California ISO

Business Requirements Specification

Energy Imbalance Market 2021 Enhancements

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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).

Background:

Energy Imbalance Market Enhancements projects collectively address important issues identified by EIM market participants through Customer Inquiry, Dispute and Information system (CIDI) requests to improve the visibility, functions and features in Energy Imbalance Market (EIM).

Different from previous years, there will be five entities (BANC, LADWP, NWMT, TID, and PNM) that will join EIM in 2021, and five entities (BPA, Avista, Tacoma, Tucson, and PSCo) in 2022. There are a number of EIM enhancement projects to address special requests for integrating these entities in EIM. Among them, enhancements for BANC2, LADWP, BPA, Avangrid, and PSCo, each have separate projects and Business requirements. In addition, a few policy initiatives through stakeholder process also form a few separate projects (FRP Refinement, RT settlement Review, Base Schedule Submission Deadline, Pseudo-ties of Shared Resources, and EIM Sub-entity SC role). Through these projects, ISO will provide significant new functions for the EIM market. Additional identified crucial enhancements will be managed through change requests.

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 Guidelines

Intellectual Property ownership must be considered by all applicable stakeholders before the services are performed. The level of analysis is two-fold:

- One, the business owner must determine if the Intellectual Property necessary to perform the services is owned by the California ISO or whether it must be obtained from a third party. Once the California ISO has secured the proper Intellectual Property rights to perform the services (i.e., the Intellectual Property is owned by the California ISO or we have licensed it from a third party), the California ISO can undertake the next step.

- The second step in the analysis is to consider whether new Intellectual Property will be created as a result of the business requirements or service requirements to be performed, and how that Intellectual Property will be owned and protected by the California ISO.

In order to assist the business owner in the analysis previously described, refer to the California Intellectual Property Policy available at: http://www.caiso.com/rules/Pages/LegalPoliciesNotices/Default.aspx, which provides a brief tutorial on what Intellectual Property is and how the California ISO can protect its Intellectual Property. Contact the Legal Department if you have any questions regarding Intellectual Property.

There are no impacts to intellectual property based on the requirements stated in this document.
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3 Details of Business Need/Problem

3.1 Description

Business Opportunity/Problem Statement:	
What:	Energy Imbalance Market Enhancements project focuses on important issues identified by EIM market participants through Customer Inquiry, Dispute and Information system (CIDI) requests to improve the visibility, functions and features in Energy Imbalance Market (EIM) **FALL 2021 Scope:** **BAAOP**: Fix/Improve existing defect global market displays regarding deleting results from previous runs while executing the new run **BAAOP/RTM**: EIM BAA-Specified parameters for Shared ramping capability constraint **ETSR Lock Screen:** Global lock/unlock for RTMO.
When:	Fall 2021
Why do we have this opportunity/problem:	Different from previous years, there will be five entities (BANC, LADWP, NWMT, TID, PNM) join EIM in 2021, six entities (BPA, Avista, Tacoma, Avangrid, Tucson, PSCo) in 2022. There are number of EIM enhancement projects to address special requests for integrating these entities in EIM. Among them, enhancements for BANC2, LADWP, BPA, Avangrid, PSCo, each have separate projects and Business requirements. In addition, a few policy initiatives through stakeholder process also form a few separate projects (FRP Refinement, RT settlement Review, Base Schedule submission deadline, Pseudo-ties of shared resource, EIM Sub-entity SC role). Through these projects, ISO will provide significant new functions for EIM market
Who does this opportunity/problem impact:	Market Participants, Market Operations, and Customer Service

4 Business Impacts

4.1   Business Practice Manual (BPM)

BPM	Description of Impact(s)
Market Instruments	<mark>Yes</mark> For new tables.
Market Operations	<mark>Yes</mark> Language to be updated for Shared Ramping Constraint for having the same BAA dependent Ancillary Services (AS) parameter and be configurable for changing this value in the future.

