Business Requirements Specification

Resource Modeling & EIM Enhancements 2017

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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 projects and to all Business Process Modeling and System Requirements Specifications efforts.

Business requirements are what must be delivered to provide value for the Users and Business Stakeholders. Systems, software, and processes are the ways (how) to delivery, satisfy or meet the business requirements (what).

The purpose of this project is to collectively address some important issues identified by policy, operations, technology, business and market participants to improve the functions and features of resource modeling and Energy Imbalance Market (EIM) due to market participant demands and needs.

Note:
The business requirements in this BRS are preliminary and shall be subject to ISO revisions.

2. Details of Business Need/Problem

2.1 Description

The purpose of this project is to collectively address the following important issues identified by policy, operations, technology, business and market participants to improve the functions and features of resource modeling and Energy Imbalance Market (EIM) due to market participant demands and needs:

2.1.1 Access & Integration: EIM Entity Access in ~~ADS,~~ ALFS, MF, OASIS, ~~MRI-S (Metering)~~WebOMS, CMRI

Target:
- Support a new EIM entity through configuration without application changes, in ~~ADS~~ALFS, MF, OASIS, ~~ALFS, MRI-S (Metering).~~WebOMS, and CMRI. Move existing External BAA Operational reports into CMRI, subject to certifications.

Business need:
- Efficiently Support new EIM entities without application release
- Bypasses endorsement of EIM Entity for EIM Entity SC wishing to provide access
- Ability for EIM Entities to retrieve FSP-Provided VER Forecasts from CMRI

2.1.2 ~~**BAAOP AIM: BAAOP provisioning in AIM**~~

Target:
- ~~New EIM Entity user role specific for only submitting dynamic limits through BAAOP, while retaining current access privileges for EIM Entity operations (e.g. both dynamic limit submission and BAAOP user-interface access).~~

Business need:
- ~~Allows EIM Entities capability to provide BAAOP access specific to EIM BAA dynamic limit submission, allowing split roles for operations and market functions.~~

~~2.1.3~~2.1.2   Data Report: EIM Data Report Enhancements to Support Market Participant and EIM Entity Settlements

~~2.1.3.1~~2.1.2.1   *Alternative OASIS Report for all RT LAP Prices.*

Target:
- Provide an OASIS report for all RT LAP prices.

Business need:
- Presently the method for obtaining ELAP prices for hourly load settlements adds significant time and resources to manage on market participants. The bill determinant files are becoming very large.

~~2.1.3.2~~2.1.2.2   *Settlements Publish EIM Transfer Amount between EIM Entities.*

Target:
- ISO settlements will publish bill determinants that contains EIM transfer $ amount between EIM entities.

Business need:
- Evaluate alternatives for transactions occurring between two EIM entities to be used for outside-ISO settlements.

~~2.1.3.3~~2.1.2.3   *Display Default Proxy Commitment Cost Bids on CMRI*

Target:
- ISO will publish CMRI report for default proxy commitment cost bids (start-up, min-load, and transition costs) for all EIM and non-EIM resources.

Business need:
- Some EIM entities requested these information be posted by ISO.

~~2.1.3.4~~2.1.2.4   *Display Input Data of Flex Ramp Requirements on OASIS*

Target:
- ISO will publish OASIS report for input data of flex ramp requirements.

Business need:
- Some EIM entities requested these information be posted by ISO for transparency.

~~2.1.4~~2.1.3   Software Enhancements: EIM Software Enhancements

~~2.1.4.1~~ ~~Add Ability to Submit to PeakRC for EIM Entities on CAISO API's~~

~~*Target*:~~

- ~~Add Ability to Submit to PeakRC for EIM Entities on CAISO API's~~

~~*Business need:*~~

- ~~Some EIM entities requested this enhancement.~~

~~2.1.4.2~~2.1.3.1   *Update EIM logos on EIM GUI's*

Target:

- Use generic EIM logo on all GUI's used by EIM participants.

Business need:

- Some EIM entities requested this enhancement.

2.1.5 SBR: Shared-BAA Resource Modeling

Target:

- The Shared-BAA Resource (SBR) model is a Generating Resource model expansion for the Energy Imbalance Markets. A SBR is a Generating Resource in the EIM Area that has multiple owners, each for a registered fraction of the overall resource capacity. The premise of the SBR model is that bids are submitted separately from each owner and then combined into a composite bid that is used to commit, schedule and dispatch the SBR subject to its technical characteristics. The SBR schedule is subsequently distributed to its various shares for settlement with the respective owners. The model employs a parent-child relationship where the parent is the physical resource and each child a logical share. The model supports various configurations where children may have different market participation, e.g., EIM Participating vs. EIM Non-Participating shares, or a different BAA association from the one of the physical resource, e.g., pseudo-tied shares to other BAAs.

Business need:

- EIM BAA has multiple SBR units

~~2.1.6~~2.1.4 ETSR: Change the ETSR Formulation to Separate the Base Energy Transfer to Distinct Non-Optimizable ETSRs

Target:
- Define separate ETSRs for base energy transfers to distinguish base and dynamic energy transfers so that EIM Entity SCs can submit base energy transfers that will not be optimized by the market, while submitting ETSR limits that would apply to dynamic energy transfers only. Changes are contained in the market optimization engine only, no other systems are affected; there are no changes to data interfaces.

Business need:
- Modeling enhancements.

~~2.1.7~~ ~~Net Interchange Histogram: Combine the Import/Export Under/Over-Scheduling Histograms to a Single Net Interchange Under/Over-Scheduling Histogram~~

~~**Note:** This item has been de-scoped from this project and will be targeted as an independent effort.~~

3. Business Requirements

3.1 Business Process: Access & Integration Enhancements: EIM Entity Access in ~~ADS,~~ ALFS, MF, OASIS, ~~MRI-S (Metering)~~WebOMS, and CMRI

3.1.1 Business Requirements

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
~~EIM17-BRQ-01100~~	~~*EIM Entity user role for ADS:*~~ ~~ADS system shall provide each EIM Entity with read-only access to all related reports for all generator resources associated within the EIM Entity's BAA (regardless whether the generator is participating in the EIM market or not).~~ ~~A specific user role shall be created to provide access to the above information both via user-interface displays and API web services.~~	~~Core~~	~~- AIM~~ ~~- ADS~~
EIM17-BRQ-01200	*WebOMS Automation of Transmission Equipment-to-EIM Entity BAA:* WebOMS system shall automate the process associating Transmission Equipment records to an EIM Entity so that EIM Entities may access their associated transmission equipment immediately after the EIM Entity is activated in MF and the transmission equipment is associated in WebOMS.	Core	- AIM - WebOMS, - MF
EIM17-BRQ-01220	*WebOMS Transmission Equipment Payload Broadcast Automation:* EMMS system shall support automatic broadcasting of its Transmission Equipment payload(s). Currently, EMMS transmission equipment broadcasts fail due to size limits, requiring a manual push of equipment data. This requirement shall resolve the integration issues requiring the manual process.	Core~~,~~ ~~Defect?~~	- WebOMS, - MF, - EMMS
EIM17-BRQ-01310	*Automated EIM SC VER Forecast ALFS Broadcast Activation:* ALFS ~~Adapter~~ shall automatically refresh its list of activated VER Resources for Daily and 5-min VER Forecast broadcasts to all downstream systems from MF system refresh. Effective with its VER resource's activation in MF, each EIM Entity SC submission of FSP-provided VER forecasts shall immediately be active for broadcasting to downstream systems once released by STF business unit after quality assurance performed.	Existing Functionality No additional work required.	- ALFS ~~Adapter,~~ - MF, - Integration

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-01315	*EIM Entity CMRI access to FSP-Provided VER Forecasts:* CMRI shall provide EIM Entity ability to retrieve FSP-Provided VER Forecasts submitted by all Participating/Non-Participating VER resources associated with its EIM Entity BAA, via the following methods: • New CMRI report ("Energy Imbalance Market" menu item) • New CMRI B2B API web service FSP-Provided VER Forecasts shall include both Daily (hourly granular) and 5-minute forecasts from EIM Entity SC.	Existing Core	- AIM, - Integration - CMRI, - CMRI B2B API
EIM17-BRQ-01320	*New EIM Entity role to access all BAA Resources:* CMRI shall provide each EIM Entity resource-level access, both via UI and API, to all generator resources within its associated BAA.	Core	- AIM, - Integration - CMRI, - CMRI B2B API
EIM17-BRQ-01400	*EIM Entity MF access to Generation RDT Report:* MF system shall provide each EIM Entity read-only access to view the Generator RDT report for any generator associated with its BAA.	Core	AIM MF
~~EIM17-BRQ-01500~~	~~*EIM Entity MRI-S (Metering Only) access to SCME Metering:* MRI-S portal shall provide each EIM Entity access to submit and view the meter data submissions for all SC Metering Entity (SCME) resources associated with its BAA. EIM Entity access will not include settlement reporting shall be provided to EIM Entity (only metering data).~~	~~Core~~	~~- AIM~~ ~~- MRI-S~~
EIM17-BRQ-01600	*IFM/RTM and SIBR "DEB Eligible" Active Resource Requirement:* IFM/RTM and SIBR systems shall receive associated Default Energy Bids (DEBs) for every active market resource that is eligible for a DEB (e.g. excludes resources that are intertie, ZISO, RA, etc). Requirement is specific to preparation for Market Simulations (especially with new fuel regions with negotiated cost variables introduced to the MF and ECIC systems). Market Simulation participants should provide negotiated variables prior to Market Sim.	Core Existing ~~Functionality~~FunctionalityCore	- Business Process Only

