California ISO

Business Requirements Specification

Energy Imbalance Market Enhancements 2018

Document Version: ~~1.2~~1.3

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Revision History

Date	Version	Description
4/18/2018	1.0	Initial document release.
6/1/2018	1.1	Section 4: • Removal of individual and aggregate ETSR ramping constraints from Fall 2018 Release scope. Business requirement 2018EIM-BRQ0019 will remain in-scope. Section 5: • Removal of ETSR ramp constraints from EIM, Market Instruments, and Market Operations BPM impacts Section 6: • Section 6.1 removed from Fall 2018 Release scope, with the exception of 2018EIM-BRQ0019 • Section 6.3 included input limit override capability for PTST displays; added new RTSI Ramping Sufficiency Test input report display in BAAOP (2018EIM-BRQ0058); minor updates Appendix A: • Removed

Date	Version	Description
7/30/2018	1.2	Section 1.1: Removed PSE registration code automated synchronization from Fall 2018 scope Section 4.1: Item 2: Include market corrections and public report of EIM BAA contingency status by RTD interval. Item 3: Add new Real-Time Schedule Interchange (RTSI) Ramping Sufficiency Test Input Report Item 4: Remove PSE registration code synchronization enhancement from scope. Section 5.1: Removed reference of new public report for ISO BAA contingency status. This report already exists and is located in OASIS > Price > Contingency Dispatch Locational Marginal Prices (interval defined in start time); new report is specific to only EIM BAAs Section 6: Added: BRQ0026: Only RTD market runs will provide EIM BAA contingency status BRQ0031: PCA (Price Corrections Application), an internal ISO system, will receive, store, and broadcast any market corrections to downstream systems (e.g. OASIS) BRQ0035: Outcomes when formerly contingent EIM BAA is corrected to non-contingent state BRQ0036: Outcomes when formerly non-contingent EIM BAA is corrected to contingent state BRQ0037: Outcomes when ISO BAA has contingency (i.e. no EIM BAA Contingency corrections). ISO BAA Contingency Status time periods is determined through the Public OASIS site through existing Price → Contingency Dispatch Locational Marginal Price report (see Start Time). Updated: BRQ0027: Clarification of potential market corrections regarding EIM BAA Contingency Status BRQ0028: Clarified how EIM BAA Contingency Status results will be published for the following conditions: 1) market results, and 2) corrected market results. BRQ0053, BRQ0054: Clarified operator display override will apply directly to RTPD market intervals, then be replicated to the associated STUC and RTD intervals automatically; system reports RTPD intervals only Removed: Section 6.4: ISO determined the derived benefit did not meet the cost to implement automated synchronizations of PSE registration codes.
8/23/2018	1.3	Added: Section 6.5: ETSR pre-hour schedules treatment of tagged quantities when BAA-pairing includes ISO Section 6.6: Enhanced Fifteen-minute schedule calculation logic for hourly resources.

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Table of Contents

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 determining the scope of projects and to all Business Process Modeling and System Requirements Specifications efforts.

Business drivers for 2018 EIM Enhancements are as follows:

- Market improvement to exclude Flexible Ramping procurement from EIM BAAs undergoing contingency events
- Market improvement to provide added transparency to allow EIM Entities the ability to determine if/when their market data submissions are included in the EIM Markets via BAAOP displays
- [Removed from EIM Enhancements 2018 scope: automated PSE code synchronization]
- Market improvements for Energy Transfer System Resource (ETSR) pre-hour schedules with one of the BAA-pairings as ISO BAA
- Market improvements for Fifteen Minute schedule calculation logic from hourly resources

2 Intellectual Property Ownership

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

2.1 Checklist

Specifically, CAISO retains intellectual property ownership of the following:

- Design of EIM; includes mathematical formulation of design principles
- Related Business Practice Manuals
- Software codes to implement the EIM design
- All rights reserved for contents included within this BRS document

