



Business Requirements Specification


Energy Imbalance Market (EIM)

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Revision History

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9/27/2013	0.11	Create BRS based on EIM Draft Final Proposal
1/10/2014	1.1	Update (In Red): <ul style="list-style-type: none">• Add requirements for EIM Entity separation from EIM market• Clarify on requirements
1/30/2014	1.2	Update (In Red): <ul style="list-style-type: none">• Clarify the metering requirement (BRQ1223) for the EIM Entity separation from EIM market• Submit EIM transmission facilities along with Full Network Model• Submit EIM new resources 90 days in advance• Suppress UFE calculation for the EIM BAAs associated with the EIM Entity separation from EIM market.

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

These requirements will serve as the initial set of business unit requirements for the appropriate software application/systems development effort. It is understood that additional requirements and systems analysis may produce “To Be” Business Process Models, System Requirements Specifications, and Use Cases to serve as the set of requirements documents used by the development teams to buy, modify, or build the necessary software and hardware systems. The Business Unit(s) involved in the project will have an opportunity to review and approve all requirements documentation produced.

1.2 References

All references represent external requirements documents or stakeholder requests developed and submitted by the Business Units.


1. Policy-related documents, including the Draft Final Proposal and stakeholder comments are located on the “Energy Imbalance Market” Stakeholder Initiatives web page at:

<http://www.caiso.com/informed/Pages/StakeholderProcesses/EnergyImbalanceMarket.aspx>

2. Details of Business Need/Problem

2.1 Overview of Energy Imbalance Market (EIM)

The EIM will allow balancing authorities (BA) throughout the West to participate in a real-time imbalance energy market operated by the ISO. The EIM will dispatch economic bids to efficiently balance supply and load within its footprint, providing substantial benefits. Broad participation in an imbalance market will bring important efficiency, reliability benefits and provide a valuable and important role in renewable integration, helping to balance variable resources.

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EIM participants would:

- Maintain complete responsibility for serving their load, controlling physical scheduling rights on their own transmission system and procuring their own ancillary services.
- Use the existing ISO internet-based bid submission system to submit real-time three-part bids, composed of start-up and minimum load cost and incremental energy bids (price-quantity curves) for participating resources, and base schedules for all resources that will be used in imbalance energy calculation and settlement.
- Receive commitment and dispatch instructions for participating resources calculated by the ISO's real-time market optimization.
- Utilize the ISO's settlement system for financial settlement of real-time deviations from the base schedules at locational marginal prices.
- Benefit from established market monitoring and market power mitigation measures including mitigation of bids for resources that are necessary for relieving congestion and a "safety-net" bid cap and floor.
- Support marginal loss settlement.

2.2 Energy Imbalance Market Definitions


Energy Imbalance Market (EIM) is operation of the ISO's real-time market to manage transmission congestion and optimize procurement of energy to balance supply and demand for the combined ISO and EIM footprint. The ISO's real-time market includes a 15-minute market and a 5-minute market.

Market Operator is the ISO.

EIM Entity is a balancing authority and transmission service provider that enters into the pro forma EIM Entity Agreement to enable the EIM to occur in its balancing authority area (BAA). By enabling the EIM, real-time load and generation imbalances within its BAA will be settled through the EIM. The EIM Entity determines which resource types and transmission service is required to be eligible to participate in the EIM within the EIM Entity BAA. For example, an EIM Entity could determine that 15-minute economic bids for imports/exports would not be supported within the EIM Entity BAA even though this functionality is supported by the EIM.

EIM Entity Scheduling Coordinator is the EIM Entity, or a third-party designated by the EIM Entity, that is certified by the ISO and that enters into the pro forma EIM Entity Scheduling Coordinator Agreement, under which it is responsible for meeting the requirements specified in Tariff Section 291 on behalf of the EIM Entity. The EIM Entity Scheduling Coordinator is responsible for compiling and submitting balanced schedules for the EIM Entity BAA to the Market Operator, for imbalance energy settlement of resources not participating in EIM, and for distributing costs or revenues from uplift allocations to the EIM Entity BAA.

EIM Participating Resource is a resource located within the EIM Entity BAA that is eligible and elects to participate in the EIM and that enters into the pro forma EIM Participating Resource Agreement, under which it is responsible for meeting the requirements specified in Tariff Section 29. In the 5-minute market, eligible resources are those that can deliver energy, curtailable demand, demand response services or other similar services under the ISO Tariff provided they are enabled by the EIM Entity under its requirements for the delivery of energy or other similar services within its BAA, and may include Generating Units, Physical Scheduling Plants, Participating Loads, Proxy Demand Resources, Non-Generator Resources and Dynamic Transfers. In the 15-minute market, imports and exports that can be scheduled on a 15-minute basis are eligible to participate in addition to all resources eligible to participate in the 5-minute market.

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EIM Participating Resource Scheduling Coordinator is the participating resource, or a third-party designated by the resource, that is certified by the ISO and enters into the pro forma EIM Participating Resource Scheduling Coordinator Agreement, under which it is responsible for meeting the requirements specified in Tariff Section 29 on behalf of the resource. The EIM Participating Resource Scheduling Coordinator interfaces with the Market Operator on behalf of resources in an EIM Entity BAA that voluntarily elect to economically participate in the EIM. An EIM Participating Resource Scheduling Coordinator may be an existing Scheduling Coordinator, but it may not be the EIM Entity Scheduling Coordinator.

EIM Transfer is a transfer of real-time energy between an EIM Entity BAA and the ISO BAA or between EIM Entity BAAs using transmission capacity available in the EIM.

Base Schedule is a forward energy schedule, with hourly granularity, that is the baseline to measure deviations for settlement through the EIM. Base schedules include the hourly forecasts of load, hourly generation schedules and hourly interchange schedules.

Resource Plan is the combination of load base schedules, generation base schedules, interchange base schedules, ancillary services plans of the EIM Entity, and the bid range voluntarily submitted by EIM Participating Resources. Resource plans balance demand and supply and are used in the resource sufficiency evaluation.

3. Business Process Impacts

3.1 High Level Business Process

3.1.1 Description

EIM Integration will modify Reliability and Market Modeling processes, include:


- Manage Network Application
- Manage Market Billing and Settlements
- Manage Scheduling
- Manage Entity and Resource Maintenance Updates
- Manage Transmission/Generation Outages
- Manage Day-ahead Market
- Manage Real-time Market
- Manage Market Validation

EIM integration has implications to most ISO business processes and systems. EIM integration will introduce EIM-related data (registration, reference information, market and network modeling, bidding, scheduling, commitment, dispatch, settlements, billing etc.) throughout the bid-to-bill process. Business processes will need change in order to incorporate the new EIM Market Participant. Systems will be modified to incorporate EIM.

3.2 Justification

EIM integration aim:

- To include the network and resources of EIM-participating Balancing Area Authorities to obtain the efficiency

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- Integrate renewable resources.

4. Business Requirements

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

4.1 Overview

The major model aspect EIM:

EMS to include the detail of EIM Entities

- Expand EMS model with new detail modeling for EIM entities with the right SCADA/telemetry

Scheduling Points

- Define Scheduling Points (SPs) for Generation Aggregation Point (GAP) for each EIM BAA and BAA aggregation.
- Define generation distribution factors for each GAP to distribute the imported or exported energy schedule to the supply resources in the corresponding GAP. Similarly, default load distribution factors would be defined for each BAA LAP to distribute the base load and demand forecast in the corresponding BAA. In the RTM, the distribution of import/export schedules would conform to the State Estimator (SE) solution.

Tagging


- The Market Operator will receive approved intertie schedules at interties between an EIM Entity BAA and non-EIM Entity BAAs from the relevant EIM Entity SC.
- The Market Operator will maintain a dynamic schedule with each EIM Entity BAA. Within 60 minutes after the end of each operating hour, each EIM Entity SC will calculate the integrated net energy interchange with the CAISO BAA during the hour and update the relevant dynamic schedule.

Transmission Limits and Intertie Scheduling limits:

- Transmission limits, and Intertie Scheduling limits constraints would not be enforced in DAM in EIM entity BAA., would be enforced of RTM network constraints in EIM Entity BAAs.
- The Net Schedule Interchange of each EIM Entity BAA will be limited in RTM based on applicable contractual rights and the intertie transmission capacity that each EIM Entity will release to EIM.

Transmission Loss and congestion for EIM BAA network:

- The Locational Marginal Prices (LMPs) will ignore the marginal loss of the EIM network branches in the loss penalty factors in DAM; LMP will reflect the marginal loss of EIM Entity BAAs in the RTM.
- The Locational Marginal Prices (LMPs) will not reflect marginal congestion cost on EIM BAA network branches in DAM, LMP will reflect congestion cost of EIM Entity BAAs in RTM.

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Generation and load resources in EIM BAAs

- Supply resources of EIM Entity BAAs:
 - Have the same level of detail, telemetry, and revenue quality meter requirements as internal generating resources.
 - EIM participating resources can be committed in RTM.
- Demand Resources of EIM Entity BAAs:
 - Load Aggregation Points (LAPs) defined for EIM Entity BAAs, one or multiple non-overlapping LAPs for a given EIM Entity BAA if that is necessary.
 - These LAPs would be used for distributing base load schedules in the DAM and demand forecast in the RTM.

Base Schedules for EIM BAA Supply, demand and interchanges in the DAM

- EIM entity SC submits day-ahead balanced supply/demand base schedules, including intertie schedules. Import/export bids to/from the CAISO should be excluded from base schedule calculation.
- Import/export bids to/from the CAISO should be then modeled at the corresponding scheduling point superimposed on the base schedules.
- The day-ahead market is executed with the day-ahead base schedule as fixed injection without enforcing transmission constraints in EIM Entity BAAs.
- The Market Operator will report any transmission overloads in EIM Entity BAAs on OASIS.

Base Schedules for EIM BAA Supply, demand and interchanges in the RTM


- EIM Entity SC submits balanced base supply/demand schedules and interchanges ahead of real time (by T-75') inclusive of potential changes after day-ahead. The base schedules can be updated at (T-55') and (T-40') for the trading hour starting at T.
- The 15-minute market will calculate 15-minute energy schedules for EIM participating resources while enforcing transmission constraints in each EIM Entity BAA.
- The 5-minute market will use the most recent Market Operator demand forecast for each EIM Entity BAA, the hourly base schedules, and the EIM participating resource energy bids, while enforcing transmission constraints in each EIM Entity BAA.
- Base schedules must be submitted (can be 0MW) for all generating resources in an EIM Entity BAA, including non-participating generators, and must include disaggregation of day-ahead import/export schedules between the EIM Entity BAA and the ISO, and disaggregation of forward export schedules to other BAAs. Base import schedules to an EIM Entity BAA from BAAs other than the ISO must be submitted at the relevant intertie scheduling points.

. Local Market Power Mitigation

- The ISO will use the same Dynamic Competitive Path Assessment (DCPA) and Local Market Power Mitigation (LMPM) methodology to mitigate energy bids from EIM Participating Resources in the RTM. DCPA will be conducted for each transmission constraint separately in each EIM Entity BAA, and LMPM may mitigate EIM participating resource bids for binding congestion separately in each EIM Entity BAA. Interties between BAAs are considered competitive.
- The ISO will select a reference bus for each EIM Entity BAA as the mitigation reference bus for LMP decomposition, for LMPM assessment.

EIM Resource Bids in RTM

- All resources with RTM bids, including resources in the CAISO and resources in EIM Entity BAAs, shall be committed and dispatched economically to balance supply and demand in the CAISO plus external EIM footprint.

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- Net interchange constraints need to be introduced in the RTM formulation to limit the imbalance energy interchange from and to EIM Entity BAAs between specified low and high limits.
- EIM Entities can also partially self-schedule to meet the imbalance energy requirements in their specific BAA as price-takers. These self-schedules can be submitted with the real-time bids by T-75'.
- Perform base schedule balancing, transmission feasibility flexible ramping requirement sufficiency test for each EIM BAA, in RTM for each hour. Meet the flexible ramping capacity requirements for each BAA reduced by prorated overall diversity benefit, but limited by available net import capacity. If an EIM Entity BAA fails the test, formulate a separate flexible ramping capacity constraint for that BAA at its own requirement without diversity benefit. Otherwise, formulate hierarchical flexible ramping capacity constraints for each BAA and BAA group reducing the group requirement by the available net import capacity.

Greenhouse Gas Emission Cost

- Calculate the net imbalance energy export to the ISO from EIM BAA.
- Optimally allocate net imbalance energy export to EIM participating resources.
- Include the GHG emission cost for the portion of the net export in the objective function, based on the EIM participating resource GHG emission bid.
- Include the shadow price of the net imbalance energy export allocation constraint in the LMP for EIM Entity BAA locations.
- Calculate the GHG emission revenue as the product of that shadow price and the net imbalance energy export.
- Distribute the revenue to each EIM participating resource based on its contribution to the net imbalance energy export.

