IRD deployment scenarios with contingencies: The shift factors in the IRU/IRD deployment scenarios with N-1 transmission contingencies using shift factor $SF_{i,m,t}^{(k)}$ The shift factors in the IRU/IRD deployment scenarios with GCARM generation/transmission contingencies using adjusted shift factor $SF_{i,m,t}^{(g)}$ <p>Note:</p> | Core | IFM, IFM-MPM |

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| | <ul style="list-style-type: none"> Critical transmission constraints will be different in general for Base scenario, with/without contingencies and IRU/IRD deployment scenarios, with/without contingencies. ACPF will determine CCS in IRU/IRD deployment scenarios by evaluating power flow with deployment of IRU/IRD awards with relevant deployment factor | | |
| DAME-BRQ-04320 | <p>Scheduling Limit constraints in co-optimization energy, AS and IR</p> <ul style="list-style-type: none"> Include IRU in ITC/ISL upper limit (import) constraints for energy plus upward AS (EA type) Include IRU in ITC/ISL upper limit constraints for upward AS without energy (AS type) Include IRD in ITC/ISL lower limit (export) constraints for energy plus downward AS (EA type) Include IRD in ITC/ISL lower limit constraints for downward AS without energy (AS type) <p>Notes</p> <ul style="list-style-type: none"> Import and export Netting is allow for the energy, not allowed between energy and capacity (AS,IR). AS Type: AS Only EA Type: Energy + AS | Core | IFM, IFM-MPM |
| DAME-BRQ-04330 | <p>Energy limit, Gas-burn, pump and other constraints in co-optimization energy, AS and IR</p> <ul style="list-style-type: none"> Gas-Burn Nomogram: Add IRU, in addition to Energy, in the Gas-Burn nomograms Daily Energy limit: Add IRU, in addition to Energy, in the Daily Energy limit constraint Pump-storage Hydro (PSH): Add IRU, in addition to Energy, in the PSH positive limit (generating mode) constraint; minus IRD, in addition to Energy, in the PSH negative limit (pumping mode) constraint. | Core | IFM, IFM-MPM |
| DAME-BRQ-04331 | <p>Include IRU/IRD in storage resource ASSOC constraint</p> <p>Include IRU in the ASSOC constraint that SOC be able to discharge to support minimum SOC plus upward AS and IRU;</p> | Core | IFM, IFM-MPM |

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| | <p>Include IRD, in the ASSOC constraint that SOC be able to charge to support downward AS and IRD with charge efficiency that not exceed the maximum SOC.</p> <p>Notes</p> $SOC_{i,t} - RU_{i,t} - SR_{i,t} - NR_{i,t} - \frac{IRU_{i,t} + IRU_{i,t+1}}{2} \geq \underline{SOC}_{i,t}$ $SOC_{i,t} + \eta_i \left(RD_{i,t} + \frac{IRD_{i,t} + IRD_{i,t+1}}{2} \right) \leq \overline{SOC}_{i,t}$ $, \forall i \in S_{LESR} \wedge t = 1, 2, \dots, T$ <ul style="list-style-type: none"> ASSOC constraints of LESR shall be consistent with Energy Storage Enhancements initiative, model attenuation and coverage factor to have SOC to support AS, and IRU/IRD provided by storage resource. | | |
| DAME-BRQ-04331A | <p>Include IRU/IRD and RCU/RCD in storage resource ASSOC constraint</p> <p>Include IRU and RCU in the ASSOC constraint that SOC be able to discharge to support minimum SOC plus upward AS and IRU/RCU;</p> <p>Include IRD and RCD in the ASSOC constraint that SOC be able to charge to support downward AS and IRD/RCD with charge efficiency that not exceed the maximum SOC.</p> <p>Notes</p> $SOC_{i,t} - RU_{i,t} - SR_{i,t} - NR_{i,t} - \frac{IRU_{i,t} + IRU_{i,t+1}}{2} - \frac{RCU_{i,t} + RCU_{i,t+1}}{2} \geq \underline{SOC}_{i,t}$ $SOC_{i,t} + \eta_i \left(RD_{i,t} + \frac{IRD_{i,t} + IRD_{i,t+1}}{2} + \frac{RCD_{i,t} + RCD_{i,t+1}}{2} \right) \leq \overline{SOC}_{i,t}$ $, \forall i \in S_{LESR} \wedge t = 1, 2, \dots, T$ <ul style="list-style-type: none"> ASSOC constraints of LESR shall be consistent with Energy Storage Enhancements initiative, model attenuation and coverage factor to have SOC to support AS, IRU/IRD, and RCU/RCD provided by storage resource. | Core | RUC |

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| DAME-BRQ-04332 | <p>Include attenuation from capacity IR/RC awards in SOC envelop constraint in MPM, IFM, RUC</p> <ul style="list-style-type: none"> • Set hourly configurable parameters by BAA for attenuation factors for IR and RC capacity awards to storage resource in DAM <ul style="list-style-type: none"> ○ System shall allow user to setup configurable parameters for attenuation factors for DAM and RTM, apply to all the storage resource SOC envelop constraints ○ Attenuation factor shall be defined for Imbalance reserve and Reliability Reserve: <ul style="list-style-type: none"> ▪ IRU ▪ IRD ▪ RCU ▪ RCD ○ Each Attenuation factor must be between 0 to 1, • The day-ahead market will generate an upper and lower bound, or envelope, for state of charge <ul style="list-style-type: none"> ○ The envelope could constrain operation for storage resources ○ The initial upper and lower bounds will be set to the initial day-ahead state of charge ○ The initial multiplier attached to the imbalance reserves in the envelope equation will be 0.85 $\forall i \in S_{LESR} \wedge t = 1, 2, \dots, T$ $SOC_{i,t}^{(u)} = \left(\begin{array}{l} SOC_{i,t-1}^{(u)} - EN_{i,t}^{(+)} - \eta_i EN_{i,t}^{(-)} \\ -AIRU_t \frac{IRU_{i,t} + IRU_{i,t+1} - ARCU_t \frac{RCU_{i,t} + RCU_{i,t+1}}{2}}{2} \end{array} \right) \geq \underline{SOC}_{i,t}$ $SOC_{i,t}^{(l)} = \left(\begin{array}{l} SOC_{i,t-1}^{(l)} - EN_{i,t}^{(+)} - \eta_i EN_{i,t}^{(-)} + \\ \eta_i AIRD_t \frac{IRD_{i,t} + IRD_{i,t+1} + \eta_i ARCD_t \frac{RCD_{i,t} + RCD_{i,t+1}}{2}}{2} \end{array} \right) \leq \overline{SOC}_{i,t}$ $\forall i \in S_{LESR} \wedge t = 1, 2, \dots, T$ <p>Where</p> $IRU_{i,T+1} = IRD_{i,T+1} = RCU_{i,T+1} = RCD_{i,T+1} = 0$ | Core | DAM |
| DAME-BRQ-04350 | <p>Calculate hourly locational marginal price (LMP) for energy in DAM include IRU/IRD deployment scenarios on congestion, for nodal and resource</p> | Core | IFM, IFM-MPM |

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| | <p>Energy locational marginal price LMP for each hour in IFM:</p> <ul style="list-style-type: none"> Shadow price of PBC/ Loss Penalty Factor (LPF) of res/node (existing) (minus) Marginal Congestion cost components (MCC) of base case using shift factor $SF_{i,m,t}$ (minus) MCC components of base case with N-1 preventive transmission contingency using shift factor $SF_{i,m,t}^{(k)}$ (minus) MCC components of base case with GCARM generation/ transmission contingency using adjusted shift factor $SF_{i,m,t}^{(g)}$ (minus) MCC components of deployment case of IRU, using DIRU* shift factor $SF_{i,m,t}^{(u)}$ (minus) MCC components of IRU deployment case with N-1 preventive transmission contingency using DIRU* shift factor $SF_{i,m,t}^{(k,u)}$ (minus) MCC components of IRU deployment case with GCARM generation/ transmission contingency using DIRD*adjusted shift factor $SF_{i,m,t}^{(g,d)}$ (minus) MCC components of deployment case of IRD, using DIRD* shift factor $SF_{i,m,t}^{(d)}$ (minus) MCC components of IRD deployment case with N-1 preventive transmission contingency using DIRD*shift factor $SF_{i,m,t}^{(k,d)}$ (minus) MCC components of IRD deployment case with GCARM generation/ transmission contingency using DIRD*adjusted shift factor $SF_{i,m,t}^{(g,d)}$ The intertie congestion components shall be included in LMP for energy Gas nomogram shadow prices shall be reflected in resource prices only, not the Pnode/APnode IRUMP. <p>Note: MCC is the sum of all congestion costs, each calculated as product of shift factor and shadow price of the binding network constraint</p> | | |
| DAME-BRQ-04360 | <p>Calculate hourly SP-Tie LMP for energy in DAM include IRU/IRD deployment scenarios on congestion as normal nodal LMP plus shadow price of ITC/ISL, for nodal and resource</p> | Core | IFM, IFM-MPM |

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| | <ul style="list-style-type: none"> The SP nodal price of energy minus the shadow prices of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-Tie Location | | |
| DAME-BRQ-04370 | <p>Calculate hourly nodal IRU marginal price (IRUMP) in DAM for all nodal and resource</p> <ul style="list-style-type: none"> Shadow price of IRU procurement constraint (no loss component) (minus) MCC components of deployment case of IRU, using shift factor $SF_{i,m,t}$ (minus) MCC components of IRU deployment case with N-1 preventive transmission contingency using shift factor $SF_{i,m,t}^{(k)}$ (minus) MCC components of IRU deployment case with GCARM generation/ transmission contingency using adjusted shift factor $SF_{i,m,t}^{(g)}$ Gas nomogram shadow prices shall be reflected in resource prices only, not the Pnode/APnode IRUMP. <p>Note</p> <ul style="list-style-type: none"> IRUMP/IRDMP will be calculated for all the pnodes and resources, similar as for Energy LMP. | Core | IFM, IFM-MPM |
| DAME-BRQ-04380 | <p>Calculate hourly nodal IRD marginal price (IRDMP) in DAM for node and resource</p> <ul style="list-style-type: none"> Shadow price of IRD procurement constraint (no loss component) (plus) MCC components of deployment case of IRD, using shift factor $SF_{i,m,t}$ (plus) MCC components of IRD deployment case with N-1 preventive transmission contingency using shift factor $SF_{i,m,t}^{(k)}$ (plus) MCC components of IRD deployment case with GCARM generation/ transmission contingency using adjusted shift factor $SF_{i,m,t}^{(g)}$ The intertie congestion components shall be included in IRDMP | Core | IFM, IFM-MPM |




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| DAME-BRQ-04390 | <p>Calculate Hourly SP-Tie IRU Marginal Price (IRUMP) in DAM for Nodal by Direction (Import & Export)</p> <p><u>For Import direction</u></p> <ul style="list-style-type: none"> • <u>SP nodal price of IRU</u> • <u>(plus) the shadow prices for import direction of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-TIE location of IRU</u> <p><u>For Export direction</u></p> <ul style="list-style-type: none"> • <u>SP nodal prices of IRU</u> • <u>(minus) the shadow prices for export direction of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-TIE location of IRU.</u> | Core | IFM, IFM-MPM |
| DAME-BRQ-0439004395 | <p>Calculate hourly Hourly SP-tie IRU marginal price Marginal Price (IRUMP) in DAM for nodal and resource Resource</p> <ul style="list-style-type: none"> • SP nodal price of IRU • <u>(minus plus) the shadow prices of import direction of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-Tie Location of IRU for import resources and TG</u> • <u>(minus) the shadow prices of export direction of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-Tie Location of IRU for export resources.</u> | Core | IFM, IFM-MPM |
| DAME-BRQ-04400 | <p>Calculate hourly Hourly SP-tie IRD marginal price Marginal Price (IRDMP) in DAM for nodal and resource Nodal by Direction (Import & Export)</p> <p><u>For import direction</u></p> <ul style="list-style-type: none"> • SP nodal price IRD • <u>(minus) the shadow prices of export direction of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-Tie location of IRD</u> <p><u>For export direction</u></p> <ul style="list-style-type: none"> • <u>SP nodal price IRD</u> | Core | IFM, IFM-MPM |




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| | <ul style="list-style-type: none"> (plus) the shadow prices <u>of import direction</u> of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-Tie <u>Location</u> of IRD. | | |
| <u>DAME-BRQ-04405</u> | <p><u>Calculate Hourly SP-Tie IRD Marginal Price (IRDMP) in DAM for Resource</u></p> <ul style="list-style-type: none"> <u>SP nodal price IRD</u> <u>(plus) the shadow prices of the import directions of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-Tie Location of IRD for export resources</u> <u>(minus) the shadow prices of the export directions of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-Tie Location of IRD for import resources and TG.</u> | <u>Core</u> | <u>IFM, IFM-MPM</u> |
| DAME-BRQ-04451 | <p>Calculate weight of distribution of IRUR/IRDR in the BAA</p> <p>For each load/Solar/Wind (d/s/w) distribution</p> <p>Weight factors for IRU/IRD, using (D/S/W) Distribution factor*(D/S/W) Allocation Factor</p> $w_{i,t}^u(d) = (LDF_{i,t} * IRUDF_{60}(d,s,w))$ $w_{i,t}^u(s) = (SDF_{i,t} * IRUSF_{60}(d,s,w))$ $w_{i,t}^u(w) = (WDF_{i,t} * IRUWF_{60}(d,s,w))$ $w_{i,t}^d(d) = (LDF_{i,t} * IRDDF_{60}(d,s,w))$ $w_{i,t}^d(s) = (SDF_{i,t} * IRDSF_{60}(d,s,w))$ $w_{i,t}^d(w) = (WDF_{i,t} * IRDWF_{60}(d,s,w))$ | Core | IFM, IFM-MPM, RUC |
| DAME-BRQ-04452 | <p>Calculate BAA Imbalance Upward/Downward deployment Shift Factors Imbalance demand reference point (Anode)</p> <p>Calculate BAA market footprint aggregated Imbalance demand Shift Factor $SF_{m,t}^{(u)} / SF_{m,t}^{(d)}$ for base case and $SF_{m,t}^{(k,u)} / SF_{m,t}^{(k,d)} SF_{m,t}^{(g,u)} / SF_{m,t}^{(g,d)}$ for contingency case (that reference point of market footprint distributed load) as sum of product of nodal weight and nodal shift factor. Calculate</p> | Core | IFM, IFM-MPM, RUC |



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| | <p>adjusted shift factor $SF_{m,t}^{(g,u)} / SF_{m,t}^{(g,d)}$ for GCARM with post contingency correction</p> <p>Note: Same Reference point is used to calculate SF for balance demand anode of each EDAM BAAs.</p> | | |
| <p>DAME-BRQ-04453</p> | <p>Include IRU/IRD awards, requirement and surplus contribution in transmission constraint</p> <p>Include IRU/IRD awards, IRU/IRD Requirements (IRUR/IRDR) and IRU/IRD Surplus (IRUS/IRDS) contribution on transmission constraint</p> $\left. \begin{aligned} \widetilde{LFL}_{m,t} &\leq \widetilde{F}_{m,t} + \sum_i (\Delta EN_{i,t} + DFIRU IRU_{i,t} + \Delta VS_{i,t} - \Delta VD_{i,t} - \Delta L_{i,t}) SF_{i,m,t} + \\ &\quad DFIRU (IRUS_t - IRUR_t) SF_{m,t}^{(u)} \leq \widetilde{UFL}_{m,t} \\ \widetilde{LFL}_{m,t} &\leq \widetilde{F}_{m,t} + \sum_i (\Delta EN_{i,t} - DFIRD IRD_{i,t} + \Delta VS_{i,t} - \Delta VD_{i,t} - \Delta L_{i,t}) SF_{i,m,t} - \\ &\quad DFIRD (IRDS_t - IRDR_t) SF_{m,t}^{(d)} \leq \widetilde{UFL}_{m,t} \end{aligned} \right\}$ <p>$\forall m \wedge t = 1, 2, \dots, T$</p> $\left. \begin{aligned} \widetilde{LFL}_{m,t}^{(k)} &\leq \widetilde{F}_{m,t}^{(k)} + \sum_i (\Delta EN_{i,t} + DFIRU IRU_{i,t} + \Delta VS_{i,t} - \Delta VD_{i,t} - \Delta L_{i,t}) SF_{i,m,t}^{(k)} + \\ &\quad DFIRU (IRUS_t - IRUR_t) SF_{m,t}^{(k,u)} \leq \widetilde{UFL}_{m,t}^{(k)} \\ \widetilde{LFL}_{m,t}^{(k)} &\leq \widetilde{F}_{m,t}^{(k)} + \sum_i (\Delta EN_{i,t} - DFIRD IRD_{i,t} + \Delta VS_{i,t} - \Delta VD_{i,t} - \Delta L_{i,t}) SF_{i,m,t}^{(k)} - \\ &\quad DFIRD (IRDS_t - IRDR_t) SF_{m,t}^{(k,d)} \leq \widetilde{UFL}_{m,t}^{(k)} \end{aligned} \right\}$ <p>$\forall k, m \wedge t = 1, 2, \dots, T$</p> $\left. \begin{aligned} \widetilde{LFL}_{m,t}^{(g)} &\leq \widetilde{F}_{m,t}^{(g)} + \sum_i (\Delta EN_{i,t} + DFIRU IRU_{i,t} + \Delta VS_{i,t} - \Delta VD_{i,t} - \Delta L_{i,t}) SF_{i,m,t}^{(g)} + \\ &\quad DFIRU (IRUS_t - IRUR_t) SF_{i,m,t}^{(g,u)} \leq \widetilde{UFL}_{m,t}^{(g)} \\ \widetilde{LFL}_{m,t}^{(g)} &\leq \widetilde{F}_{m,t}^{(g)} + \sum_i (\Delta EN_{i,t} - DFIRD IRD_{i,t} + \Delta VS_{i,t} - \Delta VD_{i,t} - \Delta L_{i,t}) SF_{i,m,t}^{(g)} - \\ &\quad DFIRD (IRDS_t - IRDR_t) SF_{i,m,t}^{(g,d)} \leq \widetilde{UFL}_{m,t}^{(g)} \end{aligned} \right\}$ <p>$\forall g, m \wedge t = 1, 2, \dots, T$</p> | <p>Core</p> | <p>IFM, IFM-MPM, RUC</p> |
| <p>DAME-BRQ-04454</p> | <p>Calculate hourly IRU/IRD Surplus variable and IRU/IRD marginal price of Surplus Apnode, price breakdown by BAA</p> <ul style="list-style-type: none"> Access Associated Imbalance Demand Hub Apnode of each BAA from MF. Access associated IR surplus zones of each BAA and their associated Apnodes from MF. | <p>Core</p> | <p>IFM</p> |