3 Acronym Definitions

Acronym	Definition
API	Application Programming Interface
BAA	Balancing Authority Area
BAAOP	Balancing Authority Area Operations Portal
CIDI	Customer Inquiry, Dispute, and Information
CMRI	CAISO Market Results Interface
EIM	Energy Imbalance Market
EIR	Electric Industry Registry
ETSR	Energy Transfer System Resource
FMM	Fifteen Minute Market
FRD	Flexible Ramping Downward
FRU	Flexible Ramping Upward
ISO	Independent System Operator
ITC	Intertie Transmission Constraint
ITS	Interchange Transaction Scheduler
MQS	Market Quality System (Internal ISO system)
NAESB	North American Energy Standards Board
OASIS	Open Access Same Time Information System
PCA	Price Correction Application (Internal ISO system)
PSE	Purchasing Selling Entity (NAESB reference)
PTST	Pseudo Tie Share Transfer
RTBS	Real-Time Base Schedule (Internal ISO system)
RTCD	Real-Time Contingency Dispatch
RTD	Real-Time Dispatch
RTM	Real-Time Market
RTMO	Real-Time Market Operator (ISO role)
RTPD	Real-Time Pre-Dispatch
RTSI	EIM Real Time Interchange Schedule Interface Data
STUC	Short-Term Unit Commitment
UI	User-Interface
VER	Variable Energy Resource

4 Details of Business Need/Problem

4.1 Description

The following project items, with their associated business needs, are included below for the 2018 EIM Enhancements project initiative.

Scope Item	Description (Business Needs)
1	**[Removed from Fall 2018 Release scope:** Upon further review, ISO determined function and control of ETSR ramping constraints would benefit from a general stakeholder review, allowing multiple viewpoints to address how best to support greater reliability for all EIM BAAs (ISO BAA included) during conditions where a limitation constrains the operational capability to serve rapidly changing transfer schedules. ISO will raise this topic in a future stakeholder process.**]** **2018EIM-BRQ0019** will remain in-scope for Fall 2018 Release scope.
2	**FRP Procurement Exclusion for EIM BAAs while in Contingency** • Market efficiency needed to automatically exclude EIM BAAs from Flex Ramp Up and Flex Ramp Down awards during their contingency periods; re-calculates adjusted EIM Area flexible ramping requirements • Market correction processes for EIM BAA contingency status. • Public reporting of EIM BAA Contingency Status for Real-Time Dispatch intervals.
3	**Balancing Area Authority Operations Portal (BAAOP) User-Interface Enhancements:** • EIM Entities need better transparency as to if/when their market data submissions are active within the EIM Markets (or whether the market uses ISO data instead). Display information should provide current data for the following market submission types: ○ Real-Time Schedule Interchange (RTSI) - Pre-Hour Interchange Schedules ○ Energy Transfer System Resource (ETSR) Limits ○ Inter-tie Transmission Constraint (ITC) limits ○ Pseudo-Tie Share Transfer (PTST) limits ○ Flowgate Limits ○ Variable Energy Resource (VER) Forecasts ○ Real-Time Schedule Interchange (RTSI) Ramping Sufficiency Test Input Report
4	**[Removed from Fall 2018 Release scope]:** ISO determined the benefit from automating the PSE code synchronization process between its interchange scheduling systems and the NAESB EIR site did not justify the ultimate cost to support the service. Instead, ISO requests Scheduling Coordinators that expect to initiate inter-tie scheduling under a new or re-activated NAESB PSE code notify their customer representative and request activation 5 to 11 business days prior to the initial trade date.