Settlement:


- The Market Operator will settle the deviations of EIM participating resources from their base schedules at the locational marginal price at the corresponding locations.
- The EIM Entity Scheduling Coordinator will be responsible for the settlement of resources that do not participate in the EIM for deviations from their base schedules.
- Collect and allocate under-scheduling and over-scheduling penalties.
- Collect and allocate real-time congestion offset.
- Allocate the real-time neutrality uplift considering imbalance energy transfers between BAAs.
- Allocate the RTM BCR uplift considering imbalance energy transfers between BAAs.
- EIM Administrative Rate of \$0.19 per MWh. The volume the rate is applied to is the gross imbalance energy of both load and generation. The minimum volume of 5% of the gross generation and 5% gross load will be applied to the ISO GMC components.

Outage:

- EIM network outages and resource outages must be submitted by the relevant EIM Entity SC in approved state to the Outage Management Scheduler seven days in advance.
- The outage can be planned or forced. The EIM Entity Scheduling Coordinator will manage all of their EIM non-participating resource outages (adjust start/end times, cancel, submit forced outages).

Load Forecast for EIM BAA:


- Receive historical load and meteorological data for the EIM Entity BAAs. Forecast EIM demand in DAM and RTM.
- In RTM, use SE solution to anchor the demand forecast.

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System Impacts

The EIM will impact:


- Master File:
 1. Define BAAs.
 2. Register EIM Entity SCs.
 3. Define EIM Entity flag (Yes/No) for each BAA.
 4. Associate EIM Entity SCs with EIM Entity BAAs (one-to-many without overlap).
 5. Register the resources in EIM Entity BAAs.
 6. Define EIM Participation flag (Yes/No) for resources in EIM Entity BAAs.
 7. Associate SCs with EIM Participating and Non-Participating Resources (one-to-many) (participation is voluntary).
 8. Register a Default LAP (DLAP) for each EIM Entity BAA comprised of all load PNodes in that BAA.
 9. Associate each EIM Entity SC with the corresponding EIM Entity BAA DLAP.
 10. Register a GAP for each EIM BAA.
 11. Define all interties among all BAAs (from BAA to BAA), including the ISO BAA and EIM BAAs modeled in the FNM. Define an ISO intertie type (Yes/No) and set it for each intertie between ISO and another BAA. Define an EIM intertie type (Yes/No) and set it for each intertie between a non-EIM Entity BAA and an EIM Entity BAA or the ISO. Orient the ISO interties in the import direction (from BAA to ISO). Orient the EIM interties in the import direction (from non-EIM Entity BAA to EIM Entity BAA or the ISO). Orient the FNM boundary interties in the import direction (from non-modeled BAA to modeled BAA).
 12. Associate each SP with applicable ISO interties (one-to-many) for tagging day-ahead intertie schedules (day-ahead intertie association). Associate each SP with applicable EIM interties (one-to-many) for tagging real-time intertie schedules (real-time intertie association).
 13. Register each EIM Entity SC as a PTO, LSE, and UDC.
 14. Define a demand forecast option (ISO/Own) for each EIM Entity SC. This option indicates whether the EIM Entity SC selects to use the ISO or its own demand forecast in balancing its base schedules and satisfying its Flexible Ramp Capacity requirements.
 15. Define a 15-minute intertie participation option (Yes/No) for each EIM Entity SC. This option controls import/export bids at SPs associated with EIM interties with the relevant EIM Entity BAA. If the option is No, only hourly intertie scheduling would be allowed at these interties.
 16. Define import and export resource for modeling dynamic imbalance interchange between each EIM BAA and the ISO BAA in real time EIM market.
 17. Set up separation Flag in case the EIM entity need separate from EIM market and financial impact.
- ALFS/Flexible Ramping Forecast Tool:
 1. Forecast EIM BAA load
 2. Forecast EIM Variable Energy Resource (VER) output
 3. Calculate flexible Ramping Requirement forecast (FRR) with confidence band for CAISO, EIM BAAs, and total EIM footprint based on load, wind. Solar forecast and forecast error, calculate diversity benefit.
 4. Broadcast the ISO, EIM BAA, and EIM footprint total load forecast
 5. Broadcast the FRR forecast of the ISO, EIM BAAs, and EIM footprint.
- Scheduling System e-tagging:
 1. EIM entity SC must submit post hour tag for the net dynamic transfer to the ISO BAAs in the EIM footprint, import export tag separately. Dynamic tagging rule applies.
- EMS/SE/GDB:
 1. Model new detail modeling for EIM BAA,
 2. Telemetry/system visibility requirements for EIM.

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3. SE solution of EIM BAAs send to the RTM.
 4. Identify all generating resources belong to the selected BA from network model.
 5. Consume a new payload that will have NSI and associate Tie lines for each selected EIM BA from market every five minutes. .
 6. New display will be created for all EIM resources with information per BAA. Operator will have following information on such as Unit name, EIM area, Unit type, Connectivity, Actual MW, SE output, DOT, availability, unloaded capacity
 7. New display will be needed for NSI and Tie Schedules per BAA.
 8. **EIM BAA Network Model must include the new resources 90 days in advance of on-line date, and use outages to control.**
 9. **EIM entity must submit EIM-owned transmission facilities and ratings to the ISO, using consistent naming convention of network model.**
- **SIBR:**
 1. Accept and validate EIM entity SC submitted hourly base schedule for all EIM resource and load forecast and EIM import/export in DAM.
 2. Accept and validate EIM resource SC submitted energy bids, daily Green House Gas cost bids at T-75. Energy bids plus GHG bids cannot exceed bids cap (\$1000). GHG bid floor is \$0. Allow EIM resource SC submit self-schedule energy bids into the RTM.
 3. If the EIM entity SC elects to 15 minute intertie participation, accept and validate EIM intertie resource SC to submit intertie bids to the EIM BAA at SP that outside EIM footprint at T-75'.
 4. Accept and validate EIM entity SC submitted hourly base schedule for all EIM resource and load and EIM import/export at T-75, updated base schedule at T-55 and T-40.
 5. Accept and validate EIM entity SC submitted the EIM intertie ATC and intertie schedule and derate.
 6. Accept and validate EIM entity SC submit non-participating resources base schedule. The non-participating resource in EIM is treated as self-scheduled resources.
 7. Allow the SC import/export bids at the SP to bid to the ISO through the ISO intertie
 8. Allow the SC import/export bids at the SP to bid to the EIM through the EIM intertie
 9. For EIM resources, no self provision AS to ISO. AS bids to ISO BAA are allowed if the EIM resource is certified to provide AS to the ISO.
 10. The EIM resource bids will reserve the capacity for EIM BAA AS and reliability dispatch
 11. Create and broadcast clean bids for EIM resources.
 12. Create and broadcast EIM entity intertie ATC and EIM Intertie schedules for the schedule between EIM and other external BAA.
 13. Create and broadcast EIM entity Base schedule and updates
 14. **Reject any energy bids from the resources that belong to the EIM entity BAAs that activate Separation Flag.**
 - **DAM/RTM:**
 1. Receive EIM Load forecasts
 2. DAM and RTM perform contingency analysis for include critical EIM BAA resources and transmission equipment.
 3. DAM and RTM include the EIM BAA equipment outages.
 4. Receive Flexible Ramping Requirement forecasts at 5 minute interval for the trading hour and look ahead 5 hours for the ISO, EIM BAAs and the total EIM footprint. Receive the EIM diversity benefit (DB) factors. Adjust the requirement for each BAA based on DB.
 5. Perform 3 resource sufficiency tests for resource base schedule balancing, transmission feasibility and flexible ramping sufficiency prior to T-60, T-45, T-37.5 using the latest base schedule submitted by the EIM entity SC.

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6. Perform flexible ramping requirement sufficiency test : (1) for each EIM BAA, set up separate flexible capacity requirements reduced by DB and net transfer out at T-7'5, reduction is limited by the available net import capability; (2) test the BAA resource plan has sufficient bids in ramping capacity to meet the EIM BAA the requirement for every 15-minute RTUC; The test is performed cumulatively for each 15 minute interval of the trading hour, 15 minute ramp for the first interval, 30 minute ramp for the second, 45 minute ramp for the third and 60 minute ramp for the fourth interval. Use initial schedules at T-7.5' and resource energy bids and ramp rates. If the total ramp capacity is below the flexible ramping requirement, test is fails. **If the balance test fails for under-schedule, the flexible ramp sufficiency test is considered failed.**
7. All resources with economic bids and are available for 15 minute RTUC commitment will be eligible to ensure the sufficient ramp capacity in the EIM BAA.
8. If T-40 EIM entity fails feasibility test, market will not need to change the input data. Uplift for congestion will accrue in the Real time congestion balancing account.
9. If T-40 EIM base schedule fails balance test, set demand (load+losses) = Supply. If EIM entity using market operator forecast, Load – Supply exceeds +/-1%, indicate it subject to under-schedule penalty process.
10. If T-40 EIM BAA fails the sufficient ramp test, constraint the net schedule interchange at T-7.5' for that BAA to the base schedule interchange. Enforce the original Ramp requirement in the isolated EIM BAA.
11. If the EIM BAA passes the sufficient ramp capacity test, enforce the ramp requirement (without Diversity Benefit) reduced by the transfer capacity constraint for each EIM BAA (not include EIM BBA that failed test), the ISO BAA, reduced by transfer capacity, and total requirement for the EIM footprint (not include EIM BBA that failed test).
12. LMPM use one reference bus for each EIM BAA for LMP decomposition
13. Perform the Dynamic Competitive Path Assessment (DCPA) for each EIM BAA for the constraint in the BAA and the test the resources in the EIM BAA
14. For the non-competitive paths within the EIM BAA, mitigate the bids of the resources belong the BAA.
15. Decompose the LMP congestion component for by competitive and non-competitive; and by the constraint belong the same BAA.
16. Determine DEBs for EIM participating resources.
17. Only mitigate the imbalance energy bids. GHG cost is not subject to mitigation.
18. Publish LMPM shift Factor, reference bus, shadow price of the constraint for each EIM BAA as same format as for the ISO.
19. Calculate/publish all the resources (include the ISO and EIM BAA, physical and virtual bids) Shift factors on the binding constraints.
20. Calculate/publish the shadow price of each binding constraints and associated BAA;
21. Include wind and solar real time adjustment of actual and schedule flow for EIM VER.
22. Calculate Net exchange balance for every BAA: Net Scheduled Interchanges (NSI), for binding and advisory intervals.
23. EIM day-ahead bids to ISO use Scheduling Points GAP, same as other BAA. The LMP must be calculated for the EIM SP GAP for IFM and RTM.
24. Manage EIM congestion in RTM. No EIM congestion in in DAM, not enforce the transmission limits constraints of the EIM in DAM.
25. Model Scarcity pricing is out of one total load balance equation
26. Model EIM day type and time zone, voltage schedule hourly
27. Provide EIM dispatch instruction block functionality for EIM BA Operator; interface with RTM.
28. In RTM include EIM BAA unit commitment, allow MSG model for EIM BAA resources.
29. In DAM, LMPs will not include marginal loss contributions from EIM BAA network losses. In RTM, loss impact from EIM BAA will be included.

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30. EIM BAA exceptional dispatch must inform ISO in real time. The EIM entity shall access the interface to submit exceptional dispatch with "EIM type". Market shall reflect the dispatch in the next RTD run.
31. When ISO run RTCD, the system shall send the latest valid prior RTD advisory results to EIM. It will also enforce NSI and block EIM dispatch instructions.
32. Model Greenhouse Gas (GHG) emission cost in objective function and net imbalance export constraint for EIM resource to ISO in optimization, GHG model to calculate the net export from EIM to ISO.
33. Calculate and broadcast net imbalance interchange between the ISO and EIM BAA, EIM BAA and other EIM BAA.
34. Optimize the ISO and EIM resources to meet the total demand of EIM entity footprint.
35. Broadcast results of 3 resource sufficiency tests for each the EIM entity SC.
36. Broadcast the final ramp requirement, marginal flexible ramp prices by resource, broadcast marginal flexible ramp prices by BAA.
37. Broadcast the base schedule for EIM resources and load used in the market IFM and RTUC.
38. Broadcast the GHG shadow price and contribution to export to the ISO by each EIM resource.
39. Broadcast EIM units Dispatch DOT and DOP same as the ISO units
40. **For the EIM BAA that activate the separation flag, set flexible ramping requirement zero, include base schedule in the balance constraint, set NSI= base schedule NSI, not enforce the transmission constraints.**

- **MQS:**


1. Calculate and broadcast EIM resource RT expected energy with consideration of the base schedule.
2. Calculate and broadcast net export to the ISO for each EIM resource for GHG payment.
3. Calculate and broadcast each resource congestion cost and associated BAA (For Real-Time Congestion Balancing Account):
 - for the physical schedule in EIM BAA and in ISO BAA, calculate the resource LMP congestion cost for each BAA by sum of the congestion components associated binding constraints in the BAA.
 - for the virtual schedule in ISO BAA, calculate the virtual schedule LMP congestion cost for each BAA by sum of the congestion components associated binding constraints in the BAA.

- **OMS/SLIC:**


1. Receive and accept EIM Entity SC submission of non-participating resources and transmission Outage
2. Receive and accept EIM Resource SC submission of participating resources Outage
3. Broadcast the outages for the ISO, EIM and non-EIM.