4.2 Other

Impact:	Description: (optional)
Market Simulation	Yes
Market Participant Impact	Yes
User Acceptance Testing (UAT)	Yes
Internal Training	Yes
External Training	Yes
Policy Initiative	No
Vendor	Yes
Architectural Framework and Roadmap	Yes

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: Manage Energy Imbalance Markets

5.1.1 Business Requirements: BAAOP Enhancements

ID#	Business Feature	Req. Type	Potential App(s) Impacted
EIM21-BRQ201	Data results from previous results shall continue to show data on displays until replaced with new market run data. This a global requirement for any display showing results. A list of critical displays is included in Appendix F. • If there are separate UIs for each market run (RTD/RTPD/STUC) then each UI will retain data. (i.e., there is a separate Critical Constraint UI for RTD and RTPD that should both retain data even though they are not listed separately below) • If there is more than one location for the UI listed, then all locations will retain data. (i.e., the RTD Dispatch Control UI is listed in RTN as well as BAAOP as well as many variations of these in the coming soon menus)	Core Phase 2	IFM/RTN/BAAOP
EIM21-BRQ203	System shall have a modified transfer totals calculation in the RTD ETSR detail screen that only includes dynamic ETSRs and modified labels as in the Appendix B mockup.	Core Phase 2	RTN/BAAOP
EIM21-BRQ204	System shall have a modified transfer totals calculation in the RTPD ETSR detail screen that includes a breakdown by ETSR type (Static, Dynamic, and Base) and modified labels as specified in the Appendix B mockup.	Core Phase 2	RTN/BAAOP

5.2   Business Process: Manage Real-Time Markets

5.2.1   Business Requirements

ID#	Business Feature	Req. Type	Potential Application(s) Impacted
EIM21-BRQ213	**Shared Ramping Constraint:** System must have Ancillary Services' parameters independently set for each BAA and be configurable for changing these values in the future. Right now, these parameters are defined in table EMM_SCUC_IMM_AS_PART_PARAM without BAA attribute. Please either expand this table or define new PARAM_CODE in table EMM_SCUC_INPUT_BAA_PARAMS.	Core Phase 2	RTM

Appendix A: Glossary

Term	Description/Definitions
A2A	Application-to-Application (internal API)
ABC	Available Balance Capacity
AIM	Access and Identity Management
ALFS	Automated Load Forecast System
API	Application Program Interface
AS	Ancillary Services
B2B	Business-to-Business (external API)
BAA	Balancing Authority Area
BAAOP	Balancing Authority Area Operations Portal
BD	Bill Determinant
BRS	Business Requirement Specification
BSAP	Base Schedule Aggregation Portal
BSC	Base Schedule Scheduling Coordinator
CAISO	California Independent System Operator
CIDI	Customer Inquiry, Dispute and Information system
CISO	See CAISO
CMRI	CAISO Market Results Interface
DAM	Day Ahead Market
DEC	Decrement. Indicates the active power output of a resource is being decreased.
DOT	Dispatch Operating Target
ED	Exceptional Dispatch
EIF	EIM Incremental Flow
EIM	Energy Imbalance Market
EMS	Energy Management System
RTF	EIM Total Flow
ETSR	Energy Transfer System Resource
GRDT	Generator Resource Data Template
HVDC	High Voltage Direct Current
ICCP	Inter-Control Center Communications Protocol
IFM	Integrated Forward Market
IE	Interval-Ending, convention (e.g. 15-minute IE 0:30 would be the time period 0:15 to 0:30)
IIE	Instructed Imbalance Energy
INC	Increment. Indicates the active power output of a resource is being increased.
ISO	Independent System Operator
ISL	Interchange Scheduling Limit

Term	Description/Definitions
ITC	Intertie Transmission Constraint
LMP	Locational Marginal Price
MF	MasterFile
MRI-S	Market Results Interface - Settlements
MSG	Multi-Stage Generation
MW	Mega-Watt
NA	Network Applications
NSI	Net Schedule Interchange. Net Scheduled Interchange is the sum of all Interchange Schedules across a given path or between Balancing Authorities for a given period or instant in time (imports minus exports).
OASIS	Open Access Same Time Information System
OOS	Out-of-Sequence
PDR	Proxy Demand Resource
PSH	Pumped Storage Hydro
ROC	Rate-of-Change
RTBS	Real-Time Balance Schedule. Application that performs resource sufficiency tests for the EIM.
RTD	Real-Time Dispatch
RTM	Real-Time Market
RTMO	Real-Time Market Operator (ISO BAA Operator)
RTPD	Real-Time Pre-Dispatch
RTSI	EIM Real Time Schedule Interchange. Schedule representation of tags sent to market for dispatch.
RTUC	Real-Time Unit Commitment
SC	Scheduling Coordinator
SCADA	Supervisory Control and Data Acquisition
SE	State Estimator
SFTP	Secured File Transfer Protocol
SIBR	Scheduling Infrastructure and Business Rules
SQMD	Settlement Quality Meter Data
STUC	Short-Term Unit Commitment
SUPP	Supplemental Energy
SVG	Scalable Vector Graphics
TG	Tie Generator (Inter-tie Generator)
TMSG	(Inter-)Tie Multi-Stage Generator
TNGR	Tie Non-Generator Resource
TSR	Transmission Service Reservation: A service request from the Transmission Customer to the Transmission Service Provider to move energy from a Point of Receipt to a Point of Delivery.
UI	User-Interface
UIE	Uninstructed Imbalance Energy
VER	Variable Energy Resource