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
~~EIM17-BRQ-01700~~	~~*CMRI External BAA Operations Reports:*~~ ~~CMRI shall include reports and B2B APIs for all existing EIDE External Operations reports with the ability to retrieve and request in CIM XSD format.~~ ~~These reports are defined as follows (with associated markets):~~ ~~• Shift Factors (RTD)~~ ~~• EIM Transfers, Binding (RTPD and RTD)~~ ~~• EIM Transfers, Advisory (RTPD and RTD)~~ ~~• BAA Load Forecasts (RTPD and RTD)~~ ~~• Cleared Resource Awards, Binding (RTPD and RTD)~~ ~~• Cleared Resource Awards, Advisory (RTPD and RTD)~~ ~~• Market Clearing Flowgate Constraint for ROC, Binding (RTPD and RTD)~~ ~~• Market Clearing Flowgate Constraint for ROC, Advisory (RTPD and RTD)~~ ~~• NSI from EIM Data (RTPD and RTD)~~ ~~• Market Clearing Scheduling Run Rate of Change Value, Upper and Lower Limit (RTD)~~ ~~• Resource Awards Resource Status, Binding (RTD)~~ ~~• Resource Awards Resource Status, Advisory (RTD)~~ ~~Reports shall only be accessed by the "non-eim_ba" user role/ certificate (i.e. existing External BAA user role).~~	~~Core~~	~~- CMRI,~~ ~~- CMRI B2B API~~
EIM17-BRQ-01710	*Automated EIM Entity Load Forecast Broadcast Activation:* ALFS Adapter shall automatically activate EIM BAA Entity (i.e. Control Area Zone) load forecasts based on its nightly ALFS SOA refresh from the MF system. This will occur only for EIM Entities that are active in MF. Broadcasts shall include 1DA, 2DA, and 7DA load forecasts for OASIS consumption, and only occur if data has been its submitted to ALFS staging tables after passing STF quality assurance.	~~Core~~~~Core~~Core Existing Functionality~~Core~~	- MF, - ALFS Adapter, - OASIS - Integration

3.2 Business Process: BAAOP AIM: BAAOP Provisioning in AIM

3.2.1 Business Requirements

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-02000	A new role shall be created and defined for a EIM Entities requiring ability to submit interfaces, as proposed below: • app_mkteim_baa_submit_ext:[BAA]	Core	AIM
EIM17-BRQ-02100	System needs to update the EIMRTInt adapter to use the new role defined in *EIM17-BRQ-02000* (instead of the existing one). • app_mkteim_baa_submit_ext:[BAA]	Core	BAAOP, Integration
EIM17-BRQ-02200	Siemens needs to update the Submit EIM Dynamic Limit interface to use the new role defined in EIM17-BRQ-0200. • app_mkteim_baa_submit_ext:[BAA]	Core	BAAOP
EIM17-BRQ-02300	All active Production certificates using the *app_mkteim_baa_op_ext:[BAA]* role shall be allocated among the client representatives, with the following verifications performed: 1. Certificates determined for use of *machine interface submissions* shall be re-assigned to the new role defined in *EIM17-BRQ-0200* and have BAAOP UI access removed 2. If the certificate is determined to apply for use of *EIM Entity operations*, the existing role shall be retained with no changes.	Core	AIM, BAAOP
EIM17-BRQ-02400	Upon completion of the exercise defined in EIM17-BRQ-0230, AIM shall be updated to allow the new role (*app_mkteim_baa_submit_ext:[BAA]*) for endorsement purposes only; with the existing BAAOP UI access role (*app_mkteim_baa_op_ext:[BAA]*) allowed for endorsement or AARF form request.	Core	AIM, BAAOP

~~3.3~~3.2   Business Process: Data Report: EIM Data Report Enhancements to Support Market Participant and EIM Entity Settlements

~~3.3.1~~3.2.1   Business Requirements: Alternative OASIS Report for ~~all~~All RT LAP Prices

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-04300	• System shall calculate RTM hourly LAP prices as outlined by EIM17-BRQ-04302. • ~~System shall follow same formulations that is outlined in Appendix 2.~~ • Hourly RTM LAP prices and their components shall be calculated at T+1~~.~~ and broadcasted to downstream systems. • Settlements shall receive the broadcasted data early enough to be able to process them and include ~~Hourly RTM LAP prices~~them in T+1 settlements statements. • Hourly RTM LAP prices and their components shall be recalculated and rebroadcasted to downstream systems, following any price corrections or data change of any of the input data that are used for their calculations.	Core	- MQS - Settlements - Integration

EIM17-BRQ-04302	• Hourly RTM LAP prices shall include all price components:
	   ○ Total (LMP)
	   ○ Energy (SMEC)
	   ○ Congestion (MCC)
	      ■ MCC BAA components
	   ○ Loss (MCL)
	   ○ GHG (MGC)
		Core	- MQS
			- Integration

EIM17-BRQ-04310	System shall calculate and store the ~~following~~ RTM LAP prices~~:~~ • ~~HourlyRTMLAPPrice~~ ~~AA'mdh~~ • ~~HourlyRTMLAPSMECPrice~~ ~~AA'mdh~~ • ~~HourlyRTMLAPMCCPrice~~ ~~Q'AA'mdh~~ • ~~HourlyRTMLAPMCLPrice~~ ~~AA'mdh~~ and all their components	Core	- MQS

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
~~EIM17-BRQ-04312~~	~~System shall store and use the following input data in the calculation of hourly RTM LAP prices:~~ • ~~DispatchIntervalRTDLAPPrice uM'AA'mdhcif~~ • ~~DispatchIntervalRTDLAPSMECPrice uM'AA'mdhcif~~ • ~~DispatchIntervalRTDLAPMCCPrice uQ'M'AA'mdhcif~~ • ~~DispatchIntervalRTDLAPMCLPrice uM'AA'mdhcif~~ • ~~FMMIntervalLAPLMPPrice uM'AA'mdhc~~ • ~~FMMIntervalLAPSMECPrice uM'AA'mdhc~~ • ~~FMMIntervalLAPMCCPrice uQM'AA'mdhc~~ • ~~FMMIntervalLAPMCLPrice uM'AA'mdhc~~ • ~~RTDEIMLAPBidAdderPrice AA'mdhcif~~ • ~~FMMEIMLAPBidAdderPrice AA'mdhc~~ • ~~DALoadSchedule BrtuT'I'Q'M'AA'R'W'F'S'VL'pmdh~~ • ~~BAResBaseLoadSchedule BrtuT'I'Q'M'AA'R'W'F'S'VL'pmdh~~ • ~~BAResBaseLoadSchedule BrtuT'I'Q'M'AA'R'W'F'S'VL'pmdhci~~ • ~~5MRTDLAPForecastQuantity AA'mdhcif~~ • ~~15MFMMLAPForecastQuantity AA'mdhc~~	~~Core~~	~~- MQS~~
EIM17-BRQ-04315	System shall follow the following rules: • The Hourly Real-Time LAP Price shall be calculated for each Custom and Default Load Aggregation Point (CLAP, DLAP, ELAP).	Core	- MQS
EIM17-BRQ-04320	System shall follow the following rules: • The Hourly Real-Time LAP Price is applicable for settlement of Uninstructed Imbalance Energy (UIE) of non-participating Demand.	Core	- ~~MQS~~Settlements
EIM17-BRQ-04325	System shall follow the following rules: • The Hourly Real Time LAP LMP prices shall be calculated as the sum of the weighted average Hourly Real Time LAP SMEC Price, the weighted average Hourly Real Time LAP MCC Price~~,~~ and BAA components, the weighted average Hourly Real Time LAP MCL Price, and the weighted average Hourly Real Time LAP MGC Price.	Core	- MQS