- **Settlement:**

1. Settle GHG payment as the net export to ISO * GHG shadow price for EIM resources and Import.
2. Settle 15-minute IIE as the difference between the energy schedule and the adjusted base schedule for the relevant resource at the 15-minute LMP.


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3. Settle 5-minute IIE as the difference between the DOP of RDT and the 15-minute energy schedule for the relevant resource at the 5-minute LMP.
4. Settle EIM participating resource UIE as the algebraic difference between the 5-minute meter data and the DOP at 5-minute LMP.
5. Settle EIM static or 15-minute import/export schedules deviation derived as operational adjustments (OA) to the respective hourly or 15-minute confirmed schedule, settled at the three 5-minute LMPs for the relevant 15 minute market interval
6. Settle EIM non-participating load UIE as the algebraic difference between the hourly meter data and the base schedule, settle at the hourly volumetric weighted average LMP of 15 minute and 5 minute markets in that hour for the relevant LAP.
7. Calculate EIM LAP hourly volumetric weighted average LMP weighted by the load forecast deviations 15minute from base, 5minute from 15 minute, bounded by the min/max LMPs.
8. UFE is settled as imbalance energy at LMP for each Utility Service Area in EIM for which UFE is calculated separately
9. The total uplift costs of EIM share will be allocated to the EIM Entity Scheduling Coordinators.
10. EIM Administrative Rate of \$0.19 per MWh of gross imbalance of load and generation with 5% minimum volume of gross load and gross generation is applied to GMC.
11. Settlement for convergence bids shall use the real time price that exclude the congestion cost that contributed by the binding constraints that not belong to the ISO.
12. Create real-time congestion balancing account for each BAA: (1) Calculate deviation between 15 minute schedule and base schedule (DAM schedule as base schedule for the ISO) for each resource; (2) calculate resources contribute to the congestion cost as the product of deviation. the resource flow contribution on congestion and shadow price of 15 minute market on the constraint of the BAA. (3)Summarize all the resources contribute to the congestion cost (positive and negative) for all the constraints in that BAA.
13. Calculate deviation between meter and 15 minute schedule (2) calculate resources contribute to the congestion cost of 5 minute market on the constraint of the BAA. (3)Summarize all the resources contribute to the congestion cost (positive and negative) for all the constraints in that BAA.
14. For the ISO constraints, both physical and virtual resources at ISO and physical resources at EIM BAA shall be included in the balancing account of the ISO.
15. For EIM BAA constraint, both the physical resources at EIM BAA and the physical resources at the ISO shall be included for congestion contribution in the balancing account of EIM entity.
16. For EIM BAA constraint, create the congestion balancing account virtual bucket by adding the total congestion contributions from 15 minute market for virtual schedule.
17. Allocate virtual congestion balancing account charge to virtual schedule in proportion to it's out-market revenue. If the account has credit, no allocation. Virtual schedule out-of-market revenue is calculated the virtual schedule multiply the virtual schedule contribution on congestion cost of 15 minute market on the constraint of the EIM BAA.
18. Create the congestion balancing account by adding the total congestion contributions from 15 minute market and 5 minute market for each BAA.
19. Send the real-time congestion balancing account (surplus or shortfall) of EIM BAA to the EIM BAA entity scheduling coordinator according to the settlement time line. EIM BAA entity SC is responsible for the payment to the ISO, and allocate the cost according to the EIM BAA own rule. The ISO will allocate congestion balancing account according to measured demand.
20. Collect Under-scheduling penalty for imbalanced base schedule: (1) calculate difference between load meter and base schedule of supply as load imbalance. If (load meter-load base schedule)/load base schedule exceed 5% but at least 2 MW, apply the 125% of LAP price to the load imbalance; (2) If (load meter-load base schedule)/load base schedule exceed 10% but at least 2 MW, apply the

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200% of LAP price to the load imbalance; . The load forecast can be EIM forecast submitted hourly, or

21. Collect the over-scheduling charge. Reduce the market's payment for over-scheduled demand to 75% of the load aggregation point's aggregate LMP for over-scheduling of 5% to 10%, and to 50% for over-scheduling of more than 10%.
 22. If use Market Operator's forecast, (forecast load-base schedule)/forecast load within +/- 1%, exempt under-schedule and over-schedule penalty.
 23. Allocate daily penalty premium to the LAP load that not under-scheduled in the day.
 24. BAA supply UIE and loss settlement Neutrality consider the transfers between BAAs, The transfer out of the BAA shall share the neutrality by percentage of the transfer out/(absolute value of UIE +abs of OA +transfer out). Net Transfer in BAA shall share the cost prorate to transfer in/(total transfer out).
 25. EIM participating resources are eligible BCR for (1) energy cost (=energy, Flexible Ramping constraint, GHG cost) (2) commitment cost (=start up and minimum load)
 26. Include GHG bid cost as cost and GHG payment as revenue for EIM resource in the BCR calculation.
 27. Uplift allocation: proportional daily uplift between BAAs based on daily transfers out. Proportional transfer out is determined on 5 minute basis. No netting across intervals.
 28. Pay EIM resources flexible Ramping capacity use same formula as the ISO resources (no spin price)
 29. Allocate EIM flexible ramping capacity cost according to the shadow price of requirements of each BAAs.
 30. **Suppress UFE calculation for the EIM BAAs associated with the EIM Entity activated separation flag.**
- **Metering:**
 1. 5-minute metering requirement apply to all participating resources of EIM Entity BAA. EIM resource SC Meter Entity (SCME) shall submit 5-minute meter data of EIM participating resource
 2. System allow EIM SC Meter Entity (ME) submit up to hourly meter data of non-participating resources, system shall calculate 5-minut meter value evenly.
 3. EIM Entity SC Meter Entity (ME) shall submit hourly meter data for the EIM BAA load. System shall divide hourly value by 12 to get 5-minute metering value of load.
 4. **For the EIM BAA with activated the separation flag, EIM entity SC must submit meter data equal to total expected energy which equal to base schedule, therefore get 0 MW imbalance energy in the settlement. EIM entity is responsible for the submission in alignment with T+55B Recalculation Statement (Final Meter Submittal T+48B).**
 - **ADS:**
 1. Receive 5-minute dispatch instruction include DOT and DOP for EIM participating resource and send to EIM resource SC.
 2. Receive 5-minute net imbalance interchange for EIM BAA, and send to the EIM entity SC.
 3. Receive and report allocation of 5-minute net imbalance energy export from EIM entity to the ISO of each resources to the EIM participating resource SC
 4. EIM resource SC shall have access to historical data (aka ADS query tool), similar to ISO internal resources
 - **CMRI:**
 1. Receive and publish base schedule balancing test results, feasibility test and flexible ramping requirement sufficiency test results after T-75, T-55, T-40 for EIM entity SC.
 2. Receive and publish RTUC Ramp, schedule, Price, expect energy, MPM result for EIM participating resource SC same as the ISO internal resources

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3. Receive and publish base schedule to EIM entity SC and resource SC
 4. Receive and publish net imbalance interchange from between EIM entity to the ISO to the EIM entity SC, between EIM BAAs
 5. Receive and publish allocation of net imbalance energy export from EIM entity to the ISO of each resource to the EIM participating resource SC.
 6. Receive and publish advisory energy schedules participating and non-participating resource for EIM Entity SC in the market horizon DAM and RTUC horizon.
 7. Receive and publish advisory energy schedules, for EIM resource SC in the RTUC horizon.
- OASIS:
 1. Publish EIM all the pnode and LAP LMP for 15 minute and 5 minute markets.
 2. Publish EIM Demand, Energy; Transmission usage, transmission outages, Public bids, Etc. for RTM same as CAISO.
 3. Publish EIM BAA's MPM price, constraints shadow price, competitive paths etc. for RTM same as CAISO
 4. Publish the GHG Shadow price of net imbalance energy export allocation constraint and Net imbalance energy export from EIM Entity BAA to the ISO.
 5. Publish EIM BAA intertie ATC.
 6. Publish EIM entity reference data, include Pnodes, LAPs and associated Mapping, LDFs.
 7. Publish EIM operating messages


4.2 Business Process: < Manage Energy Management System (EMS) >

4.2.1 Business Requirements

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0030	The ISO shall receive real time data using ICCP data link from EIM Entities.	Core EIM	EMS
EIM-BRQ0040	The ISO shall keep the same substation and equipment names from EIM Entities to facilitate revisions and outage management.	Core EIM	EMS

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM-BRQ0050	<p>The CAISO shall receive and merge EIM Entity internal network models in CIM/XML RDF file. The RDF ID must be in GUID (global unique identifier).</p> <p>The ISO shall merge all of EIM Entity operational displays to keep two systems alike.</p>	Core EIM	EMS
EIM-BRQ0060	<p>The ISO EMS shall receive and recognize the dispatch instructions from the Market.</p> <p>EMS shall not send AGC set point to the EIM entity.</p>	Core EIM	EMS, RTM, integration
EIM-BRQ0070	<p>The ISO EMS shall consume the outages broadcasted by the OMS. The Outages shall include the equipment of the BAAs of ISO, EIM BAAs.</p>	Core EIM	EMS, OMS, integration
EIM-BRQ0080	<p>Each EIM Entity shall provide a list of EIM Entity internal contingencies and associated limits to the ISO to be included EIM Entity in EMS contingency list.</p>	Core EIM	EMS
EIM-BRQ0100	<p>The ISO shall evaluate the state estimator solution (SE) for the ISO, EIM Entity.</p> <p>SE solution, include EIM BAAs shall send to the Market</p>	Core EIM	EMS, RTM, Integration
EIM-BRQ0130	<p>The EMS system shall incorporate the demand forecast for EIM BAA from ALFS.</p>	Core EIM	EMS, ALFS
EIM-BRQ0143	<p>The system shall identify all generating resources belong to the selected BAA from network model.</p>	Core EIM	EMS, GDB
EIM-BRQ0144	<p>EMS System shall receive NSI and associate Tie lines for each selected BA from market every five minutes from market.</p> <ul style="list-style-type: none"> • NSI needs to ramp from one five minute to next five minute interval. • Previous hour, current hour and next hour data needs to be presented in five minute resolution. • Effective NSI for each BA needs to be stored separately. 	Core EIM	EMS, RTD, integration

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0145	All generating units will receive DOT from the existing payload for internal resources. Resources belong to EIM class will store DOT like internal resources. Current, Previous, Next DOT will be stored for trajectory	Core EIM	EMS, RTD, integration
EIM-BRQ0146	New display will be created for all EIM resources. Operator will view the resources per BA.	Core EIM	EMS
EIM-BRQ0147	New display with similar concept will be needed for NSI and Tie Schedules per BA. Tie schedule will have start and end time.	Core EIM	EMS, RTD, integration
EIM-BRQ0148	Resource output belong to EIM class will be transferred using existing telemetry payload	Core EIM	EMS
EIM-BRQ0150	Each EIM Entity modeled substation shall be validated for proper data visibility and for accurate sign convention.	Core EIM	EMS
EIM-BRQ0160	The ISO shall develop procedures for automating future incremental model changes of EIM Entity.	Core EIM	EMS
EIM-BRQ0170	EIM Entity system load, ISO system load and Total load of (ISO and EIM Entity) shall be validated in EMS and SE.	Core EIM	EMS, ALFS
EIM-BRQ0181	Cutover to expanded network in the Market shall be coordinated with EIM Entity Entities and WECC.	Core EIM	EMS, FNM, IFM RTM


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4.3 Business Process: < Manage Full Network Model (FNM) >

4.3.1 Business Requirements

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0230	<p>The EIM Entity tie lines with external areas will be retained in the network model. Update the existing boundary substations or add new boundary substations in CAISO network model.</p> <p>EIM Entity tie line flows (actual and scheduled) shall be modeled correctly, including the sign convention.</p>	Core EIM	FNM, GDB
EIM-BRQ0240	<p>Each EIM Entity shall supply a list of EIM Entity internal contingencies. The ISO shall include all these EIM Entity contingencies in the EMS contingency list. The ISO shall include the critical subset of EIM Entity these contingencies in the Market Applications.</p>	Core EIM	EMS, FNM, GDB, NA
EIM-BRQ0250	<p>Each EIM Entity shall supply to the ISO all the branch groups (interfaces), nomograms, associated normal and emergency limits, and RAS/SPS models that are EIM Entity enforced and used in their EMS.</p> <p>The ISO shall monitor all applicable branch groups, nomograms, RAS/SPS models in the ISO EMS systems.</p>	Core EIM	FNM, GDB, SMDM
EIM-BRQ0260	<p>Each EIM Entity shall supply the schedules to the ISO for phase shifters if there is any.</p> <p>The ISO will model the phase shifter schedules in the Market Applications.</p>	Core EIM	FNM, GDB, NA
EIM-BRQ0261	<p>Each EIM Entity shall supply the voltage schedules to the ISO for all controlled voltages.</p>	Core EIM	FNM, GDB, NA
EIM-BRQ0270	<p>Each EIM Entity shall supply the dynamic models of their generating units. The dynamic models are required for online dynamic stability applications (DSA) at CAISO. In case the dynamic models are not available EIM Entity, the EIM Entity and the ISO will work jointly to derive the dynamic models from the WECC planning dynamic models.</p>	Core EIM	FNM, GDB, DSA