Scope Item	Description (Business Needs)
5	**Enhancement for Energy Transfer System Resource (ETSR) Pre-hour Interchange Schedules for EIM BAAs paired with the ISO BAA:** When calculating ETSR schedules where one of the associated BAAs is the ISO BAA, the system should ignore the submitted pre-hour interchange schedule tagged quantities since the ISO BAA does not have base schedules with other EIM BAAs. Instead, the market systems should determine ETSR schedules through economic optimization, or constrain it to the submitted base schedule in the event the ETSRs are frozen.
6	**Enhancement for Calculating Fifteen-Minute Schedules from Hourly Resources:** Evaluating the logic with how markets translate pre-hour interchange schedules into 15-minute schedules, specific improvements will allow the calculated schedule to reflect cross-hour ramping (based on 5-minute interval values) so that fifteen-minute market (FMM) interval schedules are more reflective of expected outcomes and better align with the 5-minute real-time market. For example, when a system resource has its schedule reduced for the :45 to :00 interval, the existing calculation logic for the interchange schedule at top of the next hour uses the schedule submission for the prior hour's interval :30 start time (which would not reflect the intended schedule), as shown in the *existing calculation logic*: • For Interval :00 to :15, calculated schedule matches the schedule submission at start time :30 • For Interval :15 to :30, calculated schedule matches the schedule submission at start time :30 • For Interval :30 to :45, calculated schedule matches the average of the schedule submission for 5-minute intervals beginning :30, :35, and :40 (i.e. each 5-minute interval spanning from :30 to :45) • For Interval :45 to :00, calculated schedule matches the schedule submission at start time :30 To improve the pre-hour interchange schedule calculation so that it better reflects what was intended, the schedule calculation logic *will be modified as follows*: • For Interval :00 to :15, calculated schedule matches the schedule submission at end time :15 • For Interval :15 to :30, calculated schedule matches the average of the schedule submission for 5-minute intervals beginning :15, :20, and :25 (i.e. each 5-minute interval spanning from :15 to :30) • For Interval :30 to :45, calculated schedule matches the average of the schedule submission for 5-minute intervals beginning :30, :35, and :40 (i.e. each 5-minute interval spanning from :30 to :45) • For Interval :45 to :00, calculated schedule matches the schedule submission at start time :45

5 Business Impacts

5.1 Business Practice Manual (BPM):

BPM	Scope Item	Description of Impact(s)
Energy Imbalance Market (EIM)	2	Flexible Ramping Exclusion for EIM BAA in Contingency: • Exclusion of Flex Ramp awards for EIM BAAs in contingency • EIM Area flexible ramping requirements adjustment performed to reflect BAA exclusion(s) Modified calculation logic for fifteen-minute schedules from hourly resources ETSR treatment of tagged quantities (ignored) where BAA-pairing includes ISO BAA
Market Instruments	1-2	Flexible Ramping Exclusion for EIM BAA in Contingency: • New OASIS report showing all real-time market intervals where EIM BAAs are in contingency status BAAOP Enhancements: • BAAOP User Guide updated to reflect additional UI displays providing current state of market data submissions
Market Operations	1-2	Flexible Ramping Exclusion for EIM BAA in Contingency: • FRU/FRD awards are excluded from EIM BAAs during time intervals in contingency status • Flexible Ramping Requirements and Prices set to zero for BAAs in contingency • EIM Area Adjusted Flex Requirements are recalculated to reflect excluded BAA's zero requirements

BPM	Scope Item	Description of Impact(s)
BPM Change Management	N/A	N/A
Candidate CRR Holder	N/A	N/A
Compliance Monitoring	N/A	N/A
Congestion Revenue Rights	N/A	N/A
Credit Management	N/A	N/A
Definitions & Acronyms	N/A	N/A
Direct Telemetry	N/A	N/A
Distributed Generation for Deliverability	N/A	N/A
Generator Interconnection and Deliverability Allocation Procedures	N/A	N/A
Generator Interconnection Procedure (GIP)	N/A	N/A
Generator Management	N/A	N/A
Managing Full Network Model	N/A	N/A
Metering	N/A	N/A
Outage Management	N/A	N/A
Reliability Requirement	N/A	N/A
Rules of Conduct Administration	N/A	N/A
Scheduling Coordinator Certification & Termination	N/A	N/A
Settlements & Billing	N/A	N/A
Transmission Planning Process	N/A	N/A

5.2 Other:

Impact:	Description: (optional)
Market Simulation	Yes
Market Participant Impact	Yes
User Acceptance Testing (UAT)	Yes
External Training	Yes
Policy Initiative	No

6 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.

