

Business Requirements Specification

Day-Ahead Market Enhancements

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Day-Ahead Market Enhancemer Specification	Date Created:	7/25/2023	

Revision History

Date	Version	Description
7/25/2023	1.0	Initial Document Release.
7/25/2023 12/22/2023	1.0 1.1	Initial Document Release. Updated for the following • 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. • 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 t
		 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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		 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	 Updated for the following: Clarified, corrected typos and cleaned up the document. Updated business requirement to per feedback from CAISO SMEs and market participants. DAME-BRQ-01160
		 Added to define Surplus zones in a BAA.
		DAME-BRQ-01180
		 Deleted and moved to Internal ISO System (DAME-BRQ-02005)
		• DAME-BRQ-01200
		 Added for EDAM participation Flag in MF. DAME-BRQ-02010
		 Updated to move the setting of sampling scheme parameters to separate BRQ (DAME-BRQ-02011)
		• DAME-BRQ-02011
		 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
		 Moved from MF (DAME-BRQ-01180).
		• DAME-BRQ-02040
		 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
		 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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			Forecasts, IR Demand Curves and only keep IRR, IRS and RC Awards).
		 DAME 03070 BRQ-0 	E-BRQ-02300, DAME-BRQ-02310, DAME-BRQ-02320, DAME-BRQ- , DAME-BRQ-04080, DAME-BRQ-04090, DAME-BRQ-04134, DAME- 05002
		• DAME	Updated to add "/MWh" for "\$55, \$247, \$250, \$150, \$300, \$0" to align with Tariff Compliance Filing. E-BRQ-04030
		0	Updated the note about extension of RCU/RCD bid for VERs to clarify it is in RUC.
		 DAME 04137 	E-BRQ-04134A, DAME-BRQ-04135, DAME-BRQ-04136, DAME-BRQ-
		● DAME	Added to model multiple IR zones in a BAA in the Market E-BRQ-04150
		• DAME	Updated to split calculations of IRUR/IRDR for D+2 and D+3 to a separate BRQ (DAME-BRQ-04155). -BRQ-04155
		• DAM E	Added for the calculations of IRUR/IRDR for D+2 and D+3 as a separate BRQ (split from DAME-BRQ-04150). E-BRQ-10260, DAME-BRQ-11420
		• DAME	Updated to add D+3. E-BRQ-04331, DAME-BRQ-04331A
		• DAME	Updated to correct ASSOC formulas to replace SOC _{i,t-1} index with SOC _{i,t-} F-BRQ-04334, DAME-BRQ-04337, DAME-BRQ-06075
		0	Deleted from this BRS and moved to ESE3 project's BRS.
		 DAME 	E-BRQ-04454
		0	Updated to clarify access of IR surplus zones and their associated Apnodes from MF.
		0	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	E-BRQ-05000
		0	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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		 Updated to add extension logic for non-VERs.
		• DAME-BRQ-05005
		 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
		• Updated to clarify the 2nd bullet to apply to online physical resources.
		• DAME-BRQ-05130
		 Updated to clarify resource types applicability.
		• DAME-BRQ-05144
		 Updated to remove the reference to DAME-BRQ-04334
		• DAME-BRQ-06065
		o Deleted.
		• DAME-BRQ-07860, DAME-MSIM-15020
		 Updated to add IR Surplus Zone associated Apnodes to Imbalance Hub Demand Apnode. DAME-BRQ-09160
		 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
		 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.
		\circ Updated Tier 2 to remove the max (0,).
		• DAME-BRQ-09380

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		 Updated to replace RA showing with monthly Generic and Flex (across all categories) RA showing in the pro-rata allocation.
		• DAME-BRQ-09530
		 Deleted and moved the contents to DAME-BRQ-09160.
		• DAME-BRQ-09535
		 Deleted as it is duplicate of contents within DAME-BRQ-09160.
		• DAME-BRQ-09540
		 Updated logic to use separate MCC prices for IRx Requirement and Surplus. DAME-BRQ-09610
		 Added for Apply HASP Reversal to CAISO BAA IFM Intertie Schedule. DAME-BRQ-10160, DAME-BRQ-11420
		 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
		 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
		 Added for Split OASIS BRQs into separate BRQs (one BRQ for each OASIS report).
		 DAME-BRQ-10260, DAME-BRQ-11420
		 Updated to add publishing of IRUS/IRDS and associated Apnode on IR Surplus Zone level within each BAA.
		• DAME-BRQ-10380
		 Deleted as OASIS report that publish aggregated BAA Forecasted Movement Data by resource category.
		• DAME-BRQ-10700
		 Clarified publishing by IFM-MPM and RUC-MPM.
		• DAME-BRQ-10730
		 Added to publish REN (aka RUC schedules) to Forecasted Generation report (existing).
		• DAME-BRQ-10810

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		 Added for CMRI to publish nodal by SC DA Schedule Virtual Forecasted Movement.
		• DAME-BRQ-10880
		 Added for MPP publishing Shift Factors (SF) for IRU/IRD.
		• DAME-BRQ-11420
		 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
		 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	Updated business requirement to per feedback from CAISO SMEs and market
		DAME-BRQ-01220
		 Added for GMC rate updates.
		• DAME-BRQ-03070
		 Updated to add a clarifying note that NDAB for IRD/RCD should be consistent with those of IRU/RCU, respectively.
		• DAME-BRQ-03090
		 Added for calculations update of Variable-Cost-based DAM and RTM DEBs to use updated GMC rates.
		• DAME-BRQ-07600
		 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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		 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.
12/23/2024	1.4	 Updated business requirement to per feedback from CAISO SMEs and market participants. General cleanups throughout the document.
		• DAME-BRQ-01135
		 Added Process BRQ to toggle MF RUC Participation Flag for LESRs to Yes.
		• DAME-BRQ-04080
		 Clarified to replace "registered quantities from MF" with "registered IR Certified Capacity quantities from MF".
		• DAME-BRQ-04130
		 Deleted (penalty price for IR.)
		• DAME-BRQ-04132
		 Updated to remove displaying (internal to ISO) IRU/IRD demand price curve.
		• DAME-BRQ-04135
		 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.
		• DAME-BRQ-04200
		 Updated to correct verbiage about LDF to use SYS LFZ (renormalized with respect to current topology).
		• DAME-BRQ-04390, DAME-BRQ-04400
		 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.
		 Clarified to account for import/export direction for IRUMP/IRDMP SP-Tie prices
		• DAME-BRQ-04395, DAME-BRQ-04405

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		 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.
		 Clarified to account for import/export direction for IRUMP/IRDMP SP-Tie prices
		DAME-BRQ-05002
		 Corrected to remove duplicate wording.
		DAME-BRQ-05030
		 Updated to remove use of unmitigated bids for RUC 48 and 72 hours as RUC will only run for 24 hours ahead now.
		DAME-BRQ-05160
		 Clarified to replace REN with RCU.
		• DAME-BRQ-05170
		 Clarified to replace REN with RCD.
		 DAME-BRQ-05180, DAME-BRQ-05182
		 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.
		 Clarified to account for import/export direction for RCUMP/RCDMP SP-Tie prices
		• DAME-BRQ-05181, DAME-BRQ-05183
		 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.
		 Clarified to account for import/export direction for RCUMP/RCDMP SP-Tie prices
		DAME-BRQ-06100
		 Added to revise shadow prices adjustments for the calculations of nodal SP-Tie FRU/FRD marginal price (FRUMP/FRDMP) in RTM.
		 Clarified to account for import/export direction for FRUMP/FRDMP SP-Tie prices
		DAME-BRQ-06120

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		 Added to include shadow prices adjustments for the calculations of resource SP-Tie FRU/FRD marginal price (FRUMP/FRDMP) in RTM (existing).
		DAME-BRQ-07265
		 Updated to add details for the calculation of monthly RA Showing Capacity.
		• DAME-BRQ-10160, DAME-BRQ-10160B
		 Clarified the price breakdown for nodal IRUMP/IRDMP to be (total, capacity, congestion but no loss)
		 Clarified the price breakdown for nodal RCUMP/RCDMP to be (total, capacity, congestion and loss)
		 Updated to exclude sub-components of MCC prices (by BAA) for nodal RCUMP/RCDMP
		DAME-BRQ-10160A
		 Clarified the price breakdown for nodal IRUMP/IRDMP to be (total, capacity, congestion but no loss)
		 Clarified to account for import/export direction for IRUMP/IRDMP SP-Tie prices.
		 Clarified the price breakdown for nodal RCUMP/RCDMP to be (total, capacity, congestion and loss)
		 Updated to exclude sub-components of MCC prices (by BAA) for nodal RCUMP/RCDMP
		 Clarified to account for import/export direction for RCUMP/RCDMP SP-Tie prices
		DAME-BRQ-10160AA
		 Added for OASIS to publish RTM Flexible Ramp Scheduling Point/Tie Nodal Prices by Direction (Import/Export).
		 Clarified to account for import/export direction for FRUMP/FRDMP SP-Tie prices
		• DAME-BRQ-10740
		 Clarified the price breakdown for resource IRUMP/IRDMP to be (total, capacity, congestion but no loss)
		 Clarified the price breakdown for resource RCUMP/RCDMP to be (total, capacity, congestion and loss)

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		 Updated to exclude sub-components of MCC prices (by BAA) for resource RCUMP/RCDMP
		DAME-BRQ-11420
		 Clarified the price breakdown for nodal and resource IRUMP/IRDMP to be (total, capacity, congestion but no loss).
		 Clarified the price breakdown for nodal and resource RCUMP/RCDMP to be (total, capacity, congestion and loss).
		 Updated to include sub-components of MCC prices (by BAA) for resource IRUMP/IRDMP and RCUMP/RCDMP.
		 Clarified to account for import/export direction for IRUMP/IRDMP, RCUMP/RCDMP SP-Tie prices.
		 Updated to publish FRUMP/FRDMP SP-Ties by direction.
4/7/2025	1.5	Updated business requirement to per feedback from CAISO SMEs and market
		General cleanups throughout the document.
		• DAME-BRQ-02011
		 Updated to replace 90 days with 75 days.
		• DAME-BRQ-04065
		 Added for RCU bid coverage for entire economic bid range for all physical supply resources.
		 DAME-BRQ-04510, DAME-BRQ-04515
		 Added for Market Priority Types functionality, including CRN for IFM.
		• DAME-BRQ-05000
		 Updated to correct the BRQ title to match its contents.
		• DAME-BRQ-05002
		 Updated insertion/extension bid price for Proxy RCU Bid for exports for RUC.
		• DAME-BRQ-05003
		 Added to consider Proxy RCU and RCU when SIBR receives a Proxy RCU on the exports.
		• DAME-BRQ-06100
		 Updated to correct BRQ title to remove broadcast.
		 DAME-BRQ-06150, DAME-BRQ-06170

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		 Added for Market Priority Types functionality, including CRN for RTM.
		• DAME-BRQ-10380
		 Added for OASIS to publish existing hourly aggregated data for Base scenarios (Energy product).
		 And to publish new hourly aggregated data for IRU and IRD product for IRU, IRD deployment scenarios.
		 DAME-BRQ-10735, DAME-BRQ-10737
		 Added for Market Priority Types functionality, including CRN for CMRI.
		• DAME-BRQ-10830
		 Added for CMRI to publish existing hourly data for Base scenarios (Energy product).
		 And to publish new hourly data for IRU and IRD product for IRU, IRD deployment scenarios.
		• DAME-BRQ-10940
		 Added for Market Priority Types functionality, including CRN for ADS.
		• DAME-BRQ-11420
		 Updated for Market Priority Types functionality for Data sent to FERC.
		• DAME-BRQ-15020
		 Updated for Market Priority Types functionality for Market Sim scenario guidelines.
		 Updated for checking CRR Revenue Adjustments.

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 realtime 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.
 - o 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
 - o 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

Bu	siness Opportunity/Problem Statement:
What:	The objective of this initiative is to enhance the California ISO's (CAISO's) day-ahead market by:
	 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:	 Real-Time Operations Market Performance and Advanced Analytics STF 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

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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-	Define Imbalance Reserve Up (IRU) and Imbalance Reserve Down (IRD) eligibility for the resource in DAM:	Core	Master File
01000	 Define resource and intertie eligibility for Imbalance reserve product (IR): Separate flag for upper (IRU), down (IRD) for all upper eligible registered resources 		RDT
	 Certified Capacity (MW) for IRU and IRD (IRUmax, IRDmax), 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 		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 Capacity are limited to the negative (charging) range. Pass the IRU, IRD flags and Certified Capacity MW to the downstream systems 		
	Formulas: For IRU: If SUT <= 15': IRU_{max} = Max{Min[(Pmin + [(15' - SUT) * RR]), Pmax], Min[(30' * RR), (Pmax - Pmin)] If SUT > 15': IRU_{max} = Min{ (30' * RR), (Pmax - Pmin)} For IRD: IRD_{max} = Min{ (30' * RR), (Pmax - Pmin)} Where RR is highest value among operational ramp rate segments in MW/min. 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. Note: Refer to Resource Eligibility Table in Appendix-B: 		
DAME- BRQ- 01010	Pormulas, Calculation Details, and Examples Define Reliability Capacity Up (RCU) and Reliability Capacity Down (RCD) eligibility: Define physical market resource eligibility for Reliability Capacity (RC): Separate flag for upper (RCU), down (RCD) Certified Capacity (MW) for RCU and RCD (BCU = RCD =) calculated based on 60 	Core	Master File RDT
	minute ramp, capped by Pmax/Pmin, using the below formulas.		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 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 		
	Formulas:		
	For RCU:		
	○ If SUT <= 60':		
	 RCU_{max} = Max{ Min[(Pmin + [(60' - SUT) * RR]), P_{max}], Min[(60' * RR), (P_{max} - P_{min})] } 		
	○ If SUT > 60':		
	RCU _{max} = Min{ (60' * RR), (P _{max} - P _{min})}		
	For RCD:		
	\circ RCD _{max} = Min{ (60' * RR) , (P _{max} - P _{min})}		
	 Where RR is highest value among operational ramp rate segments in MW/min. 		
	Note: The RCU/RCD eligibility flags and corresponding Certified Capacity MW quantities should be added to GRDT as read-only		
	Note:		
	 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 		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
DAME- BRQ-01040	 Define IR and RC DAB Ranking Options System shall define the following <u>separate</u> resource-specific fields, for all resources, including NGRs: IRU DAB Options Ranking IRD DAB Options Ranking RCU DAB Options Ranking RCD DAB Options Ranking Supported possible numeric rankings are for: 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	• MF
DAME- BRQ-01060	 Consume IR and RC DAB Ranking Options from Resources' SCs System shall consume the following <u>separate</u> resource-specific fields from resources' SCs, respectively, for all resources, including NGRs: IRU DAB Options Ranking IRD DAB Options Ranking RCU DAB Options Ranking RCD DAB Options Ranking RCD DAB Options Ranking Supported possible numeric rankings are for: 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) Notes 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	• MF • RDT
DAME- BRQ-01080	Default IR and RC DAB Ranking Options System shall use the following default numeric values for resource- specific IRU/IRD and RCU/RCD DAB Options Ranking, for all resources, including NGRs:	Core	• MF