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-04330	System shall follow the following rules: • The Hourly Real Time LAP SMEC Price shall be calculated as the weighted average price of the ~~product of the~~ four FMM Interval LAP SMEC Prices, ~~the twelve RTD Interval LAP SMEC Prices, the deviation of the~~weighted by the corresponding 15-minute ~~Forecast of~~ EIM Area ~~Demand~~ demand forecast deviation from the CAISO Demand ~~Scheduled~~(load plus losses) scheduled in ~~Day Ahead Market~~IFM and the net of all EIM Base Schedules, and the ~~deviation of the five~~twelve RTD Interval LAP SMEC Prices, weighted by the corresponding 5-minute ~~Forecast of~~ EIM Area ~~Demand~~ demand forecast deviation from the 15-minute ~~Forecast of~~ EIM Area ~~Demand within a specific Default or Custom~~demand forecast. This calculation is the same and shall yield the same result for every LAP.	Core	- MQS
EIM17-BRQ-04335	System shall follow the following rules: • The Hourly Real Time LAP MCC Price component for each BAA shall be calculated as the weighted average price of the ~~product of the~~ corresponding four FMM Interval LAP MCC ~~Prices, the twelve RTD Interval LAP MCC Prices, the deviation of the~~Price BAA components, weighted by the corresponding 15-minute ~~Forecast of~~ EIM Area ~~Demand~~ demand forecast deviation from the CAISO Demand ~~Scheduled~~(load plus losses) scheduled in ~~Day Ahead Market~~IFM and the net of all EIM Base Schedules, and the ~~deviation of the five~~twelve RTD Interval LAP MCC Price BAA components, weighted by the corresponding 5-minute ~~Forecast of~~ EIM Area ~~Demand~~ demand forecast deviation from the 15-minute ~~Forecast of~~ EIM Area ~~Demand within a specific Default or Custom~~demand forecast. The Hourly Real Time LAP ~~.~~ MCC Price shall be calculated as the sum of all Hourly Real Time LAP MCC Price BAA components.	Core	- MQS

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-04340	System shall follow the following rules: • The Hourly Real Time LAP MCL Price shall be calculated as the weighted average price of the ~~product of the~~ four FMM Interval LAP MCL Prices, ~~the twelve RTD Interval LAP MCL Prices, the deviation of the~~weighted by the corresponding 15-minute ~~Forecast of~~ EIM Area ~~Demand~~ demand forecast deviation from the CAISO Demand ~~Scheduled~~(load plus losses) scheduled in ~~Day Ahead Market~~IFM and the net of all EIM Base Schedules, and the ~~deviation of the five~~twelve RTD Interval LAP MCL Prices, weighted by the corresponding 5-minute ~~Forecast of~~ EIM Area ~~Demand~~ demand forecast deviation from the 15-minute ~~Forecast of~~ EIM Area ~~Demand within a specific Default or Custom LAP.~~ demand forecast.	Core	- MQS
EIM17-BRQ-04341	System shall follow the following rules: The Hourly Real Time LAP MGC Price shall be calculated as the weighted average price of the four FMM Interval LAP MGC Prices, weighted by the corresponding 15-minute EIM Area demand forecast deviation from the CAISO Demand (load plus losses) scheduled in IFM and the net of all EIM Base Schedules, and the twelve RTD Interval LAP MGC Prices, weighted by the corresponding 5-minute EIM Area demand forecast deviation from the 15-minute EIM Area demand forecast.	Core	-MQS
EIM17-BRQ-~~04345~~04342	System shall follow the following rules: • The Hourly Real Time LAP Price shall be calculated as the sum of the corresponding, Hourly Real Time ~~LAP~~SMEC Price, Hourly Real Time LAP MCC Price, Hourly Real Time LAP MCL Price, and Hourly Real Time ~~LAP MCL Price shall be upwardly bounded by the maximum positive LMP, SMEC, MCC, and MCL, respectively.~~MGC Price.	Core	- MQS
EIM17-BRQ-~~04350~~04345	System shall follow the following rules: • The Hourly Real Time LAP ~~Price, Hourly Real Time LAP~~ SMEC Price, the Hourly Real Time LAP MCC Price~~, and~~ BAA components, the Hourly Real Time LAP MCL Price, and the Hourly Real Time LAP MGC Price shall be ~~lower~~ bounded from above by the ~~lowest negative LMP, SMEC, MCC, and MCL, respectively~~maximum of the 16 prices used in the corresponding weighted average calculation.	Core	--MQS

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-~~04355~~04350	System shall follow the following rules: • ~~If the Hourly Real Time LAP Price,~~The Hourly Real Time LAP SMEC Price, the Hourly Real Time LAP MCC Price~~, or~~ BAA components, the Hourly Real Time LAP MCL Price ~~exceeds the upper boundary or is less than lower boundary,~~, and the Hourly Real Time LAP ~~Price, Hourly Real Time LAP SMEC Price, Hourly Real Time LAP MCC Price, and Hourly Real Time LAP MCL~~MGC Price shall be ~~calculated as~~bounded from below by the ~~product~~minimum of the ~~four FMM Interval LAP MCL Prices, the twelve RTD Interval LAP MCL Prices, the gross (absolute) deviation quantity of the 15-minute CAISO Forecast of CAISO Demand from the CAISO Demand Scheduled~~16 prices used in ~~Day Ahead Market, and the gross (absolute) deviation quantity of the five-minute CAISO Forecast of CAISO Demand from the 15-minute CAISO Forecast of CAISO Demand within a specific Default or Custom LAP~~the corresponding weighted average calculation.	Core	- MQS
EIM17-BRQ-~~04360~~04355	System shall follow the following rules: • If ~~the hourly gross (absolute) deviation quantity of the 15-minute CAISO Forecast of Demand from the CAISO Demand Scheduled in Day Ahead Market or EIM Base Schedules, and the hourly gross (absolute) deviation quantity of the five-minute Forecast of EIM Area Demand from the 15-minute Forecast of EIM Area Demand within~~for a ~~specific Default or Custom~~given LAP ~~are equal to zero, the Hourly Real Time LAP Price~~any of the, Hourly Real Time LAP SMEC Price, the Hourly Real Time LAP MCC Price~~, and~~ BAA components, the Hourly Real Time LAP MCL Price, or the Hourly Real Time LAP MGC Price ~~shall be calculated as the simple~~is greater than the upper bound or less than the lower bound, all the corresponding weighted average ~~of the four 15-minute FMM Interval~~calculations for that LAP ~~LMPs, the four 15-minute FMM Interval LAP SMECs, the four 15-minute FMM Interval LAP MCCs and the four 15-minute FMM Interval LAP MCLs, respectively~~shall use (absolute value instead of algebraic) deviation weights.	Core	- MQS

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-04360	System shall follow the following rules: • If all weights used in the weighted average Real Time LAP Price calculations are zero (no FMM or RTD EIM Area demand forecast deviation), resulting in a zero denominator, the Real Time LAP Prices shall be calculated as a simple average of the respective four FMM Interval LAP Prices and twelve RTD Interval LAP Prices..	Core	- MQS
EIM17-BRQ-04365	• OASIS shall consume RTM hourly LAP prices as outlined by EIM17-BRQ-04310. • OASIS shall create a new report to publish hourly RTM LAP prices: o RTM LAP Locational Marginal Price • OASIS shall re-publish the new report whenever hourly RTM LAP prices are recalculated (due to price correction or change of any input data). The republishing shall follow same logic and timing as republishing input FMM and Interval prices.	Core	- OASIS - Integration

EIM17-BRQ-04370	• Settlement shall consume RTM hourly LAP prices as outlined by EIM17-BRQ-04302
	• Following implementation of this project, Settlements shall retire RTM hourly LAP prices formulation, except the ones that are used to calculate any intermediate variables that are used as inputs to other pre-calculations or charge codes, and update the following settlement BPM:
	    o BPM - CG PC Real Time Price
	    o Link: https://bpmcm.caiso.com/Pages/SnBBPMDetails.aspx?BPM=Settlements%20and%20Billing
		Core	- Settlement
			- Integration

~~3.3.2~~3.2.2 Business Requirements: Settlements Publish EIM Transfer Amount between EIM Entities

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted

EIM17-BRQ-04600	• Settlements shall publish an information-only BD that provides each EIM entity with EIM Transfer Amount between that EIM entity and other EIM entities.
	• Settlement shall be configured to calculate these new BD's:
	   o FMM ETSR Settlement (All components: energy, loss and congestion)
	   o RTD ETSR Settlement (All components: energy, loss and congestion)
	
	Note: The EIM entity can use this informational Amount to settle between EIM BAA's outside of ISO market.
		Core	- Settlements

EIM17-BRQ-04610	RTM and PCA shall broadcast and Settlements shall consume FMM and RTD Resource specific LMP prices (total and all price components) for ETSR resources.	Core	- RTM - PCA - Settlements - Integration
EIM17-BRQ-04615	• OASIS shall consume and be able to republish the post-market shadow price corrections of ETSR Lower/Upper Limits (scheduling constraints) that applies to FMM (15min), and RTD (5min) markets. • OASIS shall consume and be able to republish the post-market shadow price corrections of physical constraints (nomograms, branch groups, flowgates, and intertie constraints) that applies to DA, FMM (15min), and RTD (5min) markets. • OASIS shall consume be able to republish the post-market AS clearing price corrections that applies to DA, FMM (15min), and RTD (5min) markets (within Market Clearing payload).	Core	- OASIS - ~~PCA~~Integration
EIM17-BRQ-04620	• RTM and PCA shall broadcast and Settlements shall consume Scheduling Point – Intertie prices (total and all price components). • Masterfile shall provide mapping of Scheduling Point – Intertie at the location that ESTR is scheduling energy and include that in LMPM group.	Core	- RTM - PCA - Settlements - MF - Integration

~~3.3.3~~3.2.3 Business Requirements: Display Default Proxy Commitment Cost Bids on CMRI