6.1 Business Process: Enforcement of Individual/Aggregate ETSR Constraints (Removed from Fall 2018 Release scope, except for 2018EIM-BRQ0019)

6.1.1 Business Requirements

ID#	Business Feature	Req Type	Potential Application(s) Impacted
ETSR Ramp Rate Constraints market enhancements are removed from scope. Note that 2018EIM-BRQ0019 (below) will remain in-scope for Fall 2018 Release.			
2018EIM-BRQ0019	System shall assign resources maximum ramp rate values for all current and future non-resource specific system resources to 9,999 MW/min, by default instead of current default of zero MW/min. Existing non-zero maximum ramp rate values shall be retained in MasterFile.	Core	MasterFile

6.2 Business Process: Flexible Ramping Product Exclusion for EIM BAAs during Contingency Events

6.2.1 Business Requirements

ID#	Business Feature	Req Type	Potential Application(s) Impacted
2018EIM-BRQ0020	Market systems shall not procure FRU/FRD awards for any EIM BAA undergoing contingency. FRU/FRD procurement shall only return once the EIM BAA has resumed to normal operating conditions. During an EIM BAA contingency event, market system shall refrain from performing the following actions: • formulating an FRU/FRD procurement constraint for that BAA • awarding FRU/FRD to resources within the contingency EIM BAA • applying any FRU/FRD awards from the contingency BAA to satisfy the EIM Area Flex Ramp requirements	Core	RTPD, RTD
2018EIM-BRQ0021	Market systems shall continue to award FRU/FRD normally for the other EIM BAAs not undergoing contingency, as well as the overall EIM Area.	Existing Function	RTPD, RTD
2018EIM-BRQ0022	Market systems shall explicitly subtract the FRU requirement from the BAA(s) undergoing contingency with a pro rata diversity factor from the overall EIM Area requirement, such that the adjusted EIM Area requirement (both UP and DOWN directions) with one or more EIM BAA under contingency is: Adjusted EIM Area Requirement = max{M, [(Original EIM Area Requirement) – (Diversity Factor) * Σ(Original Requirement of BAAs under contingency)]} Where: M = max(Original Requirement of BAAs without contingency) Diversity Factor = (Original EIM Area Requirement) / Σ(Original BAA Requirement of all BAAs in the EIM Area)	Core	RTPD, RTD
2018EIM-BRQ0023	Market systems shall broadcast zero values for the following market results for an EIM BAA undergoing contingency to downstream systems: • ~~FMM/~~RTD FRU/FRD requirements • ~~FMM/~~RTD FRU/FRD uncertainty movement awards	Core	RTPD, RTD Integration

ID#	Business Feature	Req Type	Potential Application(s) Impacted
2018EIM-BRQ0026	On an RTD market interval basis, market system shall broadcast EIM BAA contingency status market data to downstream systems. Market data broadcasts (provided by RTD market), as opposed to market correction broadcasts (provide ex-post by internal correction systems), shall provide contingency status for only those EIM BAAs that are in contingency. For instances when ISO market is in contingency, no EIM BAA contingency status shall be broadcasted (i.e. RTCD/RTDD will run instead of RTD).	Core	RTD
2018EIM-BRQ0031	On an RTD market interval basis, the system shall receive, store, and broadcast market correction Contingency Status data for each EIM BAA. Market correction broadcasts payload must define one of the following states for each EIM BAA requiring correction: • 'Y', representing EIM BAA is in contingency after correction is performed • 'N', representing no EIM BAA contingency exists after correction is performed System shall only broadcast correction payloads to downstream systems (for only those EIM BAAs whose Contingency Status was changed).	Core	PCA (Internal ISO System)
2018EIM-BRQ0035	When an EIM BAA is corrected from contingency to non-contingency state (i.e. Contingency Status flag transitions from 'Y' to 'N'), system shall perform the following for the impacted EIM BAA: • Resource-specific Flex Ramp Prices shall be corrected. Resource Flex Ramp commodity-specific parent and breakdown prices shall match the constraint shadow prices • Flex Ramp uncertainty awards will remain zero (as the flex ramp requirement remains as zero) In this scenario, Flex Ramp uncertainty awards would not settle (as the Flex Ramp requirement was zero in the performed market run). Resource-specific Flex Ramp forecasted movement would settlement at the corrected Flex Ramp prices.	Core	PCA (Internal ISO System)