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 Null (for non-eligible resources) (1) Calculated (for eligible resources) (2) Negotiated Rate (for eligible resources) 		
DAME- BRQ-	Set MSS-Specific Annual RUC Participation Flag to Always Opt-In	Core	• MF
01130	 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.		
	Notes		
	• For this project, Tariff activation date is same as Go-Live date.		
DAME-	Set RUC Participation Flag for LESRs to Yes	Process	• MF
BRQ- 01135	• RUC participation flag for LESRs shall be set to Yes, starting from Tariff activation date.		
	• This participation flag setting shall override the previous flag setting for the remainder of the year.		
	Notes		
	 For this project, Tariff activation date is same as Go-Live date. 		
DAME-	Define Imbalance Demand Hub for each BAA	Core	• MF
BRQ-01150	• 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.		
DAME- BRQ-01160	Define IR surplus zones for an EDAM BAA, consistent with FRP surplus zones for the same BAA	Core	• MF

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 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-	Define EDAM BAA Participation and Date	Core	• MF
BRQ-01200	 Define BAA with EDAM participation flag Define activate date 		
	Note: EDAM participation requirement also in EDAM-BRQ-02020 that link to the EDAM Tariff section.		
DAME-	Update GMC Rates	Core	• MF
BRQ-01220	Effective January 1, 2026		
	The following GMC rate shall be terminated:		
	• System Operations (SYSOPR)		
	Ihe following GMC rates shall be created: Output and Output and Deal Time Dispettate (0)(000DDD)		
	 System Operations Real-Time Dispatch (SYSOPRID) Applies to EDAM_CAISO BAA 		
	- Applies to EDAIN, CAISO BAA.		
	(SYSOPBAA)		
	 Applies to CAISO BAA. 		
	The following existing GMC rate shall be updated:		
	 WEIM System Operations (ESYSOPR) GMC rate shall be set equal to System Operations Real-Time Dispatch (SYSOPRTD) GMC rate. 		
	 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. 		
	Note		
	• For more <i>details</i> regarding the GMC rate, see the new Cost of Service Initiative.		

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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	General statement: Extend FRP requirements forecast quantile regression model to Imbalance Reserve requirement forecast and demand price curve The system stores the historical data and estimate the parameters of the statistic forecast model.	Process	Internal ISO System
DAME-BRQ- 02005	Mark all days as Weekdays Day Type for BARC's IR Quantile Regression Model	Process	Internal ISO System
	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).		
DAME-BRQ- 02010	Set the configurable parameters for the quantile regression for IR	Core	Internal ISO System
	The system shall have a set of system-wide configurable initialization parameters (separate set for FRP and IR) for Imbalance Requirement (IR) :		
	 the High Percentile, initially set to 97.5% (0.975) 		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 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	Set Configurable Sampling Scheme Parameters for the Quantile Regression for IR	Core	Internal ISO System
(Production- Track)	The system shall have a set of system-wide configurable sampling scheme parameters (separate set for FRP and IR) for Imbalance Requirement (IR) :		
	 Data Retention Period, initially set to 365 days 		
	 Configurable parameter to select Sampling Scheme: 		
	 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 <u>90-75</u> days backward and <u>90-75</u> days forward) 		
	Note		
	 This BRQ will be implemented in production track ahead of the DAME Go-Live. 		
DAME-BRQ-	Access EDAM BAAs	Core	Internal ISO
02012	 Access DAM BAA definition from MF Access the EDAM_AREA definition from MF 		System (from MF)

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
DAME-BRQ- 02020	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	Core	Internal ISO System (from IFM)
	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:		
	 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 		
	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.		
	Notes		
	 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. 		
DAME-BRQ- 02030	Consume and store the demand(d)/solar(s)/wind(w) trading day RTPD fore cast data	Fxisting	Internal ISO System
	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:	System Functionality	
	 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		

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	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	Calculate uncertainty as hourly maximum and minimum differences (two samples) between RTPD and DAM for the demand/solar/wind binding forecasts	Core	Internal ISO System
	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:		
	• the algebraic difference between the maximum/minimum demand 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 maximum/minimum solar 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 maximum/minimum wind 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. 		
DAME-BRQ- 02050	Manage rolling day of retention period for DAM 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.	Core	Internal ISO System

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
DAME-BRQ- 02060	Retrieve the total maximum capacity of solar/wind for each BAA and aggregate for the entire DAM area	Existing	Internal ISO System
	After rolling the Data Retention Period, the system shall		(from MF)
	 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. 		
DAME-BRQ- 02070	Adjust solar/wind forecast and uncertainty for each day in retention period:	Core	Internal ISO System
	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		
	• 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. 		
DAME-BRQ- 02080	Calculate and store net demand uncertainty as maximum/minimum net demand difference between RTPD and DAM for retention period	Core	Internal ISO System
	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		
	 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 		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	• 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	Calculate and store the Hourly High/lower percentile of histogram(H) for uncertainty of Demand(<i>D</i>) /Solar(<i>S</i>) /Wind(<i>W</i>) /Net demand(<i>ND</i>)	Core	Internal ISO System
	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		
	Calculate and store:		
	 the High/Low Percentile demand forecast uncertainty histogram (D^{H97.5}₆₀) /(D^{H2.5}₆₀) 		
	 the High/Low Percentile adjusted solar forecast uncertainty histogram (S^{H97.5}₆₀) /(S^{H2.5}₆₀) 		
	 the High/Low Percentile adjusted wind forecast uncertainty histogram (W^{H97.5}₆₀) /(W^{H2.5}₆₀) 		
	 the High/Low Percentile net demand forecast uncertainty histogram (ND^{H97.5}₆₀) /(ND^{H2.5}₆₀) 		
DAME-BRQ- 02100	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)	Core	Internal ISO System
	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		
	Calculate and store the second-order polynomial coefficients of the High/low Percentile quadratic quantile regression of uncertainty of forecast of:		
	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		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	$D_{60}^{P97.5}(d) \equiv A_{60}^{D97.5} d^2 + B_{60}^{D97.5} d + C_{60}^{D97.5}$		
	$D_{60}^{P2.5}(d) \equiv A_{60}^{D2.5} d^2 + B_{60}^{D2.5} d + C_{60}^{D2.5}$		
	• 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		
	$W_{60}^{P97.5}(w) \equiv A_{60}^{W97.5} w^2 + B_{60}^{W97.5} w + C_{60}^{W97.5}$		
	$W_{60}^{P2.5}(w) \equiv A_{60}^{W2.5} w^2 + B_{60}^{W2.5} w + C_{60}^{W2.5}$		
	Note:		
	Invercase (d, s, w) is for independent variables for forecasts		
	uncertainty data, difference between DAM and RTPD		
	to estimate A,B,C, use historical forecast and uncertainty data (historical uncertainty data will have 2 samples for each hour with max/min)		
	2 samples of uncertainty will be used in both high/low percentile regression, meaning same sample set for High/low percentile parameter estimation.		
DAME-BRQ- 02110	Construct input of mosaic for high/low percentile mosaic regression	Core	Internal ISO System
	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		
	Based on Histogram and quadratic Quantile Regression estimates uncertainty of load, wind, and solar		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	Calculate: Input (m=uncertainty of net load) for High percentile mosaic regression: $m_{60}^{P97.5}(nd, d, s, w)$ $\equiv ND_{60}^{H97.5} - (D_{60}^{H97.5} - S_{60}^{H2.5} - W_{60}^{H2.5})$ $+ (D_{60}^{P97.5}(d) - S_{60}^{P2.5}(s) - W_{60}^{P2.5}(w))$ Input (m) for Low percentile mosaic regression: $m_{60}^{P2.5}(nd, d, s, w)$ $\equiv ND_{60}^{H2.5} - (D_{60}^{H2.5} - S_{60}^{H97.5} - W_{60}^{H97.5})$ $+ (D_{60}^{P2.5}(d) - S_{60}^{P97.5}(s) - W_{60}^{P97.5}(w))$ Note:		
	There will be 2 samples of variable m created for each hour.		
DAME-BRQ- 02120	Calculate and store the hourly second-order polynomial coefficients of the High /Low Percentile quadratic quantile regression for mosaic (M)	Core	Internal ISO System
	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		
	Calculate and store the second-order polynomial coefficients of the High/low Percentile quadratic quantile regression of uncertainty of forecast of:		
	Mosaic (Net Demand):		
	$(A_{60}^{M97.5}, B_{60}^{M97.5}, C_{60}^{M97.5})/(A_{60}^{M2.5}, B_{60}^{M2.5}, C_{60}^{M2.5})$ through regression		
	$M_{60}^{P97.5}(m) \equiv A_{60}^{M97.5} m^2 + B_{60}^{M97.5} m + C_{60}^{M97.5}$		
	$M_{60}^{P2.5}(m) \equiv A_{60}^{M2.5} m^2 + B_{60}^{M2.5} m + C_{60}^{M2.5}$		
	Note:		
	In Quantile regression for Mosaic		

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	 <i>m</i> include m^{P97.5}₆₀ and m^{P2.5}₆₀ for each hour calculated for historical data according to BRQ1110 		
	 M include calculation of Net Load uncertainty max/min for historical data according to BRQ1080 		
	• 2 samples of m and 2 samples of M will be used in both high/low percentile regression for parameter A,B,C estimation for M		
DAME-BRQ- 02130	Calculate High/low percentile threshold for uncertainty of net demand (ND)	Core	Internal ISO System
	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.		
DAME-BRQ- 02140	By 6:00am of DAM each Trading Day, the system shall broadcast the following hourly data	Core	Internal ISO System
	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:		
	 the High/low Percentile hourly forecast uncertainty histogram for: 		
	• 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: $(W_{60}^{H97.5})/(W_{60}^{H27.5})$		
	 the second-order polynomial coefficients of the High/low Percentile quadratic quantile regression of hourly forecast uncertainty 		
	o demand: $(A_{60}^{D97.5}, B_{60}^{D97.5}, C_{60}^{D97.5}) / (A_{60}^{D2.5}, B_{60}^{D2.5}, C_{60}^{D2.5})$		
	$\circ \text{Solar:} \ (A_{60}^{S97.5}, B_{60}^{S97.5}, C_{60}^{S97.5}) \ / (A_{60}^{S2.5}, B_{60}^{S2.5}, C_{60}^{S2.5})$		
	• Wind: $(A_{60}^{W97.5}, B_{60}^{W97.5}, C_{60}^{W97.5}) / (A_{60}^{W2.5}, B_{60}^{W2.5}, C_{60}^{W2.5})$		
	$ \begin{tabular}{lllllllllllllllllllllllllllllllllll$		

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	 the hourly High/low Percentile Threshold forecast uncertainty histogram 		
	• net demand $(ND_{60}^{H99})/(ND_{60}^{H1})$		
	Note:		
	Market DAM will consume data to forecast the IRU and IRD requirements (IRUR/IR DR).		
	CMRI or OASIS will report the data		
DAME-BRQ- 02150	Set, Store and broadcast IRU/IRD Requirement Threshold	Core	Internal ISO System
	• 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) 		
	$(IRUR_{60}^{max})/(IRUR_{60}^{min}); IRDR_{60}^{max})/(IRDR_{60}^{min})$		
	for each BAA and DAM area		
	Note:		
	 The threshold value will be used by DAM to cap the IRU/IRD requirement. 		
	The threshold values should be positive.		
DAME-BRQ- 02300	Set configurable IRU and IRD price cap for the DAM	Core Intern	Internal ISO System
	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 IRU price cap is \$55/MWh IRD price cap is \$55/MWh		
DAME-BRQ- 02310	Consume DAM hourly forecast for demand, solar and wind for each BAA after 9 am	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	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/M Wh for IRU and -\$150/MWh for IRD, and an administration cap of \$55/MWh for both IRU/IRD	Core	Internal ISO System
	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:		
	Monotonically decreasing stepwise price curve with N segments.		
	Equidistant percentile selection from P_0 to $P_N^{(-)}$ (0.025) and from P_0 to $P_N^{(+)}$ (0.975):		
	$ \begin{cases} P_n^{(-)} = P_{n-1}^{(-)} - \frac{P_0 - P_N^{(-)}}{N}, n = 1, 2, \dots, N \end{cases} \text{ and } \begin{cases} P_n^{(+)} = P_{n-1}^{(+)} + \frac{P_N^{(+)} - P_0}{N}, n = 1, 2, \dots, N \end{cases}, \text{ where } P_0 = P_0^{(-)} = P_0^{(+)}. \end{cases} $		
	The price curve quantities are the quantiles of the selected percentiles:		
	$Q\left(P_0 = P_0^{(-)} = P_0^{(+)}\right) \equiv 0, \{Q(P_n^{(-)}), n = 1, 2,, N\},\$ and $\{Q(P_n^{(+)}), n = 1, 2,, N\}.$		
	These can be determined from the MOSAIC polynomial evaluation grid via linear interpolation.		
	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:		
	$\{P_n^{(-)} ENPF, n = 0, 1,, N - 1\}$ and $\{(1 - P_n^{(+)}) ENPC, n = 0, 1,, N - 1\}$, where $ENPF$ is the		

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	avoidance cost floor (-\$150/MWh) and <i>ENPC</i> is the avoidance cost ceiling [\$247/MWh for IRU and - \$150/MWh for IRD]).		
	• For IRU demand price curve for each hour interval for each BAA in the EDAM Area: $\begin{cases} Q\left(P_n^{(+)}\right), \left(1-P_n^{(+)}\right) ENPC, \\ n=0,1,2, \dots, N-1 \end{cases}$		
	Where: <i>N</i> is the Price Curve Segment Count <i>ENPC</i> is the avoidance cost ceiling P_0 is the percentile with zero quantile P_N^+ is the high percentile		
	$Q\left(P_{n}^{(+)}\right) = A_{60}^{MP_{n}^{+}} \left(M_{60}^{PP_{n}^{+}}\right)^{2} + B_{60}^{MP_{n}^{+}} M_{60}^{PP_{n}^{+}} + C_{60}^{MP_{n}^{+}}$ Where: $M_{60}^{PP_{n}^{+}} \equiv ND_{60}^{HP_{n}^{+}} - \left(D_{60}^{HP_{n}^{+}} - S_{60}^{H(1-P_{n}^{+})} - W_{60}^{H(1-P_{n}^{+})}\right) + \left(D_{60}^{PP_{n}^{+}}(d) - S_{60}^{P(1-P_{n}^{+})}(s) - W_{60}^{P(1-P_{n}^{+})}(w)\right)$		
	• For IRD demand price curve for each hour interval for each BAA in the EDAM Area: $\begin{cases} Q\left(P_n^{(-)}\right), P_n^{(-)} ENPF, \\ n = 0, 1, 2,, N - 1 \end{cases}$ Where: ENPF is the avoidance cost floor P_0 is the percentile with zero quantile $P_N^{(-)}$ is the low percentile		