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| | <ul style="list-style-type: none"> • The hourly IRU/IRD surplus variable values are optimally calculated through IFM co-optimization Energy, AS and IRU/IRD with demand curve. • Calculate the BAA aggregated hourly IRU/IRD Marginal prices of IRU/IRD surplus as a IRU/IRD Locational Marginal Prices and the price components at location (Apnode) associated with the BAA Imbalance Demand Hub (same method as for DLAP) per PIME logic <ul style="list-style-type: none"> ○ The IRU/IRD surplus is defined on each Apnode associated with corresponding surplus zone and are aggregated on BAA level to be on the same Imbalance Demand Hub Apnode of each BAA (DAME-BRQ-01150) ○ The Shift factor of IRU/IRD APnode is defined in (DAME-BRQ-04452) ○ The IRUMP/IRDMP locational price is defined in DAME-BRQ-04370, DAME-BRQ-04380 ○ Calculate the BAA aggregated hourly IRU/IRD price MCC components using the shift factor of Imbalance Demand anode of the BAA | | |


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5.5 Business Process: Manage DAM – RUC


- MOO for RA in RUC, VER to the forecast
- Define notion $REN=EN+RCU-RCD$
- Build RUC-MPM, apply LMPM for RCU
- Apply mitigated RUC bids for 24 hours, un-mitigated bids for 48 hour RUC or 72 hour RUC
- Procure RCU/RCD through optimization
- Fixed EN, AS and IRU/IRD IFM awards
- Model MSG transition in RUC
- RUC-NA use REN as injection, no IRU/IRD deployment scenarios
- Calculate LMP for RCU/RCD

5.5.1 Business Requirements


| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|--|------------------|-----------------------------------|
| DAME-BRQ-05000 | <p>Consume RCU/RCD resource bids and MOO in RUC, insert/extend RCU bids for RA non-VER resources.</p> <ul style="list-style-type: none"> • Consume MF defined physical market resource eligibility for Reliability Capacity (RC): Separate flag for upper (RCU), down (RCD) • Consume MF defined Certified quantity (MW) for RCU and RCD • Consume MF defined BAA-Specific EDAM Participation Flag. • Accept resource RCU/RCD bids through SIBR. • For non-VERs, if an RA resource did not bid in for RCU product, SIBR shall insert DAB bids up to the lower of energy bid range and RCU Certified Capacity. • For non-VERs, if an RA resource bid in for RCU product lower than the lower of energy bid range and RCU Certified Capacity, SIBR shall extend that bid up to that latter limit at the submitted RCU bid price. • Note: For VERs, refer to DAME-BRQ-04031. <p>Notes</p> <ul style="list-style-type: none"> • RMR resources shall be treated as generating resources. | Core | SIBR (from MF) |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
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| DAME-BRQ-05001 | <p>Keep IFM Energy, AS, IRU/IRD Fixed in RUC</p> <p>Keep the resource day-ahead market IFM awards/self-schedules for energy (EN), Ancillary Services (AS), Imbalance Reserves (IRU, IRD) at fixed value in RUC.</p> | Core | RUC |
| DAME-BRQ-05002 | <p>Create Proxy RCU Bid for Exports with IFM LPT and/or Economic Energy Schedules with Not Enough RCU Clean Bid with No RCU Clean Bid or Not Enough RCU Clean Bid</p> <ul style="list-style-type: none"> • If exports cleared IFM with LPT and/or economic energy schedules and do not have RCU clean bids, in the RUC schedule run, System shall create proxy RCU bids for them that covers their cleared IFM energy schedules with a bid price higher than the RCU penalty prices while maintain the merit order of their highest energy bid price in the IFM (between DAB bid price and RUC PBC penalty in the scheduling run and at DAB bid price in the pricing run). The proxy RCU award due to proxy penalty bids will be fixed in pricing run. • If exports cleared IFM with LPT and/or economic energy schedules and have RCU clean bids that does not cover all energy bid range, (not <i>enough</i> RCU clean bids), in the RUC schedule run, System shall create proxy RCU bids for them (extending their RCU clean bids) to cover their cleared IFM energy schedules with a bid price higher than the RCU penalty prices while maintain the merit order of their highest energy bid price in the IFM (between DAB bid price and RUC PBC penalty in the scheduling run and at DAB bid price in the pricing run). The proxy RCU award due to proxy penalty bids will be fixed in pricing run. • System shall create a resource-specific hourly flag to indicate the creation of such proxy bids and their proxy RCU awards if market awarded them. • The proxy RUC bids shall not apply to PT export, and wheeling export. • System shall exclude Proxy RCU bids from setting RCUMP. <p>Notes</p> <ul style="list-style-type: none"> • The Proxy Awards can co-exist for same resource and hour with RCU Awards. • This bid insertion is a mechanism to indicate the cleared IFM LPT and/or economic schedules for these exports are subject to Curtailment in RTM, if they are awarded RCU awards in RUC. • Since these exports have their created RCU bids at the penalty prices, they will only be awarded RCU awards if there is no available physical supply capacity in the RUC above energy schedules to meet | Core | RUC |

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| | <p>both the demand forecast and the economic and LPT exports that cleared the IFM.</p> <ul style="list-style-type: none"> The SCs for these exports will be obligated to submit energy bids for the RCU capacity, similar to the MOO for RCU awards. These created proxy RCU bids and proxy RCU awards will not be paid at the relevant marginal RCUMP in Settlements, while the clean RCU bids and RCU awards will be paid the relevant marginal RCUMP in Settlements. Proxy RCU bids shall be excluded from final bid set. In the scheduling run for RUC, the proxy RCU price will be indexed in the price range of \$250/MWh-\$300/MWh based on the energy bid for the same resource capacity portion to maintain the same merit order when proxy RCU is awarded (DAECON first followed by DALPT). In the pricing run for RUC, the proxy RCU awards will be fixed and the price discovery feature will be used to produce a \$250/MWh price (excluding marginal losses and congestion). Where \$250/MWh is RCU Bid Price Cap. | | |
| DAME-BRQ-05005 | <p>Adjust VER RCU/RCD Bid Down If Forecast Output Less than Bid MW Value</p> <p>Adjust the clean RCU/RCD VER bid down as necessary if the forecast output is less than the max MW value of the bid.</p> | Core | RUC |
| DAME-BRQ-05010 | <p>Define the notion of Reliability Energy REN</p> <p>In the RUC,</p> <ul style="list-style-type: none"> Set the notion of REN as resource reliability energy schedules that RCU/RCD awards are related to the day-ahead energy schedules fixed EN $REN_{i,t} \equiv EN_{i,t} + RCU_{i,t} - RCD_{i,t}$ <p>Note</p> <ul style="list-style-type: none"> REN is another alternative terminology of RUC Schedule. | Information-Only | RUC |
| DAME-BRQ-05020 | <p>Build RUC-MPM pass, perform market power mitigation for RCU</p> <ul style="list-style-type: none"> Build Activation switch for turn on/off of RUC-MPM If RUC-MPM is off, skip RUC-MPM pass <p>Note:</p> | Core | RUC -MPM |

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| | <p>With RUC-MPM is on:</p> <ul style="list-style-type: none"> Add market power mitigation pass in RUC (DAME-BRQ-05021, DAME-BRQ-05025) Run RUC optimization with SIBR submitted bids in RUC-MPM path. | | |
| DAME-BRQ-05021 | <p>Build RUC-DCPA, Use same process as IFM MPM for energy, except use REN in place of energy EN, in the counter-flow calculation to identify the non-competitive binding constraints use</p> $REN_{i,t} \equiv EN_{i,t} + RCU_{i,t} - RCD_{i,t}$ <p>Notes</p> <ul style="list-style-type: none"> REN is another alternative terminology of RUC Schedule. | Core | RUC -MPM |
| DAME-BRQ-05025 | <p>Build RUC-LMPM:</p> <ul style="list-style-type: none"> The shadow price of REN PBC of each BAA is used in price formation/decomposition in LMP for RCU. Calculate competitive LMP for RCU that excludes non-competitive path congestion prices, in the same manner as IFM-MPM for energy (no change to reference point for calculate LMP) Mitigation: If the non-competitive constraint congestion component of a RCU supply bid is greater than Mitigation Threshold Price (default value 0.02), the resource RCU bid will be mitigated to greater of (RCU competitive LMP and RCU DAB) if it is lower than the unmitigated bid. RCD bids shall not be mitigated. RCU Bids submitted on behalf of imports from outside the EDAM Area shall not be mitigated. <p>Notes</p> <ul style="list-style-type: none"> REN is another alternative terminology of RUC Schedule. | Core | RUC-MPM |

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| DAME-BRQ-05030 | <p>Apply mitigated RCU bids for trading day hours only</p> <ul style="list-style-type: none"> • Use mitigated bids for RCU in RUC optimization for Trading day hours (24 hours) • Use un-mitigated bids for other hours in RUC (RUC 48 hours run or RUC 72 hours run). • ↓ | Core | RUC |
| DAME-BRQ-05050 | <p>Procure RCU/RCD through optimization in RUC</p> <p>Objective function:</p> <ul style="list-style-type: none"> • Include resource RCU and RCD bid cost in OBJ function of RUC, and corresponding start-up cost and minimum load cost. • No de-commitment: Resources that are committed in IFM are modeled as must run in RUC, kept online, no de-commitment. The resource dispatch level in RUC is determined by REN optimization. • RCU and RCD are zero when the resource is offline, except for RCU that can be provided by offline resources that can start within 60min ($SUT \leq 60min$), which the optimization will determine the resource commitment based on the min load cost, start-up cost and energy bid. • For the MSG committed in IFM, model MSG transition cost • RUC shall not issue infeasible MSG transition due to RC Awards from an IFM MSG configuration. • System Resources (SRs) and Non-Generator Resources (NGRs) have no discontinuities or inter-temporal constraints and are always modeled as online. <p>Notes</p> <ul style="list-style-type: none"> • Refer to <i>Error! Reference source not found.</i> in <i>Error! Reference source not found.</i> • Fixed IFM schedules for EN, AS, IRU/IRD are not be optimized in RUC. • REN is another alternative terminology of RUC Schedule. • RC Awards can be either RCU or RCD but not both for a given resource and hour. • For a trading hour: | Core | RUC |

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| | <ul style="list-style-type: none"> ○ If CAISO forecast of BAA Demand > IFM Cleared Physical Supply, then RCU Target = Mismatch quantity and RCD Target = 0. ○ Else If CAISO forecast of BAA Demand < IFM Cleared Physical Supply, then RCU Target = 0 and RCD Target = Mismatch quantity. ○ Else If CAISO forecast of BAA Demand = IFM Cleared Physical Supply, then RCU Target = 0 and RCD Target = 0. | | |
| DAME-BRQ-05060 | <p>Allow MSG transition in RUC</p> <ul style="list-style-type: none"> • Keep online for the MSG is committed in IFM • Allow all feasible transitions modeled. The resource dispatch level and stage are determined by REN, can be at different stage, different MW from IFM • RUC shall not issue infeasible MSG transition due to RC Awards from an IFM MSG configuration. <p>Note: MSG may be transitioned to a lower configuration but not shut down in RUC. Lower configuration MLC shall be set to 0 for both CISO and EDAM BAAs in the objective function.</p> <p>The compromise with Ops was that RUC will not shut down any resource, including MSG, if scheduled by IFM. Regular resources can be assigned RCD down to Pmin, and MSGs down to the Pmin of lowest configuration. The rationale is that the operator may still ED a resource up if it is online, but not if it is shut down. In any case, the IFM schedule is the DA schedule (and that is why RUC does not shut down); The difference between the RUC schedule and the IFM schedule is RCU or RCD.</p> <p>Note</p> <ul style="list-style-type: none"> • REN is another alternative terminology of RUC Schedule. | Core | RUC |
| DAME-BRQ-05070 | <p>Procurement REN balance constraints in RUC</p> <ul style="list-style-type: none"> • Reliability energy (REN) Power Balance Constraint (PBC) is for the REN to balance the demand forecast (D) include losses. $\sum_i REN_{i,t} = D_t,$ | Core | RUC |

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| | $t = 1, 2, \dots, T.$ <ul style="list-style-type: none"> Ancillary Service awards are fixed in RUC at IFM solution IRU/IRD awards are fixed in RUC at IFM solution <p>Note</p> <ul style="list-style-type: none"> REN is another alternative terminology of RUC Schedule. | | |
| DAME-BRQ-05080 | <p>RCU/RCD Capacity upper/lower bound constraints in RUC</p> <ul style="list-style-type: none"> The RCU/RCD upper/lower bound constraints by certified the RCU/RCD capacities An energy bid is required for reliability energy schedules and RCU/RCD awards | Core | RUC |
| DAME-BRQ-05090 | <p>Resource Capacity constraint for RCU/RCD in RUC</p> <ul style="list-style-type: none"> For online physical resource, the REN is limited by capacity between the physical resource UCL minus upward AS and IRU awards, and LCL plus the downward AS and IRD For online physical resource, the REN is limited by economic limit between the adjusted LEL + IRD and adjusted UEL-IRU For offline physical resource the upward capacity awards NR + IRU +RCU is limited by capacity UCL, RCU+IRU is limited by economic limit adjusted UEL <p>For VER,</p> <ul style="list-style-type: none"> the capacity and economic limit are limited by the VER forecast <p>Notes</p> <ul style="list-style-type: none"> Adjusted LEL = max(LCL, LEL) ensure the resource must bid IFM Adjusted UEL=min(UCL,UEL) REN is another alternative terminology of RUC Schedule. | Core | RUC |
| DAME-BRQ-05100 | <p>Ramp capability constraints for REN in RUC</p> <ul style="list-style-type: none"> Include REN, AS and IRU/IRD in resource ramp capability constraint The ramp capability constraint for offline start up at beginning of the hour to support REN and upward AS, IRU | Core | RUC |

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| | <ul style="list-style-type: none"> The ramp capability constraint for the resource shut down at the end of hour to support REN, IRD and downward AS Use same granularity adjustment factors as in IFM <p>Note</p> <ul style="list-style-type: none"> REN is another alternative terminology of RUC Schedule. | | |
| DAME-BRQ-05110 | <p>RUC-NA use REN as injection, no IRU/IRD deployment scenarios:</p> <ul style="list-style-type: none"> Use REN as nodal injection in RUC-NA. Not include IRU/IRD deployment scenarios in RUC-NA power flow. The demand forecast is distributed to the load nodes using LDF <p>Notes</p> <ul style="list-style-type: none"> Treat IRU/IRD the similar manner as AS. Not include in power flow and transmission constraints, but include in the resource capacity constraint. REN is another alternative terminology of RUC Schedule. | Core | RUC |
| DAME-BRQ-05120 | <p>Network constraints in RUC using same network topology and transmission limits as IFM</p> <ul style="list-style-type: none"> Enforce critical transmission constraints from NA power flow by REN injection for <ul style="list-style-type: none"> base case, using same topology in IFM base case (shift factor set $SF_{i,m,t}$) base case with contingencies of N-1 transmission using same topology in IFM base case with contingencies (shift factor set $SF_{i,m,t}^{(k)}$) base case with contingencies of GCARM generation/transmission using same topology in IFM base case with contingencies of GCARM (shift factor set $SF_{i,m,t}^{(g)}$) Use the same transmission limits as used in IFM <p>Notes</p> <ul style="list-style-type: none"> The shift factors in the RUC base case are the same as the ones in the IFM base case because the transmission network is the | Core | RUC |

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| | same; however, the set of critical constraints is different in general. <ul style="list-style-type: none"> REN is another alternative terminology of RUC Schedule. | | |
| DAME-BRQ-05130 | Scheduling Limit constraints in RUC <ul style="list-style-type: none"> Include RCU from import resources and RCD from export resources in ITC/ISL upper limit (import) constraints for energy plus upward AS and IRU/IRD Include RCU from import resources and RCD from export resources in ITC/ISL upper limit constraints for upward AS and IRU/IRD without energy Include RCU from export resources and RCD from import resources in ITC/ISL lower limit (export) constraints for energy plus downward AS plus IRD/IRU Include RCU from export resources and RCD from import resources in ITC/ISL lower limit constraints for downward AS and IRD/IRU without energy <p>Note</p> <ul style="list-style-type: none"> The ITC/ISL constraints allow netting of import and export energy schedules, but they prevent netting among energy schedules and ancillary services or RCU/RCD/IRU/IRD awards. | Core | RUC |
| DAME-BRQ-05140 | Energy limit, Gas-burn, pump and other constraints in RUC <ul style="list-style-type: none"> <i>Gas-Burn Nomogram:</i> Add RCU/RCD, in addition to En+IRU, in the Gas-Burn nomograms <i>Daily Energy limit:</i> include En, RCU and IRU in the Daily Energy limit constraint Pump-storage Hydro (PSH): En+ IRU+RCU, in the PSH upper limit constraint; En-IRD-RCD, in the PSH lower limit constraint; | Core | RUC |
| DAME-BRQ-05144 | Model State of Charge (SOC) constraints envelop and limits of LESR: <p>Use RCU/RCD for energy charge/discharge SOC balance constraint, SOC limit constraint, attenuation factors and coverage factor apply to the AS and IR capacity awards (same as DAME-BRQ-04331, DAME-BRQ-04332)</p> <p>Envelop constraint include RCU/RCD</p> | Core | RUC |




| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
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| | <ul style="list-style-type: none"> $SOC_{i,t}^{(u)} = SOC_{i,t-1}^{(u)} - EN_{i,t}^{(u)} - \eta_i EN_{i,t}^{(r)} + \eta_i AIRD_{i,t} IRD_{i,t} + \eta_i ARCD_{i,t} RCD_{i,t} \leq SOC_{i,t}$ $SOC_{i,t}^{(l)} = SOC_{i,t-1}^{(l)} - EN_{i,t}^{(l)} - \eta_i EN_{i,t}^{(r)} - AIRU_{i,t} IRU_{i,t} - ARCU_{i,t} RCU_{i,t} \geq SOC_{i,t}$ <p>SOC limit include RCU/RCD:</p> $SOC_{i,t} - RU_{i,t} - SR_{i,t} - NR_{i,t} - IRU_{i,t} - RCU_{i,t} \geq \underline{SOC}_{i,t}$ $SOC_{i,t} + \eta_i (RD_{i,t} + IRD_{i,t} + RCD_{i,t}) \leq \overline{SOC}_{i,t}$ | | |
| DAME-BRQ-05160 | <p>Calculate hourly nodal RCU marginal price (RCUMP) and price breakdowns and sub-components of marginal congestion MCC prices in RUC for nodal and resource</p> <ul style="list-style-type: none"> Shadow price of RENRCU balance constraint / Loss Penalty Factor (LPF) of res/node (minus) MCC components of RENRCU, using shift factor $SF_{i,m,t}$ (minus) MCC components of RENRCU with N-1 preventive transmission contingency using shift factor $SF_{i,m,t}^{(k)}$ (minus) MCC components of RENRCU with GCARM generation/ transmission contingency using adjusted shift factor $SF_{i,m,t}^{(g)}$ <p>Notes</p> <ul style="list-style-type: none"> For RCUMP and RCDMP, the sign is opposite for each component of price formation, represent the RCU RCD opposite direction impact on price. Loss factor in area control feature need apply REN is another alternative terminology of RUC Schedule. | Core | RUC |
| DAME-BRQ-05170 | <p>Calculate hourly nodal RCD marginal price (RCDMP) and breakdowns and sub- components of marginal congestion MCC prices in RUC for node and resource</p> <ul style="list-style-type: none"> (minus) Shadow price of RENRCD balance constraint / Loss Penalty Factor (LPF) of res/node (plus) MCC components of RENRCD, using shift factor $SF_{i,m,t}$ (plus) MCC components of RENRCD with N-1 preventive transmission contingency using shift factor $SF_{i,m,t}^{(k)}$ | Core | RUC |



| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
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| | <ul style="list-style-type: none"> (plus) MCC components of REN REN RCD with GCARM generation/transmission contingency using adjusted shift factor $SF_{i,m,t}^{r(g)}$ <p>Notes</p> <ul style="list-style-type: none"> REN is another alternative terminology of RUC Schedule. | | |
| DAME-BRQ-05180 | <p>Calculate hourlyHourly SP-tieTie RCU marginal priceMarginal Price (RCUMP) in DAM for nodal and resourceNodal by Import/Export Direction (Import/Export)</p> <p><u>For import direction:</u></p> <ul style="list-style-type: none"> SP nodal price of RCU <u>(plus) the shadow prices of import directions of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-Tie location of RCU</u> <p><u>For export direction:</u></p> <ul style="list-style-type: none"> SP nodal prices of RCU <u>(minus) the shadow prices of export directions of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-Tie Location of RCU.</u> | Core | RUC |
| <u>DAME-BRQ-05181</u> | <p><u>Calculate Hourly SP-Tie RCU Marginal Price (RCUMP) in DAM for Resource</u></p> <ul style="list-style-type: none"> <u>SP nodal price of RCU</u> <u>(plus) the shadow prices of import directions of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-Tie Location of RCU for import resources and tie-gen (TG)</u> <u>(minus) the shadow prices of export directions of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-Tie location of RCU for export resources.</u> | <u>Core</u> | <u>RUC</u> |
| DAME-BRQ-05182 | <p>Calculate hourlyHourly SP-tieTie RCD marginal priceMarginal Price (RCDMP) in DAM for nodal and resourceNodal by Direction (Import/Export)</p> <p><u>For Import direction:</u></p> | Core | RUC |