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted

EIM17-BRQ-04700	• CMRI shall ~~display~~consume the following data from SIBR and display them in a new CMRI report:
	  - Default bid for proxy Startup Cost
	  - Default bid for proxy Minimum Load Cost
	  - Default bid for proxy Transition Cost (only for MSG resource)
	• ~~It shall apply to RTM markets.~~
	• CMRI shall publish all default commitment costs that are broadcasted by SIBR and assign each set a unique updated time stamp based on SIBR broadcast time stamp to CMRI.
	  Notes:
	   o The Updated Time Stamp is needed since SIBR is broadcasting 3 sets of default commitment costs every trade day at 2:30 AM, 9:00 AM and 10:00 PM.
	   o DA and RTM will use the latest default commitment costs that are available at the time they run.
	   o If no payload consumption failure by CMRI, DA will use the payload broadcasted at 9:00 AM and RTM will use the payload broadcasted at 10:00 PM.
	• CMRI shall publish this report daily.
	• Access to these reports shall be granted to resource's SC.
	• This shall apply to EIM and non-EIM resource types
		Core	- CMRI
			- Integration

~~3.3.4~~3.2.4 **Business Requirements: Display Input Data of Flex Ramp Requirements on OASIS**

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-04800	- OASIS shall display input data of flex ramp requirements to enhance the Base Schedule Test result output for the Flex ramp test. - These data include: - Change in load demand - Uncertainty component - Diversity benefit scaled uncertainty component - NEC - NIC - Credit - It shall be published in OASIS at T-75', T-55', and T-40'.	Core	- OASIS - Integration

~~3.4~~3.3 Business Process: Software Enhancements: EIM Software Enhancements

~~3.4.1~~ ~~Business Requirements: Add Ability to Submit to PeakRC for EIM Entities on CAISO API's~~

~~ID#~~	~~Business Feature~~	~~Requirement Type~~	~~Potential Application(s) Impacted~~
~~EIM17-BRQ-06100~~	~~WebOMS shall provide a "Submit to PeakRC" checkbox for EIM entities on these CAISO API's:~~ • ~~Submit Generation Outages~~ • ~~Submit Transmission Outages~~	~~Core~~	~~WebOMS~~

~~3.4.2~~3.3.1 Business Requirements: Update EIM logos on Siemens GUI

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-06800	• Whenever a new EIM entity is added in MF, BSAP and BAAOP GUI shall be updated automatically to use a generic GUI logo for the new EIM entity, without need to new software deployment.	Core	- BSAP - BAAOP

~~3.5 Business Process: SBR: Shared-BAA Resource Modeling~~

~~**Note:**~~

~~These business requirements are preliminary and shall be subject to ISO Tariff revisions.~~

~~**Impacted Systems:**~~
- ~~**General**~~
  - ~~Initial implementation of this functionality will be available to SBRs in EIM balancing authority areas only.~~
  - ~~Entire SBR functionality of this project shall be driven by existence of SBR data in MF.~~
- ~~**MF**~~
  - ~~Define SBR resource as a parent, Define SBR child resources as market resources and SBR parent-children relation.~~
  - ~~Defines SBR resources mapping.~~
- ~~**FNM**~~
  - ~~Set up Cnode/Anode and Zero Impedance Line (ZIL) for SBR children~~
- ~~**EMS**~~
  - ~~Get SBR parent and children telemetry and ignore SBR parent~~
- ~~**ALFS**~~
  - ~~If SBR is a VER, each child shall be responsible for submitting a VER forecast for their share~~
- ~~**ECIC**~~
  - ~~Provides DEB on SBR parent~~
- ~~**BSAP**~~
  - ~~Base schedule for SBR child market resource within EIM BAA, not parent~~
- ~~**SIBR**~~
  - ~~SC submit SBR child resource bids, not parent~~
- ~~**RTM**~~
  - ~~Derive SBR parent commitment costs from SBR Children bids~~
  - ~~Allocate AS capacity for SBR children~~
  - ~~Combine SBR Children energy bids to form SBR parent bid segments in Incremental merit order~~
  - ~~Combine SBR Children AS bids to form SBR parent AS bid segments in Incremental merit order~~
  - ~~Market shall optimally commit and schedule SBR parent, then decompose awards to SBR children~~
  - ~~Enforce inter-temporal constraint for SBR parent only, not children~~
  - ~~Apply LMPM on SBR parent, Mitigate composite bids, derive DEB on child level~~
  - ~~Support pseudo-tied resources at SBR child.~~
  - ~~Network Power flow solution on SBR child level~~
  - ~~GDF of SBR parent is calculated from SBR child schedule~~
  - ~~Combine child bids for corresponding future time from parent bids for future interval~~
  - ~~Manual Dispatch shall apply to parent~~
  - ~~Validate resource market results at both parent and child level~~
- ~~**PCA**~~
  - ~~Commitment cost on children~~
  - ~~DOP correction shall be calculated on parent.~~
  - ~~Calculations of forecast and uncertainty movement shall be performed on child level.~~
  - ~~Price correction on both parent and child level.~~
- ~~**MQS**~~
  - ~~Calculate Expected Energy and allocations on parent and decompose to child level~~
  - ~~Distribute Post-Market manual instructions of SBR parent to SBR children~~
  - ~~Calculate Commitment cost (MQS Aux Costs) on both parent and children~~

- o Calculate Historic Regulation Performance Accuracy on parent and decompose to child level
- o Calculate non-dispatchable time ranges on parent and apply to child level
- **PCT**
  - o Perform price correction for Pnodes/Apnodes for both parent and child resources
- **CMRI**
  - o Publish both SBR parent and children market results
  - o Publish both SBR parent and children adjusted post-market results
  - o Publish both SBR parents and children calculated post-market results
- **OASIS**
  - o Publish SBR children public bids after 90 days
  - o Update calculations of Mileage Calculation Components report to account for Historic Regulation Performance Accuracy on SBR resources
- **ADS**
  - o Publish SBR parent DOT
- **MRI-S**
  - o Logical meter on active children - submit by children SC.
  - o Each SC is responsible for ensuring that the submitted meter data reflects the accurate amount.
- **Settlements**
  - o No settlement for parent and children pseudo-tied to non-EIM BAA
  - o Settlement only apply to SBR Children, BCR rules apply to SBR children same as other resources
- **WebOMS**
  - o Allow outage/derate submitted by parent and not by children.
  - o WebOMS shall derive children outages from parent outages.
  - o Responsible child SC shall view derived its child outages.
  - o Validation rule for derate of parent equal total of children.
- **GOTS**
  - o Accommodates the new add-on functions and related data structure changes
- **MOTS**
  - o Accommodates the new add-on functions and related data structure changes
- **IOOC**
  - o Accommodates the new add-on functions and related data structure changes
- **DSA**
  - o Accommodates the new add-on functions and related data structure changes

3.5.1 **Business Requirements: General**

General:

- Initial implementation of this functionality will be available to SBRs in EIM balancing authority areas only.
- Entire SBR functionality of this project shall be driven by existence of SBR data in MF

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted

EIM17-BRQ-08000	**Basic General Principal:**
	• **Physical Model on Parent:**
	  ○ Physical model shall be on SBR parent level (e.g. scheduling, outages).
	• **Financial Model on Child:**
	  ○ Financial model shall be on SBR child level (e.g. bidding, settlements).
	• **Parent to Child Distribution:**
	  ○ In most cases, distribution of parent value to active children (who bids) based on owner shared will be sufficient. The values of active children may need to be prorated to account for the inactive children.
	  ○ In some cases, distribution of parent value to all children based on owner shared will be sufficient.
	  ○ In some cases, child value will match parent value.
	  ○ In some cases, child value will be independent from parent value.
	• **Child to Parent Aggregation:**
	  ○ In most cases, summing up active children (who bids) will be required. The values of active children may need to be prorated to account for the inactive children.
	  ○ In some cases, summing up all children will be sufficient.
	  ○ For converting bids from children to parent composite bid, ordering and indexing shall be used.
		Core	- ADS
			- ALFS
			- BSAP
			- CMRI
			- DSA
			- ECIC
			- ED Tool
			- EMS
			- FNM
			- GOTS
			- IOOC
			- MF
			- MOTS
			- MQS
			- MRI-S
			- OASIS
			- ODCP
			- PCA
			- PCT
			- RTM
			- Settlements
			- SIBR
			- WebOMS

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08005	• The entire SBR functionality of this project shall be driven by existence of SBR data in MF. • If no SBR data is entered in MF, all other functionalities shall work automatically without any manual interventional.	Core	• ADS • ALFS • BSAP • CMRI • DSA • ECIC • ED Tool • EMS • FNM • GOTS • IOOC • MF • MOTS • MQS • MRI-S • OASIS • ODCP • PCA • PCT • RTM • Settlements • SIBR • WebOMS

3.5.2 ~~**Business Requirements: Manage Entity and Resource Maintenance Updates (MF)**~~

~~**MF:**~~

- ~~Define SBR resource as a parent, define technical characteristic, SBR in EIM BAA~~
- ~~Define SBR child resources as market resources and SBR parent-children relation, child tech characteristic are derived from parent SBR using percentage share.~~
- ~~Downstream systems will get SBR parent-children relation and share% from MF.~~
- ~~Define cnode/anode/pnode/apnode for each child.~~
- ~~Allow Children resource at different BAAs for children that are pseudo-tied resources.~~
- ~~The children resources that are not pseudo-tied shall register at same physical location. e.g same cnode/anode as parent.~~
- ~~Define SC for parent and define SC (can be different) for each child in the EIM area.~~