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	 no steps of the demand curve will exceed the administrative ceiling of \$55/MWh for the imbalance reserve product 		
	Note d – latest demand forecast for each BAA w – latest wind forecast for each BAA		
	s – latest solar forecast for each BAA		
DAME-BRQ- 02340	Broadcast IRU and IRD demand price curve before 10 am	Core	Internal ISO System
	Broadcast demand price curve for		
	 IRU each hour each EDAM BAA for the DAM horizon (D+1) before 10 am 		
	$ \begin{cases} Q\left(P_{n}^{(+)}\right), \left(1-P_{n}^{(+)}\right) ENPC, \\ n = 0, 1, 2, \dots, N-1 \end{cases} $		
	 IRD each hour each EDAM BAA for the DAM horizon before 10 am 		
	$\begin{cases} Q(P_n^{(-)}), P_n^{(-)} ENPF, \\ n = 0, 1, 2, \dots, N-1 \end{cases}$		

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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	Sett	ing IR/RC DAB for For resources (inclu Options Ranking se shall automatically se market product to a	Calculated uding NGRs) et to "Calculat set the DAB to configurable	Ranking Option that have market product DAB ted" as first option, System for these resources for that e values (initially set as below):	Core	 Internal ISO System
		Market Product	DAB			
		IRU	\$55/MWh			
		IRD	\$55/MWh			
		RCU	\$55/MWh			
		RCD	\$55/MWh			
	• - • - !	There shall be sepa The IRU/IRD and R The x-axis of all DA WW Capacity of the as: • Registered Min Capaci	rate DAB for CU/RCD DAI Bs shall be s eligible resc Max Capacit tv (Pmin)	FIRU, IRD, RCU and RCD. B shall have single segment. Set to the entire Registered burce, specifically calculated ty (Pmax) minus Registered		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 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. 		
	Note:		
	• 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-	Negotiated Rate IR/RC DAB (NDAB)	Core	 Internal ISO System
BRQ-03060	System shall process IRU, IRD, RCU, and RCD DAB if all the following conditions are met:		
	 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). 		
	Notes		
	 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).		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
DAME-	Process for Establishing an NDAB for IRU or RCU	Business	Internal ISO System
BRQ-03070	The following process shall be adhered to for establishing NDAB for IRU or RCU:	Process	• CIDI
	 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: 		
	 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. 		
	Notes		
	 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). 		
DAME- BRQ-03080	Setting IR/RC DAB for Negotiated Option (NDAB) For resources (including NGRs) that have market product DAB Options Ranking set to "Negotiated" as first option, System shall	Core	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.		
	• 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	Replace SYSOPR GMC Rate with (SYSOPRTD+SYSOPBAA) GMC Rate in the Calculation of Variable-Cost-Based DAM and RTM DEBs	Core	Internal ISO System
	Effective January 1, 2026		
	 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. 		

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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	Specify the set of transmission constraints for IRU/IRD deployment scenarios	Core	DAM
	 Setup the configurable set of transmission constraints activate in IRU or IRD deployment scenarios 		
	 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 		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 The same set of constraints in deployment scenarios apply to all the IFM passes, in MPM,GHG pass, IFM 		
DAME- BRQ-04005	Specify configurable IRU and IRD deployment factors (DIRU/DIRD) configure portion of power flow related the IRU and IRD deployment scenarios	Core	DAM
	• 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		
	Note:		
	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		
DAME- BRQ-04008	Allow eligible resource to submit one-segment bid for Imbalance Reserve upward and downward: IRU, IRD	Core	SIBR (from ME)
	 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. The new participating lead		
	 Virtual supply/demand Hourly block import/export 60-minute PDR 60-minute RDRR 		
	Nete		
	Note:		
	• Refer to Resource Eligibility Table in Appendix-B: Formulas, Calculation Details, and Examples		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
DAME- BRQ-04010	 Set up configurable value for ramp intervals eligible for IRU/IRD, initial 30 minute 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	 Allow eligible resource to submit one-segment bid for Reliability Capacity (RC) upward and downward: RCU, RCD 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 intertie 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 intertie 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. The non-participating load Virtual supply/demand Note: Refer to Resource Eligibility Table in Appendix-B: Formulas, Calculation Details, and Examples 	Core	SIBR (from MF)
DAME- BRQ-04030	 Allow eligible VER to bid for IRU, IRD, RCU, RCD 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, VER can bid any price for RCU/RCD, same as other resource If VER is RA, RA resource SIBR rule apply Notes	Core	SIBR

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 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 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 Only allow Flex RA to submit self-schedule energy at Pmin For Flex RA capacity, MOO and bid insertion for energy: 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 Note: Any resources that are awarded IRU/IRD shall be subject to MOO in RTM. 	Core	SIBR (from CIRA)
DAME- BRQ-04060	 All the RA resources have MOO for RCU, optional for RCD and allow non-zero bid RA resources (Generic and Flex) will be able to bid non-zero prices for reliability capacity RCU/RCD. 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
	 If RA capacity has no economic RCU bids, system shall insert RCU DABs for RCU in DAM 		
	 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) 		
<u>DAME-</u> BRQ-04065	RCU Bids Coverage of Entire Economic Bid Range for All Physical Supply Resources	<u>Core</u>	<u>SIBR</u>
	 For all other physical supply resources (except RA resources, VERs and PT exports) that submit economic energy bids: If a resource did not submit RCU bid. System shall insert RCU bid at RCU DAB price to cover entire economic bid range up to their certified RCU capacity. If a resource submitted RCU bid that did not cover entire economic bid range. System shall extend RCU bid at submitted RCU capacity. 		
	 Notes This shall also apply to NGRs without REM too. RMR resources shall be treated as generating resources. Refer to DAME-BRQ-04040, DAME-BRQ-04060, DAME-BRQ- 05000 for corresponding requirement related to RA resources. Refer to DAME-BRQ-04031 for corresponding requirement related to VERs. Refer to DAME-BRQ-04070 for corresponding requirement related to PT exports. 		
	 Refer to EDAM-BRQ-11210 for corresponding EDAM BRQ. 		
DAME- BRQ-04070	 Supporting supply resource bid for RCU for PT-Export Incorporate Summer readiness 2021 rule for supporting the PT-export for RCU 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 supports sum of PT-exports 	Core	SIBR

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
DAME- BRQ-04072	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.	Core	SIBR
DAME- BRQ-04080	 Accept and validate IRU/IRD bid 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 IR Certified Capacity 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	 Accept and validate RCU/RCD capacity bids Market participants will submit separate bids for RCU, RCD 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 	Core	SIBR

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 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-04131	 IRU/IRD Requirements (IRUR/IRDR) subjects to demand price curve Apply the demand price curve to the relax variable for the IRU/IRD Requirement (IRUR/IRDR). Note: no calculation change for demand price curve for ISO and other 	Core	DAM
	EDAM BAAs		
DAME- BRQ-04132	Consume IRU/IRD demand price curve At 10 am, the system shall consume the IRU and IRD demand price curves $\{Q_k, P_k, k = 1, 2,, n\}$ for each hour interval of the DAM market horizon for each BAA in the EDAM Area. Note: 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: \int_{IRUS}	Core	DAM (from Internal ISO System)
	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		

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DAME- BRQ-04134	Apply IRU/ IRD demand price curve on IRU/IRD surplus variables in optimization to procure IRU/IRD	Core	DAM
	 Cover the IRUR/IRDR range: system shall extend or prune the end of the IRU/IRD demand price curve for each BAA in the EDAM Area to match the corresponding IRU/IRD Requirement (IRUR/IRDR) distributed to that BAA: 		
	$Q_n = IRUR$ for IRU		
	$Q_n = -IRDR$ for IRD		
	 Transform demand price curve to monotonic increase price curve for surplus variables for IRU/IDR for each hour each BAA 		
	 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 <i>q</i> capped by <i>q</i>_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 Qi shall be capped by Qn 		
	• Limit from above all segments of the IRU/IRD price curve by the IRU/IRD configurable cap price \$55/MWh.		

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DAME- BRQ- 04134A	Apply IRU/IRD demand price curve to IRU/IRD surplus in proportion to IRUR/IRDR in that surplus zone 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.	Core	DAM
	$\sum_{t=1}^{N} \sum_{j \in EIM} IRUSP_{j,t} \sum_{z \in Z_{j}} IRUS_{z,j,t} + \sum_{t=1}^{N} \sum_{j \in EIM} IRDSP_{j,t} \sum_{z \in Z_{j}} IRDS_{z,j,t}$		
DAME- BRQ-04135	BAA IRU/IRD Procurement constraints include IRU/IRD surplus in the BAA IR surplus zones• The system shall retrieve all defined IR Surplus Zones and their BAA association from Master File• BAA IRU/IRD procurement constraints include multiple IRUS/IRDS for multiple IR surplus zones in the BAA $\sum_{i \in BAA_j} IRU_{i,t} + \sum_{z \in Z_j} IRUS_{z,j,t} = IRUR_{j,t}$ $0 \le IRUS_{z,j,t}, \forall z \in Z_j$ $\sum_{i \in BAA_j} IRD_{i,t} + \sum_{z \in Z_j} IRDS_{z,j,t} = IRDR_{j,t}$ $0 \le IRDS_{z,j,t}, \forall z \in Z_j$ • 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. $IRUS_{i,z,j,t} = \frac{\Delta L_{i,t}^{(u)}}{\sum_{i \in S_x} \Delta L_{i,t}^{(u)}} IRUS_{z,j,t}, \forall i \in S_z, \forall z \in Z_j$ $IRDS_{i,z,j,t} = \frac{\Delta L_{i,t}^{(d)}}{\sum_{i \in S_x} \Delta L_{i,t}^{(d)}} IRDS_{z,j,t}, \forall i \in S_z, \forall z \in Z_j$	Core	DAM

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	• The total IRU/IRD surplus in each BAA in the EDAM Area shall be limited to the IRU/IRD requirement, respectively, in that BAA. $\sum_{z \in Z_j} IRUS_{z,j,t} \leq \widehat{IRUR}_{j,t} \equiv \sum_{z \in Z_j} \sum_{i \in S_z} \Delta L_{i,t}^{(u)}$ $\sum IRDS_{z,j,t} \leq \widehat{IRDR}_{j,t} \equiv -\sum \sum \Delta L_{i,t}^{(d)}$		
DAME- BRQ-04136	$z \in Z_{j} \qquad z \in Z_{j} \ i \in S_{z}$ Transmission Constraints with IR surplus zones Include the IRUS/IRDS nodal contribution on constraint, using IRUS nodal shift factor for the IR surplus zone $\ell \widetilde{F}L_{m,t} \leq \widetilde{F}_{m,t} + \sum_{i} (\Delta EN_{i,t} + DFIRU IRU_{i,t} + \Delta VS_{i,t} - \Delta VD_{i,t} - \Delta L_{i,t}) SF_{i,m,t}$	Core	DAM
	$+ DFIRU \left(\sum_{j \in EDAM} \sum_{z \in Z_j} IRUS_{z,j,t} SF_{z,j,m,t}^{(u)} - IRUR_t SF_{m,t}^{(u)}\right) \leq \widetilde{UFL}_{m,t}$ $\widetilde{LFL}_{m,t} \leq \widetilde{F}_{m,t} + \sum_{i} \left(\Delta EN_{i,t} - DFIRD IRU_{i,t} + \Delta VS_{i,t} - \Delta VD_{i,t} - \Delta L_{i,t}\right) SF_{i,m,t}$ $- DFIRD \left(\sum_{j \in EDAM} \sum_{z \in Z_j} IRDS_{z,j,t} SF_{z,j,m,t}^{(d)} - IRDR_t SF_{m,t}^{(d)}\right) \leq \widetilde{UFL}_{m,t}$		
DAME- BRQ-04137	Include the APnode of surplus zones shift factors in shift factor set in each market pass System shall include the APnode of surplus zones shift factors in shift factor set in each market pass.	Core	DAM
DAME- BRQ-04140	 Consume Histogram and the second-order polynomial coefficients for DAM hourly (60min) IRU and IRD for each Trading Hour of the next Trading Day (D+1), for each BAA and DAM Area: the High/low Percentile hourly forecast uncertainty histogram for: net demand: (ND₆₀^{H97.5})/(ND₆₀^{H2.5}) demand: (D₆₀^{H97.5})/(D₆₀^{H2.5}) adjusted solar: (S₆₀^{H97.5})/(S₆₀^{H2.5}) adjusted wind: (W₆₀^{H97.5})/(W₆₀^{H2.5}) the second-order polynomial coefficients of the High/low Percentile quadratic quantile regression of hourly forecast uncertainty 	Core	DAM [pre-DAM close] (from Internal ISO System)

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	o demand: $(A_{60}^{D97.5}, B_{60}^{D97.5}, C_{60}^{D97.5}) / (A_{60}^{D2.5}, B_{60}^{D2.5}, C_{60}^{D2.5})$		
	$\circ \text{Solar:} \ (A_{60}^{S97.5}, B_{60}^{S97.5}, C_{60}^{S97.5}) / (A_{60}^{S2.5}, B_{60}^{S2.5}, C_{60}^{S2.5})$		
	• Wind: $(A_{60}^{W97.5}, B_{60}^{W97.5}, C_{60}^{W97.5}) / (A_{60}^{W2.5}, B_{60}^{W2.5}, C_{60}^{W2.5})$		
	$ \begin{tabular}{lllllllllllllllllllllllllllllllllll$		
	 the hourly High/low Percentile Threshold forecast uncertainty histogram 		
	• net demand $(ND_{60}^{H99})/(ND_{60}^{H1})$		
	 Threshold value of IRU and IRD requirements (IRUR₆₀^{max})/(IRUR₆₀^{min}); IRDR₆₀^{max})/(IRDR₆₀^{min}) 		
	Note:		
	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		
DAME- BRQ-04150	Calculate the hourly IRU/IRD requirements (IRUR/IRDR) every time [IFM pre-DAM] runs for D+1	Core	IFM [pre-DAM close]
	For each Trading Hour of the next Trading Day (D+1) of the day type, for each BAA and DAM Area		
	use the corresponding parameters from D+1 to calculate:		
	 Imbalance reserve upper requirement (IRUR): 		
	$IRUR_{60} = A_{60}^{M97.5} (M_{60}^{P97.5})^2 + B_{60}^{M97.5} M_{60}^{P97.5} + C_{60}^{M97.5}$		
	Where:		
	$ 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)) $		
	$D_{60}^{P97.5}(d) \equiv A_{60}^{D97.5} d^2 + B_{60}^{D97.5} d + C_{60}^{D97.5}$		
	$S_{60}^{P2.5}(s) \equiv A_{60}^{S2.5} s^2 + B_{60}^{S2.5} s + C_{60}^{S2.5}$		
	$W_{60}^{P2.5}(w) \equiv A_{60}^{W2.5} w^2 + B_{60}^{W2.5} w + C_{60}^{W2.5}$		
	Imbalance reserve down requirement (IRDR):		