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| | <ul style="list-style-type: none"> • SP nodal price RCD • <u>(minus) the shadow prices of export directions of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-Tie location of RCD</u> For Export direction • <u>SP nodal prices of RCD</u> • <u>(plus) the shadow prices of import directions of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-Tie Location of RCD.</u> | | |
| <u>DAME-BRQ-05183</u> | <p><u>Calculate Hourly SP-Tie RCD Marginal Price (RCDMP) in DAM for Resource</u></p> <ul style="list-style-type: none"> • <u>SP nodal price RCD</u> • <u>(minus) the shadow prices of export directions of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-Tie location of RCD for import resources and tie gen (TG)</u> • <u>(plus) the shadow prices of import directions of all binding Intertie Scheduling Limits (ISLs) and Inter-Tie Constraints (ITCs) associated with that SP-Tie Location of RCD for export resources.</u> | <u>Core</u> | <u>RUC</u> |

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5.6 Business Process: Manage RTM


- MOO for Resource have DAM IRU/IRD, RCU/RCD awards
- MOO for RA resource that no DAM EN/AS/IR/RC awards
- Use IFM schedule for MSG reference stage to calculate min load
- Set UEL to 0 if IRU and/or RCU eTagging Validation Fails for System Resources
- Identify the critical constraints for FRU/FRD deployment scenarios
- Add configurable parameters coverage factor for AS and FRP capacity awards to storage resource opposite dispatch energy bids in RTM

5.6.1 Business Requirements


| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|--|------------------|-----------------------------------|
| DAME-BRQ-06010 | <p>Enforce must offer obligation in RTM for the resources with IRU/IRD, RCU/RCD DAM awards:</p> <ul style="list-style-type: none"> • Resources that are awarded reliability capacity (RCU/RCD), or imbalance reserve awards (IRU/IRD) in the day-ahead market will have real-time market bidding obligations. • Resources must bid economically energy bid the full range of their reliability capacity and imbalance reserve awards in the real-time market. • Real-time must offer obligations apply in the hours that a resource has a reliability capacity or imbalance reserve award. • The resources that do not submit the bids will have economic energy bids inserted for them at their Default Energy Bid (DEB) for the full range of RC and IR awards. • Resources receiving a RCU Award for which their SC has submitted a DA Energy Bid to export outside the EDAM Area must provide a decremental RT Energy Bid to dispatch down the export schedule in the FMM if needed. | Core | SIBR <i>For RTM</i> |
| DAME-BRQ-06020 | <p>Maintain the CAISO BAA resource adequacy real-time must-offer obligation</p> <p>System shall maintain the CAISO BAA RA RT MOO.</p> | Core | SIBR <i>For RTM</i> |
| DAME-BRQ-06060 | <p>Use IFM schedule for MSG reference stage to calculate MLC</p> | Core | RTM |



| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
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| | <p>In RTM, use IFM schedule as MSG reference stage to calculate MLC.</p> <p>Note: The difference between the RUC schedule and the IFM schedule is RCU or RCD, RUC stage will not be used as reference stage for MSG.</p> | | |
| DAME-BRQ-06070 | <p>Identify the critical constraints for FRU/FRD deployment scenarios</p> <p>Determine the critical set in the deployment scenarios superimposing the linear FR flows from UC</p> <p>Note</p> <ul style="list-style-type: none"> Refer to DAME-BRQ-04232 for DAM. | Core | RTM |
| <u>DAME-BRQ-06100</u> | <p><u>Calculate and broadcast SP-Tie FRU/FRD Marginal Price (FRUMP/FRDMP) in RTM for Nodal by Direction (Import/Export)</u></p> <p><u>For import direction FRU</u></p> <ul style="list-style-type: none"> <u>SP nodal price of FRU</u> <u>(plus) the shadow prices of import directions for Inter-Tie Scheduling Limits (ISLs) or Inter-Tie Constraint (ITCs) associated with that SP-Tie location of FRU</u> <p><u>For export direction FRU</u></p> <ul style="list-style-type: none"> <u>SP nodal price of FRU</u> <u>(minus) the shadow prices of export directions for Inter-Tie Scheduling Limits (ISLs) or Inter-Tie Constraint (ITCs) associated with that SP-Tie location of FRU</u> <p><u>For import direction FRD</u></p> <ul style="list-style-type: none"> <u>SP nodal price of FRD</u> <u>(minus) the shadow prices of export directions for Inter-Tie Scheduling Limits (ISLs) or Inter-Tie Constraint (ITCs) associated with that SP-Tie location of FRD</u> <p><u>For export direction FRD</u></p> | <u>Core</u> | <u>RTM</u> |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
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| | <ul style="list-style-type: none"> • <u>SP nodal price of FRD</u> • <u>(plus) the shadow prices of import directions for Inter-Tie Scheduling Limits (ISLs) or Inter-Tie Constraint (ITCs) associated with that SP-Tie location of FRU.</u> | | |
| <u>DAME-BRQ-06120</u> | <p><u>Include ITC/ISL Shadow Prices from SP-Tie FRU/FRD Marginal Price (FRUMP/FRDMP) in RTM for Resource</u></p> <ul style="list-style-type: none"> • <u>SP nodal price of FRU</u> | <u>Existing</u> | <u>RTM</u> |


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5.7 Business Process: Manage Market Quality System


- Calculate 15-min IRU/IRD and RCU/RCD Overlapping RA Capacity
- Calculate 15-min IRU/IRD LOC for Overlapping RA Capacity
- Calculate DA/Base Schedule Forecasted Movement Data
- Resource IRU/IRD Award 5-min Ramp Capable Portion Calculation
- FMM Ex-Post Capacity Calculation
- FMM Ex-Post IR/RC Capacity Allocations
- Update Commitment Cost Determination Logic to Account for RC
- Use IFM MSG Configuration as Reference for RT MLC Calculations
- Account for IRU/IRD in CRR1B Logic

5.7.1 Business Requirements


| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|--|------------------|---|
| DAME-BRQ-07265 | <p>Calculate 15-min IRU/IRD and RCU/RCD Overlapping RA Capacity On daily basis, and after all RTM markets run for a trade day, and after everytime corrections occurred on any of the data used in the calculations, System shall have the capability to calculate 15-min resource-specific IRU/IRD and RCU/RCD Overlapping RA Capacity, as sliced by final DA energy bid segments and as total, using latest available data for RA-resources only:</p> <ul style="list-style-type: none"> • 15-min IRU/IRD and RCU/RCD Overlapping RA Capacity are calculated as the overlapped capacity between RA Capacity and corresponding IRU/IRD and RCU/RCD awards, as sliced by final DA energy bid segments and as a total, accounting for any Pmax derates and/or Pmin re-rates that occur in FMM, where <ul style="list-style-type: none"> ○ RA Capacity is the most restrictive between monthly RA showingShowing and Daily RA Capacity. ○ Monthly RA showingShowing is from fetched fromcalculated as the <u>higher of</u> monthly showing <u>plan</u>RA Generic Showing Capacity and <u>monthly RA Flex Showing Capacity for that RA resource, where:</u> | Core | <ul style="list-style-type: none"> • Internal ISO System |

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| | <ul style="list-style-type: none"> ▪ <u>Monthly RA Generic Showing Capacity for each RA resource is calculated as the Summation of all RA Generic Showing Capacity across all LSEs that are associated with that RA resource.</u> ▪ <u>Monthly RA Flex Showing Capacity for each RA resource is calculated as the Summation of all RA Flex Showing Capacity across all Flex categories and across all LSEs that are associated with that RA resource.</u> ▪ Note: Monthly RA Showing does not account for the RA substitution. <ul style="list-style-type: none"> ○ Daily RA capacity accounts for RA resources substitution and accounts for both Generic RA capacity and Flex RA Capacity. <p>Notes</p> <ul style="list-style-type: none"> • No substitutions will be accounted for in the monthly RA showing and mapping data. • Substitution will be included in the daily RA capacity and identification data. | | |
| DAME- BRQ-07270 | <p>Calculate 15-min IRU/IRD LOC for Overlapping RA Capacity</p> <p>On daily basis, and after all RTM markets run for a trade day, and after everytime corrections occurred on any of the data used in LOC calculations, System shall have the capability to calculate 15-min resource-specific IRU/IRD Lost Opportunity Cost (LOC) for each IRU/IRD Overlapping RA Capacity, sliced by final DA energy bid segments, using latest available data for RA-resources only, include internal RA resources and intertie RA resources:</p> <ul style="list-style-type: none"> • 15-min IRU/IRD LOC is calculated as difference between DA Energy LMP and final DA energy bid for the amount of 15-min resource IRU/IRD Overlapping RA capacity, and converted into 15-min granularity, where: • Mathematically: <ul style="list-style-type: none"> ○ 15-min IRx LOC = $(\frac{1}{4}) * \text{Sum over all corresponding DA energy bid segment } i \text{ of } (15\text{-min resource IRx Overlapping RA Capacity, sliced by final DA energy bid segment } i) * (\text{hourly DA Energy LMP} - \text{hourly DA Final Energy Bid Price for bid segment } i)$ ○ Where, x is { U , D} <p>Notes</p> <ul style="list-style-type: none"> • No substitutions will be accounted for in the monthly RA showing and mapping data. | Core | <ul style="list-style-type: none"> • Internal ISO System |

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| | <ul style="list-style-type: none"> Substitution will be included in the daily RA capacity and identification data. | | |
| DAME- BRQ-07320 | <p>Calculate DA/Base Schedule Forecasted Movement Data</p> <p>Using similar calculation calendar as FMM and RTD Forecasted Movement, and for every trade hour (h) of each trade day, System shall calculate resource-specific hourly DA/Base Schedule Forecasted Movement as:</p> <ul style="list-style-type: none"> For CAISO and EDAM BAA resources (including virtual supply and demand resources): <ul style="list-style-type: none"> DA Schedule Forecasted Movement (h) = $DAES_{DAM,h} - DAES_{DAM,h-1}$ For WEIM-only BAA-only (non-EDAM) resources: <ul style="list-style-type: none"> Base Schedule Forecasted Movement (h) = $BS_h - BS_{h-1}$ <p>Notes</p> <ul style="list-style-type: none"> For Virtual Awards, the Forecasted Movement is the algebraic difference of the Virtual Award between consecutive hours. For the calculation of the DA/Base Schedule Forecasted Movement for first hour of the day, results from the previous day last hour will be used. Movement shall be calculated for all hours when there is a non-zero DAES/Base Schedule for at least one hour in the day, or there is a non-zero DAES/Base Schedule in the last hour of the previous day. This FM calculation shall run in the same run as existing FMM/RTD Forecasted Movement calculation run. | Core | <ul style="list-style-type: none"> Internal ISO System |
| DAME- BRQ-07600 | <p>Resource IRU/IRD Award 5-min Ramp Capable Portion Calculation</p> <p>System shall automatically calculate IRU/IRD award 5-min ramp capable portion ($IRU5_{DAM}, IRD5_{DAM}$) on resource-specific hourly basis for hour h as follows:</p> <ul style="list-style-type: none"> Determine DAM upward and downward ramp rate segments (RRU_{DAM} and RRD_{DAM} in MW/min, respectively) that corresponds to $DAES_{DAM}$. $IRU5_{DAM} = \min (IRU_{DAM}, \max\{0, ([RRU_{DAM} * 5'] - \max [0, (DASFM/12)]))\}$ $IRD5_{DAM} = \min (IRD_{DAM}, \max\{0, ([RRD_{DAM} * 5'] + \min [0, (DASFM/12)]))\}$ | Core | <ul style="list-style-type: none"> Internal ISO System |

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| | <ul style="list-style-type: none"> Where DASFM is Day Ahead Schedule Forecasted Movement @h ($DAES_h - DAES_{h-1}$) | | |
| DAME-BRQ-07610 | FMM Ex-Post Capacity Calculation System shall automatically calculate FMM Ex-Post Capacities ($MinExCap_{FMM}$, $MaxExCap_{FMM}$) on resource-specific 15-minute basis by utilizing FMM bid data and data that are available in FMM run, and using similar formulation as the ones used for the calculation of RTD Ex-Post Capacities ($MinExCap$, $MaxExCap$). | Core | <ul style="list-style-type: none"> Internal ISO System |
| DAME-BRQ-07615 | FMM Ex-Post IR/RC Capacity Allocations System shall automatically calculate FMM Ex-Post IRU/IRD and RCU/RCD capacity allocations on resource-specific 15-minute basis: $IRUC_{FMM}$ Imbalance Reserve Up allocated capacity range (FMM). $IRDC_{FMM}$ Imbalance Reserve Down allocated capacity range (FMM). $RCUC_{FMM}$ Reliability Capacity Up allocated capacity range (FMM). $RCDC_{FMM}$ Reliability Capacity Down allocated capacity range (FMM). | Core | <ul style="list-style-type: none"> Internal ISO System |
| DAME-BRQ-07620 | Update Commitment Cost Determination Logic to Account for RC <ul style="list-style-type: none"> System shall be updated to use RCU Awards instead of RUC Awards in commitment cost determination logic, starting from Go-Live date going forward. System shall account for RCD Awards in commitment cost determination logic, as applicable to commitment to downward MSG commitments in RUC due to RCD Awards. | Core | <ul style="list-style-type: none"> Internal ISO System |
| DAME-BRQ-07630 | Use IFM MSG Configuration as Reference for RT MLC Calculations System shall use IFM MSG configuration as reference for RT MLC calculations. | Core | <ul style="list-style-type: none"> Internal ISO System |
| DAME-BRQ-07860 | Account for IRU/IRD in CRR1B Logic System shall update CRR1B logic to account for IRU/IRD, by utilizing Shift Factors for IRU/IRD, IRU/IRD Deployment Factor (DIRU/DIRD), and IRU/IRD Resource Awards, for all upward/downward deployment scenarios, as follows: <ul style="list-style-type: none"> Calculate Hourly IRU/IRD flow by constraint and constraint case, considering IRU/IRD deployment factors. Update calculations of hourly Constraint Flow Difference (Market flow vs CRR flow) to account for IRU/IRD. Update calculations of hourly portion of CRR-settled flow by constraint and constraint case. | Core | <ul style="list-style-type: none"> Internal ISO System |

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| | <ul style="list-style-type: none"> Calculations shall include IRU/IRD deployment scenarios constraints, IRUR/IRDR and IRUS/IRDS and their Associated Imbalance Demand Hub/IR Surplus Zone Apnode for each BAA. | | |
| DAME- BRQ-07875 | <p>Include Virtual Bids impact on IRU/IRD deployment scenario binding constraints in CRR clawback for ISO BAA</p> <p>For the day-ahead constraint-entity-specific CRR revenues for ISO BAA:</p> <ul style="list-style-type: none"> Consume IFM binding constraint information by deployment scenarios Calculate the impact from all virtual bids and implicit virtuals at CAISO BA ties for the flow impact on each constraint in CAISO, include IRU/IRD deployment constraint <ul style="list-style-type: none"> Shift factors to be used for deployment scenarios are the same as the shift factors for the base scenarios for the same constraint Expand the comparison of the magnitude of the flow impact between IFM and FMM CRR congestion impacted the constraint to cover deployment scenarios <ul style="list-style-type: none"> Base/IRU/IRD deployment scenarios in IFM shall be compared with base scenario in FMM for the same constraint If the difference is more than the 10% flow impact threshold, clawback the corresponding CRR revenue Expand reporting the CRR payment adjustment by deployment scenarios. Note: moved from EDAM-BRQ-06012 | Core | <ul style="list-style-type: none"> Internal ISO System |

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5.8 Business Process: Manage Market Billing and Settlements