Term	Description/Definitions
XSD	XML Schema Definition

Appendix B: ETSR Display and Calculation

Net ETSR Totals on the ETSR Details UI:

Please update the tables on the ETSR Details Uis (RTD and RTPD)
NOTE: If EIM entity does not have MaserFile defined Static ETSRs, the data cells should be null in the Static rows

EIM > EIM > ETSR DETAILS RTD

Net ETSR Totals (5 MIN)	11:25	11:30	11:35	11:40	11:45	11:50	11:55	12:00	12:05	12:10	12:15	12:20
AZPS	Net Eff. Dyn Import Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Import Unloaded Capacity	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Eff. Dyn Export Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Export Unloaded Capacity	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Dyn DOT	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Dyn Supplemental	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###

EIM > EIM > ETSR DETAILS RTPD

Net ETSR Totals (15 MIN)	11:45	12:00	12:15	12:30	12:45	13:00	13:15	13:30	13:45	14:00
AZPS	Net Eff. Base Import Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Eff. Base Export Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Base Schedule	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Eff. Static Import Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Eff. Static Export Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Static Schedule	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Eff. Dyn Import Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Eff. Dyn Export Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Dyn Schedule	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###

For RTD ETSR detail screen:

The Net Eff. Dyn Import limit = sum of the limits of all dynamic import ETSRs, considered as negative.
The Net Import Unloaded Capacity = Net Eff. Dyn Import limit - Net Dyn DOT
The Net Eff. Dyn Export limit = sum of the limits of all dynamic export ETSRs, considered as positive.
The Net Export Unloaded Capacity = Net Eff. Dyn export limit - Net Dyn DOT

No change in calculation for net dyn DOT/Supplemental, import is considered negative, export is considered positive

ETSR	Limit	DOT
ETSR_EIMDYN_I_1	100	80
ETSR_EIMDYN_I_2	58	50
ETSR_EIMDYN_E_1	200	70
ETSR_EIMDYN_E_2	116	20

From BAA		XX:XX	XX:XX	XX:XX	XX:XX	XX:XX	XX:XX	XX:XX
EIM A	Net Eff. Dyn Import Limit	-158						
EIM A	Net Import Unloaded Capacity	-118						
EIM A	Net Eff. Dyn Export Limit	316						
EIM A	Net Export Unloaded Capacity	356						
EIM A	Net Dyn DOT	-40						
EIM A	Net Dyn Supplemental	-40						

For RTPD ETSR detail:

The Net Eff. Base Import Limit = sum of the limits (Base Schedule) of all base import ETSRs, considered as negative.
The Net Eff. Base Export Limit = sum of the limits (Base Schedule) of all base export ETSRs, considered as positive.
Net Base Schedule, no change, import is considered negative, export is considered positive
The Net Eff. Static Import Limit = sum of the limits of all static import ETSRs, considered as negative.
The Net Eff. Static Export Limit = sum of the limits of all static export ETSRs, considered as positive.
Net Static Schedule, no change, import is considered negative, export is considered positive
The Net Eff. Dyn Import Limit = sum of the limits of all dynamic import ETSRs, considered as negative.
The Net Eff. Dyn Export Limit = sum of the limits of all dynamic export ETSRs, considered as positive.
Net Dyn Schedule, no change, import is considered negative, export is considered positive

ETSR	Limit	Schedule
ETSR_EIMSTA_E	2	2
ETSR_EIMSTA_I	0	0
ETSR_EIMBASE_E	1	1
ETSR_EIMBASE_I	36	36
ETSR_EIMDYN_E	388	0
ETSR_EIMDYN_I	376	43

From BAA		XX:XX	XX:XX	XX:XX	XX:XX	XX:XX	XX:XX	XX:XX
EIM A	Net Eff. Base Import Limit	-36						
EIM A	Net Eff. Base Export Limit	1						
EIM A	Net Base Schedule	-35						
EIM A	Net Eff. Static Import Limit	0						
EIM A	Net Eff. Static Export Limit	2						
EIM A	Net Static Schedule	2						
EIM A	Net Eff. Dyn Import Limit	-376						
EIM A	Net Eff. Dyn Export Limit	388						
EIM A	Net Dyn Schedule	-43						