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	$IRDR_{60} = A_{60}^{M2.5} (M_{60}^{P2.5})^2 + B_{60}^{M2.5} M_{60}^{P2.5} + C_{60}^{M2.5}$ Where: $M_{60}^{P2.5} (nd, d, s, w) \equiv ND_{60}^{H2.5} - (D_{60}^{H2.5} - S_{60}^{H97.5} - W_{60}^{H97.5}) + (D_{60}^{P2.5}(d) - S_{60}^{P97.5}(s) - W_{60}^{P97.5}(w))$ $D_{60}^{P2.5} (d) \equiv A_{60}^{D2.5} d^2 + B_{60}^{D2.5} d + C_{60}^{D2.5}$ $S_{60}^{P97.5} (s) \equiv A_{60}^{S97.5} s^2 + B_{60}^{S97.5} s + C_{60}^{S97.5}$ $W_{60}^{P97.5} (w) \equiv A_{60}^{W97.5} w^2 + B_{60}^{W97.5} w + C_{60}^{W97.5}$ Notes • $d - latest$ 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 • 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	 Calculate the hourly IRU/IRD requirements (IRUR/IRDR) for D+2 and D+3 For each Trading Hour of the next Trading Days (D+2 and D+3) of the day type, for each BAA and DAM Area use the corresponding parameters from D+1 to calculate: Imbalance reserve upper requirement (IRUR): Imbalance reserve down requirement (IRDR): Notes 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	The system shall bound the hourly IRU/IRD Requirements (IRUR/IRDR) for each Trading Hour of the next Trading Day, for each BAA and DAM Area	Core	IFM [IFM pre-DAM close]

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	$IRUR_{60} = max \begin{pmatrix} IRUR_{60}^{min}, ND_{60}^{H1}, \\ min((ND_{60}^{H99}, IRUR_{60}, IRUR_{60}^{max})) \end{pmatrix}$		
	$IRDR_{60} = min \left(\frac{-1 * IRDR_{60}^{min}, ND_{60}^{H99},}{max \left((ND_{60}^{H1}, IRDR_{60}, -1 * IRDR_{60}^{max}) \right) \right)$		
DAME- BRQ-04180	The system shall calculate the IRU requirement allocation factors to demand, solar, and wind for each hour of the trading day for ISO BAA:	Core	DAM
	• $IRUDF_{60}(d, s, w) \equiv \frac{ D_{60}^{P97.5}(d) }{ D_{60}^{P97.5}(d) + S_{60}^{P2.5}(s) + W_{60}^{P2.5}(w) }$		
	• $IRUSF_{60}(d, s, w) \equiv \frac{ s_{60}^{P_2.5}(s) }{ D_{60}^{P_97.5}(d) + s_{60}^{P_2.5}(s) + W_{60}^{P_2.5}(w) }$		
	• $IRUWF_{60}(d, s, w) \equiv \frac{ W_{60}^{P_2.5}(w) }{ D_{60}^{P_{97}.5}(d) + S_{60}^{P_2.5}(s) + W_{60}^{P_2.5}(w) }$		
DAME- BRQ-04190	The system shall calculate the IRD requirement allocation factors to demand, solar, and wind for each hour of the trading day for ISO BAA,	Core	DAM
	• $IRDDF_{60}(d, s, w) \equiv \frac{ D_{60}^{P_2.5}(d) }{ D_{60}^{P_2.5}(d) + S_{60}^{P_{97.5}}(s) + W_{60}^{P_{97.5}}(w) }$		
	• $IRDSF_{60}(d, s, w) \equiv \frac{ S_{60}^{P_97.5}(s) }{ D_{60}^{P_2.5}(d) + S_{60}^{P_97.5}(s) + W_{60}^{P_{97.5}}(w) }$		
	• $IRDWF_{60}(d,s,w) \equiv \frac{ W_{60}^{P97.5}(w) }{ D_{60}^{P2.5}(d) + S_{60}^{P97.5}(w) + W_{60}^{P97.5}(w) }$		
DAME- BRQ-04200	The system shall distribute the IRU/IRD Requirement (IRUR/IRDR) allocated to demand nodes, superimposed on the load schedule	Core	DAM
	For each hour of the trading day in the IR deployment scenario, with distribution factors (LDF) for SYS LFZ (renormalized with respect to current topology).		
	• Allocate IRU as positive load to the load nodes: $\Delta L_{i,t}^{(u)} = (LDF_{i,t} * IRUR_{60} * IRUDF_{60}(d, s, w))$		

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	• Allocate IRD as negative load to the load nodes: $\Delta L_{i,t}^{(d)} = (-LDF_{i,t} * IRDR_{60} * IRDDF_{60}(d, s, w))$		
DAME- BRQ-04210	Calculate solar and wind distribution Factors of each VER nodes proportion to the forecasts:	Core	DAM
	Solar Resource distribution factor:		
	$SDF_{i,t} = \frac{FS_{i,t}}{\sum_i FS_{i,t}}$		
	Wind Resource distribution factor:		
	$WDF_{i,t} = \frac{FW_{i,t}}{\sum_{i} FW_{i,t}}$		
DAME- BRQ-04220	Distribute the IRU/IRD Requirement (IRUR/IRDR) to VER nodes, superimposed on the VER schedule	Core	DAM
	• Distribute IRU as positive load to the Solar and wind VER nodes: $\Delta L_{i,t}^{(u)} = (SDF_{i,t} * IRUR_{60} * IRUSF_{60}(d,s,w))$		
	$\Delta L_{i,t}^{(u)} = (WDF_{i,t} * IRUR_{60} * IRUWF_{60}(d, s, w))$		
	• Distribute IRD as negative load to the solar and wind VER nodes: $\Delta L_{i,t}^{(d)} = (-SDF_{i,t} * IRDR_{60} * IRDSF_{60}(d, s, w))$		
	$\Delta L_{i,t}^{(d)} = (-WDF_{i,t} * IRDR_{60} * IRDWF_{60}(d, s, w))$		
DAME- BRQ-04230	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	Core	DAM
	 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 		

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DAME-	Identify the critical constraints for IRU/IRD deployment scenarios	Core	DAM
BRQ-04232	Determine the critical set in the deployment scenarios superimposing the linear IR flows from UC		
	Note		
	Refer to DAME-BRQ-06070 for RTM.		
DAME-	Calculate Shift Factors for base case and base case with	Core	DAM
BRQ-04235	contingencies Calculate Shift factor based on AC power flow runs:		
	 Shift Factor SF_{i,m,t} for the node <i>i</i> on transmission <i>m</i> and hour <i>t</i> of base case Shift Factor SF^(k)_{i,m,t} for N-1 preventive transmission contingencies Shift Factor SF^(g)_{i,m,t} for GCARM generation/transmission contingencies Adjusted Shift Factor SF^(g)_{i,m,t} for GCARM generation/transmission contingencies Adjusted Shift Factor SF^(g)_{i,m,t} for GCARM generation/transmission contingencies with post-contingency correction Store the calculated the shift factors. Note: The same Shift factors will apply to the base scenario, IRU/IRD deployment scenarios in IFM, and RUC RCU/RCD procurement 		
DAME- BRQ-04240	Apply LMPM for energy bid by Including IRU and IRD deployment scenario in DCPA counter flow calculation and Energy LMP calculation	Core	IFM-MPM
	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		

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	 To calculate the Energy competitive LMP for each node, 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. 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	 Apply LMPM for IRU bid by Including IRU deployment scenario in DCPA counter flow calculation and IRU nodal price calculation 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, 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. 	Core	IFM-MPM

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	Note: LMPM applies to IRU only, not for IRD.		
DAME- BRQ-04260	System shall procure IRU/IRD through co-optimization with energy and AS	Core	IFM, IFM-MPM
	Objective function:		
	 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 		
DAME- BRQ-04280	Procurement constraints for IRU/IRD in co-optimization energy, AS and IR	Core	IFM, IFM-MPM
	 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	Capacity constraints for IRU/IRD in co-optimization energy, AS and IR	Core	IFM, IFM-MPM
	 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 For VER: 		
	 VER for IRU/IRD, UOL/UEL limited by VER forecast 		
DAME- BRQ-04300	Ramp capability constraints for IRU/IRD in co-optimization energy, AS and IR	Core	IFM, IFM-MPM
	 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. 		

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	 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 IRU. For resource shut down use configurable granularity adjustment factor (defaulted to 2) for IRD. (same factor as the one used for IRU) 		
	With the adjustment factor, there is no need to develop 15min dynamic ramp for IRU/IRD		
DAME- BRQ-04310	Transmission constraints in co-optimization energy, AS and IRU/IRD	Core	IFM, IFM-MPM
	From base case		
	• 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		
	From base case with contingencies		
	 Enforce transmission constraints for energy and virtual energy base case with N-1 transmission contingencies using shift factor SF^(k)_{i,m,t} Enforce transmission constraints for energy and virtual energy base case with GCARM generation/transmission contingencies using adjusted shift factor SF^(g)_{i,m,t} 		
	From IRU/IRD deployment scenarios		
	 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}. 		

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	 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^(k)_{i,m,t} The shift factors in the IRU/IRD deployment scenarios with GCARM generation/transmission contingencies using adjusted shift factor SF^(g)_{i,m,t} 		
	 Note: 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	 Scheduling Limit constraints in co-optimization energy, AS and IR 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) Include IRD in ITC/ISL lower limit constraints for downward AS without energy (AS type) Include IRD in ITC/ISL lower limit constraints for downward AS without energy (AS type) Notes 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	Energy limit, Gas-burn, pump and other constraints in co- optimization energy, AS and IR	Core	IFM, IFM-MPM
	Gas-Burn nomograms		

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	 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.		
DAME-	Include IRU/IRD in storage resource ASSOC constraint	Core	IFM, IFM-MPM
BRQ-04331	Include IRU in the ASSOC constraint that SOC be able to discharge to support minimum SOC plus upward AS and IRU;		
	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.		
	Notes		
	$SOC_{i,t} - RU_{i,t} - SR_{i,t} - NR_{i,t} - \frac{IRU_{i,t} + IRU_{i,t+1}}{2} \ge \underline{SOC}_{i,t}$		
	$SOC_{i,t} + \eta_i \left(RD_{i,t} + \frac{IRD_{i,t} + IRD_{i,t+1}}{2} \right) \le \overline{SOC}_{i,t}$		
	, $\forall i \in S_{LESR} \land t = 1, 2,, T$		
	 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-	Include IRU/IRD and RCU/RCD in storage resource ASSOC constraint	Core	RUC
04331A	Include IRU and RCU in the ASSOC constraint that SOC be able to discharge to support minimum SOC plus upward AS and IRU/RCU;		
	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.		
	Notes		
	$SOC_{i,t} - RU_{i,t} - SR_{i,t} - NR_{i,t} - \frac{IRU_{i,t} + IRU_{i,t+1}}{2} - \frac{RCU_{i,t} + RCU_{i,t+1}}{2} \ge \underline{SOC}_{i,t}$ $SOC_{i,t} + \eta_i \left(RD_{i,t} + \frac{IRD_{i,t+1}RD_{i,t+1}}{2} + \frac{RCD_{i,t}}{2} + \frac{RCD_{i,t}}{2} \right) \le \overline{SOC}_{i,t}$		

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	 ,∀i∈ S_{LESR} ∧ t = 1,2,,T 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. 		
DAME- BRQ-04332	Include attenuation from capacity IR/RC awards in SOC envelop constraint in MPM, IFM, RUC	Core	DAM
	 Set hourly configurable parameters by BAA for attenuation factors for IR and RC capacity awards to storage resource in DAM 		
	 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: 		
	 IRU IRD RCU RCD 		
	\circ 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 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 		
	$\forall i \in S_{LESR} \land t = 1, 2,, T$		
	$SOC_{i,t}^{(u)} = \begin{pmatrix} SOC_{it-1}^{(u)} - EN_{i,t}^{(+)} - \eta_i EN_{i,t}^{(-)} \\ -AIRU_t \frac{IRU_{it} + IRU_{i,t+1}}{2} - ARCU_t \frac{RCU_{it} + RCU_{i,t+1}}{2} \end{pmatrix} \ge \underline{SOC}_{i,t} \\ RUC: \\ SOC_{i,t}^{(d)} = \begin{pmatrix} SOC_{i,t-1}^{(d)} - EN_{i,t}^{(+)} - \eta_i EN_{i,t}^{(-)} + \\ SOC_{i,t}^{(d)} - EN_{i,t}^{(+)} - \eta_i EN_{i,t}^{(-)} + \\ \eta_i AIRD_t \frac{IRD_{i,t} + IRD_{i,t+1}}{2} + \eta_i ARCD_t \frac{RCD_{i,t} + RCD_{i,t+1}}{2} \end{pmatrix} \le \underline{SOC}_{i,t} \end{pmatrix}, \\ \forall i \in S_{LESR} \land t = 1, 2,, T$		

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	Where $IRU_{i,T+1} = IRD_{i,T+1} = RCU_{i,T+1} = RCD_{i,T+1} = 0$		
DAME- BRQ-04350	Calculate hourly locational marginal price (LMP) for energy in DAM include IRU/IRD deployment scenarios on congestion, for nodal and resource	Core	IFM, IFM-MPM
	Energy locational marginal price LMP for each hour in IFM:		
	 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 $SF_{i,m,t}^{(k,u)}$		

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	 (minus) MCC components of IRU deployment case with GCARM generation/ transmission contingency using DIRD*adjusted shift factor SF^(g,d)_{i,m,t} 		
	• (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^(g,d)_{i,m,t} 		
	 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. 		
	Note: MCC is the sum of all congestion costs, each calculated as product of shift factor and shadow price of the binding network constraint		
DAME- BRQ-04360	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	Core	IFM, IFM-MPM
	• 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	Calculate hourly nodal IRU marginal price (IRUMP) in DAM for all nodal and resource	Core	IFM, IFM-MPM
	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^(k)_{i,m,t} 		
	• (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.		