- IFM IR & RUC RC Payments
- IFM IR & RUC Cost Allocation
- IR DA & RC RT BCR Settlements
- Inclusion of IR & RC in GMC Settlements
- Update GMC Charge Codes
- IRU/IRD & RCU/RCD Unavailability No-Pay Charges
- IR and RC Unavailability No-Pay Charges Priority
- Do not assess RAAIM to IR and RC awards for generic and Flex RA
- IR – FRP RTM Ramp Deviation Settlements
- FMM Forecasted Movement Deviation Settlements
- Accounting for Virtuals in Allocation of Residual Forecasted Movement Settlements
- Settlements of Overlapping RA Capacity for True-Up Settlements Mechanism
- Apply CRR 1B Methodology for CAISO BAA
- Calculate BAA IRU/IRD and Energy Congestion Revenues
- Distribute BAA IRU/IRD Congestion Revenues for CAISO and EDAM BAAs
- Apply HASP Reversal to CAISO BAA IFM Intertie Schedule

5.8.1 Business Requirements


| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
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| DAME -BRQ- 09140 | IFM IR & RUC RC Payments System shall be updated for the following: <ul style="list-style-type: none"> • All eligible resources (including MSS resources) that have been awarded hourly IFM IRU/IRD shall be paid hourly IFM IRUMP/IRDMP prices, respectively. • All eligible resources (including CAISO RA resources and MSS resources) that have been awarded hourly RUC RCU (but excluding resources with proxy RCU awards) shall be paid hourly RUC RCUMP prices, respectively. • All eligible resources (including CAISO RA resources and MSS resources) that have been awarded hourly RUC RCD shall be paid hourly RUC RCDMP prices, respectively | Core | <ul style="list-style-type: none"> • Settlements |




| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted | | | | | | | | | | | | | | | |
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| | <p>Notes</p> <ul style="list-style-type: none"> This shall apply to MSS resources that have been awarded IR, regardless of the MSS operator's selection of Net or Gross settlement. | | | | | | | | | | | | | | | | | |
| DAME-BRQ-09160 | <p>IFM IR Cost Allocation</p> <ul style="list-style-type: none"> System shall be updated to allocate IFM IRx costs in two Tiers, where x = U, D. Tier-1 IRx Cost Allocation, for each individual component, and on hourly basis: <ul style="list-style-type: none"> Tier-1 IFM IRx Allocation Cost = Tier-1 IRx Allocation Quantity * Tier-1 IRx BAA Allocation Price. Tier-1 IRx Allocation Quantity shall be calculated as follows: <table border="1" data-bbox="264 1119 1149 1789"> <thead> <tr> <th data-bbox="264 1119 431 1213">Component Type</th> <th data-bbox="431 1119 776 1213">Tier-1 IRU Allocation Quantity</th> <th data-bbox="776 1119 1149 1213">Tier-1 IRD Allocation Quantity</th> </tr> </thead> <tbody> <tr> <td data-bbox="264 1213 431 1455">Generation (including ESR)</td> <td data-bbox="431 1213 776 1455"> $\max(0, [DAES_{DAM} - MaxExCap_{FMM}])$ as affected by de-rates and reduction in VER forecast between DAM and RTM (if applicable) </td> <td data-bbox="776 1213 1149 1455"> $\max(0, [MaxExCap_{FMM} - DAES_{DAM}])$ as affected by rerates or self-schedules (if applicable) </td> </tr> <tr> <td data-bbox="264 1455 431 1633">Import</td> <td data-bbox="431 1455 776 1633"> $\max(0, [DAES_{DAM} - MaxExCap_{FMM}])$ as affected by e-Tag transmission profile </td> <td data-bbox="776 1455 1149 1633"> $\max(0, [SS_{FMM} - DAES_{DAM}])$ </td> </tr> <tr> <td data-bbox="264 1633 431 1696">Load</td> <td data-bbox="431 1633 776 1696">ABS (Negative UIE)</td> <td data-bbox="776 1633 1149 1696">Positive UIE</td> </tr> <tr> <td data-bbox="264 1696 431 1789">Export</td> <td data-bbox="431 1696 776 1789"> $\max(0, [SS_{FMM} - DAES_{DAM}])$ </td> <td data-bbox="776 1696 1149 1789"> $\max(0, [DAES_{DAM} - eTag \text{ transmission profile}])$ </td> </tr> </tbody> </table> | Component Type | Tier-1 IRU Allocation Quantity | Tier-1 IRD Allocation Quantity | Generation (including ESR) | $\max(0, [DAES_{DAM} - MaxExCap_{FMM}])$ as affected by de-rates and reduction in VER forecast between DAM and RTM (if applicable) | $\max(0, [MaxExCap_{FMM} - DAES_{DAM}])$ as affected by rerates or self-schedules (if applicable) | Import | $\max(0, [DAES_{DAM} - MaxExCap_{FMM}])$ as affected by e-Tag transmission profile | $\max(0, [SS_{FMM} - DAES_{DAM}])$ | Load | ABS (Negative UIE) | Positive UIE | Export | $\max(0, [SS_{FMM} - DAES_{DAM}])$ | $\max(0, [DAES_{DAM} - eTag \text{ transmission profile}])$ | Core | <ul style="list-style-type: none"> Settlements |
| Component Type | Tier-1 IRU Allocation Quantity | Tier-1 IRD Allocation Quantity | | | | | | | | | | | | | | | | |
| Generation (including ESR) | $\max(0, [DAES_{DAM} - MaxExCap_{FMM}])$ as affected by de-rates and reduction in VER forecast between DAM and RTM (if applicable) | $\max(0, [MaxExCap_{FMM} - DAES_{DAM}])$ as affected by rerates or self-schedules (if applicable) | | | | | | | | | | | | | | | | |
| Import | $\max(0, [DAES_{DAM} - MaxExCap_{FMM}])$ as affected by e-Tag transmission profile | $\max(0, [SS_{FMM} - DAES_{DAM}])$ | | | | | | | | | | | | | | | | |
| Load | ABS (Negative UIE) | Positive UIE | | | | | | | | | | | | | | | | |
| Export | $\max(0, [SS_{FMM} - DAES_{DAM}])$ | $\max(0, [DAES_{DAM} - eTag \text{ transmission profile}])$ | | | | | | | | | | | | | | | | |

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| | MSS (on Load Following) | MSS operator's net portfolio uninstructed deviations. | MSS operator's net portfolio uninstructed deviations. | | |
| | MSS (NOT on Load Following, regardless of their Net versus Gross selection) | Same as non-MSS resources | Same as non-MSS resources | | |
| | <ul style="list-style-type: none"> ○ For each BAA, and on hourly basis, Tier-1 IRx BAA Allocation Price shall be calculated as follows: <ul style="list-style-type: none"> ▪ Min (IRx BAA Average Price, IRx BAA Derived Price) ▪ where <ul style="list-style-type: none"> • $IRx\ BAA\ Average\ Price = IRx\ BAA\ Allocation\ Cost / (IRxR\ minus\ sum\ of\ IRxS\ over\ all\ surplus\ zones\ within\ the\ BAA\ minus\ sum\ of\ IRx\ No\ Pay\ Quantity\ over\ all\ resources\ within\ the\ BAA)$ • $IRx\ BAA\ Derived\ Price = IRx\ BAA\ Allocation\ Cost / Sum\ of\ Tier-1\ IRx\ Allocation\ Quantity\ across\ BAA.$ • Where IRx BAA Allocation Cost = Max {0, [IRx BAA Requirement Cost + IRx BAA Surplus Adjustment]} + IRx BAA No Pay Revenue • $IRx\ BAA\ Requirement\ Cost = IRxR * IRxRMP$ • $IRx\ BAA\ Surplus\ Adjustment = sum\ of\ (IRxS * IRxSMP)$ over all IR Surplus zones in BAA | | | | |

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| | <ul style="list-style-type: none"> • IRx BAA No Pay Revenue = $-1 * \text{Sum over all resources within a BAA of (IRx No Pay Charge)}$ • IRxRMP = IRX BAA Requirement Price = IRxMP Associated Imbalance Demand Hub Apnode of the BAA • IRxSMP = IRX Surplus Marginal Price = IRxMP at Associated Apnode of the IR Surplus Zone • Tier-2 IRx Cost Allocation, for each BAA, and on hourly basis: <ul style="list-style-type: none"> ○ System shall calculate Tier-2 IRx BAA Allocation Cost as the remainder (left over) of unallocated IRx costs from Tier-1, as follows: <ul style="list-style-type: none"> ▪ Tier-2 IRx BAA Allocation Cost = IRx BAA Allocation Cost – Sum of Tier-1 IRx Cost Allocation across BAA ○ System shall allocate Tier-2 IRx BAA Allocation Cost proportional to Metered Demand within each BAA, except for: ○ If a BAA is Gen-only (does not have metered demand), Tier-2 IRx BAA Allocation Cost shall be directly allocated to the Entity of the BAA. • Treatment of MSS <ul style="list-style-type: none"> ○ If MSS operator has elected to load follow to manage its own load variability, it shall get IRx Tier-1 and IRx Tier-2 cost allocations based on the MSS operator's net portfolio uninstructed deviations. <ul style="list-style-type: none"> ▪ Note: Load Following is an MSS Annual Election. For the MSS that has elected to Load Follow, the generation and load resource shall be excluded from the Generation Bucket and Load Bucket, and instead be calculated as a separate bill determinant at the MSS portfolio level based upon Net Deviation of the portfolio (Net of Generation UIE and Load UIE). The Net UIE shall determine if that MSS Bubble receives an IRU or IRD allocation for any given interval. | | |

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| | <ul style="list-style-type: none"> ○ Otherwise, for both IRx Tier-1 and IRx Tier 2 cost allocations, MSS resources shall be settled in a similar manner as non-MSS resources, regardless of their Net versus Gross selection. ● Treatment of ETC, and TOR <ul style="list-style-type: none"> ○ System shall exclude the ETC and TOR self-schedules from IR Tier-1 and IR Tier-2 allocations up to the valid and balanced portion of ETC and TOR self-schedules. ○ In contrast, System shall consider quantities above the valid and balanced portion of the ETC or TOR self-schedules in IRx Tier-1 and IRx Tier-2 cost allocations. <p>Notes</p> <ul style="list-style-type: none"> ● This cost allocation does not apply to EIM BAAs. ● Tier-1 IRx Cost Allocation to Generation and Import/Export component types applies to all generation resources, regardless whether they are awarded IRx or not. ● ESRs (using either the NGR model or the proposed ESR mode) will be considered under the “Generation” component type of the Tier-1 IRx cost allocations. ● For each BAA, if the IRx obligation is higher than the IRx awards, all of the IRx cost will be allocated to IRx Tier-1, otherwise, IRx cost will be split between Tier-1 and Tier-2. | | | | | | | | |
| DAME-BRQ-09180 | <p>RUC RC Cost Allocation</p> <ul style="list-style-type: none"> ● System shall be updated to allocate RUC RCx costs in two Tiers, where x = U, D. ● Tier-1 RCx Cost Allocation, for each individual component, and on hourly basis: <ul style="list-style-type: none"> ○ Tier-1 RUC RCx Allocation Cost = Tier-1 RCx Allocation Quantity * Tier-1 RCx BAA Allocation Price. ○ Tier-1 RCx Allocation Quantity shall be calculated as follows: <table border="1" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th style="text-align: center;">Component Type</th> <th style="text-align: center;">Tier-1 RCU Allocation Quantity</th> <th style="text-align: center;">Tier-1 RCD Allocation Quantity</th> </tr> </thead> <tbody> <tr> <td style="height: 20px;"> </td> <td> </td> <td> </td> </tr> </tbody> </table> | Component Type | Tier-1 RCU Allocation Quantity | Tier-1 RCD Allocation Quantity | | | | Core | ● Settlements |
| Component Type | Tier-1 RCU Allocation Quantity | Tier-1 RCD Allocation Quantity | | | | | | | |
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| | Virtual Bids | max (0 , SC Net Virtual Supply Awards). Applies only if the BAA has total net virtual supply. | max (0 , SC Net Virtual Demand Awards). Applies only if the BAA has total net virtual demand. | | |
| | Load | ABS (Net Negative Metered Demand) i.e. Under-Scheduled Load See note below about Net Negative Metered Demand exclusions. | Net Positive Metered Demand i.e. Over-Scheduled Load See note below about Net Positive Metered Demand exclusions. | | |
| | <ul style="list-style-type: none"> ○ For each BAA, Tier-1 RCx BAA Allocation Price shall be calculated as follows: <ul style="list-style-type: none"> ▪ Min (RCx BAA Average Price , RCx BAA Derived Price) ▪ where <ul style="list-style-type: none"> • RCx BAA Average Price = RCx BAA Allocation Cost / Sum of (RCx Awards minus RCx No Pay Quantity) over all resources within the BAA. • RCx BAA Derived Price = RCx BAA Allocation Cost / Sum of Tier-1 RCx Allocation Quantity across BAA. • Where RCx BAA Allocation Cost = Sum of (RCx Payments minus RCx No Pay Charge) over all resources within the BAA • Tier-2 RCx Cost Allocation, for each BAA, and on hourly basis: <ul style="list-style-type: none"> ○ System shall calculate Tier-2 RCx BAA Allocation Cost as the remainder (left over) of unallocated RCx costs from Tier-1, as follows: <ul style="list-style-type: none"> ▪ Tier-2 RCx BAA Allocation Cost = RCx BAA Allocation Cost – Sum of Tier-1 RCx Cost Allocation across BAA | | | | |

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| | <ul style="list-style-type: none"> ○ System shall allocate Tier-2 RCx BAA Allocation Cost proportional to Metered Demand within each BAA. ○ If a BAA is Gen-only (does not have metered demand), Tier-2 RCx BAA Allocation Cost shall be directly allocated to the Entity of the BAA. ● Treatment of MSS <ul style="list-style-type: none"> ○ If MSS operator has elected to load follow to manage its own load variability, it shall NOT get RCx Tier-1 nor RCx Tier-2 cost allocations. <ul style="list-style-type: none"> ▪ Note: Because an MSS Operator that has elected to Load Follow is required to provide sufficient resources in DAM to follow its Load within the MSS Deviation Band, the MSS Bubble which has elected to Load Follow shall not receive a RCU/RCD allocation. ○ Otherwise, for both RCx Tier-1 and RCx Tier 2 cost allocations, MSS resources shall be settled in a similar manner as non-MSS resources, regardless of their Net versus Gross selection. ● Treatment of ETC, and TOR <ul style="list-style-type: none"> ○ System shall exclude the ETC and TOR self-schedules from RCx Tier-1 and RCx Tier-2 allocations up to the valid and balanced portion of ETC and TOR self-schedules. ○ In contrast, System shall consider quantities above the valid and balanced portion of the ETC or TOR self-schedules in RCx Tier-1 and RCx Tier-2 cost allocations. <p>Notes</p> <ul style="list-style-type: none"> ● This cost allocation does not apply to EIM BAAs. ● For Tier-1 RCU (RCD, respectively) cost allocations to Load component type, the net negative (positive) metered demand will exclude net negative (positive) demand associated with balanced ETC/TOR rights, negative (positive) deviation for Participating Load (PL) resulting from a market dispatch. ● For each BAA, If the RCx obligation is higher than the RCx awards, all of the RCx cost will be allocated to RCx Tier-1, otherwise, RCx cost will be split between Tier-1 and Tier-2, where x = U, D. | | |

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| DAME-BRQ-09200 | <p>IR DA BCR Settlements</p> <p>System shall be updated for the following:</p> <ul style="list-style-type: none"> • Revenue and bid costs for IRU/IRD awards (after netting No-Pay) shall be included in the calculation of DA BCR. • Mathematically, for each resource, for each hour: <ul style="list-style-type: none"> ○ IR Revenues = ([IFM IRU Awards – IRU No-Pay Quantity] * IFM IRUMP) + ([IFM IRD Awards – IRD No-Pay Quantity] * IFM IRDMP) ○ IR Bid Costs = ([IFM IRU Awards – IRU No-Pay Quantity] * IFM IRU Bid Price) + ([IFM IRD Awards – IRD No-Pay Quantity] * IFM IRD Bid Price) <p>Notes</p> <ul style="list-style-type: none"> • Resources committed in IFM, including resources that are scheduled for IRU/IRD, shall be eligible to get DA BCR. • Accounting Commitment Costs in DA BCR will remain intact as existing. | Core | • Settlements |
| DAME-BRQ-09220 | <p>RC RT BCR Settlements</p> <p>System shall be updated for the following:</p> <ul style="list-style-type: none"> • Revenue and bid costs for RCU awards (but excluding resources with proxy RCU awards) (after netting No-Pay and RCU/RCD Overlapping RA Capacity, regardless of their LSE-RA Resource Pair True-Up Flags) shall be included in the calculation of RT BCR. • Revenue and bid costs for RCD awards (after netting No-Pay) shall be included in the calculation of RT BCR. • Mathematically, for each resource, for each hour: <ul style="list-style-type: none"> ○ RC Revenues = {Max (0, [RUC RCU Awards – Hourly RCU Overlapping RA Capacity Quantity – RCU No-Pay Quantity]) * RUC RCUMP} + {Max (0, [RUC RCD Awards – Hourly RCD Overlapping RA Capacity Quantity – RCD No-Pay Quantity]) * RUC RCDMP} ○ RC Bid Costs = {Max (0, [RUC RCU Awards – Hourly RCU Overlapping RA Capacity Quantity – RCU No-Pay Quantity]) * RUC RCU Bid Price} + {Max (0, [RUC RCD Awards – Hourly RCD Overlapping RA Capacity Quantity – RCD No-Pay Quantity]) * RUC RCD Bid Price} • RUC BCR costs shall be allocated, in alignment with RCU cost allocation, to net virtual supply and under scheduled load. | Core | • Settlements |

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| | Notes <ul style="list-style-type: none"> Resources committed in RUC, including resources that are scheduled for RCU/RCD, shall be eligible to get RT BCR. A resource can be awarded either RCU or RCD awards, but not both, for the same hour. Accounting Commitment Costs in RT BCR will remain intact as existing. | | |
| DAME-BRQ-09240 | Inclusion of IR & RC in GMC Settlements System shall be updated for the following: <ul style="list-style-type: none"> GMC Bid Transaction Fee shall be applied for IRU/IRD and RCU/RCD bid segments. GMC Market Services Charge shall be applied for IRU/IRD and RCU/RCD awards (but excluding proxy RCU awards). Notes <ul style="list-style-type: none"> Eligible resources will include these GMC costs in their IR and RC bids. Final RCU bids will not contain any proxy RCU bids. Coordination/synchronization may be needed with GMC initiative. | Core | <ul style="list-style-type: none"> Settlements |
| DAME-BRQ-09250 | Update GMC Charge Codes Effective January 1, 2026 <ul style="list-style-type: none"> The following GMC charge code shall be terminated: <ul style="list-style-type: none"> System Operations The following GMC charge code shall be created: <ul style="list-style-type: none"> System Operations Real-Time Dispatch. <ul style="list-style-type: none"> Represents the fees for real-time dispatch services for EDAM, and CAISO BAA. Applies to metered flows in MWh of supply and demand Applies to EDAM, CAISO BAA System Operations Balancing Authority Area Services <ul style="list-style-type: none"> Represents the costs to support services within the CAISO BAA such as transmission planning, summer readiness, and planning coordinator. Applies to CAISO BAA metered flows in MWh of supply and demand. | Core | <ul style="list-style-type: none"> Settlements |