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0280	The ISO shall use real time SE solutions to calculate EIM Entity Load Distribution Factors (LDFs) for their EIM Entity LAP(s) and Generation Distribution Factors (GDFs) for their generating units. These LDFs/GDFs will be used in the Market Applications.	Core EIM	FNM, GDB, SMDM
EIM-BRQ0300	The ISO market model (FNM) shall be exported from the ISO modeling tool in CIM/XML format in applicable CIM version that is used in the Market Applications:	Core EIM	FNM, GDB, EMS
EIM-BRQ0310	One-line diagrams shall be created from RDF CIM/XML static file	Core EIM	FNM, GDB
EIM-BRQ0330	EIM Entity based ITCs shall be defined. Add new scheduling limits to FNM public reference document	Core EIM	FNM, GDB, SMDM
EIM-BRQ0340	The ISO shall enforce EIM Entity branch, nomogram, and flowgate limits for congestion management in Real Time market..	Core EIM	FNM, GDB, SMDM
EIM-BRQ0342	The system shall producing PSS/E files that include external network, include EIM Entity. The system shall ensure the PSS/E FNM contains the bus number. For CRR , PSS/E FNM contains the Augbus.	Core EIM	FNM, GDB, EMMS, IFM/RTM
EIM-BRQ0346	EIM BAA Network Model must include the new resources 90 days in advance of planed production date. The market operator will use outages to control the resource effective on-line date.	Core EIM	FNM, EMS, EMMS, OMS
EIM-BRQ0347	EIM entity must submit EIM-owned transmission facilities and ratings to the ISO in the pre-defined format, using consistent naming convention of network CIM model.	Core EIM	FNM, EMS, EMMS

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4.4 Business Process: < Manage Entity and Resource Maintenance Updates (Master File)>

4.4.1 Business Requirements


<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0350	External BAAs modeled in FNM shall be defined as aggregate nodes (ANodes). Connectivity nodes (CNodes) and pricing nodes (PNodes) shall be mapped to the relevant external BAAs. The BAAs shall not be overlapping.	Core EIM	Master File
EIM-BRQ0351	External BAAs that are EIM Entity Areas shall be identified by an EIM Participation flag.	Core EIM	Master File
EIM-BRQ0352	The system shall register EIM Entity SC. SCs that are EIM Entities shall be identified by an EIM Entity flag.	Core EIM	Master File
EIM-BRQ0353	EIM Entity SCs shall be associated with EIM Entity BAA . This shall be a one-to-many association.	Core EIM	Master File
EIM-BRQ0354	The system shall define the EIM BAA groups that include multiple EIM BAAs. Note: In market EIM BAA groups can be used to construct the flexible ramping requirements.	Core EIM	Master File
EIM-BRQ0355	Define a demand forecast option (ISO/Own) for each EIM Entity SC. This option indicates whether the EIM Entity SC selects to use the ISO or its own demand forecast in balancing its base schedules and satisfying its Flexible Ramp Capacity requirements.	Core EIM	Master File

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM-BRQ0357	External Load Aggregation Points (LAPs) and Load Forecast Zones (LFZs) shall be defined for each external BAA modeled in FNM with LDF. Pricing nodes shall be mapped to the relevant external LAPs and LFZs. The LAPs and LFZs shall coincide, i.e., they shall include the same load nodes, but they shall not overlap with each other.	Core EIM	Master File
EIM-BRQ0358	Define DLAP: <ul style="list-style-type: none"> System shall register a Default LAP (DLAP) for each EIM Entity BAA comprised of all load PNodes in that BAA. Define Default LDF. System shall register load resources over the EIM DLAP. Associate each EIM Entity SC with the load resources corresponding EIM Entity BAA DLAP. The EIM Entity SC must submit meter data for the load in the DLAP. 	Core EIM	Master File
EIM-BRQ0360	Define GAP and SP: The system shall register Generation Aggregated Point (GAP) for each BAA modeled in the FNM and each BAA aggregation comprised of all generation PNodes in that BAA. Define default GDF. Define a Market Scheduling Points (SP) for GAP in FNM to be used as an import/export bid location for energy and ancillary services. These SPs shall be identified (with a SP Type) as BAA SPs. The SPs of the GAP can be used by any eligible SC as locations for import/export bids. EIM SP shall be used for import/export bids only in DAM; In RTM, the base schedules and bids from EIM Participants must be submitted at the relevant generating resources.	Core EIM	Master File
EIM-BRQ0403	The system shall continue define the scheduling points at the ISO boundary, currently used in the ISO market.	Core EIM	Master File


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EIM-BRQ0489	<p>The system shall be able to set up separation Flag in case the EIM entity need separate from EIM market:</p> <ul style="list-style-type: none"> • Setup flag in the master file for the EIM entity separation in EIM Market. • Allow update the flag according to the timing of master file refresh. • Make the separation flag available to the downstream system. 	Core EIM	Master File
EIM-BRQ0406	<ul style="list-style-type: none"> • Define all interties among all BAAs (from BAA to BAA), including the ISO BAA, EIM BAA and external BAAs not modeled in the FNM. • Define an ISO intertie type (Yes/No) and set it for each intertie between ISO and another BAA. • Define an EIM intertie type (Yes/No) and set it for each intertie between a non-EIM Entity BAA and an EIM Entity BAA or the ISO. • Orient the ISO interties in the import direction (from BAA to ISO). • Orient the EIM interties in the import direction (from non-EIM Entity BAA to EIM Entity BAA or the ISO). • Orient the FNM boundary interties in the import direction (from non-modeled BAA to modeled BAA). 	Core EIM	Master File

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0420	Register all the resources in EIM Entity BAA <ul style="list-style-type: none"> • The system shall define individual generating resources or aggregated generating resources (with GDF) for EIM Entity Areas with the same level of detail as ISO internal generating resources, such as capacity limits, ramp rate limits, etc. • The system shall register all EIM resources with participating/non-participating Flag • The EIM resource shall register startup cost and minimum load, minimum up time or down time cost same as internal ISO resource. • These resources shall be associated with the relevant EIM Entity Area. • EIM resources shall not be certified for participating in DAM or for providing ancillary services; • EIM resources shall be certified for participation in RTM and they may submit energy bids in RTM. • As an exception to this rule, resources with dynamic scheduling agreements with the CAISO shall be certified for participation in both DAM and RTM and they may be certified for ancillary services. These resources may submit bids for energy and ancillary services in DAM and RTM. 	Core EIM	Master File
EIM-BRQ0421	For the resources have dynamic scheduling agreements with the CAISO, define dynamic schedule or Pseudo Tie Generator resources modeled at the location in FNM. These resources shall map to the ISO interties. These resources shall be allowed to participate energy and AS market in DAM and RTM. For the resources have dynamic scheduling agreements with the EIM BAA entity, define dynamic schedule or Pseudo Tie Generator resources modeled at the location in FNM. These resources shall map to the EIM BAA interties. These resources shall be allowed to participate energy market in RTM.	Core EIM	Master File

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0431	The system shall define an aggregate load resource for each LAP in EIM BAAs. The load resources for EIM Entity Areas shall be used for base scheduling in DAM and RTM and for load imbalance settlement in RTM.	Core EIM	Master File
EIM-BRQ0440	The system shall define the interties between EIM BAAs and the CAISO at the CAISO boundary. Each SP shall be associated with one or more of these CAISO interties (even if there is no direct connection). These interties shall be used for schedule tagging purposes based on the possible contract pathways. They shall also be used to enforce scheduling limits in DAM and RTM.	Core EIM	Master File
EIM-BRQ0442	The system shall define a 15-minute intertie participation option (Yes/No) for each EIM Entity SC. This option controls import/export bids at SPs associated with EIM interties with the relevant EIM Entity BAA. If the option is No, only hourly intertie scheduling would be allowed at these interties.	Core EIM	Master File
EIM-BRQ0461	Define import and export resource for modeling total net imbalance interchange between each EIM BAA and the ISO BAA in real time EIM market.	Core EIM	Master File
EIM-BRQ0480	The system shall define maximum scheduling and physical limits for each CAISO intertie and EIM intertie.	Core EIM	Master File
EIM-BRQ0481	The system shall define Default Energy Bids for participating resources in EIM Entity Areas, to be used in Market Power Mitigation.	Core EIM	RLC, Master File

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EIM-BRQ0488	<p>EIM participating resource shall be associated with an EIM resource SC. SC can associate with multiple resources. EIM resource SC shall be allowed to represent non-participating resources as well.</p> <p>By default, unassigned EIM non-participating resources shall be associated with EIM Entity SC. EIM entity SC is responsible for the settlement of deviation.</p>	Core EIM	Master File		
EIM-BRQ0490	<p>The system shall make all EIM related data available to downstream systems,</p> <p>For example:</p> <ul style="list-style-type: none"> • The EIM BAAs and associated flags; • The EIM Entities and associated flags and BAA associations; • The SPs and associated types and associations; • The allowable inerties for tagging schedules at that SP; • The BAA aggregate load resources, LAPs, and LFZs; • EIM resources, GHG cost and associated flags • EIM BAA inerties • External dynamic resources • Associated data to calculate Default Energy Bids for external dynamic resources and EIM participating resources 	Core EIM	Master File		
EIM-BRQ0510	Register each EIM Entity SC as a PTO, LSE, and UDC.	Core EIM	Master File		

4.5 Business Process: < Manage Day Ahead Market and Real Time Market >

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4.5.1 Business Requirements

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0520	The system shall receive the external BAA, EIM Entity, and SP definition, new resource definition, new LAP, and LFZ definition, Resource ID for RA, ETC/TOR dynamic Transfers for intertie bids and all associated data from the upstream system.	Core EIM	Master File, SIBR, IFM, RTM
EIM-BRQ0561	<p>The system shall allow EIM entity SC to submit hourly base schedules in DAM include:</p> <ul style="list-style-type: none"> • Load Forecast in the EIM entity Area • Anticipated resource base schedules for all the resources, include EIM participating resources and non-participating resources. • The net scheduled interchange (NSI) with each other BAAs, exclude the interchange between EIM entity and the ISO <p>Timing: For DAM, EIM entity SC shall submit Base schedules. The system shall accept the base schedule from OD-7 10 PPT to OD-1 10 PPT. The system shall broadcast DAM EIM base schedule.</p>	Core EIM	SIBR, DAM, Integration

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0562	<p>The system shall allow EIM entity SC and EIM resource SCs to submit hourly base schedules in RTM market:</p> <ol style="list-style-type: none"> 1. The system shall allow EIM entity SC and EIM resource SC to submit base schedule through SIBR. 2. The system shall allow EIM entity SC has full visibility of all base schedules at all time. 3. The EIM resource SC shall submit the resource base schedules no later than T-75 minute, then submit the updated base schedules up to T-55 minute. 4. The EIM entity SC shall submit the base schedules for load forecast, intertie schedules and adjusted base schedule for any resources no later than T-75 minute, then submit the updated base schedule up to T-55 minute. 5. After T-55, the system shall only allow the EIM Entity SC to adjust base schedules of any resources in the EIM entity area. The system shall accept the final base schedules approved by the EIM entity SC at T-40 minutes. 6. The system shall ensure the all the base schedule submissions are for a rolling time horizon of at least 2 subsequent hours, up to 5 hours. The system shall use the last hour submitted base schedule for the hours that no base schedule in the market horizon. 7. The system shall broadcast RTM EIM base schedules submitted at T-75, T-55 and T-40. . 	Core EIM	SIBR, DAM, Integration

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0563	<p>For RTM, the EIM Entity SC shall ensure the base schedule reflect the fixed net scheduling interchange with other BAAs:</p> <ul style="list-style-type: none"> • EIM BAA base schedule must include import/Export schedule with other BAAs at applicable Scheduling Points to the EIM entity area. • Resource base schedule must include disaggregation of day-ahead import/export schedules between the EIM Entity BAA and the ISO BAA, and disaggregation of forward export schedules to other BAAs. 	Core EIM	SIBR, DAM, RTM, Integration
EIM-BRQ0564	<p>The system shall validate base schedules with respect to the relevant resource registered minimum load and maximum capacity.</p> <p>The base schedules shall be persistent, i.e., their values shall be retained until revised; hence they must be set to zero when units shut down.</p> <p>All the resources include third party resources in the EIM entity area shall have base schedule in DAM and RTM. If no base schedule is submitted, the default value is zero.</p>	Core EIM	SIBR, DAM, RTM, Integration
EIM-BRQ0570	<p>EIM resource Bids and GHG cost adder submission</p> <ul style="list-style-type: none"> • The system shall allow and validate EIM Resource SC to submit energy bids with up to 10 bid segments for the EIM participating resources in RTM same as internal generators of CAISO by T-75. • The system shall allow and validate EIM Resource SC to submit single segment GHG bids adder daily. • Energy bids plus GHG bids cannot exceed bids cap (\$1000). • GHG bid floor is \$0.0. The resource without GHG shall submit \$0 bid for GHG bid. 	Core EIM	SIBR, RTM