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	Noto		
	 IRUMP/IRDMP will be calculated for all the pnodes and resources, similar as for Energy LMP. 		
DAME- BRQ-04380	Calculate hourly nodal IRD marginal price (IRDMP) in DAM for node and resource	Core	IFM, IFM-MPM
	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'^(g)_{i,m,t} 		
	The intertie congestion components shall be included in IRDMP		
DAME- BRQ-04390	Nodal by Direction (Import & Export)	Core	IFM, IFM-MPM
	For Import direction		
	SP nodal price of IRU		
	 (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 		
	For Export direction		
	SP nodal prices of IRU		
	• (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.		
DAME- BRQ-04395	Calculate Hourly SP-Tie IRU Marginal Price (IRUMP) in DAM for Resource	Core	IFM, IFM-MPM
	SP nodal price of IRU		

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	 (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 		
	 (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. 		
DAME- BRQ-04400	Calculate Hourly SP-Tie IRD Marginal Price (IRDMP) in DAM for Nodal by Direction (Import & Export) For import direction	Core	IFM, IFM-MPM
	SP nodal price IRD		
	 (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 		
	For export direction		
	SP nodal price IRD		
	 (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 IRD. 		
DAME- BRQ-04405	Calculate Hourly SP-Tie IRD Marginal Price (IRDMP) in DAM for Resource	Core	IFM, IFM-MPM
	SP nodal price IRD		
	 (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 		
	 (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. 		
DAME-	Calculate weight of distribution of IRUR/IRDR in the BAA	Core	IFM, IFM-
BRQ-04451	For each load/Solar/Wind (d/s/w) distribution		MPM, RUC
	Weight factors for IRU/IRD, using (D/S/W) Distribution factor*(D/S/W) Allocation Factor		
	$w_{i,t}^{u}(d) = (LDF_{i,t} * IRUDF_{60}(d, s, w))$		
	$w_{i,t}^{u}(s) = (SDF_{i,t} * IRUSF_{60}(d, s, w))$		

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	$w_{i,t}^{u}(w) = (WDF_{i,t} * IRUWF_{60}(d, s, w))$		
	$\mathbf{w}_{i,t}^{d}(\mathbf{d}) = (LDF_{i,t} * IRDDF_{60}(d, s, w))$		
	$w_{i,t}^{d}(s) = (SDF_{i,t} * IRDSF_{60}(d, s, w))$		
	$\mathbf{w}_{i,t}^{d}(\mathbf{w}) = (WDF_{i,t} * IRDWF_{60}(d, s, w))$		
DAME- BRQ-04452	Calculate BAA Imbalance Upward/Downward deployment Shift Factors Imbalance demand reference point (Anode)	Core	IFM, IFM- MPM, RUC
	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 adjusted shift factor $SF_{m,t}^{'(g,u)}/SF_{m,t}^{'(g,d)}$ for GCARM with post contingency correction Note: Same Reference point is used to calculate SF for balance demand apode of each EDAM BAAs		
DAME- BRQ-04453	Include IRU/IRD awards, requirement and surplus contribution in transmission constraint Include IRU/IRD awards, IRU/IRD Requirements (IRUR/IRDR) and IRU/IRD Surplus (IRUS/IRDS) contribution on transmission constraint	Core	IFM, IFM- MPM, RUC
	$\begin{split} \widetilde{LFL}_{m,t} &\leq \widetilde{F}_{m,t} + \sum_{i} \left(\Delta E N_{i,t} + DFIRU IRU_{i,t} + \Delta VS_{i,t} - \Delta VD_{i,t} - \Delta L_{i,t} \right) SF_{i,m,t} + \\ 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} \left(\Delta E N_{i,t} - DFIRD IRD_{i,t} + \Delta VS_{i,t} - \Delta VD_{i,t} - \Delta L_{i,t} \right) SF_{i,m,t} - \\ DFIRD (IRDS_t - IRDR_t) SF_{m,t}^{(d)} &\leq \widetilde{UFL}_{m,t} \end{split} $		

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	$ \begin{aligned} \forall k, m \wedge t &= 1, 2, \dots, T \\ L\widetilde{F}L_{m,t}^{(g)} &\leq \widetilde{F}_{m,t}^{(g)} + \sum_{i} \left(\Delta E N_{i,t} + DF IRU IRU_{i,t} + \Delta V S_{i,t} - \Delta V D_{i,t} - \Delta L_{i,t} \right) SF_{i,m,t}^{(g)} + \\ DF IRU (IRUS_t - IRUR_t) SF_{i,m,t}^{(g,u)} &\leq \widetilde{UFL}_{m,t}^{(g)} \\ L\widetilde{F}L_{m,t}^{(g)} &\leq \widetilde{F}_{m,t}^{(g)} + \sum_{i} \left(\Delta E N_{i,t} - DF IRD IRD_{i,t} + \Delta V S_{i,t} - \Delta V D_{i,t} - \Delta L_{i,t} \right) SF_{i,m,t}^{(g,d)} - \\ DF IRD (IRDS_t - IRDR_t) SF_{i,m,t}^{(g,d)} &\leq \widetilde{UFL}_{m,t}^{(g)} \end{aligned} $		
DAME- BRQ-04454	 Calculate hourly IRO/IRD Surplus variable and IRO/IRD marginal price of Surplus Apnode, price breakdown by BAA 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. 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 The IRU/IRD surplus is defined on each Apnode associated and the price components at location of the price of the pric	Core	IFM
	 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 	Corp	
<u>DAME-</u> BRQ-04510	Types for Export Resources	<u>Core</u>	<u>IFM</u>

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	For broadcasting purposes-only, System shall roll over DAECON into DALPT resource-specific market priority type for export resources.		
	 <u>An export resource ID can be associated with more than one</u> market priority types with a MW corresponding to each market priority type. 		
<u>DAME-</u> <u>BRQ-04515</u>	Roll Over DAECON into PT Resource-Specific Market PriorityTypes for Non-Export ResourcesFor broadcasting purposes-only, System shall roll over DAECON into PTresource-specific market priority type for non-export resources.	<u>Core</u>	<u>IFM</u>
	 <u>An export resource ID can be associated with more than one</u> market priority types with a MW corresponding to each market priority type. 		

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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	 Consume RCU/RCD resource bidsMF Data and MOO in RUC, insert/extend RCU bids for RA non-VER resources Consume MF defined physical market resource eligibility for Reliability Capacity (RC): Separate flag for upper (RCU), down 	Core	SIBR (from MF)
	 (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. 		
	 Notes RMR resources shall be treated as generating resources. 		
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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
DAME-	Keep IFM Energy, AS, IRU/IRD Fixed in RUC	Core	RUC
BRQ- 05001	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.		
DAME- BRQ- 05002	 Create Proxy RCU Bid for Exports with IFM LPT and/or Economic Energy Schedules with No RCU Clean Bid or Not Enough RCU Clean Bid 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 DAB price (configurable) and lower than the RUC PBC penalty in the scheduling run and at DAB bid price in the pricing run. If exports cleared IFM with LPT and/or economic energy schedules and have RCU clean bids), in the RUC schedule run, System shall create proxy RCU leads 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 DAB price in the IFM (between DAB bid price (configurable) and lower than the RUC PBC penalty in the scheduling run for the extended portion and at DAB bid price inusing the 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 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 if the penalty prices, they will only be awarded RCU awards if the reis in oavailable 	Core	RUC

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	 physical supply capacity in the RUC above energy schedules to meet both the demand forecast and the economic and LPT exports that cleared the IFM. 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, 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. For extended RCU bids, the proxy portion is omitted and the clean bid portion is included in the 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 RCU DAB price plus a configurable value and the same resource capacity portionRUC PBC penalty in the scheduling run to maintain the same merit order when proxy RCU is awards (DAECON first followed by DALPT).), two separate configurable values shall be available, one for DAECON and one for 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. 		
<u>DAME-</u> <u>BRQ-</u> 05003	 <u>Consider Proxy RCU and RCU when SIBR Receives a Proxy RCU on the Exports</u> <u>System shall ensure that there is an energy bid curve with a bid range equal to the sum of the RCU award MW and the Proxy RCU MW.</u> <u>System shall have a validation rule to prohibit a Total Self-Schedule from being greater than the IFM Schedule minus the sum of the RCU Award and the Proxy RCU MW. if any.</u> 	<u>Core</u>	RUC
DAME- BRQ- 05005	Adjust VER RCU/RCD Bid Down If Forecast Output Less than Bid MW Value Adjust the clean RCU/RCD VER bid down as necessary if the forecast output is less than the max MW value of the bid.	Core	RUC
DAME- BRQ- 05010	 Define the notion of Reliability Energy REN In the RUC, Set the notion of REN as resource reliability energy schedules that RCU/RCD awards are related to the day-ahead energy schedules fixed EN 	Information- Only	RUC

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	$REN_{i,t} \equiv EN_{i,t} + RCU_{i,t} - RCD_{i,t}$		
	NoteREN is another alternative terminology of RUC Schedule.		
DAME- BRQ- 05020	 Build RUC-MPM pass, perform market power mitigation for RCU Build Activation switch for turn on/off of RUC-MPM If RUC-MPM is off, skip RUC-MPM pass 	Core	RUC -MPM
	 Note: With RUC-MPM is on: 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	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 $REN_{i,t} \equiv EN_{i,t} + RCU_{i,t} - RCD_{i,t}$	Core	RUC -MPM
	Notes		
	REN is another alternative terminology of RUC Schedule.		
DAME- BRQ- 05025	 Build RUC- LMPM: 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 IEM- 	Core	RUC-MPM
	MPM for energy (no change to reference point for calculate LMP)		

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	 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. 		
	 Notes REN is another alternative terminology of RUC Schedule. 		
DAME- BRQ-	Apply mitigated RCU bids for trading day hours only	Core	RUC
05030	 Use mitigated bids for RCU in RUC optimization for Trading day hours (24 hours). 		
DAME-	Procure RCU/RCD through optimization in RUC	Core	RUC
BRQ-	Objective function:		
05050	 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 ≤ 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. 		
	Notes		

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	 Refer to <i>Error! Reference source not found.</i> in <i>Error!</i> <i>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: 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	 Allow MSG transition in RUC 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. 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. 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 PCD.	Core	RUC

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	 Note REN is another alternative terminology of RUC Schedule. 		
DAME- BRQ- 05070	Procurement REN balance constraints in RUC • Reliability energy (REN) Power Balance Constraint (PBC) is for the REN to balance the demand forecast (D) include losses. $\sum_{i} REN_{i,t} = D_t$, $t = 1, 2,, T$. • Ancillary Service awards are fixed in RUC at IFM solution • IRU/IRD awards are fixed in RUC at IFM solution	Core	RUC
DAME- BRQ- 05080	 RCU/RCD Capacity upper/lower bound constraints in RUC 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	 Resource Capacity constraint for RCU/RCD in RUC 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 For VER, the capacity and economic limit are limited by the VER forecast 	Core	RUC
	 Adjusted LEL = max(LCL, LEL) ensure the resource must bid IFM 		

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	 Adjusted UEL=min(UCL,UEL) 		
	REN is another alternative terminology of RUC Schedule.		
DAME-	Ramp capability constraints for REN in RUC	Core	RUC
05100	 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 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 		
	Note		
	RUC-NA use REN as injection. no IRU/IRD deployment scenarios:		DU O
DAME-		Core	RUC
05110	 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 		
	Notes		
	 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. 		
DAME-	Network constraints in RUC using same network topology and	Core	RUC
BRQ-			
05120	 Enforce critical transmission constraints from NA power flow by REN injection for 		
	 base case, using same topology in IFM base case (shift 		
	factor set $SF_{i,m,t}$) o 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 		

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	 base case with contingencies of GCARM (shift factor set SF^(g)_{i,m,t}) Use the same transmission limits as used in IFM 		
	 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 same; however, the set of critical constraints is different in general. REN is another alternative terminology of RUC Schedule. 		
DAME- BRQ- 05130	 Scheduling Limit constraints in RUC 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 (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 Include RCU from export resources and RCD from import resources in ITC/ISL lower limit constraints for downward AS and IRD/IRU without energy 	Core	RUC
DAME- BRQ- 05140	 Energy limit, Gas-burn, pump and other constraints in RUC Gas-Burn Nomogram: Add RCU/RCD, in addition to En+IRU, in the Gas-Burn nomograms Daily Energy limit: 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:	Core	RUC

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	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)		
	Envelop constraint include RCU/RCD		
	$ \begin{aligned} & SOC_{l,t}^{(u)} = SOC_{l,t-1}^{(u)} - EN_{l,t}^{(+)} - \eta_i EN_{l,t}^{(-)} + \eta_i AIRD_t IRD_{t,t} + \eta_i ARCD_t RCD_{l,t} \leq \overline{SOC}_{l,t} \\ & SOC_{l,t}^{(l)} = SOC_{l,t-1}^{(l)} - EN_{l,t}^{(+)} - \eta_i EN_{l,t}^{(-)} - AIRU_t IRU_{l,t} - ARCU_t RCU_{l,t} \geq \underline{SOC}_{l,t} \end{aligned} $		
	SOC limit include RCU/RCD:		
	$SOC_{i,t} - RU_{i,t} - SR_{i,t} - NR_{i,t} - IRU_{i,t} - RCU_{i,t} \ge \underline{SOC}_{i,t}$		
	$SOC_{i,t} + \eta_i (RD_{i,t} + IRD_{i,t} + RCD_{i,t}) \le SOC_{i,t}$ Calculate hourly nodal RCU marginal price (RCUMP) and price	Core	RUC
BRQ- 05160	breakdowns and sub-components of MCC prices in RUC for nodal and resource		Koo
	Shadow price of RCU balance constraint / Loss Penalty Factor (LPF) of res/node		
	• (minus) MCC components of RCU , using shift factor $SF_{i,m,t}$		
	• (minus) MCC components of RCU with N-1 preventive transmission contingency using shift factor $SF_{i,m,t}^{(k)}$		
	 (minus) MCC components of RCU with GCARM generation/ transmission contingency using adjusted shift factor SF '^(g)_{i,m,t} 		
	Notes		
	 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. 		
DAME- BRQ- 05170	Calculate hourly nodal RCD marginal price (RCDMP) and breakdowns and sub- components of MCC prices in RUC for node and resource	Core	RUC
	 (minus) Shadow price of RCD balance constraint / Loss Penalty Factor (LPF) of res/node 		

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	• (plus) MCC components of RCD , using shift factor $SF_{i,m,t}$		
	 (plus) MCC components of RCD with N-1 preventive transmission contingency using shift factor SF^(k)_{i,m,t} 		
	 (plus) MCC components of RCD with GCARM generation/ transmission contingency using adjusted shift factor SF '^(g)_{i,m,t} 		
	Notes		
	REN is another alternative terminology of RUC Schedule.		
DAME- BRQ-	Calculate Hourly SP-Tie RCU Marginal Price (RCUMP) in DAM for Nodal by Import/Export Direction (Import/Export)	Core	RUC
05180	For import direction:		
	SP nodal price of RCU		
	• (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 export direction:		
	SP nodal prices of RCU		
	• (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.		
DAME- BRQ- 05181	Calculate Hourly SP-Tie RCU Marginal Price (RCUMP) in DAM for Resource	Core	RUC
03101	SP nodal price of RCU		
	• (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)		
	• (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.		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
DAME- BRQ-	Calculate Hourly SP-Tie RCD Marginal Price (RCDMP) in DAM for Nodal by Direction (Import/Export)	Core	RUC
05182	For Import direction:		
	SP nodal price RCD		
	• (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 Export direction		
	SP nodal prices of RCD		
	• (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.		
DAME- BRQ-	Calculate Hourly SP-Tie RCD Marginal Price (RCDMP) in DAM for Resource	Core	RUC
05183	SP nodal price RCD		
	• (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)		
	• (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.		