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| | Note <ul style="list-style-type: none"> No change to WEIM-only BAA Settlements. For more details regarding the GMC charge codes, see the new Cost of Service Initiative. | | |
| DAME-BRQ-09260 | IRU/IRD Unavailability No-Pay Charges System shall be updated for the following: <ul style="list-style-type: none"> Resources with an FMM Ex-post capacity range that does not support ($DAES_{DAM} + [IRU_{DAM} - IRU5_{DAM}]$) will be charged the resource-specific IRU No-Pay Penalty Price of Max (FMM FRUMP, IRUMP) for the undelivered MW quantity after accounting for DA Spinning Reserve award, and DA Non-Spinning Reserve award, in that respective order. Resources with an FMM Ex-post capacity range that does not support ($DAES_{DAM} - [IRD_{DAM} - IRD5_{DAM}]$) will be charged the resource-specific IRD No-Pay Penalty Price of Max (FMM FRDMP, IRDMP) for the undelivered MW quantity. | Core | <ul style="list-style-type: none"> Settlements |
| DAME-BRQ-09280 | RCU/RCD Unavailability No-Pay Charges System shall be updated for the following: <ul style="list-style-type: none"> Resources with an FMM Ex-post capacity range that does not support ($DAES_{DAM} + RCU_{DAM}$) (but excluding proxy RCU awards) will be charged the 5-minute resource-specific RCUMP for the undelivered MW quantity after accounting for DA Spinning Reserve award, DA Non-Spinning Reserve award, and IRU award, in that respective order. Exception is for VERs, where RCU No-Pay Penalty Price shall be the RCUMP. Resources with an FMM Ex-post capacity range that does not support ($DAES_{DAM} - RCD_{DAM}$) will be charged the 5-minute resource-specific RCDMP for the undelivered MW quantity after accounting for IRD award. | Core | <ul style="list-style-type: none"> Settlements |
| DAME-BRQ-09300 | IR and RC Unavailability No-Pay Charges Priority System shall be updated for the following: <ul style="list-style-type: none"> Resources that have been awarded both a RC and IR and are not available, or only bid a portion of their combined award, shall have the unavailability charge applied first to RC and then to IR. | Core | <ul style="list-style-type: none"> Settlements |
| DAME-BRQ-09310 | Do not Assess RAAIM to IR and RC Awards for Generic and Flex RA System shall continue to assess RAAIM penalty for Energy and AS bids. Notes | Existing | <ul style="list-style-type: none"> Settlements |

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| | <ul style="list-style-type: none"> CAISO’s availability assessment shall not consider local and system (generic) nor Flex RA resource’s compliance with any IR and RC bidding obligations it holds. Implementation There will not be impact to exiting RAIM functionality. | | |
| DAME-BRQ-09320 | <p>IR – FRP RTM Ramp Deviation Settlements</p> <p>System shall be updated for the following:</p> <ul style="list-style-type: none"> Resources that have been awarded both IRU (IRD) in IFM and FRU (FRD) in FMM shall be charged (paid) for the deviation between the FMM FRU (FRD) award and the 5-min ramp capable portion of the IRU (IRD) award [$IRU5_{DAM}$ ($IRD5_{DAM}$) from MQS] at the FMM FRUMP (FRDMP), respectively. <p>Notes</p> <ul style="list-style-type: none"> Deviation settlements between FMM FRU (FRD) and RTD FRU (FRD), respectively, is existing functionality. | Core | <ul style="list-style-type: none"> Settlements |
| DAME-BRQ-09340 | <p>FMM Forecasted Movement Deviation Settlements</p> <p>System shall be updated for the following:</p> <ul style="list-style-type: none"> For CAISO and EDAM BAAs, resources (including virtual supply and demand resources) that have upward (downward) deviation in Forecasted Movement in FMM relative to DAM is paid (charged) net difference between FMM FRUMP and FMM FRDMP, respectively. For WEIM-only BAAs, resources that have upward (downward) deviation in Forecasted Movement in FMM relative to Base Schedule Forecasted Movement is paid (charged) net difference between FMM FRUMP and FMM FRDMP, respectively. <p>Notes</p> <ul style="list-style-type: none"> DA/Base Schedule Forecasted Movement is not settled. It is used to determine the deviation settlement of FMM Forecasted Movement Deviation only. DA/Base Schedule Forecasted Movement settlement is embedded in Day Ahead Energy settlement already or in the bi-lateral market settlement. Forecasted Movement Deviation settlements between FMM and RTD is existing functionality. | Core | <ul style="list-style-type: none"> Settlements |

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| | <ul style="list-style-type: none"> If the 5-minute ramp capability that is awarded in IFM (as either energy movement or an IR award) is available and awarded in FMM (as either forecasted movement or a FRP award), there should be No net deviation settlement in FMM. If the 5-minute ramp capability that is awarded in FMM is available and awarded in RTD (as either forecasted movement or a FRP award), there should be No net deviation settlement in RTD. If the 5-minute ramp capability of a resource is awarded between forecasted movement and uncertainty awards the same across markets, from IFM to FMM to RTD, there are no net payments or charges due to deviations in RTM. The only exceptions are when a resource reaches their Pmin or Pmax at a different time than in the preceding market, there is a ramp rate de-rate, or the resource's ramp capability is not fully used. | | |
| DAME-BRQ-09350 | <p>Accounting for Virtuals in Allocation of Residual Forecasted Movement Settlements</p> <p>System shall be updated for the following for each 5-min interval:</p> <ul style="list-style-type: none"> For BAAs (CAISO BAA, EDAM BAAs and WEIM-only BAAs), the summation of FMM resource-specific FM and FMM virtual FM and RTD resource-specific FM shall be allocated to Meter Demand of the BAA or Passed Group as determined by WEIM RSE flexible ramp assessment. <p>Notes</p> <ul style="list-style-type: none"> Allocation methodology is existing but adding virtual award FM costs/revenues. | Core | <ul style="list-style-type: none"> Settlements |
| DAME-BRQ-09380 | <p>Settlements of Overlapping RA Capacity for LSE-RA Resource True-Up Settlements Mechanism</p> <p>If an RA resource is mapped to one or more LSEs that have their LSE-RA Resource Pair True-Up Flag set to Opt-In for a trading day,</p> <ul style="list-style-type: none"> System shall calculate the Settlements Amount for that RA Resource and each hour as: <ul style="list-style-type: none"> Hourly IRx Overlapping RA Capacity Quantity <ul style="list-style-type: none"> Sum over all 15-min within the hour (15-min IRx Overlapping RA Capacity / 4) Hourly IRx LOC for Overlapping RA Capacity | Core | <ul style="list-style-type: none"> Settlements |




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| | <ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> ▪ Sum over all 15-min within the hour (15-min IRx LOC for Overlapping RA Capacity) ○ Hourly IRx Overlapping RA Capacity Amount <ul style="list-style-type: none"> ▪ (Hourly IRx Overlapping RA Capacity Quantity * Hourly IRxMP) – Hourly IRx LOC for Overlapping RA Capacity ○ Hourly RCx Overlapping RA Capacity Quantity <ul style="list-style-type: none"> ▪ Sum over all 15-min within the hour (15-min RCx Overlapping RA Capacity / 4) ○ Hourly RCx Overlapping RA Capacity Amount <ul style="list-style-type: none"> ▪ Hourly RCx Overlapping RA Capacity * Hourly RCxMP ○ Where x = {U, D} • System shall allocate the hourly IRx and RCx Overlapping RA Capacity Amount for that RA resource to the LSEs associated with it pro-rata to their monthly Generic and Flex (across all categories) RA Showings for LSEs that have Opted-In LSE-RA Resource Pair True-Up Flag, resulting in: <ul style="list-style-type: none"> ○ Hourly IRx Overlapping RA Capacity LSE Amount ○ Hourly RCx Overlapping RA Capacity LSE Amount • SCs of LSEs that have their LSE-RA Resource Pair True-Up Flag opted-in shall be paid Hourly IRx Overlapping RA Capacity LSE Amount and RCx Overlapping RA Capacity LSE Amount for all RA resources that are associated with them. • SCs of resources shall be charged the Hourly IRx Overlapping RA Capacity LSE Amount and RCx Overlapping RA Capacity LSE Amount for all LSEs that are associated with it. | | |
| DAME-BRQ-09520 | <p>Apply CRR 1B Methodology for CAISO BAA For CAISO BAA: System shall apply CRR 1B methodology per existing Tariff</p> | Core | • Settlements |
| DAME-BRQ-09540 | <p>Calculate BAA IRU/IRD Congestion Revenue For CAISO and EDAM BAAs:</p> <ul style="list-style-type: none"> • System shall calculate BAA IRU/IRD Congestion Revenue as the sum over all resources within that BAA of the product of (IRU/IRD Awards and the sub-components of marginal congestionMCC prices of IRUMP/IRDMP [by BAA]) netted against the BAA-level (product of IRUR/IRDR and the sub-components of marginal congestionMCC prices of IRURMP/IRDRMP (for corresponding BAA) at the associated Imbalance Demand Hub Apnode minus product of Sum of IRUS/IRDS over the IR surplus zones within the BAA and the sub-components of marginal congestionMCC prices of IRUSMP/IRDSMP of the associated IR surplus zone Apnode, respectively. | Core | • Settlements |



| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
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| | <ul style="list-style-type: none"> • Mathematically, for each BAA, for each hour: <ul style="list-style-type: none"> ○ IRx Congestion Revenue = Sum over all resources for that BAA (IRx Award * IRxMP MCC by BAA) – Max {0, [IRx BAA Requirement Congestion Amount – IRx Surplus Congestion Amount]} ○ Where <ul style="list-style-type: none"> ▪ IRx BAA Requirement Congestion Amount = IRxR * IRxRMP MCC by BAA ▪ IRx Surplus Congestion Amount = Sum over all IR Surplus Zones within the BAA (IRxS * IRxSMP MCC by BAA) ▪ Where x = {U, D} <p>Notes</p> <ul style="list-style-type: none"> • Based upon payload failures and fill logic, any IRx imbalance will be settled through neutrality charge code (rounding). | | |
| DAME-BRQ-09560 | <p>Calculate BAA Energy Congestion Revenues For CAISO and EDAM BAAs:</p> <ul style="list-style-type: none"> • System shall calculate BAA Energy congestion revenues as product of DA Energy Awards and congestion sub-components MCC of Energy LMP (for corresponding BAA). | Existing System Functionality | • Settlements |
| DAME-BRQ-09580 | <p>Distribute BAA IRU/IRD Congestion Revenues for CAISO BAA For CAISO BAA:</p> <ul style="list-style-type: none"> • System shall distribute the BAA IRU/IRD congestion revenues net of BAA Energy congestion revenues through the existing CRR Balancing Account. | Core | • Settlements |
| DAME-BRQ-09600 | <p>Distribute BAA IRU/IRD Congestion Revenues for EDAM BAAs For EDAM BAA:</p> <ul style="list-style-type: none"> • System shall return the BAA IRU/IRD congestion revenues, along with BAA Energy congestion revenues, to EDAM BAAs through BAA Congestion Offset Account, for distribution to its participants according to their OATT processes. <p>Notes</p> <ul style="list-style-type: none"> • Congestion contributions to transmission constraints in an EDAM BAA from resources in other EDAM BAAs contribute to the congestion offset of the EDAM BAA where the congestion occurs. | Core | • Settlements |
| DAME-BRQ-09610 | <p>Apply HASP Reversal to CAISO BAA IFM Intertie Schedule For CAISO BAA:</p> <ul style="list-style-type: none"> • For intertie schedules that are awarded energy and/or RCU/RCD schedules in DAM and subsequently have incremental/decremental FMM schedule change in the RTM and did not submit energy profile tag | Core | • Settlements |

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| | prior to HASP, System shall apply revised Settlements HASP reversal rule on them by using IFM Energy plus RCU Award minus RCD Award instead of the current logic of using the minimum of IFM Energy Award and RUC Energy Schedule. | | |

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5.9 Business Process: Manage Market Reporting

OASIS


- Publish IR/RC Bid-Related Data
- Publish IFM IR and RUC RC Nodal Prices
- Publish IFM IR and RUC Binding Constraints Shadow Prices
- Publish IFM IR and RUC RC Nomogram/Branch and Interties Shadow Prices
- Publish IFM IR and RUC RC MPM Intertie Constraint Competitive Path
- Publish IFM IR and RUC RC MPM Nomogram/Branch Competitive Path
- Publish IFM IR and RUC RC Aggregate Awards
- Publish IRU/IRD Requirements (IRUR/IRDR), IRU/IRD Surplus (IRUS/IRDS) and their Associated Imbalance Demand Hub/IR surplus zones Apnode for each BAA
- Publish IRU/IRD Requirement Thresholds
- Publish IRU/IRD Requirements Input Polynomials
- Publish IRU/IRD Requirements Uncertainty Histograms
- Publish IRU/IRD Forecasts
- Publish IRU/IRD Demand Curves
- Publish Payment and No-Payments of IR/RC-Charge Code Settlements Amounts Data

CMRI

- Publish IR and RC DAB Curves
- Publish IFM IRU and RUC RCU Mitigated Bids
- Publish IFM IR and RUC RC Resource Awards
- Publish IFM IR and RUC RC Resource Prices
- Publish IFM IR and RUC RC LSE Resource Awards
- Publish 15-min IRU/IRD LOC for Overlapping RA Capacity
- Publish resource-specific DA/Base Schedule Forecasted Movement Data
- Publish nodal, by SC DA Schedule Virtual Forecasted Movement Data


MPP

- Publish Shift Factors Data for IR Deployment Scenarios from IFM


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5.9.1 Business Requirements


| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|-----------------|---|------------------|-----------------------------------|
| DAME-BRQ-10140 | <p>Publish IR/RC Bid-Related Data Upon data receipt, System shall report the following IR/RC bid-related data (original and corrected):</p> <ul style="list-style-type: none"> • Resource-Specific Hourly Data <ul style="list-style-type: none"> ○ IRU/IRD Clean Bids ○ RCU/RCD Clean Bids | Core | • OASIS |
| DAME-BRQ-10160 | <p>Publish IFM IR and RUC RC Nodal Prices Upon data receipt, System shall report the following IFM IR and RUC RC market results data (original and corrected):</p> <ul style="list-style-type: none"> • Nodal Hourly Data <ul style="list-style-type: none"> ○ IFM IRUMP/IRDMP Nodal Prices and their price breakdown, (total, capacity, congestion but no loss), but shall not includeexclude the sub-components of their marginal congestionMCC prices, including (by BAA), and include prices for Imbalance Demand Hub Apnodes as well as Apnodes associated with IR surplus zones. ○ RUC RCUMP/RCDMP Nodal Prices (single total prices [no price breakdown]) and their price breakdown (total, capacity, congestion and loss), but excluding sub-components of MCC prices (by BAA). | Core | • OASIS |
| DAME-BRQ-10160A | <p>Publish IFM IR and RUC RC Scheduling Point/Tie Combination Nodal Prices Upon data receipt, System shall report the following IFM IR and RUC RC market results data (original and corrected) for Scheduling Points/Tie Combinations: by direction (import/export):</p> <ul style="list-style-type: none"> • Nodal Hourly Data <ul style="list-style-type: none"> ○ IFM IRUMP/IRDMP Nodal Prices and their price breakdown, (total, capacity, congestion but no loss), but shall not includeexclude the sub-components of their marginal congestionMCC prices, including (by BAA), and include prices for Imbalance Demand Hub Apnodes as well as Apnodes associated with IR surplus zones. | Core | • OASIS |

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| | <ul style="list-style-type: none"> ○ RUC RCUMP/RCDMP Nodal Prices (single total prices [no price breakdown]) and their price breakdown (total, capacity, congestion and loss), but excluding sub-components of MCC prices (by BAA). | | |
| <u>DAME-BRQ-10160AA</u> | <p><u>Publish RTM Flexible Ramp Scheduling Point/Tie Nodal Prices by Direction (Import/Export)</u></p> <p><u>Upon data receipt, System shall report the following RTM FR market results data (original and corrected) for Scheduling Points/Tie Combinations by direction (import/export):</u></p> <ul style="list-style-type: none"> ● <u>Nodal 15-min & 5-min Data</u> <ul style="list-style-type: none"> ○ <u>FRUMP/FRDMP Nodal Prices but excluding their price breakdown, and sub-components of MCC prices (by BAA).</u> | <u>Core</u> | <ul style="list-style-type: none"> ● <u>OASIS</u> |
| DAME-BRQ-10160B | <p>Publish IFM-MPM IR and RUC-MPM RC Nodal Prices</p> <p>Upon data receipt, System shall report the following IFM-MPM IR and RUC-MPM RC market results data (original):</p> <ul style="list-style-type: none"> ● Nodal Hourly Data <ul style="list-style-type: none"> ○ IFM-MPM IRUMP/IRDMP Nodal Prices and their price breakdown, (total, capacity, congestion but no loss), but shall not include <u>exclude</u> the sub-components of their marginal congestion <u>MCC</u> prices, including (by BAA), and <u>include</u> prices for Imbalance Demand Hub Apnodes as well as Apnodes associated with IR surplus zones. ○ RUC-MPM RCUMP/RCDMP Nodal Prices (single total prices [no price breakdown]) and their price breakdown (total, capacity, congestion and loss), but excluding sub-components of MCC prices (by BAA). | Core | <ul style="list-style-type: none"> ● OASIS |
| DAME-BRQ-10180 | <p>Publish IFM IR Binding Constraints Results</p> <p>Upon data receipt, System shall report the following IFM IR market results data (original and corrected):</p> <ul style="list-style-type: none"> ● BAA Group Hourly Data <ul style="list-style-type: none"> ○ Binding IFM IRU/IRD Capacity. ○ Binding IFM IRU/IRD Shadow Prices | Core | <ul style="list-style-type: none"> ● OASIS |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
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| DAME-BRQ-10180A | <p>Publish IFM IR Binding Constraints Shadow Prices</p> <p>Upon data receipt, System shall report the following IFM IR market results data (original and corrected):</p> <ul style="list-style-type: none"> • Network Constraints Hourly Data <ul style="list-style-type: none"> ○ Binding Constraint due to IFM IRU/IRD. ○ IFM IRU/IRD Constraint Shadow Prices | Core | • OASIS |
| DAME-BRQ-10180B | <p>Publish IFM IR Binding Scheduling Constraints Shadow Prices</p> <p>Upon data receipt, System shall report the following IFM IR market results data (original and corrected):</p> <ul style="list-style-type: none"> • Scheduling Constraints Hourly Data <ul style="list-style-type: none"> ○ Binding Constraint due to IFM IRU/IRD. ○ IFM IRU/IRD Constraint Shadow Prices | Core | • OASIS |
| DAME-BRQ-10200 | <p>Publish IFM IR and RUC RC Nomogram/Branch Shadow Prices</p> <p>Upon data receipt, System shall report the following IFM IR and RUC RC market results data (original and corrected):</p> <ul style="list-style-type: none"> • Network Constraints Hourly Data <ul style="list-style-type: none"> ○ IFM IRU/IRD Nomogram/Branch Shadow Prices ○ RUC RCU/RCD Nomogram/Branch Shadow Prices | Core | • OASIS |
| DAME-BRQ-10200A | <p>Publish IFM IR and RUC RC Interties Shadow Prices</p> <p>Upon data receipt, System shall report the following IFM IR and RUC RC market results data (original and corrected):</p> <ul style="list-style-type: none"> • Network Constraints Hourly Data <ul style="list-style-type: none"> ○ IFM IRU/IRD Intertie Shadow Prices ○ RUC RCU/RCD Intertie Shadow Prices | Core | • OASIS |
| DAME-BRQ-10200B | <p>Publish IFM-MPM IR and RUC-MPM RC Nomogram/Branch Shadow Prices</p> <p>Upon data receipt, System shall report the following IFM-MPM IR and RUC-MPM RC market results data (original):</p> <ul style="list-style-type: none"> • Network Constraints Hourly Data | Core | • OASIS |