~~ID#~~	~~Business Feature~~	~~Requirement Type~~	~~Potential Application(s) Impacted~~
~~EIM17-BRQ-08020~~	~~**Define Shared-BAA Resource (SBR) Resource as a parent**:~~ ○ ~~**SBR Flag:** The SBR shall be registered in the MF as a regular market resource and will be identified by a flag as a SBR parent. The SBR Flag should be added to the Generator RDT as a non-modifiable attribute.~~ ○ ~~**SBR as single resource:** The SBR can be single resource at a connectivity node (CNode) or~~ ○ ~~**SBR as aggregated resource with GDF:** The SBR can be an aggregate resource at an aggregate node (ANode) composed of one or more CNodes where the relevant individual units are connected. Define GDF for the aggregated resource.~~ ○ ~~**SBR as MSG:** The SBR may be registered as a Multi-State Unit (MSG).~~ ○ ~~**No PDR/NGR/COG**: SBR model shall not be PDR, NGR, or COG resources.~~	~~Core~~	~~MF~~

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08040	**Define SBR child resources and SBR parent-children relation:** o **Parent and children:** The SBR shall be designated as the "parent" resource and shall be associated with two or more "children" resources, one child for each Owner. o **Make** parent-children relation available to downstream systems o **Children resources (that are within EIM area):** Register each child resource as a market resource and designated as a SBR child. o **SBR MSG parent and children:** If the SBR parent is registered as a MSG, its SBR children must also be registered as MSGs and with exactly the same states and state transitions. o **Same cnode/anode for non-pseudo-tied children:** For non-pseudo-tied children, register with same cnode/anode as parent or another cnode/anode that is connected to parent cnode/anode via ZIL. o **Cnode/Anode and ZIL for pseudo-tied children:** The SBR children shall be registered with a CNode connect to the cnode of SBR parent via a zero-impedance line (ZIL). For an aggregate SBR parent, each SBR child shall be at an ANode composed of CNodes connected to the CNodes of the aggregate SBR parent via ZILs. Create Cnode/Anode and ZIL for children in Full Network Model (FNM). o **Ownership Share by child:** define each child ownership percentage (share). o **Participation option in EIM by each child:** A SBR child may be registered as EIM Participating or Non-Participating Resource irrespective of the registry of it siblings. o **Participation option in EIM by parent:** A SBR parent shall be registered as EIM Non-Participating Resource.	Core	- MF - FNM

~~ID#~~	~~Business Feature~~	~~Requirement Type~~	~~Potential Application(s) Impacted~~
~~EIM17-BRQ-08060~~	~~**Allow SBR parent and Children to be in different BAAs for Single resource**~~ • ~~A SBR child may reside in same BAA or a different Balancing Authority Area (BAA) than that of its parent and siblings, if the child is pseudo-tied resource.~~ • ~~Hence some shares of a SBR that is physically located in a BAA can be pseudo-tied to different BAAs.~~ • ~~The BAA of a SBR parent may be an EIM BAA, but NOT a non-EIM BAA.~~ • ~~The BAA of a SBR child may be an EIM BAA, or a non-EIM BAA.~~ • ~~If a child of a SBR is a pseudo-tied to a non-EIM BAA, it shall not be registered as market resource.~~ ~~Ex:~~ ~~Physical unit at CNODE: Cnd1,~~ ~~Parent: Phy_RES_1, at Cnd1 BAA1~~ ~~Child C1, RES_1_C1, at Cnd1 BAA1 1 share 0.4~~ ~~Child C2, RES_1_C2, pseudo-tied, at Cnd1-C2 BAA2 ZIL2 share 0.6~~	~~Core~~	• ~~MF~~ • ~~FNM~~
~~EIM17-BRQ-08080~~	~~**Allow SBR parent and Children to be in different BAAs for Aggregated resource**~~ ~~Parent: res_1_p (200MW) at And (BAA1)~~ ~~Child1: res_1_c1 (100 MW) at And (BAA1),~~ ~~Pseudo-tied Child2: res_1_c2 (100 MW) at Andc2(BAA2)~~ ~~SBR children as an aggregated resource can have different GDF. GDF of parent aggregated resource shall be derived from children GDF by aggregating the distribution of children ownership MW to parent level as shown in the below example.~~ ~~**Example**~~	~~Core~~	• ~~MF~~ • ~~FNM~~

~~Example table:~~

~~Res_id~~	~~P(arent) /C(hild)~~	~~cnode~~	~~MW~~	~~GDF~~
~~Res_1_p~~ ~~200 MW Pmax~~	~~p~~	~~Cnd1~~ ~~Cnd2~~	~~70~~ ~~130~~	~~0.35~~ ~~0.65~~
~~Res_1_c1~~ ~~50% ownership~~	~~c~~	~~Cnd1~~ ~~Cnd2~~	~~40~~ ~~60~~	~~0.4~~ ~~0.6~~
~~Res_1_c2~~ ~~50% ownership~~	~~c~~	~~Cnd1-c2~~ ~~Cnd2-c2~~	~~30~~ ~~70~~	~~0.3~~ ~~0.7~~

~~ID#~~	~~Business Feature~~	~~Requirement Type~~	~~Potential Application(s) Impacted~~
~~EIM17-BRQ-08100~~	~~**Scheduling Coordinator (SC) of SBR parent registration and responsibility :**~~ • ~~**Register**: Register SC of SBR parent in the MF system, Resource SC agreement and requirement are applicable.~~ • ~~**Technical characteristic**: SC of parent shall be responsible for registering the technical characteristics of the SBR. **Note:** Refer.to Appendix-4 for list of technical characteristics and parent/child derivation and responsibilities.~~ • ~~**SBR MSG characteristic:** If the SBR parent is registered as a MSG, its SC shall be responsible for registering the technical characteristics of all registered states, as well as the state transition times for allowed transitions.~~ • ~~**AS Certification**: SC of parent shall be responsible for ancillary services certification and testing.~~ • ~~Children SC's shall be capable to view all technical characteristic and all of the above of the parent.~~	~~Core~~	~~- MF~~

~~ID#~~	~~Business Feature~~	~~Requirement Type~~	~~Potential Application(s) Impacted~~

~~EIM17-BRQ-08120~~	**~~Scheduling Coordinator (SC) of SBR child registration and responsibility :~~**
	• **~~Register~~**~~: system shall register the SC and the Base Schedule Coordinator (BSC) registered for a SBR child represent the SBR Owner~~
	• **~~Technical characteristic by share:~~**
	   o ~~The SC for a SBR child shall be responsible for providing supporting documentation for setting some technical characteristics.~~
	   o ~~Some child technical characteristics will be rather derived (by MF or ECIC) from the corresponding data of the relevant SBR parent.~~
	~~Notes:~~
	• ~~Refer.to Appendix-4 for list of technical characteristics and parent/child derivation and responsibilities.~~
	
	• **~~MSG by share~~**~~: If the SBR parent is registered as a MSG, the technical characteristics required for bid generation for the states of its SBR children shall be derived from the corresponding data of the states of the SBR parent prorated by the shares of the SBR children.~~
	• **~~AS by share~~**~~: If the SBR parent is certified for ancillary services, all of its children shall also be certified and the certified capacity of the SBR parent shall be allocated to its children in proportion to their share.~~
	• **~~No inter-temporal constraint:~~** ~~There is no need for a registered ramp rate or other inter-temporal constraints for a SBR child, because these shall be enforced only for the SBR parent.~~
		~~Core~~	~~- MF~~
			~~- ECIC~~

3.5.3 Business Requirements: Manage Full Network Model (FNM) and Energy Management System (EMS)

- **FNM**
  - Set up Cnode/Anode and Zero Impedance Line (ZIL) for SBR children
- **EMS**
  - Get SBR parent and children telemetry and ignore SBR parent

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08140	**Set up Cnode/Anode and Zero Impedance Line (ZIL) for SBR children:** • Create Cnode/Anode and ZIL for children in Full Network Model (FNM) • The SBR children shall be connected with a CNode connect to the cnode of SBR parent via a zero-impedance line (ZIL). • For an aggregate SBR parent, each SBR child shall be at an ANode composed of CNodes connected to the CNodes of the aggregate SBR parent via ZILs. **Note:** This shall apply only to children with pseudo-tied in different BAA's, otherwise, children can have same Cnode/Anode as parent.	Core	- FNM
EIM17-BRQ-08145	**SBR Network Model Impact:** • If SBR children are associated to same BAA, SBR shall be modeled as a parent resource in NM. (Existing functionality) • If SBR children are associated to different BAA's, all SBR children shall be split and modeled as separate resources in NM.	Core	- FNM