Appendix C: BAAOP UI for ITC and ETSR sub-table and CMRI for ITC limits

Master File define:

MF define ITC with BAA

ITC	BAA
MOENKOPI_NAVAJO	AZPS
MOENKOPI_NAVAJO	CISO
MOENKOPI_NAVAJO	NEVP

Based on:

MF - Existing

ITC_NAME	ETSR
MOENKOPI_NAVAJO	AZPS_WILLOWBEACH_CISO_I_EIMDYN
MOENKOPI_NAVAJO	AZPS_WILLOWBEACH_CISO_E_EIMDYN
MOENKOPI_NAVAJO	AZPS_CRYSTAL500_NEVP_I_EIMDYN
MOENKOPI_NAVAJO	AZPS_CRYSTAL500_NEVP_E_EIMDYN

BAAOP:

UI for each associated BAA: AZPS, NEVP, CISO

A Designated UI for EIM ITC and ETSR

BAA	ITC name	Start Time	Import	Export
AZPS	MOENKOPI_NAVAJO	12/18/2020 13:00	800	1600
AZPS	MOENKOPI_NAVAJO	12/18/2020 14:00	1000	1600
AZPS	AZPS_NET_ITC	12/18/2020 13:00	9999	9999
AZPS	AZPS_NET_ITC	12/18/2020 14:00	9999	9999

For MOENKOPI_NAVAJO

Sub Table

RTPD ETSR (15 MIN) Schedule	From BAA	To BAA	12:00	12:15	12:30	12:45
AZPS_WILLOWBEACH_CISO_I_EIMDYN	AZPS	CISO	300	300	300	300
AZPS_WILLOWBEACH_CISO_E_EIMDYN	AZPS	CISO	0	0	0	0
AZPS_CRYSTAL500_NEVP_I_EIMDYN	AZPS	NEVP	300	300	300	300
AZPS_CRYSTAL500_NEVP_E_EIMDYN	AZPS	NEVP	0	0	0	0
total			600	600	600	600

RTD ETSR (5 min) Schedule	From BAA	To BAA	12:00	12:05	12:10	12:15	12:20	12:25
AZPS_WILLOWBEACH_CISO_I_EIMDYN	AZPS	CISO	1000	300	300	300	300	300
AZPS_WILLOWBEACH_CISO_E_EIMDYN	AZPS	CISO	0	0	0	0	0	300
AZPS_CRYSTAL500_NEVP_I_EIMDYN	AZPS	NEVP	0	300	300	300	300	300

AZPS_CRYSTAL500_NEVP_E_EIMDYN	AZPS	NEVP	200	0	0	0	0	0
total			800	600	600	600	600	300

CMRI Mock up for ITC limits by intervals:
Reflect the derate in RTD

ITC Name	Start time	End time	Market	Import Limit	Export Limit
MOENKOPI_NAVAJO	12/18/2020 13:00	12/18/2020 13:15	RTPD	800	1600
MOENKOPI_NAVAJO	12/18/2020 13:00	12/18/2020 13:05	RTD	*600*	1600
MOENKOPI_NAVAJO	12/18/2020 13:05	12/18/2020 13:10	RTD	*600*	1600
MOENKOPI_NAVAJO	12/18/2020 13:10	12/18/2020 13:15	RTD	*600*	1600

Appendix E: Net ETSR Totals on the ETSR Details UI

Net ETSR Totals on the ETSR Details UI:

Please update the tables on the ETSR Details Uis (RTD and RTPD)
NOTE: If EIM entity does not have MasterFile defined Static ETSRs, the data cells should be null in the Static rows

EIM > EIM > ETSR DETAILS RTD

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AZPS	Net Eff. Dyn Import Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Eff. Dyn Export Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Dyn DOT	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Dyn Supplemental	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###

EIM > EIM > ETSR DETAILS RTPD

Net ETSR Totals (15 MIN)		11:25	11:30	11:35	11:40	11:45	11:50	11:55	12:00	12:05	12:10	12:15	12:20
AZPS	Net Eff. Base Import Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Eff. Base Export Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Base Schedule	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Eff. Static Import Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Eff. Static Export Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Static Schedule	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Eff. Dyn Import Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Eff. Dyn Export Limit	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###
AZPS	Net Dyn Schedule	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###	#,###