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| | <ul style="list-style-type: none"> ○ IFM-MPM IRU/IRD Nomogram/Branch Shadow Prices ○ RUC-MPM RCU/RCD Nomogram/Branch Shadow Prices | | |
| DAME-BRQ-10200C | <p>Publish IFM-MPM IR and RUC-MPM RC Interties Shadow Prices</p> <p>Upon data receipt, System shall report the following IFM-MPM IR and RUC-MPM RC market results data (original):</p> <ul style="list-style-type: none"> • Network Constraints Hourly Data <ul style="list-style-type: none"> ○ IFM-MPM IRU/IRD Intertie Shadow Prices ○ RUC-MPM RCU/RCD Intertie Shadow Prices | Core | • OASIS |
| DAME-BRQ-10220 | <p>Publish IFM-MPM IR and RUC-MPM RC MPM Nomogram/Branch Competitive Path</p> <p>Upon data receipt, System shall report the following IFM-MPM IR and RUC-MPM RC market results data (original):</p> <ul style="list-style-type: none"> • Competitive Path Hourly Data <ul style="list-style-type: none"> ○ MPM Nomogram/Branch Competitive Path | Core | • OASIS |
| DAME-BRQ-10220A | <p>Publish IFM-MPM IR and RUC-MPM RC MPM Intertie Constraint Competitive Path</p> <p>Upon data receipt, System shall report the following IFM-MPM IR and RUC-MPM RC market results data (original):</p> <ul style="list-style-type: none"> • Competitive Path Hourly Data <ul style="list-style-type: none"> ○ MPM Intertie Constraint Competitive Path | Core | • OASIS |
| DAME-BRQ-10240 | <p>Publish IFM IR and RUC RC Aggregate Awards</p> <p>Upon data receipt, System shall report the following IFM IR and RUC RC market results data (original and corrected):</p> <ul style="list-style-type: none"> • BAA Hourly Data <ul style="list-style-type: none"> ○ IFM IRU/IRD Awards ○ RUC RCU/RCD Awards (including proxy RCU awards) | Core | • OASIS |
| DAME-BRQ-10260 | <p>Publish IRU/IRD Requirements</p> <p>Upon data receipt, System shall report the following data for next Trade Days (binding: D+1 as well as advisory: D+2 and D+3) (original and corrected data):</p> | Core | • OASIS |

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| | <ul style="list-style-type: none"> • BAA Hourly Data <ul style="list-style-type: none"> ○ IRU/IRD Requirements (IRUR/IRDR) ○ IRU/IRD Surplus (IRUS/IRDS) ○ Associated Imbalance Demand Hub Apnode <p>Notes</p> <ul style="list-style-type: none"> • The published IRUR/IRDR are the ones that are adjusted to account for diversity benefit. • D+2 advisory data will be published at different time by 6 pm everyday. • D+3 advisory data will be published at different time by 6+ pm everyday. | | |
| DAME-BRQ-10260A | <p>Publish IRU/IRD Surplus</p> <p>Upon data receipt, System shall report the following data for next Trade Days (binding: D+1 as well as advisory: D+2 and D+3) (original and corrected data):</p> <ul style="list-style-type: none"> • IR Surplus Zone Hourly Data (within each BAA) <ul style="list-style-type: none"> ○ IRU/IRD Surplus (IRUS/IRDS) ○ Associated IR Surplus Zone Apnode <p>Notes</p> <ul style="list-style-type: none"> • D+2 advisory data will be published at different time by 6 pm everyday. • D+3 advisory data will be published at different time by 6+ pm everyday. | Core | • OASIS |
| DAME-BRQ-10280 | <p>Publish IRU/IRD Requirement Thresholds</p> <p>Upon data receipt, System shall report the following data for next Trade Day (D+1) (original data only, no data corrections):</p> <ul style="list-style-type: none"> • BAA Hourly Data <ul style="list-style-type: none"> ○ IRU/IRD Requirement Thresholds | Core | • OASIS |
| DAME-BRQ-10300 | <p>Publish IRU/IRD Requirements Input Polynomials</p> <p>Upon data receipt, System shall report the following data for next Trade Day (D+1) (original data only, no data corrections):</p> | Core | • OASIS |

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| | <ul style="list-style-type: none"> • BAA Hourly Data <ul style="list-style-type: none"> ○ IRU/IRD Requirements Input Polynomials | | |
| DAME-BRQ-10320 | <p>Publish IRU/IRD Requirements Uncertainty Histograms Upon data receipt, System shall report the following data for next Trade Day (D+1) (original data only, no data corrections):</p> <ul style="list-style-type: none"> • BAA Hourly Data <ul style="list-style-type: none"> ○ IRU/IRD Requirements Uncertainty Histograms | Core | • OASIS |
| DAME-BRQ-10340 | <p>Publish IRU/IRD Input Data for Demand, Wind, Solar Forecasts Upon data receipt, System shall report the following data for next Trade Day (D+1) (original data only, no data corrections):</p> <ul style="list-style-type: none"> • BAA Hourly Data <ul style="list-style-type: none"> ○ IRU/IRD Forecasts | Core | • OASIS |
| DAME-BRQ-10360 | <p>Publish IRU/IRD Demand Curves Upon data receipt, System shall report the following data for next Trade Day (D+1) (original data only, no data corrections):</p> <ul style="list-style-type: none"> • BAA Hourly Data <ul style="list-style-type: none"> ○ IRU/IRD Demand Curves | Core | • OASIS |
| DAME-BRQ-10400 | <p>Publish Payment and No-Payments of IR/RC-Charge Code Settlements Amounts Data Upon data receipt, System shall report the following payment and no-payments of IR/RC charge code Settlements amounts (original and corrected):</p> <ul style="list-style-type: none"> • Resource-Specific Monthly Data and Zonal-Specific Daily Data <ul style="list-style-type: none"> ○ CC-6800 – DA RUC Availability Settlement <ul style="list-style-type: none"> ▪ (or tentative replacement: CC-6xxxx – DA RUC Reliability Capacity Up Settlement) ○ CC-06824 – No Pay Residual Unit Commitment (RUC) Settlement <ul style="list-style-type: none"> ▪ (or tentative replacement: CC-6xxxx – No Pay Residual Unit Commitment (RUC) Reliability Capacity Up Settlement) ○ CC-6xxx (tentative) – No Pay Residual Unit Commitment (RUC) Reliability Capacity Down Settlement ○ CC-6xxx (tentative) – DA Imbalance Reserve Up Settlement ○ CC-6xxx (tentative) – No Pay DA Imbalance Reserve Up Settlement | Core | • OASIS |

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| | <ul style="list-style-type: none"> ○ CC-6xxx (tentative) – DA Imbalance Reserve Down Settlement ○ CC-6xxx (tentative) – No Pay DA Imbalance Reserve Down Settlement | | |
| DAME-BRQ-10680 | <p>Publish IR and RC DAB Curves Upon data receipt, System shall report the following data:</p> <ul style="list-style-type: none"> ● Resource-specific Daily <ul style="list-style-type: none"> ○ DAB Curves (MW , Bid Price) ○ Market Product Type: <ul style="list-style-type: none"> ▪ IRU ▪ IRD ▪ RCU ▪ RCD | Core | ● CMRI |
| DAME-BRQ-10700 | <p>Publish IFM-MPM IRU and RUC RCU-MPM Mitigated Bids Upon data receipt, System shall report the following IFM IR and RUC RC market results data (original and corrected):</p> <ul style="list-style-type: none"> ● Resource-Specific Hourly Data <ul style="list-style-type: none"> ○ IRU Mitigated Bids ○ RCU Mitigated Bids | Core | ● CMRI |
| DAME-BRQ-10720 | <p>Publish IFM IR and RUC RC Resource Awards Upon data receipt, System shall report the following IFM IR and RUC RC market results data (original and corrected):</p> <ul style="list-style-type: none"> ● Resource-Specific Hourly Data <ul style="list-style-type: none"> ○ IFM IRU/IRD Resource Awards (Market and Cleared) ○ RUC RCU/RCD Resource Awards (Market, Proxy and Cleared) ○ Retire RUC Awards as it is replaced with RCU Awards. <p>Notes</p> <ul style="list-style-type: none"> ● The Proxy RCU Awards can co-exist for same resource and hour with RCU Awards. | Core | ● CMRI |

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| | <ul style="list-style-type: none"> Award MW: Represents market award MW corresponding to the submitted bid (after mitigation, if any) for a specific market product (IRU, IRD, RCU, or RCD). Proxy RCU MW: Represents the proxy RCU Award MW corresponding to the inserted/extends proxy bid. Cleared MW: Represents the total cleared capacity MW (Award MW + Proxy MW [if applicable]) for a specific market product (IRU, IRD, RCU, or RCD). Proxy MW should be zero for non-export resources. Proxy MW should be zero for IRU, IRD and RCD market products. No self-schedule MW is applicable to IRU/IRD or RCU/RCD market products. | | |
| DAME-BRQ-10730 | <p>Publish REN</p> <p>System shall continue to publish REN.</p> <p>Notes</p> <ul style="list-style-type: none"> The following existing CMRI reports will be used without any modifications. <ul style="list-style-type: none"> Reliability Coordination <ul style="list-style-type: none"> Forecasted Generation | Existing | <ul style="list-style-type: none"> CMRI |
| DAME-BRQ-10740 | <p>Publish IFM IR and RUC RC Resource Prices</p> <p>Upon data receipt, System shall report the following IFM IR and RUC RC market results data (original and corrected):</p> <ul style="list-style-type: none"> Resource-Specific Hourly Data <ul style="list-style-type: none"> IFM IRUMP/IRDMP Resource Prices and their price breakdown, (total, capacity, congestion but no loss), but shall not include exclude the sub-components of their marginal congestion <u>MCC</u> prices (by BAA). RUC RCUMP/RCDMP Resource Prices (single total prices [no and their price breakdown]) (total, capacity, congestion and loss), but excluding sub-components of MCC prices (by BAA). | Core | <ul style="list-style-type: none"> CMRI |

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|----------------|--|------------------|-----------------------------------|
| DAME-BRQ-10780 | <p>Publish 15-min IRU/IRD LOC and IRU/IRD & RCU/RCD Overlapping RA Capacity</p> <p>Upon data receipt, System shall report the following data (original and corrected) and shall be accessed by each resource's SC and by each resource's associated LSE:</p> <ul style="list-style-type: none"> • RA-Resource-Specific 15-min <ul style="list-style-type: none"> ○ IRU/IRD LOC for Overlapping RA Capacity ○ IRU/IRD Overlapping RA Capacity ○ RCU/RCD Overlapping RA Capacity | Core | • CMRI |
| DAME-BRQ-10800 | <p>Publish DA/Base Schedule Forecasted Movement Data</p> <p>Upon data receipt, System shall report the following data (original and corrected) and shall be accessed by each resource's SC:</p> <ul style="list-style-type: none"> • Resource-Specific Hourly <ul style="list-style-type: none"> ○ DA Schedule Forecasted Movement (for CAISO and EDAM BAAs) ○ Base Schedule Forecasted Movement (for WEIM BAAs) | Core | • CMRI |
| DAME-BRQ-10810 | <p>Publish DA Schedule Virtual Forecasted Movement Data</p> <p>Upon data receipt, System shall report the following data (original and corrected) and shall be accessed by each node's SC:</p> <ul style="list-style-type: none"> • Nodal, by SC, Hourly <ul style="list-style-type: none"> ○ DA Schedule Virtual Forecasted Movement (for CAISO and EDAM BAAs) | Core | • CMRI |
| DAME-BRQ-10880 | <p>Publish Shift Factors for IRU/IRD Deployment Scenarios</p> <p>Upon data receipt, System shall report the following IFM market results data:</p> <ul style="list-style-type: none"> • Shift Factor Hourly Data <ul style="list-style-type: none"> ○ Shift Factor for IRU/IRD deployment scenarios (including Imbalance demand Anode) | Core | • MPP |


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5.10 Business Process: Manage FERC Reporting


- Publish Market Data FERC
- Publish Settlements Data FERC

5.10.1 Business Requirements


| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|---|------------------|---|
| DAME-BRQ-11420 | <p>Publish Market Data to FERC System shall have the capability to automatically publish the following data to FERC:</p> <ul style="list-style-type: none"> • System Parameters Daily Data <ul style="list-style-type: none"> ○ IRU/IRD Deployment Factor (DIRU/DIRD) • Resource-Specific Data <ul style="list-style-type: none"> ○ IR Eligibility Flag ○ RC Eligibility Flag • RA-Resource-Specific Monthly Data <ul style="list-style-type: none"> ○ Mapping between RA Resources and LSEs ○ RA Resources RA Showing Capacity ○ RA Resources Generic RA Showing Capacity for each mapped LSE ○ RA Resources Flex RA Showing Capacity (for all categories) for each mapped LSE ○ LSE-Resource Pair True-Up Flag (Opt- In/Out) • RA-Resource-Specific Daily Data <ul style="list-style-type: none"> ○ RA Resources Identification ○ RA Resources Generic RA Capacity ○ RA Resources Flex RA Capacity • Resource-Specific Daily Data <ul style="list-style-type: none"> ○ DAB Curves (Capacity MW , Bid Price) for: <ul style="list-style-type: none"> ▪ IRU ▪ IRD | Core | <ul style="list-style-type: none"> • Internal ISO System |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|-----|--|------------------|-----------------------------------|
| | <ul style="list-style-type: none"> ▪ RCU ▪ RCD • Resource-Specific Hourly Data <ul style="list-style-type: none"> ○ IRU/IRD and RCU/RCD Clean Bids ○ IRU/IRD and RCU/RCD Final Bids (including mitigation flags) ○ IRU/IRD and RCU/RCD Resource Awards ○ Retire RUC Awards (from go-live) as it is replaced with RCU Awards. ○ Proxy RCU MW ○ IRUMP/IRDMP Resource Prices and their price breakdown, (total, capacity, congestion but excluding no loss), including sub-components of marginal congestion MCC prices (by BAA). ○ RCUMP/RCDMP Resource Prices and their price breakdown, but excluding (total, capacity, congestion and loss), including sub-components of marginal congestion MCC prices (by BAA). ○ DA Schedule Forecasted Movement (for CAISO and EDAM BAAs) ○ Base Schedule Forecasted Movement (for EIM BAAs) • RA-Resource-Specific 15-min <ul style="list-style-type: none"> ○ IRU/IRD LOC for Overlapping RA Capacity ○ IRU/IRD Overlapping RA Capacity ○ RCU/RCD Overlapping RA Capacity • Nodal Hourly Data <ul style="list-style-type: none"> ○ IRUMP/IRDMP Nodal Prices and their price breakdown, (total, capacity, congestion but no loss), including sub-components of marginal congestion MCC prices (by BAA), including prices for Imbalance Demand Hub Aprnodes as well as Aprnodes associated with IR surplus zones. | | |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|-----|--|------------------|-----------------------------------|
| | <ul style="list-style-type: none"> ○ RCUMP/RCDMP Nodal Prices and their price breakdown, (total, capacity, congestion and loss), including sub-components of marginal congestion MCC prices (by BAA). ● Nodal, by SC, Hourly Data <ul style="list-style-type: none"> ○ DA Schedule Virtual Forecasted Movement (for CAISO and EDAM BAAs) ● Network Constraints Hourly Data <ul style="list-style-type: none"> ○ Binding Constraint due to IRU/IRD and RUC. ○ IRU/IRD and RUC Constraint Shadow Prices ● Network Constraints Daily Data <ul style="list-style-type: none"> ○ Deployment Scenario Deliverability Constraints Activation Flag for IRU/IRD Awards (separate activation flags for IRU and IRD) ● BAA Hourly Data [for next Trading Days (D+1 as well as D+2 and D+3)] <ul style="list-style-type: none"> ○ IRU/IRD Requirements (IRUR/IRDR) (adjusted for diversity benefit) ○ IRU/IRD Surplus (IRUS/IRDS) ○ Associated Imbalance Demand Hub Apnode ● BAA Hourly Data [for next Trading Day (D+1)] <ul style="list-style-type: none"> ○ IRU/IRD Requirement Thresholds ○ IRU/IRD Requirements Input Polynomials ○ IRU/IRD Requirements Uncertainty Histograms ○ IRU/IRD Forecasts ○ IRU/IRD Demand Curves ● IR Surplus Zone Hourly Data (within each BAA) <ul style="list-style-type: none"> ○ IRU/IRD Surplus (IRUS/IRDS) ○ Associated IR Surplus Zone Apnode ● <u>Nodal 15-min & 5-min Data</u> | | |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|---|------------------|---|
| | <ul style="list-style-type: none"> ○ <u>FRUMP/FRDMP Nodal Prices but excluding their price breakdown, and sub-components of MCC prices (by BAA).</u> <p>Notes</p> <ul style="list-style-type: none"> ● <u>The Proxy RCU Awards can co-exist for same resource and hour with RCU Awards.</u> ● <u>The IRU/IRD, RCU/RCD and FRU/FRD SP-Tie prices are published by direction (import/export).</u> | | |
| DAME-BRQ-11440 | <p>Publish Settlements Data to FERC System shall have the capability to automatically publish the following data to FERC:</p> <ul style="list-style-type: none"> ● IRU/IRD and RCU/RCD Settlements Charge Codes <ul style="list-style-type: none"> ○ Payments ○ No-Pay Charges ○ Cost Allocations ○ BCR ○ GMC ○ IR – FRP Ramp Deviation | Core | <ul style="list-style-type: none"> ● Internal ISO System |