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08150	**Telemetry**: • SC of parent shall be responsible for submitting physical telemetry on the SBR parent and the individual physical units under an aggregate SBR if applicable. • SC of child shall be responsible for submitting logical telemetry for its share. • EMS shall use the telemetry for the SBR children.	Core (Existing Functionality)	- EMS
EIM17-BRQ-08160	**EMS shall ignore SBR parent** The EMS shall ignore the SBR parent; the power flow solution, contingency analysis, critical constraint determination, and loss penalty and shift factor calculation shall only consider the SBR children. It is important these calculations are at the SBR child level to support SBR children pseudo-tied to other BAAs. The EMS must use the telemetry for the SBR children.	Core (Existing Functionality)	- FNM, - EMS

3.5.4   Business Requirements: Manage ALFS

ALFS
- If SBR is a VER, each child shall be responsible for submitting a VER forecast for their share

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08170	**VER Forecast**: If SBR is a VER, each child shall be responsible for submitting a VER forecast for their share.	Core	- ALFS - MF

3.5.5   **Business Requirements: Manage Resource Default Energy Bids (ECIC)**

ECIC (RLC):
- DEB is on SBR parent

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08180	**DEB is on SBR parent:** Default Energy Bid is on SBR parent. SC of parent shall be responsible for negotiating the Default Energy Bid (DEB).	Core (Existing Functionality)	- ECIC

3.5.6 Business Requirements: Manage Real Time Market

BSAP:

- Base schedule for SBR child market resource within EIM BAA, not parent

SIBR

- SC submit SBR child resource bids, not parent

RTM

- Derive SBR parent commitment costs from SBR Children bids
- Allocate AS capacity for SBR children
- Combine SBR Children energy bids to form SBR parent bid segments in Incremental merit order
- Combine SBR Children AS bids to form SBR parent AS bid segments in Incremental merit order
- Market shall optimally commit and schedule SBR parent, then decompose awards to SBR children
- Enforce inter-temporal constraint for SBR parent only, not children
- Apply LMPM on SBR parent, Mitigate composite bids, derive DEB on child level
- Support pseudo-tied resources at SBR child.
- Network Power flow solution on SBR child level
- GDF of SBR parent is calculated from SBR child schedule
- Combine child bids for corresponding future time from parent bids for future interval
- Manual Dispatch shall apply to parent
- Validate resource market results at both parent and child level

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08200	**No base schedules or bids shall be allowed for the SBR parent.** - System shall not allow SBR parent resource to submit base schedule and bids. - The SBR Child resource can submit base schedule and bids.	Core	- BSAP, - SIBR, - RTM

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted

EIM17-BRQ-08240	**SC Submit SBR child base schedule and bids:**
	• **Base schedule**: The BSC of a SBR child shall be responsible for submitting base schedules for energy and ancillary services,
	• **Bids**:
	    ○ The SC of a SBR child shall be responsible for submitting bids for energy and ancillary services as applicable.
	    ○ SC of a SBR parent shall not be able to view the bid prices of any SBR child.
	    ○ SC of a SBR child shall not be able to view the entire bid of other SBR children.
		Core (Existing Function)	- BSAP,
			- SIBR,
			- RTM

EIM17-BRQ-08260	**Enforce inter-temporal constraint for SBR parent only:** • Enforce inter-temporal constraint for SBR parent • **No inter-temporal constraint for SBR child:** no ramp rate or other inter-temporal constraints for a SBR child.	Core	- RTM

~~ID#~~	~~Business Feature~~	~~Requirement Type~~	~~Potential Application(s) Impacted~~
~~EIM17-BRQ-08280~~	~~**SBR children schedule and bids validation:**~~ ~~• **Validate Energy and AS bids**: Base schedules and bids submitted for the SBR children shall be validated in BSAP and SIBR based on the registered Pmin/Pmax and the AS certified capacity, as applicable by the share. *(Existing Functionality)*~~ ~~• **Validate SUC and MLC bids:**~~ ~~o Start Up Cost (SUC), Minimum Load Cost (MLC) and State Transition Cost (STC) bids and submitted for the SBR children shall also be validated in SIBR according to existing bidding rules. *(Existing Functionality)*~~ ~~o SBR children shall not be allowed to bid any Start-Up Time (SUT) different than the corresponding registered data for their parent.~~ ~~• **Validate MSG bids**: If the SBR parent is registered as a MSG, the base state submitted from all of its SBR children must be the same. Similarly, any submitted self-schedules must be for the same state. SBR children shall not be allowed to bid any Start-Up Time (SUT) different than the corresponding registered data for their SBR parent. Similarly, SBR MSG children shall not be allowed to bid any State Transition Time (STT) different than the corresponding registered data for their SBR MSG parent.~~	~~Core~~	~~• SIBR,~~ ~~• RTM~~

~~ID#~~	~~Business Feature~~	~~Requirement Type~~	~~Potential Application(s) Impacted~~
~~EIM17-BRQ-08300~~	**~~Derive SBR parent SUC/MLC/STC from SBR Children:~~** • ~~The MLC for the SBR parent shall be derived in the market application as the sum of the MLC bids of its "active" SBR children in the market, as modified (based on existing method) to account for any Pmin adjustments due to physical parent Pmin rerate or lack of some children participation.~~ • ~~The SUC/STC of the SBR parent shall be derived as the sum of the SUCs/STCs of its active children, adjusted pro rata to account for lack of some children participation by allocating pro rata on child share the corresponding default SUC/STC of the inactive parent SBR share.~~ • ~~Active children with base schedules without bids shall not contribute to the SUC/MLC/STC of the SBR parent.~~ • ~~The SUC/MLC can only be used to commit the SBR if there is no positive base schedule submitted from any of its children since a nonzero base schedule indicates self commitment.~~ **~~Note:~~** ~~active children are the children with schedules and/or bids.~~	~~Core~~	~~- SIBR,~~ ~~- RTM~~

~~EIM17-BRQ-08320~~	**Allocate Capacity for SBR Children:**	~~Core~~	~~- SIBR,~~
	- ~~Any ancillary services schedules or awards on a SBR child shall be allocated onto the energy bid and capacity range of that child according to current rules as applicable. *(Existing Functionality)*~~		~~- RTM~~
	- ~~The capacity range of a SBR child is the range between its Upper and Lower Operating Limits (UOL and LOL) that reflect allocated Pmax/Pmin and derates from its parent. Pmax derates and Pmin rerates on the SBR parent shall be allocated to its active SBR children in proportion to their share (resulting in adjusted Pmin for active children).~~		
	- ~~If this allocation results in a Pmin higher than the UOL of a SBR child, the SBR cannot be scheduled due to insufficient child participation, in which case all children bids shall be ignored.~~		
	- ~~Otherwise, the final LOL on a SBR child shall consume the lower end of its energy bid as needed to accommodate the LOL.~~		
	- ~~The consequence of this Pmin adjustment for SBR children is that if there is a single active child and its share is less than the Pmin of the SBR parent, the allocated Pmin will entirely consume the energy bid and the SBR will be scheduled at its Pmin based on its SUC and MLC alone without the ability to set the LMP.~~		
	- ~~These Pmin/Pmax adjustments shall apply to each applicable configuration for active SBR MSG children. An optimal state transition out of a state for a SBR MSG shall only be possible if the entire capacity range for that state is fully bid by all of its SBR MSG children. Consequently, for a SBR MSG with children in EIM BAAs, such a transition shall only be possible in RTM and only if all of its EIM children are registered as EIM Participating Resources.~~		

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	• Optimal state transitions in RTM for SBR MSG parents with children in non-EIM BAAs shall accommodate the base schedules of these children. • The SBR parent can be manually transitioned to another state via Manual Dispatch (MD).		

~~EIM17-BRQ-08340~~	**Combine SBR Children energy bids to form SBR parent bid segments in Incremental merit order:**	~~Core~~	~~RTM,~~ ~~ECIC~~
	• **Combine bids:** The energy bids and ancillary services schedules or awards from the SBR children shall be combined by the market application to form a composite energy bid and ancillary services schedule for the SBR parent.		
	• **GHG Bid Adders:** The GHG bid adders submitted by SBR children that are registered as EIM Participating Resources shall not be combined to a composite GHG bid adder for their parent because the parent and its children may reside in different gas regulation areas. The SBR children export allocations to various gas regulation areas and their associated GHG bid adders shall be modeled separately at the SBR child level. This is possible because the export allocation does not depend on the technical characteristics of the SBR parent, hence it can be performed independently for each of its children.		
	• **MSG bids:** If the SBR parent is registered as a MSG, a composite energy bid and composite ancillary services schedules shall be constructed for each applicable configuration from the corresponding schedules or bids of its SBR MSG children.		
	• **Track Segments**: The segments of this composite energy bid and ancillary services schedule shall be arranged in incremental merit order from the Lower Operating Limit (LOL) of the SBR parent upward, subject to relevant allocation priority rules among the ancillary services, and their association with the relevant child shall be tracked.		
	• **Track same price segments**: Segments at the same price shall still be tracked separately and their merit order shall be determined randomly.		