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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

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
DAME-BRQ- 06010	 Enforce must offer obligation in RTM for the resources with IRU/IRD, RCU/RCD DAM awards: 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 For RTM
DAME-BRQ- 06020	Maintain the CAISO BAA resource adequacy real-time must- offer obligation System shall maintain the CAISO BAA RA RT MOO.	Core	SIBR For RTM
DAME-BRQ- 06060	Use IFM schedule for MSG reference stage to calculate MLC	Core	RTM

5.6.1 Business Requirements

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	In RTM, use IFM schedule as MSG reference stage to calculate MLC.		
	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.		
DAME-BRQ- 06070	Identify the critical constraints for FRU/FRD deployment scenarios	Core	RTM
	Determine the critical set in the deployment scenarios superimposing the linear FR flows from UC		
	NoteRefer to DAME-BRQ-04232 for DAM.		
DAME-BRQ- 06100	Calculate and broadcast SP-Tie FRU/FRD Marginal Price (FRUMP/FRDMP) in RTM for Nodal by Direction (Import/Export)	Core	RTM
	For import direction FRU		
	SP nodal price of FRU		
	 (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 		
	For export direction FRU		
	SP nodal price of FRU		
	 (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 		
	For import direction FRD		
	SP nodal price of FRD		
	 (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 		
	For export direction FRD		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 SP nodal price of FRD (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.		
DAME-BRQ- 06120	Include ITC/ISL Shadow Prices from SP-Tie FRU/FRD Marginal Price (FRUMP/FRDMP) in RTM for Resource	Existing	RTM
	SP nodal price of FRU		
DAME-BRQ- 06150	Roll Over DAECON into DALPT Resource-Specific Market Priority Types for Export Resources	Core	RTM
	System shall roll over DAECON into DALPT resource-specific market priority type for export resources.		
	<u>Notes</u>		
	 A resource ID can be associated with more than one market priority types with a MW corresponding to each market priority type. 		
	The existing HASP functionality shall be extended to FMM and RTD markets.		
DAME-BRQ- 06170	Roll Over DAECON into PT Resource-Specific Market Priority Types for Non-Export Resources	Core	RTM
	For broadcasting purposes-only, System shall roll over DAECON into PT resource-specific market priority type for non-export resources.		
	Notes		
	 A resource ID can be associated with more than one market priority types with a MW corresponding to each market priority type. 		
	The existing HASP functionality shall be extended to FMM and RTD markets.		

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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	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:	Core	• Internal ISO System
	 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 		
	 RA Capacity is the most restrictive between monthly RA Showing and Daily RA Capacity. 		
	 Monthly RA Showing is calculated as the higher of monthly RA Generic Showing Capacity and monthly RA Flex Showing Capacity for that RA resource, where: 		
	•		

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	 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. 		
	 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. 		
	 Note: Monthly RA Showing does not account for the RA substitution. 		
	 Daily RA capacity accounts for RA resources substitution and accounts for both Generic RA capacity and Flex RA Capacity. 		
	 Notes 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	Calculate 15-min IRU/IRD LOC for 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 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:	Core	 Internal ISO System
	 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:		
	 15-min IRx LOC = (¼) * Sum over all corresponding DA energy bid segment i of (15-min resource IRx Overlapping RA Capacity, sliced by final DA energy bid segment i) * (hourly DA Energy LMP – hourly DA Final Energy Bid Price for bid segment i) 		
	 Where, x is { U , D} 		
	 Notes No substitutions will be accounted for in the monthly RA showing and mapping data. 		

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	 Substitution will be included in the daily RA capacity and identification data. 		
	Calculate DA/Base Schedule Forecasted Movement Data	Coro	 Internal ISO
BRQ-07320	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:	Core	System
	 For CAISO and EDAM BAA resources (including virtual supply and demand resources): 		
	• DA Schedule Forecasted Movement (h) = $DAES_{DAM,h} - DAES_{DAM,h-1}$		
	 For WEIM-only BAA-only (non-EDAM) resources: 		
	• Base Schedule Forecasted Movement (h) = $BS_h - BS_{h-1}$		
	Notes		
	 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. 		
DAME- BRQ-07600	Resource IRU/IRD Award 5-min Ramp Capable Portion Calculation	Core	 Internal ISO System
	 System shall automatically calculate IRU/IRD award 5-min ramp capable portion (<i>IRU5_{DAM}</i>, <i>IRD5_{DAM}</i>) on resource-specific hourly basis for hour h as follows: Determine DAM upward and downward ramp rate segments (<i>RRU_{DAM}</i> and <i>RRD_{DAM}</i> in MW/min, respectively) that corresponds to <i>DAES_{DAM}</i>. <i>IRU5_{DAM}</i> = min (<i>IRU_{DAM}</i>, max{0, ([<i>RRU_{DAM}</i> * 5'] - max [0,(<i>DASFM</i>/12)])}) <i>IRD5_{DAM}</i> = min(<i>IRD_{DAM}</i>, max{0, ([<i>RRD_{DAM}</i> * 5'] + min [0,(<i>DASFM</i>/12)])}) 		

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	 Where DASFM is Day Ahead Schedule Forecasted Movement @h (DAES_h - DAES_{h-1}) 		
DAME- BRQ-07610	FMM Ex-Post Capacity Calculation	Core	 Internal ISO System
	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 $(MinExCap, MaxExCap)$.		
DAME-	FMM Ex-Post IR/RC Capacity Allocations	Core	 Internal ISO System
BRQ-07615	System shall automatically calculate FMM Ex-Post IRU/IRD and RCU/RCD capacity allocations on resource-specific 15-minute basis:		Cycloni
	<i>IRUC_{FMM}</i> 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)		
DAME- BRQ-07620	Update Commitment Cost Determination Logic to Account for RC	Core	 Internal ISO System
Bride 07020	 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. 		
DAME- BRQ-07630	Use IFM MSG Configuration as Reference for RT MLC Calculations	Core	 Internal ISO System
	System shall use IFM MSG configuration as reference for RT MLC calculations.		
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: Calculate Hourly IRU/IRD flow by constraint and constraint case, considering IRU/IRD deployment factors. Update calculations of hourly Constraint Flow Difference 	Core	 Internal ISO System
	 (Market flow vs CRR flow) to account for IRU/IRD. Update calculations of hourly portion of CRR-settled flow by constraint and constraint case. 		

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	 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	Include Virtual Bids impact on IRU/IRD deployment scenario binding constraints in CRR clawback for ISO BAA	Core	 Internal ISO System
	For the day-ahead constraint-entity-specific CRR revenues for ISO BAA:		
	 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 		
	 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 		
	 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		

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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
DAME	IFM IR & RUC RC Payments	Core	 Settlements
о9140	 System shall be updated for the following: All eligible resources (including MSS resources) that have been awarded bourly IEM IRL/IRD shall be paid bourly IEM. 		
	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 		

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ID#	Business Fea	ature	Requirement Type	Potential Application(s) Impacted	
	Notes This s regard settle	hall apply to MSS resources dless of the MSS operator's s ment.	that have been awarded IR, selection of Net or Gross		
DAME -BRQ- 09160	IFM IR Cost A • Syste where • Tier-' hourly o	Allocation em shall be updated to allocat e x = U, D. I IRx Cost Allocation, for eac basis: Tier-1 IFM IRx Allocation O Quantity * Tier-1 IRx BAA Tier-1 IRx Allocation Quan follows:	te IFM IRx costs in two Tiers, h individual component, and on Cost = Tier-1 IRx Allocation Allocation Price. htity shall be calculated as	Core	• Settlements
	Compone nt 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, [<i>SS_{FMM} – DAES_{DAM}</i>])		
	Load	ABS (Negative UIE)	Positive UIE		
	Export	$\max(0, [SS_{FMM} - DAES_{DAM}])$	max(0, [<i>DAES</i> _{DAM} eTag transmission profile])		

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ID#	Business Feature			Requirement Type	Potential Application(s) Impacted
	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		
	 For each BAA, and on hourly basis, Tier-1 IRx BAA Allocation Price shall be calculated as follows: Min (IRx BAA Average Price, IRx BAA Deri Price) where IRx BAA Average Price = IRx BAA Allocation Cost / (IRxR minus sum over all surplus zones within the BA minus sum of IRx No Pay Quantity 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 = {0, [IRx BAA Requirement Cost + I Surplus Adjustment]} + IRx BAA N Revenue IRx BAA Requirement Cost = IRxR IRxRMP IRx BAA Surplus Adjustment = sur (IRx S* IRxSMP) over all IR Surplus 		rly basis, Tier-1 IRx BAA alculated as follows: rage Price, IRx BAA Derived werage Price = IRx BAA Cost / (IRxR minus sum of IRxS rplus zones within the BAA n of IRx No Pay Quantity over all within the BAA) Derived Price = IRx BAA Cost / Sum of Tier-1 IRx Quantity across BAA. BAA Allocation Cost = Max A Requirement Cost + IRx BAA djustment]} + IRx BAA No Pay Requirement Cost = IRxR *		

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	 IRx BAA No Pay Revenue = -1 * 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 = IRXSurplus Marginal Price = IRxMP at Associated Apnode of the IR Surplus Zone 		
	• Tier-2 IRx Cost Allocation, for each BAA, and on hourly basis:		
	 System shall calculate Tier-2 IRx BAA Allocation Cost as the remainder (left over) of unallocated IRx costs from Tier- 1, as follows: 		
	 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		
	 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. 		
	 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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		 Otherwise, for both IRx Tie allocations, MSS resources manner as non-MSS resources versus Gross selection. 	r-1 and IRx Tier 2 cost s shall be settled in a similar urces, regardless of their Net		
	• Trea	tment of ETC, and TOR			
		 System shall exclude the E from IR Tier-1 and IR Tier-2 balanced portion of ETC ar 	TC and TOR self-schedules 2 allocations up to the valid and nd TOR self-schedules.		
		 In contrast, System shall c valid and balanced portion schedules in IRx Tier-1 and 	onsider quantities above the of the ETC or TOR self- d IRx Tier-2 cost allocations.		
	Notes				
	• 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. 				
	ESR be co IRx c	 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 all of will b 	each BAA, if the IRx obligation the IRx cost will be allocated be split between Tier-1 and Tier	is higher than the IRx awards, to IRx Tier-1, otherwise, IRx cost r-2.		
DAME	RUC RC Cos	st Allocation		Core	 Settlements
-BRQ- 09180	 Syst where 	em shall be updated to allocate $x = U, D.$			
	 Tier-1 RCx Cost Allocation, for each individual component, and on hourly basis: Tier-1 RUC RCx Allocation Cost = Tier-1 RCx Allocation Quantity * Tier-1 RCx BAA Allocation Price. 				
	C	 Tier-1 RCx Allocation Quantity shall be calculated as follows: 			
	Compone nt Type	Compone nt TypeTier-1 RCU Allocation QuantityTier-1 RCD Allocation Quantity			

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	Virtual Bids	max (0 , SC Net Virtual Supply Awards).	max (0, SC Net Virtual Demand Awards).		
		Applies only if the BAA has total net virtual supply.	Applies only if the BAA has total net virtual demand.		
	Load	ABS (Net Negative Metered Demand)	Net Positive Metered Demand		
		i.e. Under-Scheduled Load	i.e. Over-Scheduled Load		
		See note below about Net Negative Metered Demand exclusions.	See note below about Net Positive Metered Demand exclusions.		
	0	For each BAA, Tier-1 RCx calculated as follows:	BAA Allocation Price shall be		
		 Min (RCx BAA Ave Price) 	erage Price , RCx BAA Derived		
		 where 			
		 RCx BAA Allocation minus RC> resources 	Average Price = RCx BAA Cost / Sum of (RCx Awards < No Pay Quantity) over all within the BAA.		
		 RCx BAA Allocation Allocation 	Derived Price = RCx BAA Cost / Sum of Tier-1 RCx Quantity across BAA.		
		 Where RC of (RCx Pa Charge) ov 	x BAA Allocation Cost = Sum ayments minus RCx No Pay er all resources within the BAA		
	• Tier-2	2 RCx Cost Allocation, for eac	h BAA, and on hourly basis:		
	0	System shall calculate Tier the remainder (left over) of Tier-1, as follows:	-2 RCx BAA Allocation Cost as unallocated RCx costs from		
		 Tier-2 RCx BAA Al Allocation Cost – S Allocation across E 	llocation Cost = RCx BAA Sum of Tier-1 RCx Cost BAA		

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	 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		
	 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. 		
	 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		
	 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. 		
	Notes		
	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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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
DAME	IR DA BCR Settlements	Core	 Settlements
-BKQ- 09200	 System shall be updated for the following: 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: 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) 		
	Notes		
	 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. 		
DAME	RC RT BCR Settlements	Core	 Settlements
-BRQ- 09220	 System shall be updated for the following: 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: RC Revenues = {Max (0, [RUC RCU Awards – Hourly RCU Overlapping RA Capacity Quantity – RCU No-Pay Quantity]) * RUC RCUMP} +		
	 Bid Price} RUC BCR costs shall be allocated, in alignment with RCU cost allocation, to net virtual supply and under scheduled load. 		

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	 Notes 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: 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 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	Settlements
DAME -BRQ- 09250	 Update GMC Charge Codes Effective January 1, 2026 The following GMC charge code shall be terminated: System Operations The following GMC charge code shall be created: System Operations Real-Time Dispatch. 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 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	• Settlements

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	 Note 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: 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	• Settlements
DAME -BRQ- 09280	 RCU/RCD Unavailability No-Pay Charges System shall be updated for the following: 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	• Settlements
DAME -BRQ- 09300	 IR and RC Unavailability No-Pay Charges Priority System shall be updated for the following: 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	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	Settlements

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	 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 RAAIM functionality. 		
DAME	IR – FRP RTM Ramp Deviation Settlements	Core	 Settlements
-BRQ- 09320	System shall be updated for the following:		
	 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 [<i>IRU5_{DAM}</i> (<i>IRD5_{DAM}</i>) from MQS] at the FMM FRUMP (FRDMP), respectively. 		
	Notes		
	 Deviation settlements between FMM FRU (FRD) and RTD FRU (FRD), respectively, is existing functionality. 		
DAME	FMM Forecasted Movement Deviation Settlements	Core	 Settlements
-BRQ- 09340	System shall be updated for the following:		
	 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 relative to Base Schedule Forecasted Movement is paid (charged) net difference between FMM FRUMP and FMM FRDMP, respectively. 		
	Notes		
	 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. 		