ID#	Business Feature	Req Type	Potential Application(s) Impacted
2018EIM-BRQ0036	When an EIM BAA is corrected from non-contingency to contingency state (i.e. Contingency Status flag shall transition from 'N' to 'Y'): • The business unit shall insert the contingency status flag as 'Y' unless it already exists, in which case it shall be updated to 'Y' • Resource-specific, commodity-specific Flex Ramp Prices shall be set to zero at the parent and breakdown levels In this scenario, the flex ramp uncertainty awards would not update, but no settlement occurs (for either uncertainty awards or forecasted movement) since the flex ramp prices are zero.	Core	PCA (Internal ISO System)
2018EIM-BRQ0037	For instances when the ISO BAA is in contingency, no Contingency Status correction shall be performed for EIM BAAs as there will be no Flex Ramp requirement for the entire EIM Area during that time.	Core	PCA (Internal ISO System)
2018EIM-BRQ0025	System shall continue to normally calculate and settle a forecasted movement for an EIM BAA under contingency, as there will be a price of zero applied for each resource will occur.	Existing Function Regression Test Req	*MQS, PCA (Internal Systems)* *Settlements*

ID#	Business Feature	Req Type	Potential Application(s) Impacted
2018EIM-BRQ0028	System shall receive and publish information publicly designating those RTM intervals in which an EIM BAA experienced a contingency event. If EIM BAA contingency status is included in a market correction, reporting system shall receive and report the corrected values. For intervals where ISO BAA is in contingency state, no reporting shall occur for EIM BAA contingency status. System shall report the following BAA Contingency Status info: • BAA ID • Market Type ('RTD' only) • Trade Date • Trade Hour • Interval Number • Contingency Status (Y/N) Reported market broadcast Contingency Status values shall reflect: • 'Y' for EIM BAA(s) in a contingency state, • No records for EIM BAA(s) in a non-contingency state If Contingency Status value is corrected, the reported Contingency Status value shall reflect: • 'Contingency – Corrected to Yes' for EIM BAA(s) corrected to a contingency state, • 'Contingency – Corrected to No' for EIM BAA(s) corrected to a non-contingency state	Core	*OASIS~~, PCA~~*

6.3 Enhancement: Balancing Area Authority Operations Portal (BAAOP) User-Interface Enhancements

6.3.1 Business Requirements

ID#	Business Feature	Req Type	Potential Application(s) Impacted
2018EIM-BRQ0050	System shall provide ISO users and EIM BAA market participants with an interface to view the following incoming EIM market data submissions on an updated basis and capability to override the input limits for the applicable displays from below list: • Real-Time Schedule Interchange (RTSI) Pre-Hour Interchange Schedules • Energy Transfer System Resource (ETSR) Limits • Inter-tie Transmission Constraint (ITC) limits • Pseudo-Tie Share Transfer (PTST) Limits • Flowgate Limits • Variable Energy Resource (VER) Forecasts • Real-Time Schedule Interchange (RTSI) Ramping Sufficiency Test Input Report	Core *UI*	BAAOP
2018EIM-BRQ0051	System displays shall only provide EIM BAA market participants with data submissions associated with their own EIM BAA. RTM Operator role shall be able to view all or filter select EIM BAA submission data.	Core *UI*	BAAOP
2018EIM-BRQ0053	System shall display the following fields for the **Real-Time Schedule Interchange (RTSI) Pre-Hour Interchange Schedules** report • EIM BAA ID • Intertie ID • Start Time • End Time • RTPD MW Schedule Value Operator override display interface shall only apply to RTPD input values, wherein submitted RTPD override values will pass to the other market schemas automatically (i.e. STUC and RTD) for those correlating interval still in that market's horizon. RMTO user shall have ability to filter results by EIM BAA ID.	Core *UI*	BAAOP STUC, RTPD, RTD