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0571	<p>EIM intertie resource Bids submission</p> <p>If the EIM entity elects allow its intertie resource participating EIM 15 minute market, the system shall allow and validate EIM Intertie Resource SC to submit import/export bids at a SP through EIM intertie into EIM BAA in RTM on 15 minute basis same as intertie resource of CAISO by T-75. Dispatch options shall be available to the EIM Intertie Resources (FERC 764 functionality).</p>	Core EIM	SIBR, RTM
EIM-BRQ0572	<p>The system shall allow EIM resource SC submit self-schedule energy bids into the RTM.</p> <p>The system shall not allow EIM resource SC submit self provision for ancillary service to the ISO into the RTM.</p> <p>If the EIM resource is certified to provide AS to the ISO, the system shall allow the EIM resource to bid AS in RTM.</p> <p>EIM resource SC submitted energy bids shall reserve the capacity with for EIM BAA ancillary service and reliability dispatch.</p> <p>The system shall allow EIM resource SC submit self provision ancillary service for the EIM BAA to reserve the capacity for EIM BAA ancillary service and reliability dispatch.</p>	Core EIM	SIBR, RTM
EIM-BRQ0573	<p>Accept and validate the base schedule for the EIM BAA interties Transmission Profile, energy profile, intertie derate at T-75'.</p>	Core EIM	SIBR, DAM, RTM
EIM-BRQ0574	<p>EIM entity SC shall send to ISO market system the EIM intertie ATC.</p> <p>EIM entity SC shall send to ISO market confirmed intertie schedule along with transaction ID and intertie schedule derate</p> <p>The system shall accept and validate the submission.</p>	Core EIM	SIBR, DAM, RTM

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<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0578	The system shall broadcast the EIM entity base schedule for each updates of EIM entity SC submission at DAM, T-75', T-55', T-40.	Core EIM	SIBR, DAM, RTM, Integration
EIM-BRQ0579	The system shall broadcast the EIM entity intertie ATC changes. The system shall broadcast the EIM intertie schedule and derate for the intertie schedules between EIM BAA and other external BAA.	Core EIM	SIBR, DAM, RTM, Integration
EIM-BRQ0585	The market system shall receive load forecasts of each external BAA LAPs.	Core EIM	DAM, RTM, ALFS, integration
EIM-BRQ0640	<p>Compute GDF and LDF for EIM BAA</p> <p>Default LDFs and GDFs shall be computed from real time SE solutions and shall be used in the market applications.</p> <p>In the RTM, the distribution of import/export schedules at BAA SPs would conform to the State Estimator (SE) solution.</p> <p>The default generation and load distribution factors would be adapted from the SE solution and would be maintained in an electronic library for various seasons, day types (e.g., workday, weekday/holiday), and day periods (e.g., on-peak, off-peak).</p>	Core EIM	SMDM,SE, DAM, RTM
EIM-BRQ0661	<p>Transmission Losses for EIM Entity Areas:</p> <ul style="list-style-type: none"> • In DAM, exclude EIM Entity Area transmission loss impact in loss penalty factors and LMPs. • In RTM, the EIM Entity Area transmission loss impact shall be included in the loss penalty factors and LMPs. 	Core EIM	DAM, RTM, NA

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0673	<p>Test balancing Base Schedules for each EIM BAAs supply, demand and net interchange for under- or over-schedule in RTM:</p> <ul style="list-style-type: none"> • Use demand forecast in RTM from EIM Entities that elect the Self Demand Forecast option. • Use the demand forecast from ISO internal forecast system for each EIM Entity Area that the associated EIM Entity elect the market Operator's Demand Forecast option. • An EIM Entity SC resource plan shall be deemed under-schedule for the hour if the sum of base schedules of non-participating resources and the sum of the highest quantity offers in the energy bid range from EIM Participating Resources is less than the total demand forecast for the associated EIM Entity BAA. (resources include interchange with other BAAs.) . • An EIM Entity SC resource plan shall be deemed over-schedule if the sum of base schedules from non-participating resources and the sum of the lowest quantity offers in the energy bid range from EIM Participating Resources is greater than the total demand forecast. • For each EIM entity, perform resource base schedule balancing test for each of 3 submissions. At T-40' test, if the test fails, set base schedule demand (load + loss) = Supply. Set flag for the EIM Entity subject to under- or over-schedule penalty • For the EIM entity elects use the market operator's forecast, if imbalance within +/-1% threshold of the load forecast, set the flag exempt the EIM entity the under-/over- schedule penalty. If imbalance exceeds +/-1% of the load forecast, the EIM sentity shall subject to under- or over-schedule penalty. • Broadcast the 3 test results and under-/over schedule flag 	Core EIM	RTM, SIBR, ALFS, Integration
EIM-BRQ0674	<p>Test transmission feasibility Base Schedules for each EIM BAAs supply, demand and net interchange in RTM:</p> <ul style="list-style-type: none"> • Perform base schedule power flow feasibility test for each of 3 submissions: if the transmission violations appears, test fails. • Broadcast the 3 test results 	Core EIM	RTM, SIBR, Integration

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0675	<p><u>Test Flexible Ramping requirement sufficiency for each EIM BAA Base Schedules in RTM:</u></p> <ul style="list-style-type: none"> • If the balancing test fails for under-schedule, the flexible ramp sufficiency test is considered failed and not performed; otherwise, perform the following test. • Receive Flexible Ramping Requirement forecasts at 5 minute interval for the trading hour and look ahead 5 hours for the ISO, EIM BAAs and the total EIM footprint. Receive the EIM diversity benefit (DB) factors. • Reduce the requirement for each BAA in EIM based on DB. Reduce the requirement for each BAA by net EIM transfer export at T-7.5". The reduction is limited by the available net import capacity. • Perform flexible ramping requirement sufficiency test for each of 3 submissions. • for each EIM BAA, set up separate flexible capacity requirements; • test the BAA resource plan has sufficient bids in ramping capacity to meet the EIM BAA the requirement for every 15-minute RTUC; • The test is performed cumulatively for each 15 minute interval of the trading hour, 15 minute ramp for the first interval, 30 minute ramp for the second, 45 minute ramp for the third and 60 minute ramp for the fourth interval. • Use initial schedules at T-7.5' and resource energy bids and ramp rates. • All resources with economic bids and are available for 15 minute RTUC commitment will be eligible to ensure the sufficient ramp capacity in the EIM BAA. • If the total ramp capacity is below the flexible ramping requirement in any of four cumulative tests, tests fail. If the total ramp capacity meets the flexible ramping requirement in all four cumulative tests, tests passes • Broadcast the 3 test results 	Core EIM	RTM, SIBR, Ramp tool, ALFS, RTM, Integration

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<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0676	<p>In RTUC, enforce the Flexible ramping capacity requirement constraints for the ISO BAA, each EIM BAA /group and Total EIM footprint.</p> <ul style="list-style-type: none"> • If EIM BAA fails the sufficient ramp test at T-40', constraint the net schedule interchange for that BAA to the base schedule interchange. Enforce the original Ramp requirement in the isolated EIM BAA • If the EIM BAA passes the sufficient ramp capacity test, the ramp original requirement (no DB) shall be reduced by the available net import capacity reduced by the loop flow through the BAAs that fails ramping test. Enforce the constraint for each EIM BAA, the ISO BAA, each BAA group and total requirement with DB for the EIM footprint group BAAs that pass the flexible ramping capacity test. <p>The flexible ramp requirements for BAA groups can be potentially lower than the individual requirements of each BAA in the group, reflecting the benefits of reduced uncertainty and volatility across the BAA group, by considering the available net import transfer capability in the individual and BAA group constraints.</p>	Core EIM	RTM, SIBR, ALFS, RTM, Integration
EIM-BRQ0677	<p>The Flexible Ramping Capacity shall be managed in corresponding RTD for EIM market in the same manner as current CAISO RTM market. Publish the shadow prices of each flexible ramping constraint and associated BAA, BAA group, total EIM footprint.</p>	Core EIM	RTM, Integration Settlement
EIM-BRQ0679	<p>For variable energy resource (VER) in EIM Entity BAA, the rules of market and settlement for the ISO internal VER are applicable.</p> <p>EIM VER can use the ISO 5-minute a few hour look forward forecast, pay \$0.10 per MWh of metered output. The 15-minute forecast is derived as the average of the corresponding three 5-minute forecasts</p> <p>EIM VER can use an independent forecast to schedule its output, waive the \$0.10 per MWh service charge. The EIM resource SC must be certified by the ISO to provide the VER forecast and submit the forecast to the ISO within the market timeline.</p>	Core EIM	SIBR, ALFS, RTM, Integration Settlement

Energy Imbalance Market (EIM) Business Requirements Specification - Planning

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0684	The day-ahead market shall run with the day-ahead base schedule as fixed injection without enforcing transmission constraints in EIM BAA.	Core EIM	DAM, NA
EIM-BRQ0685	The 15-minute market will be solved using the hourly energy bids for EIM resources, enforcing transmission constraints in the EIM Entity BAA. The 5-minute market for EIM participating resources, same rules as internal ISO resource are applicable.	Core EIM	RTM, NA
EIM-BRQ0695	RTM shall manage congestion in EIM BAA DAM shall not manage congestion in EIM BAA.	Core EIM	DAM, RTM
EIM-BRQ0696	DAM and RTM shall model Scarcity pricing is out of one total load balance equation of EIM footprint that include the ISO and EIM entities.	Core EIM	DAM, RTM
EIM-BRQ0697	DAM and RTM shall model EIM day type and time zone, hourly voltage schedule.	Core EIM	NA, DAM, RTM
EIM-BRQ0698	RTM shall allow the EIM entity Operator to block EIM market dispatch instruction through a new interface with RTM.	Core EIM	RTM
EIM-BRQ0701	EIM Resource unit commitment and dispatch in RTM <ul style="list-style-type: none"> All resources with RTM bids, including resources in EIM Entity Areas, internal ISO resources, and dynamic resources, shall be dispatched economically to balance supply and demand in the CAISO plus EIM Entity Area footprint. RTM shall run unit commitment for EIM resources. RTPD shall allow EIM resource modeled as MSG, including MSG transition. Accept VER resource 5-minute 5 hour look forward forecast as self-schedule (FERC Order 764 functionality). 	Core EIM	SIBR, RTPD, RTD
EIM-BRQ0710	Net interchange constraints need to be introduced in the RTM formulation to limit the imbalance energy interchange from and to EIM Entity Areas between specified low and high limits if applicable.	Core EIM	RTM

Energy Imbalance Market (EIM) Business Requirements Specification - Planning


<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0720	Same as the ISO internal generating units, the EIM Participant resources with energy bids, shall be optimized in the 15 minute energy market to meet the total forecasted energy demand of the ISO and EIM Entity Areas.	Core EIM	Q2F, RTPD, SIBR, integration
EIM-BRQ0730	Same as the ISO internal generation units, the EIM resources energy bids, shall be optimized in the 5 minute energy market to meet the total forecasted energy demand of the ISO and EIM Entity Area.	Core EIM	Q2F, RTD, SIBR, integration
EIM-BRQ0741	<p>The market system shall model the EIM net export to the ISO include GHG cost in the market optimization:</p> <ul style="list-style-type: none"> • Include the GHG emission cost for the portion of the export to ISO from EIM resource in the objective function • Include net imbalance energy export allocation constraint: • Calculate the net export from EIM to ISO • Include shadow price of net imbalance energy export allocation constraint in LMP for EIM resource location: 	Core EIM	SIBR, DAM, RTM
EIM-BRQ0742	The market system shall broadcast for downstream systems the result of EIM GHG model include total net export to ISO, export to ISO from each EIM resource and the shadow price of the GHG :	Core EIM	DAM, RTM MQS Integration
EIM-BRQ0760	<p>The DAM and RTM shall receive and process the EIM Entity Area demand forecast and external BAA load forecast from the internal forecast system.</p> <p>The EIM load forecast shall be made available in the same frequency as the existing internal CAISO forecast.</p>	Core EIM	ALFS, DAM, RTM, EMS
EIM-BRQ0770	The RTM shall receive State Estimator solution and telemetry information for EIM BAAs.	Core EIM	RTM, EMS

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0790	<p>EIM Participant resource bids shall be subject to Real Time local market power mitigation (LMPM) based on the respective LMPM flag.</p> <ul style="list-style-type: none"> • Designate EIM interties as competitive as a default • Static CPA and default competitive settings shall be established for EIM Entity Areas. • The RTM shall use a reference bus for the EIM Entity BAA as the mitigation reference bus. • LMPM use one reference bus for each EIM BAA for LMP decomposition. <p>The LMPM process for EIM will be similar to the ISO, the only different is mitigate the EIM resource for the congestion the EIM BAA only.</p> <ul style="list-style-type: none"> • Perform the Dynamic Competitive Path Assessment (DCPA) for each BAA for the constraint in the BAA and the test the resources in the same BAA • For the non-competitive paths within belong the BAA, mitigate the bids of the resources belong the BAA. • Decompose the LMP congestion component for by competitive and non-competitive; and by the constraint belong the same BAA. • Calculate DEBs for EIM participating resources • Only mitigate the imbalance energy bids. 	Core EIM	MPM, RTPD, RLC
EIM-BRQ0800	<p>EIM dispatch:</p> <p>The RTPD and RTD dispatch instruction for EIM Participant resources shall identify base schedule and total Dispatch Target. The RTM shall broadcast the base schedule and the dispatch instructions for EIM resources.</p> <p>The base schedule shall be part of the DOT components made available to ADS.</p>	Core EIM	RTPD, RTD, ADS, integration
EIM-BRQ0810	The DAM and RTM shall broadcast the binding and advisory resource awards and base schedules.	Core EIM	DAM, RTM, Integration, CMRI