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	 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-	Accounting for Virtuals in Allocation of Residual Forecasted Movement Settlements	Core	 Settlements
09350	System shall be updated for the following for each 5-min interval:		
	 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. 		
	Notes		
	 Allocation methodology is existing but adding virtual award FM costs/revenues. 		
DAME -BRQ-	Settlements of Overlapping RA Capacity for LSE-RA Resource True- Up Settlements Mechanism	Core	Settlements
09360	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, • System shall calculate the Settlements Amount for that RA Resource and each hour as: • Hourly IRx Overlapping RA Capacity Quantity • Sum over all 15-min within the hour (15-min IRx Overlapping RA Capacity / 4) • Hourly IRx LOC for Overlapping RA Capacity		

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DAME -BRQ- 09520	 Sum over all 15-min within the hour (15-min IRX LOC for Overlapping RA Capacity) Hourly IRx Overlapping RA Capacity Amount (Hourly IRXMP) – Hourly IRx LOC for Overlapping RA Capacity Hourly RCx Overlapping RA Capacity Quantity Sum over all 15-min within the hour (15-min RCx Overlapping RA Capacity / 4) Hourly RCx Overlapping RA Capacity Amount 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: Hourly RCx 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 SCs of resources shall be charged the Hourly IRx 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 for all LSEs that are associated with it. Apply CRR 1B methodology per existing Tariff 	Core	• Settlements
DAME -BRQ- 09540	 Calculate BAA IRU/IRD Congestion Revenue For CAISO and EDAM BAAs: 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 MCC prices of IRUMP/IRDMP [by BAA]) netted against the BAA-level (product of IRUR/IRDR and the sub-components of MCC 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 MCC prices of IRUSMP/IRDSMP of the associated IR surplus zone Apnode, respectively. Mathematically, for each BAA, for each hour: 	Core	Settlements

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	 IRx Congestion Revenue = Sum over all resources for that BAA (IRx Award * IRxMP MCC by BAA) – Max {0, [IRx BAA Requirement Congestion Amount] Where 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} 		
	Notes		
	 Based upon payload failures and fill logic, any fix imbalance will be settled through neutrality charge code (rounding). 		
DAME -BRQ- 09560	 Calculate BAA Energy Congestion Revenues For CAISO and EDAM BAAs: 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	 Distribute BAA IRU/IRD Congestion Revenues for CAISO BAA For CAISO BAA: System shall distribute the BAA IRU/IRD congestion revenues net of BAA Energy congestion revenues through the existing CRR Balancing 	Core	Settlements
DAME -BRQ- 09600	 Account. Distribute BAA IRU/IRD Congestion Revenues for EDAM BAAs For EDAM BAA: 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. 	Core	Settlements
	 Notes 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. 		
DAME -BRQ- 09610	 Apply HASP Reversal to CAISO BAA IFM Intertie Schedule For CAISO BAA: 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 prior to HASP, System shall apply revised Settlements HASP reversal rule on them by using IFM Energy plus RCU Award minus RCD Award 	Core	Settlements

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	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 CRR Aggregated Revenue Adjustments Data for IRU/IRD Deployment Scenarios
- 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 IFM & RUC Resource-Specific Market Priority Types Results
- Publish RTM Resource-Specific Market Priority Types Results
- Publish 15-min IRU/IRD LOC for Overlapping RA Capacity
- Publish resource-specific Resource-Specific DA/Base Schedule Forecasted Movement Data
- Publish nodalNodal, by SC DA Schedule Virtual Forecasted Movement Data

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• Publish CRR Revenue Adjustments Details for IRU/IRD Deployment Scenarios

MPP

• Publish Shift Factors Data for IR Deployment Scenarios from IFM

<u>ADS</u>

Publish RTM Resource-Specific Market Priority Types Results for HASP Exports

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
DAME- BRQ-10140	 Publish IR/RC Bid-Related Data Upon data receipt, System shall report the following IR/RC bid-related data (original and corrected): Resource-Specific Hourly Data IRU/IRD Clean Bids 	Core	• OASIS
	• RCU/RCD Clean Bids		
DAME-	Publish IFM IR and RUC RC Nodal Prices	Core	• OASIS
BRQ-10160	Upon data receipt, System shall report the following IFM IR and RUC RC market results data (original and corrected):		
	Nodal Hourly Data		
	 IFM IRUMP/IRDMP Nodal Prices and their price breakdown (total, capacity, congestion but no loss), but shall exclude the sub-components of their MCC prices (by BAA), and include prices for Imbalance Demand Hub Apnodes as well as Apnodes associated with IR surplus zones. 		
	 RUC RCUMP/RCDMP Nodal Prices and their price breakdown (total, capacity, congestion and loss), but excluding sub-components of MCC prices (by BAA). 		
DAME- BRQ- 10160A	Publish IFM IR and RUC RC Scheduling Point/Tie Combination Nodal Prices	Core	• OASIS

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	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):		
	Nodal Hourly Data		
	 IFM IRUMP/IRDMP Nodal Prices and their price breakdown (total, capacity, congestion but no loss), but shall exclude the sub-components of their MCC prices (by BAA), and include prices for Imbalance Demand Hub Apnodes as well as Apnodes associated with IR surplus zones. 		
	 RUC RCUMP/RCDMP Nodal Prices and their price breakdown (total, capacity, congestion and loss), but excluding sub-components of MCC prices (by BAA). 		
DAME- BRQ-	Publish RTM Flexible Ramp Scheduling Point/Tie Nodal Prices by Direction (Import/Export)	Core	• OASIS
10160AA	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):		
	Nodal 15-min & 5-min Data		
	 FRUMP/FRDMP Nodal Prices but excluding their price breakdown, and sub-components of MCC prices (by BAA). 		
DAME-	Publish IFM-MPM IR and RUC-MPM RC Nodal Prices	Core	• OASIS
BRQ- 10160B	Upon data receipt, System shall report the following IFM-MPM IR and RUC-MPM RC market results data (original):		
	Nodal Hourly Data		
	 IFM-MPM IRUMP/IRDMP Nodal Prices and their price breakdown (total, capacity, congestion but no loss), but shall exclude the sub-components of their MCC prices (by BAA), and include prices for Imbalance Demand Hub Apnodes as well as Apnodes associated with IR surplus zones. 		
	 RUC-MPM RCUMP/RCDMP Nodal Prices and their price breakdown (total, capacity, congestion and loss), but excluding sub-components of MCC prices (by BAA). 		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
DAME-	Publish IFM IR Binding Constraints Results	Core	• OASIS
BRQ-10180	Upon data receipt, System shall report the following IFM IR market results data (original and corrected):		
	BAA Group Hourly Data		
	 Binding IFM IRU/IRD Capacity. 		
	 Binding IFM IRU/IRD Shadow Prices 		
DAME-	Publish IFM IR Binding Constraints Shadow Prices	Core	• OASIS
BRQ- 10180A	Upon data receipt, System shall report the following IFM IR market results data (original and corrected):		
	Network Constraints Hourly Data		
	 Binding Constraint due to IFM IRU/IRD. 		
	 IFM IRU/IRD Constraint Shadow Prices 		
DAME-	Publish IFM IR Binding Scheduling Constraints Shadow Prices	Core	• OASIS
BRQ- 10180B	Upon data receipt, System shall report the following IFM IR market results data (original and corrected):		
	Scheduling Constraints Hourly Data		
	 Binding Constraint due to IFM IRU/IRD. 		
	 IFM IRU/IRD Constraint Shadow Prices 		
DAME-	Publish IFM IR and RUC RC Nomogram/Branch Shadow Prices	Core	• OASIS
BRQ-10200	Upon data receipt, System shall report the following IFM IR and RUC RC market results data (original and corrected):		
	Network Constraints Hourly Data		
	 IFM IRU/IRD Nomogram/Branch Shadow Prices 		
	 RUC RCU/RCD Nomogram/Branch Shadow Prices 		
DAME-	Publish IFM IR and RUC RC Interties Shadow Prices	Core	• OASIS
BRQ- 10200A	Upon data receipt, System shall report the following IFM IR and RUC RC market results data (original and corrected):		
	Network Constraints Hourly Data		
	 IFM IRU/IRD Intertie Shadow Prices 		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 RUC RCU/RCD Intertie Shadow Prices 		
DAME- BRQ-	Publish IFM-MPM IR and RUC-MPM RC Nomogram/Branch Shadow Prices	Core	• OASIS
10200B	Upon data receipt, System shall report the following IFM-MPM IR and RUC-MPM RC market results data (original):		
	Network Constraints Hourly Data		
	 IFM-MPM IRU/IRD Nomogram/Branch Shadow Prices 		
	 RUC-MPM RCU/RCD Nomogram/Branch Shadow Prices 		
DAME-	Publish IFM-MPM IR and RUC-MPM RC Interties Shadow Prices	Core	• OASIS
BRQ- 10200C	Upon data receipt, System shall report the following IFM-MPM IR and RUC-MPM RC market results data (original):		
	Network Constraints Hourly Data		
	 IFM-MPM IRU/IRD Intertie Shadow Prices 		
	 RUC-MPM RCU/RCD Intertie Shadow Prices 		
DAME- BRQ-10220	Publish IFM-MPM IR and RUC-MPM RC MPM Nomogram/Branch Competitive Path	Core	• OASIS
	Upon data receipt, System shall report the following IFM-MPM IR and RUC-MPM RC market results data (original):		
	Competitive Path Hourly Data		
	 MPM Nomogram/Branch Competitive Path 		
DAME- BRQ-	Publish IFM-MPM IR and RUC-MPM RC MPM Intertie Constraint Competitive Path	Core	• OASIS
10220A	Upon data receipt, System shall report the following IFM-MPM IR and RUC-MPM RC market results data (original):		
	Competitive Path Hourly Data		
	 MPM Intertie Constraint Competitive Path 		
DAME- BRQ-10240	Publish IFM IR and RUC RC Aggregate AwardsUpon data receipt, System shall report the following IFM IR andRUC RC market results data (original and corrected):BAA Hourly Data	Core	• OASIS

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 IFM IRU/IRD Awards 		
	• RUC RCU/RCD Awards (including proxy RCU awards)		
DAME-	Publish IRU/IRD Requirements	Core	• OASIS
BRQ-10260	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):		
	BAA Hourly Data		
	 IRU/IRD Requirements (IRUR/IRDR) 		
	 IRU/IRD Surplus (IRUS/IRDS) 		
	 Associated Imbalance Demand Hub Apnode 		
	Notes		
	 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-	Publish IRU/IRD Surplus	Core	• OASIS
BRQ- 10260A	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):		
	IR Surplus Zone Hourly Data (within each BAA)		
	 IRU/IRD Surplus (IRUS/IRDS) 		
	 Associated IR Surplus Zone Apnode 		
	Notes		
	 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. 		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
DAME- BRQ-10280	 Publish IRU/IRD Requirement Thresholds Upon data receipt, System shall report the following data for next Trade Day (D+1) (original data only, no data corrections): BAA Hourly Data 	Core	• OASIS
	 IRU/IRD Requirement Thresholds 		
DAME- BRQ-10300	 Publish IRU/IRD Requirements Input Polynomials Upon data receipt, System shall report the following data for next Trade Day (D+1) (original data only, no data corrections): BAA Hourly Data 	Core	• OASIS
	 IRU/IRD Requirements Input Polynomials 		
DAME- BRQ-10320	 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): BAA Hourly Data 	Core	• OASIS
	 IRU/IRD Requirements Uncertainty Histograms 		
DAME- BRQ-10340	 Publish IRU/IRD Input Data for Demand, Wind, Solar Forecasts Upon data receipt, System shall report the following data for next Trade Das (D+1) (original data only, no data corrections): BAA Hourly Data 	Core	• OASIS
	 IRU/IRD Forecasts 		
DAME- BRQ-10360	 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): BAA Hourly Data IRU/IRD Demand Curves 	Core	• OASIS
<u>DAME-</u> BRQ-10380	Publish CRR Aggregated Revenue Adjustments Data for IRU/IRD Deployment Scenarios	Core	• OASIS
	Upon data receipt, System shall report the following data (original and corrected):		
	Hourly Data Product Constraint Case Transmission Constraint ID CRR Offset Revenue CRR Clawback Revenue CRR Circular Scheduling Revenue CRR Notional Revenue		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 <u>Directional Indicator</u> <u>IFM Net Flow</u> 		
DAME- BRQ-10400	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): • Resource-Specific Monthly Data and Zonal-Specific Daily Data CC-6800 – DA RUC Availability Settlement (or tentative replacement: CC-6xxxx – DA RUC Reliability Capacity Up Settlement) CC-06824 – No Pay Residual Unit Commitment (RUC) Settlement (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) – 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 CC-6xxx (tentative) – DA Imbalance Reserve Down Settlement) CC-6xxx (tentative) – No Pay DA Imbalance Reserve Down Settlement) 	Core	• OASIS
DAME- BRQ-10680	Publish IR and RC DAB Curves Upon data receipt, System shall report the following data:	Core	• CMRI
	 DAB Curves (MW , Bid Price) Market Product Type: IRU IRD RCU RCD 		
DAME- BRQ-10700	 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): Resource-Specific Hourly Data O IRU Mitigated Bids 	Core	• CMRI

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 RCU Mitigated Bids 		
DAME- BRQ-10720	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): • Resource-Specific Hourly Data • 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.	Core	• CMRI
	 Notes The Proxy RCU Awards can co-exist for same resource and hour with RCU Awards. 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	Publish REN System shall continue to publish REN.	Existing	• CMRI
	Notes		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 The following existing CMRI reports will be used without any modifications. 		
	 Reliability Coordination 		
	 Forecasted Generation 		
<u>DAME-</u> BRQ-10735	Publish IFM & RUC Resource-Specific Market Priority Types Results	<u>Core</u>	
	Upon data receipt. System shall report the following resource- specific market priority types for all resources (original and corrected):		
	 All Resource-specific market priority types and their associated MW data, including but not limited to: ETC (including CRN ID and Type) TOR (including CRN ID and Type) OATT1 (including CRN ID Type) OATT2 (including CRN ID Type) DAPT DALPT (this includes rolled-over DAECON) The existing reporting functionality for export resources shall be extended to all resources. The existing reporting functionality shall be extended for OATT1 and OATT2. 		
	 A resource ID can be associated with more than one market priority types with a MW corresponding to each market priority type. There is an existing CMRI report for RUC export resources. OATT1 and OATT2 are new functionalities that are applicable to EDAM BAAs only. 		
	Publish RTM Resource-Specific Market Priority Types Posulte	Core	• CMRI
BRQ-10737	<u>Upon data receipt, System shall report the following resource-</u> <u>specific market priority types for all resources (original and</u> <u>corrected):</u> <u> • All Resource-specific market priority types and their</u> <u>associated MW data for binding 15-min and 5-min</u> <u>intervals, including but not limited to:</u> <u> • ETC (including CPN ID and Type)</u>		
	 TOR (including CRN ID and Type) 		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 OATT1 (including CRN ID Type) OATT2 (including CRN ID Type) DAPT DALPT (this includes rolled-over DAECON) RTPT RTLPT RTECON (RT economic exports that clear HASP) The existing reporting functionality for export resources shall be extended to all resources. The existing HASP reporting functionality shall be extended to FMM and RTD markets. The existing functionality shall be extended for OATT1 and OATT2. Notes A resource ID can be associated with more than one market priority types with a MW corresponding to each market priority type. There is an existing CMRI report for HASP export resources. OATT1 and OATT2 are new functionalities that are applicable to EDAM BAAs only 		
DAME- BRQ-10740	 Publish IFM IR and RUC RC Resource Prices Upon data receipt, System shall report the following IFM IR and RUC RC market results data (original and corrected): Resource-Specific Hourly Data IFM IRUMP/IRDMP Resource Prices and their price breakdown (total, capacity, congestion but no loss), but shall exclude the sub-components of their MCC prices (by BAA). RUC RCUMP/RCDMP Resource Prices and their price breakdown (total, capacity, congestion and loss), but excluding sub-components of MCC prices (by BAA). 	Core	• CMRI
DAME- BRQ-10780	Publish 15-min IRU/IRD LOC and IRU/IRD & RCU/RCD Overlapping RA Capacity	Core	• CMRI