ID#	Business Feature	Req Type	Potential Application(s) Impacted
2018EIM-BRQ0054	System shall display the following fields for the **Energy Transfer System Resource (ETSR) Limits** report (with current data status provided): • EIM BAA ID • EIM Transfer System Resource ID • Start Time • End Time • RTPD Limit MW Value Operator override display interface shall only apply to RTPD input values, wherein submitted RTPD override values will pass to the other market schemas automatically (i.e. STUC and RTD) for those correlating interval still in that market's horizon.	Core *UI*	BAAOP STUC, RTPD, RTD
2018EIM-BRQ0055	System shall display the following fields for the **Inter-tie Transmission Constraint (ITC)** limits report: • EIM BAA ID • ITC Name • Start Time • End Time • MW Constraint Limit System shall display the following fields for the **Pseudo-Tie Share Transfer (PTST)** report: • EIM BAA ID • PTST Name • Start Time • End Time • Lower Limit • Upper Limit • Operator Override Lower Limit (editable field) • Operator Override Upper Limit (editable field) • Active status (view only)	Core *UI*	BAAOP
2018EIM-BRQ0056	System shall display the following fields for the **Flowgate Limits** report: • EIM BAA ID • Flowgate Name • Start Time • End Time • MW Limit	Core *UI*	BAAOP

ID#	Business Feature	Req Type	Potential Application(s) Impacted
2018EIM-BRQ0057	System shall display the following fields for the **Variable Energy Resource (VER) Forecasts** report: • EIM BAA ID • SCID • Resource ID • Start Time • End Time • MW Forecast	Core *UI*	BAAOP
2018EIM-BRQ0058	System shall report to operator the following data used as input for flex ramp sufficiency tests: • Trade Date • Start Time • End Time • Export BAA • Export RTSI Schedule (as reflected by initial point T-7.5') • Export ETSR/Transaction ID • Import BAA • Import RTSI Schedule (as reflected by initial point T-7.5') • Import ETSR/Transaction ID (mirror of export ETSR)	Core	BAAOP

6.4 Business Process: Automated Synchronization of PSE Registered Entity Codes with ISO Systems

(Removed from Fall 2018 Release scope)

6.4.1 Business Requirements

ID#	Business Feature	Req Type	Potential Application(s) Impacted
Automated PSE code synchronization was removed from the Fall 2018 Release scope.			

6.5 Business Process: Enhancement for Energy Transfer System Resource (ETSR) Pre-hour Interchange Schedules for EIM BAAs paired with the ISO BAA

6.5.1 Business Requirements

ID#	Business Feature	Req Type	Potential Application(s) Impacted
2018EIM-BRQ0450	Market systems shall ignore submitted ETSR pre-hour schedule tagged quantities when its BAA-pairing includes the CISO BAA. ETSR schedule quantity will be determined through economic optimization within the Fifteen-Minute Market (FMM) or its submitted base schedule, if frozen.	Core	RTM, e-Tag

6.6 Business Process: Enhancement for Calculating Fifteen-Minute Schedules from Hourly Resources

6.6.1 Business Requirements

<table>
<tr><th>ID#</th><th>Business Feature</th><th>Req Type</th><th>Potential Application(s) Impacted</th></tr>
<tr><td>2018EIM-BRQ0451</td><td>For the following fifteen-minute market interval periods of a given pre-hour schedule, the system shall calculate the schedule quantity with the following logic:

<table>
<tr><th>FMM Market Interval</th><th>Calculated Fifteen-Minute Schedule (based on Hourly Schedule)</th></tr>
<tr><td>:00 to :15</td><td>Hourly schedule submission value at end time :15</td></tr>
<tr><td>:15 to :30</td><td>Average of the schedule submissions for 5-minute intervals beginning at minutes :15, :20, and :25 of trade hour (i.e. each 5-minute interval spanning from :15 to :30)</td></tr>
<tr><td>:30 to :45</td><td>Average of the schedule submission for 5-minute intervals beginning :30, :35, and :40 (i.e. each 5-minute interval spanning from :30 to :45)</td></tr>
<tr><td>:45 to :00</td><td>Hourly schedule submission value at start time :45</td></tr>
</table>
</td><td>Core</td><td>RTM</td></tr>
</table>