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0812	<p>EIM entity Separation from Market:</p> <ol style="list-style-type: none"> 1. Receive separation flag defined in the master file for activate the EIM entity separation in EIM Market 2. No Economic bids: <ul style="list-style-type: none"> • SIBR rejects any energy bids from the resources that belong to the EIM entity BAAs. • Therefore, no Unit Commitment/Economic Dispatch for EIM resources in the RTM Market. 3. Flexible Ramping requirement equal zero for the EIM BAA <ul style="list-style-type: none"> • Set the Flexible Ramping requirement= 0 for the EIM BAA in the market. • Set FRR test failed for the EIM BAA 4. Balance the Base Schedule for EIM BAA: <ul style="list-style-type: none"> • EIM entity must submit the base schedules. • Includes the base schedule of EIM BAAs in the balance constraint in market. 5. No incremental transfer between EIM BAA and the ISO BAA: <ul style="list-style-type: none"> • NSI=Base schedule NSI for EIM BAA in the RTM market 6. No congestion management for the EIM BAA: <ul style="list-style-type: none"> • Not enforce the EIM BAA transmission constraints in RTM. 	Core EIM	SIBR, RTM, MF
EIM-BRQ0815	<p>EIM BAA exceptional dispatch must inform ISO in real time. The EIM entity SC shall access the interface to submit exceptional dispatch with “EIM type”</p> <p>These exceptional dispatch instructions shall be treated similarly to exceptional dispatch instructions for generating resources internal to CAISO, i.e., they will constrain the dispatch of the relevant resources in the same manner as internal generating resources.</p>	Core EIM	DAM, RTM, ED

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<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0821	<p>In the event of a contingency in CAISO, RTUC and RTD shall isolate the CAISO BAA from the rest of external BAAs in the FNM by freezing the CAISO net scheduled interchange. RTD shall use prior advisory interval results for EIM if RTCD or RTDD is invoked. While RTCD remains active, the dispatch instructions from RTD for internal CAISO resources shall be automatically blocked and discarded. However, the dispatch instructions from RTD for external resources shall be sent through ADS normally.</p> <p>RTCD and RTDD shall isolate EIM Entity Areas by freezing their net scheduled interchange. The dispatch instructions from RTCD or RTDD for EIM Participant resources shall be automatically blocked and discarded. However, the dispatch instructions for other internal or external dynamic resources shall be sent through ADS normally.</p>	Core EIM	RTM, Integration, Settlement
EIM-BRQ0822	<p>In the event of a contingency in an EIM Entity Area, RTUC and RTD shall isolate that EIM Entity Area by freezing its net scheduled interchange. The dispatch instructions from RTD for EIM Participant resources in that EIM Entity Area shall be automatically blocked and discarded. However, the dispatch instructions for all other internal or external dynamic resources shall be sent through ADS normally.</p> <p>The signal of a contingency in an EIM Entity Area can be informed by an automatic communication and/or manual set in the RTM runs (to accommodate a verbal communication of the event).</p>	Core EIM	RTM, Integration, Settlement
EIM-BRQ0823	Calculate and broadcast at 5 minute basis net imbalance interchange in the EIM footprint between the ISO and EIM BAA, EIM BAA and other EIM BAAs of imbalance energy in the energy imbalance market.	Core EIM	RTM, Integration, Settlement

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EIM-BRQ0826	<ol style="list-style-type: none"> 1. Broadcast resource awards payloads include Import/export 2. Broadcast the base schedule for EIM resources 3. Broadcast the GHG shadow price and contribution to export to the ISO by each EIM resource. 4. Broadcast EIM units DOT, same as the ISO units 5. Broadcast every 5 minutes the EIM tie flows and net interchange (NSI) using network model tie line names 6. Broadcast the resource specified marginal specified marginal flexible ramping price and flexible ramp requirement associated with each flexible ramp constraint 	Core EIM	RTM, Integration, Settlement, MOTS		

4.6 Business Process: < Manage Generation Dispatch (ADS)>

4.6.1 Business Requirements

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>	
EIM-BRQ0851	The dispatch system shall send out the EIM resource dispatch instruction, including base schedule, as part of the DOT components and Dispatch Operating Target. Scheduling coordinator of Eligible EIM resources shall receive dispatch instructions for the resources. Specifically for EIM Participant resources, dispatch instruction and base schedules shall also be sent to the associated EIM Entity.	Core EIM	ADS. EMS ,	
EIM-BRQ0855	EIM resource SC shall have access to historical data (aka ADS query tool), similar to ISO internal resources	Core EIM	ADS	
EIM-BRQ0856	The system shall receive 5-minute net imbalance interchange for EIM BAA, and send to the EIM entity SC.	Core EIM	ADS	

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EIM-BRQ0857	The system shall receive and report allocation of 5-minute net imbalance energy export from EIM entity to the ISO of each resources. EIM participating resource SC shall receive it share of 5-minute net imbalance energy export to the ISO.			Core EIM	ADS

4.7 Business Process: < Manage Transmission Registry (TR)>

4.7.1 Business Requirements


N/A

4.8 Business Process: < Manage Load Forecast (ALFS)>

4.8.1 Business Requirements

<i>ID#</i>	<i>Business Feature</i>			<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0880	New EIM Load Forecast Zones shall be defined for load forecasting.			Core EIM	ALFS

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ0890	EIM-based weather stations and weather data shall be subscribed to as an input into a EIM load forecast	Core EIM	ALFS
EIM-BRQ0900	A new weather zone shall be created to incorporate the EIM region. The weather zone will encompass a single weather station.	Core EIM	ALFS, IDR
EIM-BRQ0910	EIM-based 5-minute historical load forecast data shall be made available to the forecast engine.	Core EIM	EMS, ALFS,
EIM-BRQ0930	Historical meter data shall be utilized for the EIM footprint, input into Load forecast system.	Core EIM	EMS, ALFS, PI
EIM-BRQ0940	The system-wide load forecast shall be augmented to include the EIM region(s). The ISO+EIM Total System Load shall include EIM load. The forecast shall include ISO load, EIM load by each EIM region, EIM footprint total load.	Core EIM	ALFS
EIM-BRQ0950	The system shall broadcast the load forecast include ISO load, EIM load by each EIM region, EIM footprint total load.	Core EIM	ALFS, integration
EIM-BRQ0960	The Day-Ahead load forecast shall include forecast 8 or 9 days in advance (T-8 or 9 days) for EIM footprint. The Real-time load forecast shall include 24 hours for EIM footprint.	Core EIM	ALFS, integration
EIM-BRQ0970	The system shall produce and broadcast EIM VER resource forecast.	Core EIM	ALFS, integration
EIM-BRQ0975	The system shall produce flexible Ramping Requirement forecast (FRR) with 90% - 95% confidence level for CAISO, EIM BAAs, and total EIM footprint based on load, wind. Solar forecast and forecast error, calculate diversify benefit.	Core EIM	ALFS, integration


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EIM-BRQ0976	<p>The system shall broadcast Flexible Ramping Requirement resource forecast with confidence band for CAISO, EIM BAAs, and total EIM footprint.</p> <p>The system shall broadcast diversify benefit for each EIM BAA.</p>			Core EIM	ALFS, integration

4.9 Business Process: < Manage Scheduling (CAS/e-Tagging)>

<Provide a description of the Business Process including inputs, processing and outputs.>

4.9.1 Business Requirements


<i>ID#</i>	<i>Business Feature</i>		<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ1103	The system shall receive the net imbalance interchange energy of between each EIM BAA along with corresponding resource ID in the EIM footprint from the market.		Core EIM	e-Tagging, integration
EIM-BRQ1104	<p>EIM entity SC shall submit post hour tag for the total net dynamic transfer to the ISO BAAs in the EIM footprint. The tag shall be unidirectional, import and export separately, associated with the resource IDs that pre-defined in the Master File for the EIM BAA to the ISO BAA dynamic transfer.</p> <p>EIM entity SC shall submit the tag using hour ahead advisory schedule as expected energy.</p> <p>Dynamic tagging rule applies to the EIM net dynamic transfer to ISO.</p>		Core EIM	e-Tagging, integration, MF
EIM-BRQ1105	The market operator e-tagging system shall manage check out and approval the import/export tag between the ISO BAA and each EIM BAA in the EIM footprint.		Core EIM	e-Tagging, integration, SIBR, DAM, RTM

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EIM-BRQ1106	<p>The EIM BAA entity shall manage e-tagging of the import/export of its own tags that between EIM BAA and other external (non-ISO) BAAs and send the approved import/export transaction to the ISO Market system directly as part of base schedule submission and e-tag real time curtailment updates .</p> <p>The EIM BAA own tags will not enter or pass through the ISO e-tagging system.</p>	Core EIM	Integration, SIBR, DAM, RTM		

4.10 Business Process: < Manage Outage (OMS) >

4.10.1 Business Requirements

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>		
EIM-BRQ1205	<ul style="list-style-type: none"> The system shall allow EIM entity SC and EIM resources SC to log on the outages within the required timeframe established by the ISO. Appropriate certificates shall be made available for EIM entity SC and EIM resources SCs. Same as the ISO internal resources, the planned Outages shall be inputted to the ISO Outage Management System (OMS) seven days in advance and forced outages in real time as they occur. The EIM entity SC shall submit all EIM non-participating resource outages electronically into the system, using pre-defined mutually agreed format. EIM entity SC shall I manage the outage on the resource level, with adjusted start/end times, cancel, submit forced outage. The EIM resource SC shall submit participating resource outages and de-rates/re-rates electronically into the system, using pre-defined format. EIM resource SC shall I manage the outage on the resource level, with adjusted start/end times, cancel, submit forced outage. 	Core EIM	SLIC/OMS		

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EIM-BRQ1210	<p>The ISO will not be involved in the approving or denying of outages on the EIM participants system.</p> <p>The system shall perform the validation of the EIM resource outages, based on resource registration, such as Pmax/Pmin. The internal resource outage validation rule is applicable.</p> <p>The system shall auto accept the valid EIM outages.</p>			Core EIM	SLIC/OMS MF
EIM-BRQ1215	<p>The system shall broadcast the EIM resources outages to the downstream system, in the same manner as the ISO internal resources.</p>			Core EIM	SLIC/OMS, Integration

4.11 Business Process: < Manage Metering >

4.11.1 Business Requirements

<i>ID#</i>	<i>Business Feature</i>		<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ1220	<p>Settlement metering is required for all generators, including participating and non-participating resources, within an EIM Entity BAA and shall follow all existing standards and/or requirements for each type of metered entity.</p>		Core EIM	OMAR, Settlement
EIM-BRQ1221	<p>EIM entities SC Meter Entity (ME) shall submit hourly meter data for the EIM BAA load.</p> <p>The system shall divide hourly load value by 12 to get 5-minute metering value of the load.</p> <p>The ISO meter system shall perform Validation, Estimation, and Editing (VEE) and send Settlement Quality Meter Data (SQMD) to settlement system.</p>		Core EIM	OMAR, Settlement



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<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ1222	<p>The EIM resource SC ME for the participating resources shall submit meter values in 5-minute intervals to the ISO meter system.</p> <p>The ISO meter system shall perform Validation, Estimation, and Editing (VEE) and send Settlement Quality Meter Data (SQMD) to settlement system.</p>	Core EIM	OMAR, Settlement
EIM-BRQ1223	<p>If EIM BAA activates separation flag in the Master File, the EIM Entity SC shall submit meter in alignment with T+55B Recalculation Statement (Final Meter Submittal T+48B). The EIM entity SC shall submit the meter equal to the total expected energy for all the EIM BAA resources.</p> <p>As normal process, the settlement produces statements at T+3B and T+12B using estimation of meter, which is the total expected energy from the market. If an EIM BAA activates the separation flag, the expected energy calculated from the market will equal to the base schedule for all the resources/loads/interties belong to this BAA. Therefore, the estimation of meter will equal to base schedule. The EIM imbalance energy will equal to zero.</p> <p>Note: EIM entity is responsible for base schedule and meter submission and imbalance energy settlement if the meter not equal to the base schedule.</p>	Core EIM	OMAR, MQS Settlement