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5.11 Business Process: Manage Resource Adequacy Requirements (CIRA)


- Define LSE-RA Resource True-Up Flag
- Consume LSE-Resource Pair True-Up Flag from LSE' SCs
- Consume LSE-Resource Pair True-Up Flag from Resource's SC
- Set and Display Effective LSE-Resource Pair True-Up Flag
- LSE-Resource Pair True-Up Flag Election Change Rules
- Set LSE-RA Resource Pair True-Up Flag
- Broadcast LSE-RA Resource Pair True-Up Flag
- Broadcast Monthly RA Resources Identification and Mappings
- Broadcast Daily RA Resources Identification and Mappings

5.11.1 Business Requirements


| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|--|------------------|-----------------------------------|
| DAME-BRQ-13005 | <p>Define LSE-Resource Pair True-Up Flag</p> <ul style="list-style-type: none"> • System shall define the following LSE-resource pair specific fields: <ul style="list-style-type: none"> ○ LSE-Resource Pair True-Up Flag • Supported possible values are: <ul style="list-style-type: none"> ○ Opt-In ○ Opt-Out • Default values for first implementation shall be set to: <ul style="list-style-type: none"> ○ Opt-Out • The same resource may be part of multiple LSE SCs. • The same LSE SC may be paired with multiple resources. <p>Notes</p> <ul style="list-style-type: none"> • This flag is used for LSE-RA Resource True-Up settlements to compensate LSEs for IRU/IRD and RCU/RCD awards that overlap with RA capacity with IRU/IRD awards for transitional three years period starting from Tariff activation date. | Core | • CIRA |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|--|------------------|-----------------------------------|
| DAME-BRQ-13010 | <p>Consume LSE-Resource Pair True-Up Flag from LSE' SCs</p> <p>At any time, System shall automatically consume the following LSE-resource pair specific fields from LSE' SCs:</p> <ul style="list-style-type: none"> LSE-Resource Pair True-Up Flag (Submitted by LSE's SC) | Core | • CIRA |
| DAME-BRQ-13012 | <p>Consume LSE-Resource Pair True-Up Flag from Resource's SC</p> <p>At any time, System shall consume the following LSE resource pairs specific fields from resource's SC:</p> <ul style="list-style-type: none"> LSE-Resource Pair True-Up Flag (Submitted by resource's SC) | Core | • CIRA |
| DAME-BRQ-13013 | <p>Set and Display Effective LSE-Resource Pair True-Up Flag</p> <p>Upon receipt of any data change,</p> <ul style="list-style-type: none"> If the LSE-Resource Pair True-Up Flag submitted by resource's SC matches the corresponding flag submitted by LSE's SC, System shall use the matched flag; otherwise, the effective flag shall be set to Opt-Out for that LSE-Resource pair. System shall display the Effective LSE-Resource Pair True-Up Flag to both resource's SC and LSE's SC. | Core | • CIRA |
| DAME-BRQ-13015 | <p>LSE-Resource Pair True-Up Flag Election Change Rules</p> <ul style="list-style-type: none"> If an LSE's SC and resource's SC mutually change their Opt-in/Opt-out election for LSE-resource pair within 60-days of Tariff activation date, System shall apply that election retroactively starting from the Tariff activation date. If an LSE's SC and resource's SC mutually change their Opt-in/Opt-out election for LSE-resource pair more than 60-days of Tariff activation date, System shall apply that election starting with the first Trading Day of the month after the month in which they completed the election process. Display this flag to LSE's and resource's SC. After 3-years from Tariff activation date, System shall set this flag to always Opt-Out for all LSE-RA resource pairs. | Core | • CIRA |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|----------------|--|------------------|--|
| | Note <ul style="list-style-type: none"> For this project, Tariff activation date is same as Go-Live date. | | |
| DAME-BRQ-13017 | Set LSE-RA Resource Pair True-Up Flag For all RA resources-LSE pairs, System shall have the capability to automatically perform the following: <ul style="list-style-type: none"> If LSE-Resource Pair True-Up Flag exists (not NULL), set LSE-RA Resource Pair True-Up Flag to be equal to LSE-Resource Pair True-Up Flag. Otherwise (LSE-Resource Pair True-Up Flag does not exist (NULL), set LSE-RA Resource Pair True-Up Flag to Opt-Out. | Core | <ul style="list-style-type: none"> CIRA |

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5.12 Business Process: <Market/Business Simulation>


This section shall provide a basis for the development of the Market/Business Simulation Scenarios. These requirements will provide guidance on the market participant impacts, inputs into the Scenarios, endpoints to the Scenarios and reasons for potential 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 Scenario* column will be to offer guidance regarding what potential scenarios, and their context, may be needed for this project. This section applies to all policy development projects, market enhancements, technology enhancements, operation enhancements, Western Energy Imbalance Market (WEIM) implementations, and Reliability Coordination (RC) service implementations.

In the Reason for Potential Scenario column, 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 or export provided by the ISO.
6. **New user role:** The addition or modification of access permissions for a user role applied to specific business units within a WEIM entity or market participant organization (e.g., Load Serving Entity (LSE) as a Local Regulatory Authority (LRA) role). Scenarios are beneficial for market participants taking on a new function or process within their organization.

5.12.1 Business Requirements


| ID# | Guidance on Market Participant Impacts | Source System | Sink System | Reason for Potential Scenario |
|-----------------|--|--|--|---|
| DAME-MSIM-15020 | ISO SCs Submit IRU/IRD & RCU/RCD Bids | <ul style="list-style-type: none"> • SIBR | <ul style="list-style-type: none"> • CMRI • OASIS • MRI-S | 1. Rule Impacts 2. Interface changes |

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| ID# | Guidance on Market Participant Impacts | Source System | Sink System | Reason for Potential Scenario |
|-----|--|---------------|-------------|---|
| | <ul style="list-style-type: none"> • Set up a scenario where SCs for resources within CAISO BAA submit bid combinations, including IRU/IRD and RCU/RCD bids. • Run DAM (IFM and RUC). • Run Settlements • Follow the results in sink systems to verify market results: <ul style="list-style-type: none"> ○ OASIS <ul style="list-style-type: none"> ▪ IR/RC Bid-Related Data ▪ IFM IR and RUC RC Nodal Prices ▪ IFM-MPM IR and RUC-MPM RC Nodal Prices ▪ IFM IR and RUC Binding Constraints Shadow Prices ▪ IFM IR and RUC RC Nomogram/Branch and Interties Shadow Prices ▪ IFM-MPM IR and RUC-MPM RC Nomogram/Branch and Interties Shadow Prices ▪ IFM-MPM IR and RUC-MPM RC MPM Nomogram/Branch and Intertie Constraint Competitive Path ▪ IFM IR and RUC RC Aggregate Awards ▪ IRU/IRD Requirements (IRUR/IRDR) ▪ IRU/IRD Surplus (IRUS/IRDS) ▪ Associated Imbalance Demand Hub/IR Surplus Zone Apnode ▪ IRU/IRD Requirement Thresholds ▪ IRU/IRD Requirements Input Polynomials | | | 3. new application /report 4. New system process |

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| ID# | Guidance on Market Participant Impacts | Source System | Sink System | Reason for Potential Scenario |
|-----|---|---------------|-------------|-------------------------------|
| | <ul style="list-style-type: none"> ▪ IRU/IRD Requirements Uncertainty Histograms ▪ IRU/IRD Forecasts ▪ IRU/IRD Demand Curves ▪ Payment and No-Payments of IR/RC-Charge Code Settlements Amounts Data ○ CMRI <ul style="list-style-type: none"> ▪ IR and RC DAB Curves ▪ IFM-MPM IRU and RUC-MPM RCU Mitigated Bids ▪ IFM IR and RUC RC Resource Awards ▪ IFM IR and RUC RC Resource Prices ▪ IFM IR and RUC RC LSE Resource Awards ▪ IRU/IRD Overlapping RA Capacity ▪ RCU/RCD Overlapping RA Capacity ▪ IRU/IRD LOC for Overlapping RA Capacity ▪ DA/Base Schedule Forecasted Movement Data ▪ DA Schedule Virtual Forecasted Movement Data ○ MPP <ul style="list-style-type: none"> ▪ Shift Factors Data for IR Deployment Scenarios ○ Settlements <ul style="list-style-type: none"> ▪ IFM IR & RUC RC Payments ▪ IFM IR & RUC RC Cost Allocation ▪ IR DA and RC RT BCR Settlements | | | |

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| ID# | Guidance on Market Participant Impacts | Source System | Sink System | Reason for Potential Scenario |
|-----------------|---|---|--|--|
| | <ul style="list-style-type: none"> ▪ Inclusion of IR & RC in GMC Settlements ▪ IRU/IRD & RCU/RCD Unavailability No-Pay Charges ▪ IR and RC Unavailability No-Pay Charges Priority ▪ IR – FRP RTM Ramp Deviation Settlements ▪ FMM Forecasted Movement Deviation Settlements ▪ Settlements of Overlapping RA Capacity for True-Up Settlements Mechanism ▪ Accounting IRU/IRD in CRR Settlements for CAISO and EDAM BAAs | | | |
| DAME-MSIM-15040 | <p>Change Setting of IRU/IRD Deployment Factors</p> <ul style="list-style-type: none"> • Set up a scenario where CAISO set the IRU/IRD Deployment Factors to 50%. • Follow same scenario setup as the one described in DAME-MSIM-15020. | <ul style="list-style-type: none"> • DAM • SIBR | <ul style="list-style-type: none"> • CMRI • OASIS • MRI-S | <ol style="list-style-type: none"> 1. Rule Impacts 2. Interface changes 3. new application /report 4. New system process |
| DAME-MSIM-15060 | <p>Change Set of Activated Transmission Constraints in the IRU/IRD Deployment Scenarios</p> <ul style="list-style-type: none"> • Set up a scenario where CAISO BAA Operator changes set of activated transmission constraints that are monitored in the IRU/IRD deployment scenarios. • Follow same scenario setup as the one described in DAME-MSIM-15020. | <ul style="list-style-type: none"> • DAM • SIBR | <ul style="list-style-type: none"> • CMRI • OASIS • MRI-S | <ol style="list-style-type: none"> 1. Rule Impacts 2. Interface changes 3. new application /report 4. New system process |

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6 Appendices

6.1 Appendix-A – Acronym Definition


| Acronym | Definition |
|---------|------------------------------------|
| A2A | Application-to-Application |
| ABC | Available Balancing Capacity |
| ABS | Absolute value |
| AC | Alternating Current |
| ACL | Access Control List |
| ACPF | Alternating Current Power Flow |
| ADS | Automatic Dispatch System |
| AGC | Automatic Generation Control |
| AIM | Access and Identity Management |
| ALFS | Automated Load Forecast System |
| Anode | Aggregate Node |
| API | Application Program Interface |
| Apnode | Aggregate Pricing Node |
| AS | Ancillary Services |
| ASSOC | Ancillary Services State Of Charge |
| AUX | Auxiliary |
| B2B | Business-to-Business |
| BA | Business Analyst |
| BAA | Balancing Authority Area |

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| Acronym | Definition |
|---------|--|
| BAAOP | Balancing Authority Area Operations Portal |
| BARC | Balancing Area Requirement Calculator |
| BCR | Bid Cost Recovery |
| BPM | Business Process Manual |
| BRS | Business Requirement Specifications |
| BS | Base Schedule |
| BSAP | Base Schedule Aggregation Portal |
| BSC | Base Schedule Coordinator |
| BSSD | (WEIM) Base Schedule Submission Deadline |
| CAISO | California Independent System Operator |
| CB | Convergence Bidding |
| CC | Commitment Cost |
| CC | Charge Code |
| CCDEBE | Commitment Costs and Default Energy Bid Enhancements |
| CDN | Conformed Dispatch Notice |
| CF | Capacity Factor |
| CIDI | Customer Inquiry, Dispute and Information system |
| CIM | Common Information Model |
| CIP | Critical Infrastructure Protection |
| CIRA | Customer Interface for Resource Adequacy |
| CISO | California Independent System Operator |
| CLAP | Custom Load Aggregation Point |

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| Acronym | Definition |
|---------|---|
| CMRI | Customer Market Results Interface |
| CMT | Commitment |
| Cnode | Connectivity Node |
| COG | Constrained-Output Generator |
| CPM | Capacity Procurement Mechanism |
| CRN | Contract Reference Number |
| CRR | Congestion Revenue Rights |
| CRR1B | Congestion Revenue Rights Auction Efficiency 1B Project |
| CRRS | Congestion Revenue Rights Settlements (aka CRR Clawback system) |
| CSS | Critical Systems Support |
| CSV | Comma Separated Value |
| D | Day |
| D+1 | Trading Day plus 1 day |
| D+2 | Trading Day plus 2 days |
| DA | Day-Ahead |
| DAB | Default Availability Bid |
| DACA | Day-Ahead Contingency Analysis |
| DAES | Day-Ahead Energy Schedule |
| DAM | Day-Ahead Market |
| DAME | Day-Ahead Market Enhancements |
| DART | Day-Ahead Reliability Tool |
| DASFM | Day Ahead Schedule Forecasted Movement |

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| Acronym | Definition |
|---------|---|
| DCC | Default Commitment Cost |
| DCPA | Dynamic Competitive Path Assessment |
| DCPF | Direct Current Power Flow |
| DEB | Default Energy Bid |
| Dec | Decremental |
| DER | Distributed Energy Resource |
| DF | Demand Forecast |
| DGAP | Default Generation Aggregation Point |
| DIRD | Imbalance Reserve Down Deployment Factor (used in IRU Deployment Scenarios) |
| DIRU | Imbalance Reserve Up Deployment Factor (used in IRD Deployment Scenarios) |
| DMLC | Default Minimum Load Cost |
| DMM | Department of Market Monitoring |
| DOP | Dispatch Operating Point |
| DOT | Dispatch Operating Target |
| DR | Demand Response |
| DRP | Demand Response Program |
| DSA | Dynamic Stability Analysis |
| DSTC | Default State Transition Cost |
| DSUC | Default Start Up Cost |
| DUIT | Detailed Unit Information Tool |
| EA | Energy + Ancillary Services |
| ECIC | Energy Costs and Index Calculator |

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| Acronym | Definition |
|---------|---|
| ED | Exceptional Dispatch |
| EDAM | Extended Day-Ahead Market |
| EDR | Enterprise Data Repository |
| EE | Expected Energy |
| EEA | Expected Energy Allocation |
| EEA | Energy Emergency Alert |
| EEA2 | Energy Emergency Alert Stage-2 |
| EESC | Energy Imbalance Market Entity Scheduling Coordinator |
| EFC | Effective Flexible Capacity |
| EMM | Enterprise Model Management |
| EMMS | Enterprise Model Management System |
| EMNA | Energy Management Network Application |
| EMS | Energy Management System |
| En | Energy |
| EN | Energy |
| EPI | Electricity Price Index |
| ESP | Electronic Security Perimeter |
| ESR | Energy Storage Resource |
| ETC | Existing Transmission Contract |
| ETSR | Energy Transfer System Resources |
| FERC | Federal Energy Regulatory Commission |

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| Acronym | Definition |
|---------|--|
| FIT | Fully Integrated Tracking (ISO reporting tool that provides system operators various reports for RT operations, such as Capacity Forecast, Day Ahead Reports, Load Shedding, Peak Day, Market Impacts Checker, etc.) |
| FM | Forecasted Movement |
| FMCA | Fifteen-Minute Contingency Analysis |
| FMM | Fifteen-Minute Market |
| FMU | Frequently Mitigated Unit |
| FNM | Full Network Model |
| FODD | FERC Outgoing Data Depository |
| FRCT | Forbidden Region Crossing Time |
| FRD | Flexible Ramp Down |
| FRDMP | Flexible Ramp Down Marginal Price |
| FRP | Flexible Ramp Product |
| FRU | Flexible Ramp Up |
| FRUMP | Flexible Ramp Up Marginal Price |
| GCARM | Generator Contingency and RAS Modeling |
| GDF | Generation Distribution Factor |
| GHG | Green House Gas |
| GIP | Generator Interconnection Procedure |
| GMC | Grid Management Charge |
| GPI | Gas Price Index |
| GRDT | Generator Resource Data Template |
| GUI | Graphical User Interface |

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| Acronym | Definition |
|---------|---|
| h | Trading Hour |
| HASP | Hour-Ahead Scheduling Process |
| HAVGC | Heat Average Cost (for non-gas resources) |
| HR | Heat Rate |
| ICE | InterContinental Exchange |
| ICM | Infrastructure Contracts and Management |
| ID | Identifier |
| IFM | Integrated Forward Market |
| Inc | Incremental |
| ISL | Intertie Scheduling Limit |
| ISO | California Independent System Operator |
| Isomon | ISO Monitoring application |
| IOOC | Integrated Optimal Outage Coordination |
| IR | Imbalance Reserve |
| IRD | Imbalance Reserve Down (award) |
| IRD5 | IRD Award 5-minute Ramp-Capable Portion |
| IRD5+ | IRD Award excluding 5-minute Ramp-Capable Portion |
| IRDC | Imbalance Reserve Down allocated Capacity range |
| IRDC5 | Imbalance Reserve Down allocated Capacity range, for the IRD 5-minute Ramp-Capable Portion. |
| IRDC5+ | Imbalance Reserve Down allocated Capacity range, excluding IRU 5-minute Ramp-Capable Portion. |
| IRDMP | Imbalance Reserve Down Marginal Price |

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| Acronym | Definition |
|---------|---|
| IRDR | Imbalance Reserve Down Requirement |
| IRDRMP | Imbalance Reserve Down Requirement Marginal Price |
| IRDS | Imbalance Reserve Down Surplus |
| IRDSMP | Imbalance Reserve Down Surplus Marginal Price |
| IRU | Imbalance Reserve Up (award) |
| IRU5 | IRU Award 5-minute Ramp-Capable Portion |
| IRU5+ | IRU Award excluding 5-minute Ramp-Capable Portion |
| IRUC | Imbalance Reserve Up allocated Capacity range |
| IRUC5 | Imbalance Reserve Up allocated Capacity range, for the IRU 5-minute Ramp-Capable Portion. |
| IRUC5+ | Imbalance Reserve Up allocated Capacity range, excluding IRU 5-minute Ramp-Capable Portion. |
| IRUMP | Imbalance Reserve Up Marginal Price |
| IRUR | Imbalance Reserve Up Requirement |
| IRURMP | Imbalance Reserve Up Requirement Marginal Price |
| IRUS | Imbalance Reserve Up Surplus |
| IRUSMP | Imbalance Reserve Up Surplus Marginal Price |
| ISL | Interchange Scheduling Limit |
| IT | Information Technology |
| ITC | Inter-Tie Constraint |
| ITPD | Information Technology Product Development |
| ITS | Interchange Transaction Scheduler |
| ITSM | Information Technology Service Management |