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	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:		
	RA-Resource-Specific 15-min		
	 IRU/IRD LOC for Overlapping RA Capacity 		
	 IRU/IRD Overlapping RA Capacity 		
	RCU/RCD Overlapping RA Capacity		01/15/
DAME- BRQ-10800	 Publish DA/Base Schedule Forecasted Movement Data Upon data receipt, System shall report the following data (original and corrected) and shall be accessed by each resource's SC: Resource-Specific Hourly DA Schedule Forecasted Movement (for CAISO and EDAM BAAs) Base Schedule Forecasted Movement (for WEIM BAAs) 	Core	• CMRI
DAME-	Publish DA Schedule Virtual Forecasted Movement Data	Core	• CMRI
BRQ-10810	Upon data receipt, System shall report the following data (original and corrected) and shall be accessed by each node's SC:		
	Nodal, by SC, Hourly		
	 DA Schedule Virtual Forecasted Movement (for CAISO and EDAM BAAs) 		
DAME- BRQ-10830	Publish CRR Revenue Adjustments Details for IRU/IRD Deployment Scenarios Upon data receipt, System shall report the following data (original and corrected): • Hourly Data • Product • CRR ID • CRR Type • CRR Hedge Type • CRR Award MW • SC ID • Constraint Case • Transmission Constraint ID • CRR Offset Revenue • CRR Circular Scheduling Revenue • CRR Notional Revenue	Core	• CMRI

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 Derate Factor 		
DAME- BRQ-10880	Publish Shift Factors for IRU/IRD Deployment Scenarios Upon data receipt, System shall report the following IFM market results data: • Shift Factor Hourly Data • Shift Factor for IRU/IRD deployment scenarios (including Imbalance demand Anode)	Core	• MPP
DAME- BRQ-10940	Publish RTM Resource-Specific Market Priority Types Results for HASP Exports System shall continue to publish the following resource-specific market priority types for all export resources: ● All Resource-specific market priority types and their associated MW data for all resources, including but not limited to: ● ETC (including CRN ID and Type) ● TOR (including CRN ID and Type) ● OATT1 (including CRN ID Type) ● OATT2 (including CRN ID Type) ● DALPT (this includes rolled-over DAECON) ● RTPT ● DALPT (this includes rolled-over DAECON) ● RTPT ● RTECON (RT economic) ● PT (this is applicable to non-export resources, and includes rolled-over DAECON) ● The existing publishing functionality for export resources shall stay the same and shall not be extended to all resources. ● The existing HASP publishing functionality shall stay the same and shall not be extended to publish data from FMM and RTD markets. ● The existing publishing functionality shall be extended for OATT1 and OATT2. Notes ● ● A resource ID can be associated with more than one market priority type.	Core	• ADS

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 OATT1 and OATT2 are new functionalities that are applicable to EDAM BAAs only. 		
	 Refer to existing RSEE2-BRQ-08040 in RSEE2 project. 		

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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	Publish Market Data to FERC System shall have the capability to automatically publish the following data to FERC:	Core	 Internal ISO System
	System Parameters Daily Data		
	 IRU/IRD Deployment Factor (DIRU/DIRD) 		
	Resource-Specific Data		
	 IR Eligibility Flag 		
	 RC Eligibility Flag 		
	RA-Resource-Specific Monthly Data		
	 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		
	 RA Resources Identification 		
	 RA Resources Generic RA Capacity 		
	 RA Resources Flex RA Capacity 		
	Resource-Specific Daily Data		
	 DAB Curves (Capacity MW, Bid Price) for: 		
	■ IRU		
	■ IRD		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 RCU 		
	 RCD 		
	Resource-Specific Hourly Data		
	 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 no loss), including sub-components of MCC prices (by BAA). 		
	 RCUMP/RCDMP Resource Prices and their price breakdown (total, capacity, congestion and loss), including sub-components of MCC prices (by BAA). 		
	 DA Schedule Forecasted Movement (for CAISO and EDAM BAAs) 		
	 Base Schedule Forecasted Movement (for EIM BAAs) 		
	 IFM and RUC Energy Schedules and breakdown by market priority type (including CRN ID and Type) for all resources. 		
	RA-Resource-Specific 15-min		
	 IRU/IRD LOC for Overlapping RA Capacity 		
	 IRU/IRD Overlapping RA Capacity 		
	 RCU/RCD Overlapping RA Capacity 		
	Nodal Hourly Data		
	 IRUMP/IRDMP Nodal Prices and their price breakdown (total, capacity, congestion but no loss), including sub-components of MCC prices (by BAA), including prices for Imbalance Demand Hub Apnodes as well as Apnodes associated with IR surplus zones. 		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	 RCUMP/RCDMP Nodal Prices and their price breakdown (total, capacity, congestion and loss), including sub-components of MCC prices (by BAA). 		
	Nodal, by SC, Hourly Data		
	 DA Schedule Virtual Forecasted Movement (for CAISO and EDAM BAAs) 		
	Network Constraints Hourly Data		
	 Binding Constraint due to IRU/IRD and RUC. 		
	 IRU/IRD and RUC Constraint Shadow Prices 		
	Network Constraints Daily Data		
	 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)] 		
	 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)]		
	 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)		
	 IRU/IRD Surplus (IRUS/IRDS) 		
	 Associated IR Surplus Zone Apnode 		
	Nodal 15-min & 5-min Data		
	 FRUMP/FRDMP Nodal Prices but excluding their price breakdown, and sub-components of MCC prices (by BAA). 		

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		Impacted
 Resource-Specific Hourly, 15-min & 5-min Data RTM Energy Schedules broken down by market priority type (including CRN ID and Type) for all resources. 		
 Notes The Proxy RCU Awards can co-exist for same resource and hour with RCU Awards. The IRU/IRD, RCU/RCD and FRU/FRD SP-Tie prices are published by direction (import/export) 		
Publish Settlements Data to FERC System shall have the capability to automatically publish the following data to FERC: • IRU/IRD and RCU/RCD Settlements Charge Codes • Payments • No-Pay Charges • Cost Allocations • BCR • GMC	Core	Internal ISO System
• FSft	Resource-Specific Hourly, 15-min & 5-min Data • RTM Energy Schedules broken down by market priority type (including CRN ID and Type) for all resources. botes • The Proxy RCU Awards can co-exist for same resource and hour with RCU Awards. • The IRU/IRD, RCU/RCD and FRU/FRD SP-Tie prices are published by direction (import/export). Publish Settlements Data to FERC System shall have the capability to automatically publish the collowing data to FERC: • IRU/IRD and RCU/RCD Settlements Charge Codes • Payments • Cost Allocations • BCR • IR – FRP Ramp Deviation	Resource-Specific Hourly, 15-min & 5-min Data • RTM Energy Schedules broken down by market priority type (including CRN ID and Type) for all resources. Jotes • The Proxy RCU Awards can co-exist for same resource and hour with RCU Awards. • The IRU/IRD, RCU/RCD and FRU/FRD SP-Tie prices are published by direction (import/export). Publish Settlements Data to FERC System shall have the capability to automatically publish the ollowing data to FERC: • IRU/IRD and RCU/RCD Settlements Charge Codes • No-Pay Charges • Cost Allocations • BCR • IR – FRP Ramp Deviation

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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-	Define LSE-Resource Pair True-Up Flag	Core	• CIRA
13005	• System shall define the following LSE-resource pair specific fields:		
	 LSE-Resource Pair True-Up Flag 		
	Supported possible values are:		
	 Opt-In 		
	 Opt-Out 		
	Default values for first implementation shall be set to:		
	 Opt-Out 		
	• The same resource may be part of multiple LSE SCs.		
	• The same LSE SC may be paired with multiple resources.		
	Notes		
	 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. 		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
DAME-BRQ-	Consume LSE-Resource Pair True-Up Flag from LSE' SCs	Core	• CIRA
13010	At any time, System shall automatically consume the following LSE-resource pair specific fields from LSE' SCs:		
	LSE-Resource Pair True-Up Flag (Submitted by LSE's SC)		
DAME-BRQ- 13012	Consume LSE-Resource Pair True-Up Flag from Resource's SC	Core	• CIRA
	At any time, System shall consume the following LSE resource pairs specific fields from resource's SC:		
	LSE-Resource Pair True-Up Flag (Submitted by resource's SC)		
DAME-BRQ-	Set and Display Effective LSE-Resource Pair True-Up Flag	Core	• CIRA
13013	Upon receipt of any data change,		
	• 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.		
DAME-BRQ-	LSE-Resource Pair True-Up Flag Election Change Rules	Core	• CIRA
13015	• 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.		

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	Note		
	• For this project, Tariff activation date is same as Go-Live date.		
DAME-BRQ-	Set LSE-RA Resource Pair True-Up Flag	Core	• CIRA
13017	For all RA resources-LSE pairs, System shall have the capability to automatically perform the following:		
	 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.		

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5.12Business 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	• SIBR	CMRI OASIS MPP	 Rule Impacts Interface changes

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ID#	Guidance on Market Participant Impacts	Source System	Sink System	Reason for Potential Scenario
	 Set up a scenario where SCs for resources within CAISO BAA submit bid combinations, including IRU/IRD and RCU/RCD bids. 		ADS MRI-S	3. new application /report
	• Run DAM (IFM and RUC).			4. New system
	• Run RTM			process
	Run Settlements			
	 Follow the results in sink systems to verify market results: 			
	∘ OASIS			
	 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 			

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ID#	Guidance on Ma	arket Participant Impacts	Source System	Sink System	Reason for Potential Scenario
	•	IRU/IRD Requirements Uncertainty Histograms			
	-	IRU/IRD Forecasts			
	-	IRU/IRD Demand Curves			
	-	CRR Aggregated Revenue Adjustment Data			
		Payment and No-Payments of IR/RC-Charge Code Settlements Amounts Data			
	o CMRI				
	•	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			
	-	DA Schedules by Market Priority Types			
	-	Real-Time Schedules by Market Priority Types			
	•	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			
	• •	CRR Revenue Adjustments Details			
	• MPP				

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ID#	Guidance on Market Participant Impacts	Source System	Sink System	Reason for Potential Scenario
	 Shift Pactors Data for IK Deployment Scenarios <u>ADS</u> <u>RTM Resource-Specific Market</u> <u>Priority Types Results for HASP</u> <u>Exports</u> Settlements IFM IR & RUC RC Payments IFM IR & RUC RC Cost Allocation IR DA and RC RT BCR Settlements 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	 Change Setting of IRU/IRD Deployment Factors 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. 	DAMSIBR	CMRIOASISMRI-S	 Rule Impacts Interface changes new application /report New system

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ID#	Guidance on Market Participant Impacts	Source System	Sink System	Reason for Potential Scenario
DAME- MSIM- 15060	 Change Set of Activated Transmission Constraints in the IRU/IRD Deployment Scenarios 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. 	DAMSIBR	CMRIOASISMRI-S	 Rule Impacts Interface changes new application /report 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
ВА	Business Analyst
ВАА	Balancing Authority Area

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Acronym	Definition
ВААОР	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
СВ	Convergence Bidding
СС	Commitment Cost
СС	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
СМТ	Commitment
Cnode	Connectivity Node
COG	Constrained-Output Generator
СРМ	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
ЕММ	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
п	Information Technology
ПС	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)
LESR	Limited Energy Storage Resource
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	Loss Penalty Factor
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
Мах	Maximum
MaxExCap	Maximum Ex-post Capacity
МахЕхСар _{ғмм}	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
ММА	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
МОО	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		
ΟΑΤΙ	Open Access Technology International		
	Open Access Transmission Tariff		
OC	Opportunity Cost		
000	Opportunity Cost Calculator		
ODCP	On Demand Capacity Procurement		
OES	Operations Engineering Services		
OMS	Outage Management System		
ООМ	Out Of Market		
OTS	Operations Training Simulator		
P97.5	97.5% Percentile		
PAC	PacifiCorp		
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Acronym	Definition
PACE	PacifiCorp East
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
РМО	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
РТ	High Priority Price Taker

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Acronym	Definition
РТО	Participating Transmission Owner
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>DOT</i> s 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)

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Acronym	Definition
RegU	Regulation Up (award)
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
RSEE2	Resource Sufficiency Evaluation Enhancements – Phase-2
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)

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Acronym	Definition
RTUC	Real-Time Unit Commitment
RU	Regulation Up (award)
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

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Acronym	Definition
STC	State Transition Cost
STF	Short-Term Forecast
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
Т	Trading Day
TBD	To Be Determined
ТЕР	Tucson Electric Power
TG	Tie Generator
TNA	Transmission Network Application
ТОР	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

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Acronym	Definition
UFR	Upper Forbidden Region
UI	User Interface
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

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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
							EN <= Pmax - IRU	EN >= Pmin + IRD
Long-Start Generator	Yes	Eligible	Eligible	EN >= Pmin	Eligible	Eligible	EN >= Pmin EN <= Pmax -	EN <= Pmax EN >= Pmin +
							IRU	IRD
Short-Start Generator	Yes	Eligible	Eligible	None	Eligible	Eligible	EN >= Pmin	EN <= Pmax
							EN <= Pmax - IRU	EN >= Pmin + IRD
Participating Load w/ 15- Min dispatch	Yes	Eligible	Eligible	None	Eligible	Eligible	EN >= Pmin	EN <= Pmax
Capability							EN <= Pmax - IRU	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		Eligibilit	y determine	d by individu	al storage a	nd VER com	ponents	
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