<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ1225	<p>The system shall allow the EIM participating resource to be an ISO Metered Entity (ISOME). The ISOME requirements and benefits are applicable to the EIM resources that choose to be ISOME:</p> <ul style="list-style-type: none"> • Must use an ISO Approved Meter; • Must make modifications to adhere to 5-minute intervals • Must provide supporting site and meter documentation, complete meter testing and validation associated with the certificate of compliance process • Must adhere to Metering Business Practice Manual for ISOMEs including Maintenance & Repair timelines • The ISO directly poll meter data on the EIM resource behalf • ISO metering personnel (MDAS) performs Validation, Estimation, and Editing (VEE) on behalf of customer and sends corrected values to settlements and notifies customer if requested • Exempt from late or missing data penalties associated with the Rules of Conduct (since ISO responsible for data submission) <p>ISOMEs are eligible to receive free Qualified Reporting Entity (QRE) services associated with renewable data submission to WREGIS (WECC).</p>	Core EIM	OMAR
EIM-BRQ1230	<p>The system shall allow the EIM participating resource to be a Schedule Coordinator Metered Entity (SCME). The SCME requirements are applicable to the EIM resources that choose to be SCME:</p> <ul style="list-style-type: none"> • SC must submit Estimated or Actual Settlement Quality Meter according to the various timelines and meter data submission requirements on 5 minute interval associated with Settlement Quality Meter Data (SQMD). • SC is responsible for obtaining all necessary authorization from Local Regulatory Authorizes in regards to data used in the settlement process • SC must submit an annual Scheduling Coordinator Self-Audit report • SC is subject to late or missing data penalties associated with the Rules of Conduct 	Core EIM	OMAR

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EIM-BRQ1235	<p>The system shall allow non-participating resources to be a Schedule Coordinator Metered Entity (SCME). SCME of Non-participating resource in EIM BAA shall submit the meter data to the ISO. The SCME requirements are applicable to the non-participating resources.</p> <p>System shall allow SCME of non-participating resources to submit meter data in larger intervals up to 60 minutes. The non-participating resource meter data must be submitted based upon the metering interval.</p> <p>The system shall divide the larger interval meter data into 5-minute meter value for measurement and settlement of UIE.</p> <p>Example: SCME submits 15- minute meter data for their non-participating resource. The system shall calculate 5-minute meter value by dividing the 15-minute meter value by 3.</p>			Core EIM	OMAR

4.12 Business Process: < Manage Expected Energy and Market Correction >

4.12.1 Business Requirements

<i>ID#</i>	<i>Business Feature</i>			<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ1241	<p>The system shall calculate and broadcast the real-time expected energy for EIM resources based on the base schedules and the dispatch instruction for the EIM resources. MQS shall also allocate the real-time energy bid curve to the determined real-time economic energy portion of the dispatch.</p>			Core EIM	MQS

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EIM-BRQ1243	The system shall Calculate and broadcast each resource congestion cost and associated BAA (For Real-Time Congestion Balancing Account): <ul style="list-style-type: none"> • for the physical schedule in EIM BAA and in ISO BAA, calculate the resource LMP congestion cost for each BAA by sum of the congestion components associated binding constraints in the BAA. • for the virtual schedule in ISO BAA, calculate the virtual schedule LMP congestion cost for each BAA by sum of the congestion components associated binding constraints in the BAA. 			Core EIM	RTM, MQS
EIM-BRQ1244	The system shall calculate and broadcast net export to the ISO BAA for each EIM resource for GHG payment.			Core EIM	MQS

4.13 Business Process: < Manage Billing and Settlements >

4.13.1 Business Requirements

<i>ID#</i>	<i>Business Feature</i>			<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
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<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ1250	Settlement system shall: <ul style="list-style-type: none"> • Receive the base schedule for all EIM resources including participating and non-participating resources, and EIM load • Receive the net imbalance interchanges between EIM BAAs at five minute basis. • Receive LMP and components include congestion component by BAA • Receive DAM schedule contribution of constraint and associated BAA, include virtual schedule on EIM BAA and ISO constraints. • Receive RTM schedule contribution of constraint and associated BAA, include physical schedule on EIM BAA and ISO constraints • Receive each resource flexible ramp awards and resource specified marginal flexi ramp price, shadow prices for the ramping constraints • Receive each BAA flexible ramp requirements and the BAA specified marginal flexi ramp price, shadow prices for the ramping constraints • Receive IIE for 15 minute market and IIE for 5 minute market. • Receive shadow price of EIM GHG cost associated net imbalance energy export to the ISO • Receive each EIM resource export allocation to the ISO for GHG settlement • Receive the final confirmed intertie schedule for both ISO and EIM. 	Core EIM	RTM, MQS Integration, Dreams, Settlement
EIM-BRQ1255	The system shall settle the GHG payment as the export allocation to ISO * GHG shadow price for EIM resources and EIM Import resource. The EIM resource SC shall receive the settlement for the participating resource that export allocation to the ISO.	Core EIM	Settlement
EIM-BRQ1260	System shall settle 15-minute IIE as the difference between the energy schedule and the base schedule for the relevant resource at the 15-minute LMP. The EIM resource SC shall receive the settlement for the participating resource.	Core EIM	Integration, Dreams, Settlement
EIM-BRQ1270	System shall settle 5-minute IIE as the difference between the DOP of RDT and the 15-minute energy schedule for the relevant resource at the 5-minute LMP. The EIM resource SC shall receive the settlement for the participating resource.	Core EIM	Settlement MQS Integration


<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ1280	<p>System shall settle EIM participating resource UIE as the algebraic difference between the 5-minute meter data and the DOP at 5-minute LMP.</p> <p>The EIM resource SC shall receive the settlement for the participating resource.</p>	Core EIM	Settlement MQS Integration
EIM-BRQ1290	<p>Settle EIM static or 15-minute import/export schedules change from base schedule to the respective 15-minute LMP.</p> <p>The EIM intertie resource SC shall receive the settlement for the participating resource.</p>	Core EIM	Settlement
EIM-BRQ1291	<p>Settle operational adjustments (OA) as difference between EIM static or 15-minute import/export schedules to the respective hourly or 15-minute e-tags/confirmed schedule, settled at the 5-minute market LMPs.</p>	Core EIM	Settlement
EIM-BRQ1300	<p>Settle EIM non-participating load UIE as the algebraic difference between the hourly meter data and the calculated base schedule, is settled at the hourly volumetric weighted average LMP of 15 minute and 5 minute markets in that hour for the relevant LAP. The weights in the calculation is as following:</p> <p>For the 15 minute LMP, it is the difference between 15 minute demand forecast and the demand forecast was used to calculated base load at T-40 (Load + Loss). For the 5 minute LMP, it is the difference between 5 minute and 15 minute demand forecast. The LMP is bounded by Max/Min LMP over the hour.</p> <p>The EIM Entity SC shall receive the settlement for the non-participating load.</p>	Core EIM	Settlement MQS Integration
EIM-BRQ1305	<p>System shall settle EIM non-participating resource UIE as the algebraic difference between the 5-minute meter data and the base schedule at 5-minute LMP.</p> <p>The EIM Entity SC shall receive the settlement for the non-participating resources.</p>	Core EIM	Settlement
EIM-BRQ1315	<p>System shall settle the EIM intertie schedules. The EIM confirmed intertie schedule is deemed delivered and is thus equivalent to metering.</p>	Core EIM	Settlement

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ1320	UFE is settled as imbalance energy at LMP for each Utility Service Area in EIM for which UFE is calculated separately	Core EIM	Settlement MQS Integration
EIM-BRQ1330	The relevant uplift costs of EIM share will be allocated to the EIM Entity Scheduling Coordinators	Core EIM	Settlement
EIM-BRQ1340	EIM Administrative Rate of \$0.19 per MWh of gross imbalance of load and generation with 5% minimum volume of gross load and gross generation is applied to GMC. Note: Base schedule update 60 minutes may not need 5%	Core EIM	Settlement
EIM-BRQ1350	Settlement for convergence bids shall use the real time price that exclude the congestion cost that contributed by the binding constraints that not belong to the ISO	Core EIM	Settlement
EIM-BRQ1355	Calculate virtual resource congestion contribution to the EIM BAA constraints and its allocation: <ul style="list-style-type: none"> • For EIM BAA constraint, virtual resources at the ISO shall be included for congestion contribution in the balancing account of virtual schedules. Create the congestion balancing account by adding the total congestion contributions from 15 minute market for virtual schedule • Allocate virtual congestion balancing account charge to virtual schedule in proportion to it's out-market revenue. If the account has credit, no allocation. • Virtual schedule out-of-market revenue is calculated the virtual overflow schedule multiply the virtual schedule marginal congestion cost of 15 minute market of the EIM BAA. 	Core EIM	Settlement
EIM-BRQ1360	Create real-time congestion balancing account for each BAA: (1) Calculate deviation between 15 minute schedule and base schedule (DAM schedule as base schedule for the ISO) for each resource; (2) the deviation multiply the resource specified marginal congestion cost of 15 minute market of the BAA. (3) Summarize all the resources contribute to the congestion cost (positive and negative) for all the constraints in that BAA. The calculation of deviation between 15 minute schedule and base schedule shall apply to the generation schedules, load schedules and virtual schedules.	Core EIM	Settlement

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ1370	<p>(1) Calculate deviation between meter and 15 minute schedule (2) the deviation multiply the resource specified marginal congestion cost of 5 minute market of the BAA. (3) Summarize all the resources contribute to the congestion cost (positive and negative) for all the constraints in that BAA</p> <p>The calculation of deviation between meter and 15 minute schedule shall apply to the generation schedules, load schedules.</p>	Core EIM	Settlement
EIM-BRQ1380	For EIM BAA constraint, only the physical resources at EIM BAA and the physical resources at the ISO shall be included for congestion contribution in the balancing account. For the ISO constraints, both physical and virtual resources at ISO and physical resources at EIM BAA shall be included in the balancing account	Core EIM	Settlement, RTM, integration
EIM-BRQ1400	Send the real-time congestion balancing account (surplus or shortfall) of EIM BAA to the EIM BAA entity scheduling coordinator according to the settlement time line. EIM BAA entity SC is responsible for the payment to the ISO, and allocate the cost according to the EIM BAA own rule. The ISO will allocate congestion balancing account according to measured demand	Core EIM	Settlement, MQS, integration
EIM-BRQ1410	<p>Receive the resources and flag that subject to the under-schedule penalty from the market.</p> <p>Collect Under-scheduling penalty for imbalanced base schedule: (1) calculate difference between load meter and base schedule of supply as load imbalance. If (load meter-load base schedule)/load base schedule exceed 5% but imbalance at least 2 MW, apply the 125% of LAP price to the load imbalance; (2) If (load meter-load base schedule)/load base schedule exceed 10% but at least 2 MW, apply the 200% of LAP price to the load imbalance.</p>	Core EIM	Settlement, MQS, integration
EIM-BRQ1415	<p>Receive the resources and flag that subject to the over-schedule penalty from the market.</p> <p>Collect Over-scheduling penalty for imbalanced base schedule: (1) calculate difference between load meter and base schedule of supply as load imbalance. If (load meter-load base schedule)/load base schedule less than -5% but imbalance less than or equal to -2 MW, apply the 75% of LAP price to the load imbalance; (2) If (load meter-load base schedule)/load base schedule less than -10% but imbalance less than or equal to -2 MW, apply the 50% of LAP price to the load imbalance;</p>	Core EIM	Settlement, MQS, integration

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ1430	Allocate daily under-schedule penalty and over-schedule penalty premium to the BAA LAP load that not under-scheduled or over-scheduled in the day.	Core EIM	Settlement, MQS, integration
EIM-BRQ1435	System shall calculate Transfer Denominator as the sum of absolute value of uninstructed imbalance energy load, the absolute value of supply uninstructed imbalance energy, the absolute value of unaccounted for energy, and the net EIM transfer out of the BAA EIM BAA Transfer Denominator = (abs(UIE)+abs(UFE)+Net Transfer Out)	Core EIM	Settlement
EIM-BRQ1436	The charges for each BAA that had EIM transfers out in the 5-minute interval are summed together. The summed charges are then allocated to each BAA that had EIM transfers in during the 5-minute interval. The proportional transfer in is based upon the pro-rata share of all BAAs that have had EIM transfers in during a 5-minute interval.	Core EIM	Settlement
EIM-BRQ1440	BAA supply UIE and loss settlement Neutrality consider the transfers between BAAs, The transfer out of the BAA shall share the neutrality by percentage of the transfer out/ Transfer Denominator	Core EIM	Settlement, MQS, integration
EIM-BRQ1450	EIM participating resources are eligible BCR for (1) energy cost (=energy, Flexible Ramping constraint, GHG cost) (2) commitment cost (=start up and minimum load) Include GHG bid cost and GHG payment as revenue for EIM resource in the BCR calculation. Treat non-zero EIM base schedules as self-schedules for applying bid cost recovery rules in the same manner as the ISO internal resources. The resource is not eligible for recovery of start-up costs, but is eligible for minimum load costs during the period in which it was committed by the Market Operator.	Core EIM	Settlement, MQS, integration
EIM-BRQ1460	Uplift allocation: proportional daily uplift between BAAs based on daily transfers out/Transfer Denominator. Proportional transfer out is determined on 5 minute basis. No netting across intervals	Core EIM	Settlement, MQS, integration