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	• **Base schedule as self-schedule:** Base schedules without energy bids shall be treated as high priority self-schedules in this merit order. A similar functionality is currently employed for constructing composite virtual energy bids at Virtual Locations; however, it must be expanded to accommodate ancillary services. • **Display SBR parent bids:** The composite energy bid and AS bids shall be displayed to market operators by the market application, but it shall not be published to any SC because it contains commercially sensitive information.		
EIM17-BRQ-08360	**Combine SBR Children AS bids to form SBR parent AS bid segments in Incremental merit order:** • **Combine**: The ancillary services capacity bids from the SBR children shall be combined by the market application to form a composite ancillary services bid for the SBR parent. • **MSG AS bids:** If the SBR parent is registered as a MSG, composite ancillary services bids shall be constructed for each applicable state from the corresponding bids of its SBR MSG children. • **Merit order and track segments**: The segments of this composite ancillary services bid shall be arranged in incremental merit order and their association with the relevant child shall be tracked. • **Display**: The composite ancillary services bid shall be displayed to market operators by the market application, but it shall not be published to any SC because it contains commercially sensitive information.	Core	— RTM

EIM17-BRQ-08380	**Market shall optimally commit and schedule SBR parent, then decompose awards to SBR children:**	Core	• RTM
	• **Schedule SBR parent:**		
	o The market application shall optimally commit and schedule the SBR parent based on its telemetry (State Estimator solution), three-part energy bid (derived SUC, derived MLC, and composite incremental energy bid) and the composite ancillary services bid, subject to its technical limits (ramp rate, minimum up and down times, etc.).		
	o SBR's with children pseudo tied to non EIM BAA's with non zero GDF's shall be self-committed because of the non-zero schedule of these children. If there is telemetry for these children, the telemetry shall overwrite the GDF allocation. Therefore, with zero telemetry the SBR can be optimally committed.		
	o For real-time dispatch, the segments of a SBR parent energy bid that correspond to allocated ancillary services capacity shall be protected from dispatch or conditionally released for dispatch according to current rules.		
	• **Decompose SBR parent awards to SBR children:** The optimal energy schedule and ancillary services awards for the SBR parent shall then be decomposed to individual energy schedules and ancillary services awards for its SBR children based on the tracked association of the energy and ancillary services bid segments to these children. This applies to children within EIM areas. Non-participating children in non EIM BAA's shall follow its own telemetry, unless telemetry is absent, they will be scheduled according to their GDF.		

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	• **Protect AS of children in parent dispatch:** For real-time dispatch, the segments of a SBR child energy bid that correspond to allocated ancillary services capacity shall be protected from dispatch or conditionally released for dispatch according to current rules. • **MSG dispatch:** If the SBR parent is registered as a MSG, its optimal energy schedule and ancillary services awards shall be similarly decomposed to individual energy schedules and ancillary services awards for its active MSG SBR children and the state of all active SBR children shall match the one of their SBR parent.		
EIM17-BRQ-08400	**Network Power flow solution on SBR child level** **Ignore parent:** The Network Applications shall ignore the SBR parent; **Network solution at child level:** the power flow solution, contingency analysis, critical constraint determination, and loss penalty and shift factor calculation shall only consider the SBR children. **Support pseudo-tied resources at SBR child:** It is important these calculations are at the SBR child level to support SBR children pseudo-tied to different BAAs for the BAA of the SBR parent.	Core	- RTM

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08420	**GDF of SBR parent is calculated from SBR child schedule:** **Distribute SBR child awards to the units:** In the case of an aggregate SBR, the optimal schedule of each SBR child shall be distributed to the relevant units in the aggregation based on the applicable Generation Distribution Factors (GDFs), renormalized to account for any individual unit outages. **Allow GDF specifications in child bid:** This is only applicable to children that are within EIM Area.	Core	- RTM
EIM17-BRQ-08480	**Manual Dispatch shall apply to parent:** **MD apply to Parent:** • Manual Dispatch Instructions shall apply to the SBR parent (the portion that comprises children within EIM Area) and shall be communicated to the SC of the SBR parent, who is responsible for following dispatch instructions. • ED Tool shall include validation rules to restrict MD to the portion of the parent that comprised of the children that are within EIM Area. This is done so that the MD will not compromise the dispatch of children pseudo-tied to non EIM BAA's. • Parents' schedules with an active MD shall be distributed to its children in same manner as distributing optimal market schedule using children track bid segments (EIM17-BRQ-08380). For schedule portions that have no bids (i.e. above parents' UEL), or in the case where no child has a bid, they shall be distributed to active children pro-rata to share ownership. **MD publish to children:** • These instructions shall also be distributed and communicated to the SCs of the corresponding SBR children for information purposes.	Core	- RTM, - ED Tool, - ODCP, - MQS, - PCA

| ~~EIM17-BRQ-08500~~ | ~~**Apply LMPM on SBR parent:**~~ ~~**LMPM on parent:** The SBR model shall support Local Market Power Mitigation (LMPM) at the SBR parent level.~~ ~~**Mitigate composite bids:** If it is assessed that the SBR parent can exercise local market power with respect to a non-competitive transmission constraint, its composite energy bid shall be mitigated using the corresponding DEB;~~ ~~**Maintain merit order of bid segments:** the mitigation shall maintain the merit order of the energy bid segments from the energy bids of the SBR children.~~ ~~**Derive mitigated bids to children:** The mitigated energy bid for each SBR child shall be extracted (by Market Application) from the mitigated composite energy bid of their SBR parent.~~ ~~**Derive DEB's for SBR child:**~~ | ~~Core~~ | ~~• SIBR,~~ ~~• RTM,~~ ~~• ECIC~~ |
| | ~~• The DEB for each child shall be derived from the DEB of the parent by indexing the DEB of the parent to the composite bid of the parent and then to the children using the bid segment-to-child association of that composite bid, following the order in which the child bid segments are arranged in merit order to form the composite bid of the parent.~~ ~~• Since the submitted bids from the children generally vary every hour, even when the DEB of the parent is static, the derived DEB's for the children may be different every hour and between markets (RTM).~~ ~~• Since the child may not bid all the way up to its maximum capacity, its hourly DEB shall be extended, if necessary, to its maximum capacity by extending the last segment of its derived DEB.~~ ~~**DCPA:**~~ ~~The counter flow capacity shall be calculated using children information (not parent).~~ | | |

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08540	**Combine child bids for corresponding future time form parent bids for future interval** **STUC parent bids:** Similarly, in STUC, the combination of the energy bids of the SBR children to the energy bid for the SBR parent for Trading Hours after the Active Hour shall use the multi-hour bids of the SBR children.	Core	- SIBR, - RTM
EIM17-BRQ-08570	**Resource Market Results Validation** RTM shall validate resource market results at both parent and child level using existing rules.	Core	- RTM
EIM17-BRQ-08580	**Commitment Cost (needed for MQS Aux Cost)** - RTM Requirement: Active children shall inherit commitment periods and related information from their parents.	Core	- RTM, - MQS

3.5.7 **Business Requirements: MQS, PCA, PCT**

- PCA
  - Commitment cost on children
  - DOP correction shall be calculated on parent.
  - Calculations of forecast and uncertainty movement shall be performed on child level.
  - Price correction on both parent and child level.
- MQS
  - Calculate Expected Energy and allocations on parent and decompose to child level
  - Distribute Post-Market manual instructions of SBR parent to SBR children
  - Calculate Commitment cost (MQS Aux Costs) on both parent and children
  - Calculate Historic Regulation Performance Accuracy on parent and decompose to child level
  - Calculate non-dispatchable time ranges on parent and apply to children
- PCT
  - Perform price correction for Pnodes/Apnodes for both parent and child resources

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08580	**Calculate EE and Allocation for Parent level:** • The Market Quality System (MQS) shall calculate and classify the Expected Energy for the SBR parent based on existing rules and formulae. • MQS shall distribute parent EE to its children based on bid segment to child association of the final bid for the parent. • In case where calculated EE does not have a matching bid segment, the EE shall be distributed to active children in proportional to their share ownerships, without exceeding, in total, the maximum energy that correspond to child UOL. • MQS shall not broadcast EE to children pseudo tied to non-EIM BAA's.	Core	• MQS
EIM17-BRQ-08600	**Distribute Post-Market Manual Instructions of SBR Parent to SBR Children** • MQS shall be capable of decomposing MD's, which MQS retrieve post-market, from Parent to children.	Core	• MQS
EIM17-BRQ-08625	**Commitment Cost (MQS Aux Cost)** • MQS/PCA shall calculate and classify the commitment cost for the SBR parent and children based on existing rules and formulae.	Core	• MQS, • PCA

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08645	**DOP Corrections** System shall correct DOP correction on SBR parent level.	Core	- PCA
EIM17-BRQ-08650	**Historic Regulation Performance Accuracy** The Historic Regulation Performance Accuracy for SBR certified for Regulation shall be calculated for the SBR parent and shall apply to all of its children. All regulation Mileage calculations shall be performed for the SBR parent and the Regulation Mileage awards of the SBR parent shall be distributed to its active children pro rata on their Regulation awards.	Core	- MQS
EIM17-BRQ-08655	**Non-Dispatchable Time Ranges** The non-dispatchable time ranges shall be calculated for the SBR parent and shall apply to all of its children.	Core	- MQS
EIM17-BRQ-08667	**Resource Price Corrections** PCT shall perform price correction for Pnodes/Apnodes for both parent and child resources.	Core	- PCT
EIM17-BRQ-08669	**Forecast and Uncertainty Movement shall be Performed on Child Level** Calculations of forecast and uncertainty movement shall be performed on child level.	Core	- PCA