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| Acronym | Definition |
|--------------------|---|
| JOU | Joint Owned Unit |
| LACA | Look-Ahead Contingency Analysis |
| LAP | Load Aggregation Point |
| LCL | Lower Capacity Limit |
| LDF | Load Distribution Factor |
| LEL | Lower Economic Limit |
| LEL _{FMM} | Lower Economic Limit (FMM) |
| <u>LESR</u> | <u>Limited Energy Storage Resource</u> |
| LF | Load Forecast |
| LFD | Load Following Down qualified self-provision capacity |
| LFD | Load Following Down qualified self-provision capacity |
| LFDC | Load Following Down allocated Capacity. |
| LFR | Lower Forbidden Region |
| LFU | Load Following Up qualified self-provision capacity |
| LFU | Load Following Up qualified self-provision capacity |
| LFUC | Load Following Up allocated Capacity. |
| LMP | Locational Marginal Price |
| LMPM | Locational Market Power Mitigation |
| LOC | Lost Opportunity Cost |
| LOL | Lower Operating Limit |
| LPF | <i>Loss Penalty Factor</i> |
| LPT | Low Priority Price Taker |

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| Acronym | Definition |
|-------------------------|--|
| LRA | Local Regulatory Authority |
| LRL | Lower Regulation Limit |
| LSE | Load Serving Entity |
| LTCA | Long-Term Contingency Analysis |
| Max | Maximum |
| MaxExCap | Maximum Ex-post Capacity |
| MaxExCap _{FMM} | Maximum Ex-post Capacity (FMM) |
| MCC | Marginal Congestion Cost |
| MCI | Model and Contract Implementation |
| MD | Manual Dispatch |
| MDT | Minimum Down Time |
| MDS | Maximum Daily Startups |
| MF | Master File |
| MIBP | Maximum Import Bid Price |
| Min | Minimum |
| MinExCap | Minimum Ex-post Capacity |
| MLAC | Minimum Load Average Cost |
| MLC | Minimum Load Cost |
| MLHAVGC | Minimum Load Heat Average Cost (for non-gas resources) |
| MLHR | Minimum Load Heat Rate |
| MMA | Major Maintenance Adder |
| MMAMLC | Major Maintenance Adder for Minimum Load Cost |

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| Acronym | Definition |
|---------|---|
| MMASUC | Major Maintenance Adder for Start Up Cost |
| MMASTC | Major Maintenance Adder for MSG State Transition Cost |
| MMG | Manage Markets & Grid |
| MMR | Manage Market & Reliability |
| MOO | Must Offer Obligation |
| MOS | Manage Operations Support & Settlements |
| MP | Marginal Price |
| MP | Market Participant |
| MPM | Market Power Mitigation |
| MPP | Market Participant Portal |
| MQS | Market Quality System |
| MRID | Master Resource Identifier |
| MRI-S | Market Results Interface – Settlements |
| MSS | Metered Sub System |
| MSSA | Metered Sub System Agreement |
| MSG | Multi-Stage Generator |
| MUT | Minimum Up Time |
| MV | Materialized View |
| MV&A | Market Validation & Analysis |
| MVT | Market Validation Tool |
| N/A | Not Applicable |
| NA | Network Application |

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| Acronym | Definition |
|---------|---|
| ND | Net Demand |
| NDAB | Negotiated Default Availability Bid |
| NDEB | Negotiated Default Energy Bid |
| NGR | Non-Generating Resource |
| NM | Network Model |
| NPM | Nodal Price Model |
| NQC | Net Qualifying Capacity |
| NR | Non-Spinning Reserve award |
| NS | Non-Spinning Reserve award; it includes qualified self-provision capacity |
| NSC | Non-Spinning Reserve allocated Capacity range |
| OASIS | Open Access Same-time information System |
| OATI | Open Access Technology International |
| OC | Opportunity Cost |
| OCC | Opportunity Cost Calculator |
| ODCP | On Demand Capacity Procurement |
| OES | Operations Engineering Services |
| OMS | Outage Management System |
| OOM | Out Of Market |
| OTS | Operations Training Simulator |
| P97.5 | 97.5% Percentile |
| PAC | PacifiCorp |
| PACE | PacifiCorp East |

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| Acronym | Definition |
|---------|---|
| PACW | PacifiCorp West |
| PAM | Program and Application Management |
| PBC | Power Balance Constraint |
| PC | Pre-Calculation |
| PCA | Price Correction Admin |
| PDR | Proxy Demand Resource |
| PF | Power Flow |
| PI | Plant Information |
| PL | Participating Load |
| Pmax | Maximum Generation Capacity |
| Pmin | Minimum Generation Capacity |
| PMO | Program Management Office |
| PNM | Public New Mexico |
| Pnode | Pricing Node |
| POC | Point Of Contact |
| PRSC | Participating Resource Scheduling Coordinator |
| PSH | Pump Storage Hydro |
| PSTD | Power Systems Technology Development |
| PSTO | Power Systems Technology Operations |
| PT | Price Taker |
| PT | High Priority Price Taker |
| PTO | Participating Transmission Owner |

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| Acronym | Definition |
|---------|---|
| QRB | Quality Review Board |
| RA | Resource Adequacy |
| RAAIM | Resource Adequacy Availability Incentive Mechanism |
| RAS | Remedial Action Schemes |
| RC | Reliability Coordinator |
| RC | Reliability Capacity |
| RC-BSAP | Reliability Coordinator - Base Schedule Aggregation Portal |
| RCD | Reliability Capacity Down (award) |
| RCDC | Reliability Capacity Down allocated Capacity range (FMM). |
| RCDMP | Reliability Capacity Down Marginal Price |
| RCSA | Reliability Coordinator Service Agreement |
| RCU | Reliability Capacity Up (award) |
| RCUMP | Reliability Capacity Up Marginal Price |
| RCUC | Reliability Capacity Up allocated Capacity range |
| RD | Regulation Down (award) |
| RDC | Regulation Down allocated Capacity. |
| RDOT | Ramping Dispatch Operating Target (a continuous piecewise linear curve connecting consecutive <i>DOTs</i> using their mid-interval points, from RTD, RTCD, or RTDD runs, as applicable) |
| RDRR | Reliability Demand Response Resource |
| RDT | Resource Data Template |
| RegD | Regulation Down (award) |
| RegU | Regulation Up (award) |

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| Acronym | Definition |
|---------|--|
| REN | Reliability Energy (another alternative terminology of RUC Schedule) |
| RIG | Remote Intelligent Gateway |
| RIMS | Resource Interconnection Management System |
| RMR | Reliability Must Run |
| ROPR | Operating Reserve Ramp Rate |
| RR | Ramp Rate |
| RRD | Ramp Rate that corresponds to $DAES_{DAM} - IRD_{DAM}$ |
| RREG | Regulation Ramp Rate |
| RRU | Ramp Rate that corresponds to $DAES_{DAM} + IRU_{DAM}$ |
| RSE | Resource Sufficiency Evaluation |
| RSEE | Resource Sufficiency Evaluation Enhancements |
| RT | Real-Time |
| RTBS | Real-Time Base Scheduler |
| RTCA | Real-Time Contingency Analysis |
| RTCD | Real-Time Contingency Dispatch |
| RTD | Real-Time Dispatch |
| RTDD | Real-Time Disturbance Dispatch |
| RTPD | Real-Time Pre-Dispatch |
| RTM | Real-Time Market |
| RTN | Real-Time Nodal (Market) |
| RTUC | Real-Time Unit Commitment |
| RU | Regulation Up (award) |

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| Acronym | Definition |
|----------------|--|
| RUC | Residual Unit Commitment |
| RUC | Regulation Up allocated Capacity. |
| SADS | System And Design Specifications |
| SC | Scheduling Coordinator |
| SCME | Scheduling Coordinator Meter Entity |
| SDF | Solar Distribution Factor |
| SE | State Estimator |
| SF | Shift Factor |
| SIBR | Scheduling Infrastructure and Business Rules |
| SME | Subject Matter Expert |
| SOA | Service-Oriented Architecture |
| SOC | State Of Charge |
| SP | Scheduling Point |
| SPCE | Siemens Price Correction Engine |
| SQMD | Settlements Quality Meter Data |
| SR | Spinning Reserve (award) |
| SRC | Spinning Reserve allocated Capacity range |
| SRS | System Requirement Specifications |
| SS | Self-Schedule |
| SSAE | Statement on Standards for Attestation Engagements |
| STC | State Transition Cost |
| STF | Short-Term Forecast |

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| Acronym | Definition |
|---------|--|
| STC | State Transition Cost |
| STT | State Transition Time |
| STUC | Short-Term Unit Commitment |
| SUC | Start Up Cost |
| SUE | Start Up Energy |
| SUF | Start Up Fuel |
| SURT | Start Up Ramp Time |
| SUT | Start Up Time |
| T | Trading Day |
| TBD | To Be Determined |
| TEP | Tucson Electric Power |
| TG | Tie Generator |
| TNA | Transmission Network Application |
| TOP | Transmission Operator Provider |
| TOR | Transmission Ownership Contract |
| TEE | Total Expected Energy |
| TTEE | Total Target Expected Energy (based on RDOT) |
| UAT | User Acceptance Testing |
| UCL | Upper Capacity Limit |
| UEL | Upper Economic Limit |
| UFR | Upper Forbidden Region |
| UI | User Interface |

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| Acronym | Definition |
|----------------|--|
| UIE | Uninstructed Energy Imbalance |
| UL | User Limited |
| UOL | Upper Operating Limit |
| URL | Upper Regulation Limit |
| VER | Variable Energy Resource |
| VOM | Variable Operations & Maintenance |
| VOMC | Variable Operations & Maintenance Cost |
| WDF | Wind Distribution Factor |
| WebOMS | Web-based Outage Management System |
| WEIM | Western Energy Imbalance Market |
| XML | Extensible Markup Language |
| XSD | XML Schema Definition |

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6.2 Appendix-B: Formulas, Calculation Details, and Examples

6.2.1 Eligibility Tables

6.2.1.1 Resource Eligibility Table

Reference BRQs

- DAME-BRQ-01000
- DAME-BRQ-01010
- DAME-BRQ-04008
- DAME-BRQ-04020

| | EN | RCU | RCD | EN needed for RCU/D award | IRU | IRD | EN needed for IRU award | EN needed for IRD award |
|------------------------|-----|--------------|--------------|---------------------------|--------------|--------------|-------------------------|-------------------------|
| Non-Participating Load | Yes | Not Eligible | Not Eligible | N/A | Not Eligible | Not Eligible | N/A | N/A |
| Virtual Supply | Yes | Not Eligible | Not Eligible | N/A | Not Eligible | Not Eligible | N/A | N/A |
| Virtual Demand | Yes | Not Eligible | Not Eligible | N/A | Not Eligible | Not Eligible | N/A | N/A |
| Hourly Block Import | Yes | Eligible | Eligible | None | Not Eligible | Not Eligible | N/A | N/A |
| Hourly Block Export | Yes | Eligible | Eligible | None | Not Eligible | Not Eligible | N/A | N/A |
| 15-Min Import | Yes | Eligible | Eligible | None | Eligible | Eligible | None | EN >= IRD |
| 15-Min Export | Yes | Eligible | Eligible | None | Eligible | Eligible | EN >= IRU | None |
| Dynamic Import | Yes | Eligible | Eligible | None | Eligible | Eligible | EN >= Pmin | EN <= Pmax |



| | EN | RCU | RCD | EN needed for RCU/D award | IRU | IRD | EN needed for IRU award | EN needed for IRD award |
|--|-----|----------|----------|---------------------------|--------------|--------------|--------------------------------|--------------------------------|
| | | | | | | | EN <= Pmax - IRU | EN >= Pmin + IRD |
| Long-Start Generator | Yes | Eligible | Eligible | EN >= Pmin | Eligible | Eligible | EN >= Pmin EN <= Pmax - IRU | EN <= Pmax EN >= Pmin + IRD |
| Short-Start Generator | Yes | Eligible | Eligible | None | Eligible | Eligible | EN >= Pmin EN <= Pmax - IRU | EN <= Pmax EN >= Pmin + IRD |
| Participating Load w/ 15-Min dispatch capability | Yes | Eligible | Eligible | None | Eligible | Eligible | EN >= Pmin EN <= Pmax - IRU | EN <= Pmax EN >= Pmin + IRD |
| Participating Load w/ Hourly dispatch capability | Yes | Eligible | Eligible | None | Not Eligible | Not Eligible | N/A | N/A |
| Variable Energy Resources (Wind/Solar) | Yes | Eligible | Eligible | TBD | Eligible | Eligible | TBD | TBD |
| Non-Generator | Yes | Eligible | Eligible | N/A | Eligible | Eligible | N/A | N/A |



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| | EN | RCU | RCD | EN needed for RCU/D award | IRU | IRD | EN needed for IRU award | EN needed for IRD award |
|--------------------------------------|---|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------------|--------------------------------|
| Resources (Storage) | | (only for positive range) | (only for negative range) | | (only for positive range) | (only for negative range) | | |
| Hybrid Resource | Yes | Eligible | Eligible | N/A | Eligible | Eligible | N/A | N/A |
| Co-Located Resource | --- Eligibility determined by individual storage and VER components --- | | | | | | | |
| Energy Storage Resource | Yes | Eligible | Eligible | N/A | Eligible | Eligible | N/A | N/A |
| 60-Minute Proxy Demand Resource | Yes | Eligible | Eligible | None | Not Eligible | Not Eligible | N/A | N/A |
| 15-Minute Proxy Demand Resource | Yes | Eligible | Eligible | None | Eligible | Eligible | EN >= Pmin EN <= Pmax - IRU | EN <= Pmax EN >= Pmin + IRD |
| 5-Minute Proxy Demand Resource | Yes | Eligible | Eligible | None | Eligible | Eligible | EN >= Pmin EN <= Pmax - IRU | EN <= Pmax EN >= Pmin + IRD |
| Reliability Demand Response Resource | Yes | Not Eligible | Not Eligible | None | Not Eligible | Not Eligible | N/A | N/A |


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6.2.1.2 Proposed and Existing DAM Products

| Title | Acronym | Time Granularity | Purpose | Eligibility* | Procured In | Status |
|----------------------------|---------|------------------|---|---|-------------|---------------------|
| Energy | EN | Hourly | Energy schedules cleared to meet bid-in demand | All resources | IFM | Existing |
| Reliability Capacity, Up | RCU | Hourly | Incremental capacity procured to meet the positive difference between the net load forecast and cleared non-VER physical supply | Physical resources based on 60-minute ramp capability | RUC | Replaces RUC awards |
| Reliability Capacity, Down | RCD | Hourly | Decremental capacity procured to meet the negative difference between net load forecast and cleared non-VER physical supply | Physical resources based on 60-minute ramp capability | RUC | Proposed |
| Imbalance Reserves, Up | IRU | 15-min | Incremental capacity procured relative to the net load forecast to meet the upward uncertainty requirement | 15-minute dispatchable physical resources, award based on 15-minute ramp capability | IFM | Proposed |

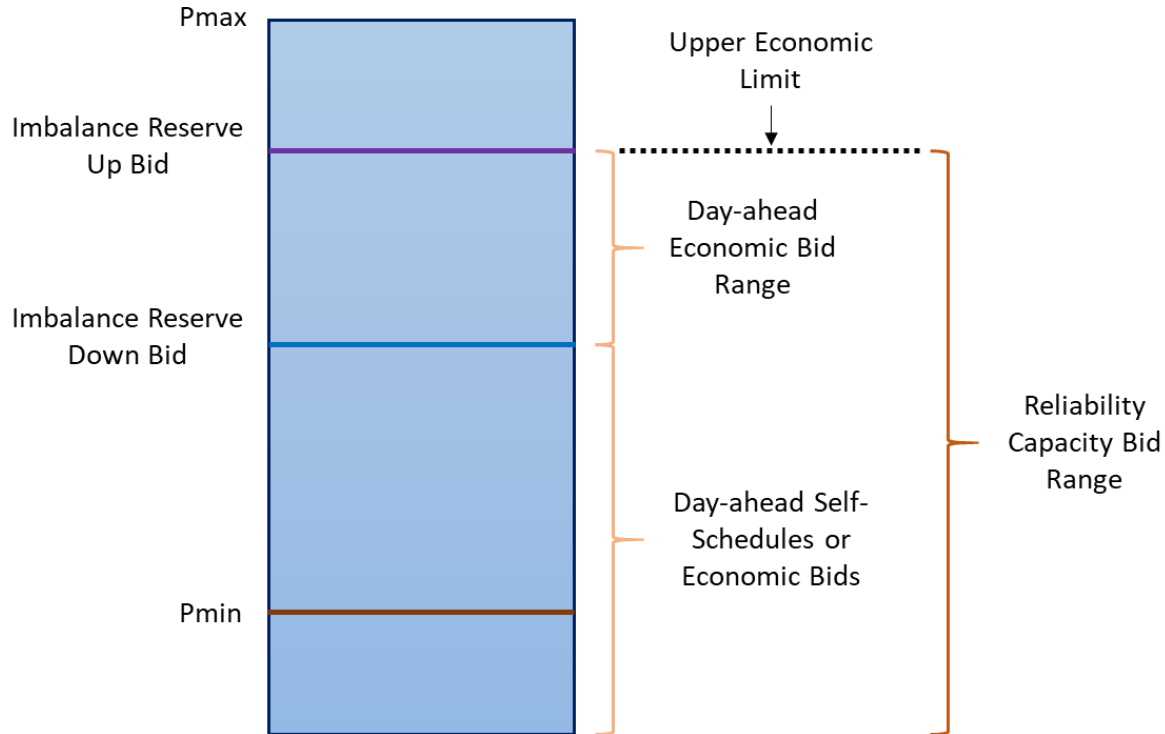
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| Title | Acronym | Time Granularity | Purpose | Eligibility* | Procured In | Status |
|--------------------------|----------------|-------------------------|--|---|--------------------|---------------|
| Imbalance Reserves, Down | IRD | 15-min | Decremental capacity procured relative to the net load forecast to meet the downward uncertainty requirement | 15-minute dispatchable physical resources, award based on 15-minute ramp capability | IFM | Proposed |
| Ancillary Services | AS | 10-min | Incremental capacity procured and reserved to meet real-time regulation and contingency reserve requirements | Resources certified to provide the respective service | IFM | Existing |

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6.2.2 Bidding Obligation

6.2.2.1 Day-Ahead Bidding Rules for Imbalance Reserves and Reliability Capacity



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6.2.2.2 Real-Time Bidding Obligations