<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ1470	<p>Proportional transfer of BCR cost with BAAs:</p> <ul style="list-style-type: none"> System shall calculate the daily bid cost recovery payments for all resources within the EIM Entity BAA. And break into evenly divided 5-minute interval cost. System shall allocate the EIM BAA 5-minute BCR cost to the 5-minute interval in the EIM BAA. For the EIM BAA that is net transfer out, the allocation of BCR cost is reduced by the proportional EIM BCR* (net transfer out/Transfer Denominator) System shall calculate the total transfer out MW and BCR cost of 5-minute interval that of all the BAAs in the EIM footprint. For the EIM BAA that is net transfer in, the BCR cost allocation is increased by prorated share of the net transfer in during a 5-minute interval, total transfer out BCR cost * (Net Transfer in/Total Transfer Out MW) 	Core EIM	Settlement, MQS, integration
EIM-BRQ1480	<p>System shall calculate the flexible Ramping capacity payment for the resources flexible ramp capacity awards as the product of flexible ramp compensation and the flexible ramp capacity award of the resource.</p> <p>All resources awarded flexible ramp capacity within the EIM footprint will be compensated using the formula used in the ISO market.</p> <p>The compensation is equal to the lesser of: 1) \$800/MWh; or 2) the greater of: (a) zero (0), or (b) the Real-Time Ancillary Services Marginal Price for Spinning Reserves for the applicable fifteen-minute RTUC interval; or (c) the Flexible Ramping Constraint Shadow Price minus 75% of the maximum of (i) zero (0), or (ii) the Real-Time System Marginal Energy Cost, calculated as the simple average of the three five-minute Dispatch Interval System Marginal energy costs in the applicable fifteen-minute RTUC interval.</p> <p>Note:</p> <ul style="list-style-type: none"> Because an EIM Entity does not procure ancillary services through the EIM, marginal price for spinning reserves are zero. Using resource specified marginal flexible ramp price for the Flexible Ramping Constraint Shadow Price. The resource specified marginal flexible ramp prices reflect the multiple flexi ramp constraints impact. 	Core EIM	Settlement, MQS, integration


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EIM-BRQ1500	Allocate EIM flexible ramping capacity cost pro-rata of product of BAA requirements and BAA specified marginal flexi ramp price.			Core EIM	Settlement, MQS, integration
EIM-BRQ1511	Receive activated EIM entity separation flag; suppress UFE calculation for the EIM BAAs associated with that EIM Entity.			Core EIM	MF Settlement

4.14 Business Process: < Manage Market Results Interface (CMRI) >

4.14.1 Business Requirements


<i>ID#</i>	<i>Business Feature</i>			<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
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<i>ID#</i>	<i>Business Feature</i>	<i>Requirement Type</i>	<i>Potential Application(s) Impacted</i>
EIM-BRQ1550	For EIM resources SC of participating resources in EIM: The system shall produce reports same as the ISO internal resources, include: <ul style="list-style-type: none"> • resource base schedule hourly • 15 minute market award, Ramp, Price, expected energy • 15 minute market power mitigation (MPM) results • RTUC market allocation of net imbalance energy export from EIM entity to the ISO • All advisory 15-min energy schedules in the RTUC horizon • 5-minute resource-level VER forecast • 5 minute market award, Ramp, Price, expected energy • Net imbalance energy export from EIM resource to the ISO • All advisory 5-min energy schedules in the RTD horizon The system shall receive and produce report on base schedule: <ul style="list-style-type: none"> • resource base schedule hourly 	Core EIM	RTM Integration, CMRI

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EIM-BRQ1560	<p>For EIM entity SC of EIM BAA:</p> <p>The system shall receive and publish:</p> <ul style="list-style-type: none"> • Base schedule of the EIM BAA used in the DAM and RTM. The base schedule shall include the participating resources, non-participating resources, EIM BAA interchanges, EIM BAA load. • Test results for Base schedule balancing test for EIM BAA, at DAM, T-60,T-45, T-25; include pass/fail, and the under-schedule, over-schedule for each hour. • Test results for Base schedule transmission violation test for EIM BAA, at DAM, T-60, T-45, T-25; include pass/fail, violation transmission list for each hour. • Test results for flexible ramping requirement sufficiency test for EIM BAA, T-60,T-45, T-25; • RTM 15 minute market net imbalance energy export from EIM entity to the ISO, total and for each participating resources; • Net imbalance interchange to each EIM BAAs in the EIM footprint in RTM 15 minute market • Load forecast used in the DAM and RTM for EIM BAA; • Advisory energy schedules for participating and non-participating resource in the RTUC horizon. • EIM non-participating resources expected energy and expected energy allocation 	Core EIM	DAM,RTM Integration, CMRI		
EIM-BRQ1565	The system shall allow EIM entity SC and EIM resource SC to access EIM BAA load distribution factors, the shift factors, and the transmission limits, same as the existing SCs.	Core EIM	CMRI		


4.15 Business Process: < Manage Open Access Same-Time System (OASIS) >

4.15.1 Business Requirements

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EIM-BRQ1571	<p>Any item in OASIS that shows an aggregated TAC area-level report shall include EIM TAC area / DLAP. All reports will have EIM nodal elements.</p> <p>New TAC Areas will be defined for EIM BAAs. This new TAC will need its own line item (or set of line items) in the aforementioned reports.</p>	Core EIM	Integration, OASIS		
EIM-BRQ1580	Demand Forecast and Peak Demand Forecast reports need to include new TAC areas for EIM.	Core EIM	Integration, OASIS		
EIM-BRQ1610	Publish the GHG Shadow price of net imbalance energy export allocation constraint and Net imbalance energy export from EIM Entity BAA. Publish net imbalance interchange between EIM BAAs in EIM footprint.	Core EIM	RTM Integration, OASIS		
EIM-BRQ1620	<p>Publish applicable Price of EIM same as CAISO:</p> <ul style="list-style-type: none"> • All the node and LAP LMP for 15 minute and 5 minute markets. • Constraint shadow price • Flexible Ramping constraint results • MPM results 	Core EIM	RTM Integration, OASIS		
EIM-BRQ1630	<p>Publish applicable EIM entity Demand, Energy; Transmission, Public bids, Etc. in RTM same as CAISO. Publish EIM BAA inertie ATC.</p> <p>Note:</p> <p>No AS and CRR report for EIM BAA.</p>	Core EIM	RTM Integration, OASIS		
EIM-BRQ1635	Publish EIM entity reference data, include Pnodes, LAPs and associated Mapping, LDFs.	Core EIM	OASIS		

5. Appendix A: Examples

5.1 Flexible Ramping Capacity Constraints, Sufficiency Tests Examples

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Flexible Ramp Sufficiency Test

- Performed for each EIM entity BAA after T-75', T-55' and T-40' for the trading hour starting at T. Use initial schedules at T-7.5' and EIM resources energy bids and ramp rates.
- Every 15 minutes Flexible Ramping Requirements for the BAA reduced by any prorated EIM diversity benefit, reduced by any net outgoing EIM transfer at T-7.5'. The total reductions are limited by the available net import capability.
- Cumulative test for meeting flexible ramp requirements for each 15' interval of the hour

15' ramp from T-7.5' to T+7.5' (1st 15' interval)

30' ramp from T-7.5' to T+22.5' (2nd 15' interval)

45' ramp from T-7.5' to T+37.5' (3rd 15' interval)

60' ramp from T-7.5' to T+52.5' (4th 15' interval)

- Test passed if all four cumulative tests pass; Test fails if any of the four cumulative tests fail.

Flexible Ramping capacity Constraints


- If EIM Entity BAA that fails the test, exclude the EIM BAA from group constraint and Net import interchange is capped at last 15-min schedule before the hour (at T-7.5').
- If EIM Entity BAAs that pass the test, bottom-up hierarchical constraints for all BAA combinations and BAA group requirement is reduced by the available net import capability into the BAA group

To illustrate the proposal, consider the following example where the base schedules and initial EIM transfers are assumed zero for simplicity:

BAA	Flexible Ramping Requirement (MW)	Flexible Ramping Requirement with diversity benefit (MW)	Flexible Ramping Sufficiency Test
ISO	300	N/A	N/A
EIM ₁	200	$200 \times 600 / 650 = 184.62$	✓
EIM ₂	150	$150 \times 600 / 650 = 138.46$	✗
ALL	650	600	

Table 1 – Flexible Ramping Sufficiency Test Results

The flexible ramping requirements used in the flexible ramping sufficiency test for each BAA consider the EIM diversity benefits. EIM₁ passes the flexible ramping sufficiency test, whereas the test fails for EIM₂. The available power transfer capability between the participating BAAs does not limit diversity benefits and is as follows:

 California ISO <small>Shaping a Renewed Future</small>	Technology	Template Version:	2.8
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	ISO	EIM ₁	EIM ₂
ISO		80	80
EIM ₁	80		20
EIM ₂	80	20	

Table 2 – Available power transfer capability between BAAs


Since EIM₂ fails the flexible ramping sufficiency test, it will be isolated from the rest of the EIM, i.e., there will be no net imbalance energy import into that BAA. The flexible ramping constraints limits will be as follows:

BAA	Minimum Flexible Ramping Capacity Limit (MW)
ISO	$200 = 300 - 80 - 20$
EIM ₁	$100 = 200 - 80 - 20$
EIM ₂	150
ISO+ EIM ₁	$500 = 300 + 200$

Table 3 – Market Optimization Constraint Limits – EIM₂ Fails Test

The flexible ramping constraint for EIM₂ will probably not be satisfied, hence it will be relaxed with the price reflecting such scarcity; however, it will still be enforced at the relaxed limit to reduce the likelihood of scarcity in EIM₂. The minimum flexible ramping capacity limits for the ISO and EIM₁ are reduced by the 100 MW available net power transfer capability between these areas, allowing for a 20 MW loop flow through EIM₂. The minimum flexible ramping capacity limit for both areas effectively allows the requirement in one area to be met by resources in the other area, but only within the available net power transfer capability.

If EIM₂ had passed the flexible ramping sufficiency test, the flexible ramping capacity constraints limits would have been as follows:

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BAA	Minimum Flexible Ramping Capacity Limit (MW)
ISO	140 = 300 – 80 – 80
EIM ₁	100 = 200 – 80 – 20
EIM ₂	50 = 150 – 80 – 20
ISO+ EIM ₁	400 = 300 + 200 – 80 – 20
ISO+ EIM ₂	350 = 300 + 150 – 80 – 20
EIM ₁ + EIM ₂	190 = 200 + 150 – 80 – 80
ALL	600

Table 4 – Market Optimization Constraint Limits – All BAAs Pass Test

This example shows the benefits of EIM participation to reduce uncertainty and volatility across the EIM footprint utilizing the available net power transfer capability across the EIM BAAs.

6. Appendix B: Acronym Term

Acronym	Term
ADS	Automated Dispatch System
ALFS	Automated Load Forecast System
ATC	Available Transfer Capability
AS	Ancillary Services
BA	Balancing Authority
BAA	Balancing Authority Area
BCR	Bid Cost Recovery
CLAP	Custom Load Aggregation Point

Acronym	Term
CGAP	Custom Generation Aggregation Point
CMRI	ISO Market Results Interface
DB	Diversity Benefits
DCPA	Dynamic Competitive Path Assessment
DOP	Dispatch Operating Point
DOT	Dispatch Operating Target
EIM	Energy Imbalance Market
EMS	Energy Management System
ETC	Existing Transmission Contract
FNM	Full Network Model
GAP	Generation Aggregation Point
GDF	Generation Distribution Factor
GHG	Greenhouse Gas
GMC	Grid Management Charge
IBAA	Integrated Balancing Authority Area
ICCP	Inter-Control Center Communication Protocol
IIE	Instructed Imbalance Energy
ISO	California Independent System Operator Corporation
ISO ME	ISO Metered Entity
LAP	Load Aggregation Point
LDF	Load Distribution Factor
LFZ	Load Forecast Zone
LMP	Locational Marginal Price

Acronym	Term
LMPM	Local Market Power Mitigation
MP	Market Participant
NA	Network Applications
NSI	Net Scheduled Interchange
OATT	Open Access Transmission Tariff
OASIS	Open Access Same-Time Information System
OMAR	Operational Meter Analysis and Reporting
OMS	Outage Management System
RA	Resource Adequacy
RDT	Resource Data Template
RTCD	Real-Time Contingency Dispatch
RTD	Real-Time Dispatch
RTED	Real-Time Economic Dispatch
RTUC	Real-Time Unit Commitment
SaMC	Settlements and Market Clearing
SC	Scheduling Coordinator
SCED	Security Constrained Economic Dispatch
SC ME	Scheduling Coordinator Metered Entity
SE	State Estimator
SIBR	Scheduling Infrastructure and Business Rules system
SLIC	Scheduling and Logging system for the ISO
SMDM	Supplemental Market Data Management
SOL	System Operating Limit

Acronym	Term
SP	Scheduling Point
TAC	Transmission Access Charge
TOP	Transmission Operator
TOR	Transmission Ownership Right
UDC	Utility Distribution Company
UFE	Unaccounted For Energy
UIE	Uninstructed Imbalance Energy
VER	Variable Energy Resource
WECC	Western Electricity Coordinating Council
WIT	WECC Interchange Tool