3.5.8 **Business Requirements: Manage CMRI, OASIS, ADS**

CMRI:
- Publish both SBR parent and children market results
- Publish both SBR parent and children adjusted post-market results
- Publish both SBR parents and children calculated post-market results

OASIS
- Publish SBR children public bids after 90 days
- Update calculations of Mileage Calculation Components report to account for Historic Regulation Performance Accuracy on SBR resources

ADS
- Publish SBR parent DOT

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted

EIM17-BRQ-08680	**Publish both SBR Parent and Children Market Results and Adjusted Post-Market Results**
	
	- **Publish Awards to parent and children:**
	- **Parent awards publish to SC of parent:** The energy schedules, ancillary services awards, 5min dispatch, and the Dispatch Operating Point (DOP) trajectory of the SBR parent shall be communicated to the SC of the SBR parent
	- **Parent awards publish to SC of children:**
	  o SC of a SBR child shall not be able to view any SBR parent schedules, awards, dispatches DOP's.
	  o SC of a SBR child shall be able to view SBR parent DEB.
	- **Child awards publish to child:** Conversely, the energy schedules, ancillary services awards, of each SBR child shall be communicated to the SC of that SBR child,
	- **Child awards publish to parent:** All in the above bullet shall also be published to the SC of its SBR parent.
	- **Publish Mitigated bids for SBR child:** the "extracted mitigated energy bids" of
		Core	- RTM,
			- PCA,
			- MQS,
			- CMRI
			- ADS

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	the SBR children shall be published for the Child SC. • **Publish derived DEB's for SBR child:** the "derived DEB's" of the SBR children shall be published for the Child SC. **Notes:** • SBR parent can see SBR parent as well as all SBR children. SBR Child can see itself but cannot see other children nor SBR parent except for SBR parent DEB. • Parent can see mitigated bid and DEB (including segment to child association) for parent but NOT children.		
EIM17-BRQ-08690	**Publish Calculated Post-Market Results** • **Publish Expected Energy for both SBR Parent Child:** the expected energy of the SBR parent and children shall be published. • **Publish Expected Energy Allocation for both SBR Parent Child:** the expected energy allocations of both SBR parent and children shall be published. • **Publish ISO Commitment Costs Details for both SBR Parent and Child:** the ISO commitment costs details of both SBR parent and children shall be published. • **Publish Non-Dispatchable Time Ranges for both SBR Parent and Child:** the non-dispatchable time ranges of the SBR parent and children shall be published. **Notes:** • SBR parent can see SBR parent as well as all SBR children. SBR Child can see itself but cannot see other children nor SBR parent except for SBR parent DEB.	Core	• MQS, • CMRI
EIM17-BRQ-08700	**DOT for ADS** • Parent shall only view parent DOT.	Core	• RTM, • ADS

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08830	**CMRI shall publish derived DEB on child level:** CMRI shall publish derived DEB on child level.	Core	- MQS, - PCA, - CMRI
EIM17-BRQ-08740	**Publish SBR OASIS Reports** • Only the masked child public bids for SBR shall be published in the OASIS public bids report; the public bids of the SBR parent shall not be published. • OASIS shall update its calculations of Mileage • Calculation Components report to account for Historic Regulation Performance Accuracy on SBR resources.	Core	- RTM, - MQS, - OASIS

3.5.9 Business Requirements: Manage Metering & Settlement

Meter:
- Logical meter on active children - submit by children SC.
- Each SC is responsible for ensuring that the submitted meter data reflects the accurate amount.

Settlement:
- No settlement for parent and children pseudo-tied to non-EIM BAA
- Settlement only apply to SBR Children, BCR rules apply to SBR children same as other resources

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08780	**Receive logical meter for SBR children** - SCME of child shall be responsible for submitting meter data for the SBR child. - Each SC shall be responsible for ensuring that the submitted meter data reflects the accurate amount.	Core	- MRI-S, - Settlement
EIM17-BRQ-08800	**No settlement for parent** - There shall be no settlement of any kind (energy, ancillary services, neutrality, GMC, etc.) with the SC of the SBR parent. - Settlements shall not produce any statements for parent SC as pertinent to SBR. - However, the self-commitment period, the Persistent Deviation Metric, and the Real Time Performance metric for commitment cost qualification shall be performed for the SBR parent and then inherited by its children.	Core	- Settlement

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08820	**SBR child settlement:** • **Settlement**: The SC of child shall responsible for all settlements pertaining to the participation of the SBR child in the markets. • There shall be no settlements for children pseudo-tied to non-EIM BAA. • **Note:** Settlements shall calculate UIE based on SBR child meter **Note:** Market and MQS/PCA shall publish settlement values for children. Settlement do not need break the parent down to the children for the market results.	Core	– MQS – Settlement
EIM17-BRQ-08860	**Settlement only apply to SBR Children resources** The settlement with the SCs of the SBR children shall be performed no different than any other resource.	Core	– MQS – Settlement

3.5.10 **Business Requirements: Manage Outages**

WebOMS
- Allow outage/derate submitted by parent and not by children.
- WebOMS shall derive children outages from parent outages.
- Responsible child SC shall view derived its child outages.
- Validation rule for derate of parent equal total of children.

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08880	**Outage/Derate Submitted on Parent**: SC of parent shall be responsible for reporting outages and derates.	Core	- WebOMS
EIM17-BRQ-08900	**Outage/Derate Derived on Children**: - Outages or derates shall not be allowed to be submitted on the SBR children. - WebOMS shall derive children outage derates/rerates from parent outages using share %. - Validation: derate of parent equal to total of children, issue error if not. - Parent can view only parent outages. - A child can view only its own child outage. It shall neither see parent outage nor other children outages. - Outage reports shall not double count outage derates/rerates in both parent and children.	Core	- MF, - WebOMS, - RTM

3.5.11 Business Requirements: Manage GOTS, MOTS and IOOC, DSA

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-08985	The GOTS shall accommodated the new add-on functions and related data structure changes.	Core	• GOTS
EIM17-BRQ-08990	The MOTS shall accommodated the new add-on functions and related data structure changes.	Core	• MOTS
EIM17-BRQ-08995	The IOOC shall accommodated the new add-on functions and related data structure changes.	Core	• IOOC
EIM17-BRQ-08970	The DSA shall accommodated the new add-on functions and related data structure changes.	Core	• DSA

~~3.6~~3.4 Business Process: ETSR: Change ETSR Formulation to Separate the Base Energy Transfer to Distinct Non-Optimizable ETSRs

~~3.6.1~~3.4.1 Business Requirements

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
EIM17-BRQ-10000	• A new type of ETSR shall be defined in MF: base, as XXX_EIMBASE for import/export for each BAA on either side of every intertie used for Energy Transfers. • A new Y/N Flag shall be added in MF to identify base ETSRs. This flag shall be Y for all base (XXX_EIMBASE) ETSRs and N set for the static (XXX_EIMSTAT) and dynamic (XXX_EIMDYN) ETSRs. • The corresponding EIM Entity BSC shall be assigned to the base ETSRs and the TAG_FLG shall have the same value as the corresponding static and dynamic ETSRs; however, the BSC shall be removed from static and dynamic ETSRs so that base schedules can only be submitted for base ETSRs.	Core	- MF

| EIM17-BRQ-10020 | • **RTBS:**
  ○ All ETSRs, including the new base ETSRs, shall be excluded from the flexible ramp sufficiency tests (existing functionality).
  ○ For NIC/NEC/FRUC/FRDC, base schedules shall only be available for base ETSRs.
• **DSTUC/RTUC/RTD:**
  ○ Base ETSRs shall not be variables; they shall be fixed at their final base schedule submitted to BSAP by T–40', unless revised through the real-time intertie schedule interface.
  ○ ETSR limits submitted for base ETSRs shall be ignored. **Note:** Since base ETSRs are not optimized, any limits that EIM Entities may submit on them via the dynamic transmission limit web service by mistake should be ignored.
  ○ Static (15min) and dynamic (5min) ETSRs shall not include the corresponding base ETSRs (they will effectively have a zero base) and shall be scheduled optimally subject to the corresponding ETSR limits based on existing functionality.
  ○ All ETSR schedules (base, static, and dynamic) shall be broadcasted.
  ○ For ADS, the BASE DOT component shall be the base schedule for the base ETSRs and zero for static and dynamic ETSRs, and the SUPP DOT component shall be zero for base ETSRs and the optimal schedule for static and dynamic ETSRs. **Note:** In current functionality, the ETSR DOT is broken down to BASE and SUPP. No changes to Market Application. This clarification mainly states the expected outcome where the base ETSRs will only have a BASE DOT component and all others only a SUPP DOT component.
• During CISO or EIM BAA contingency, existing rules shall apply for all ETSRs, including base ETSRs.
Note:
• Base ETSRs are not optimizable, thus they do not factor in, except for their contribution to the base net EIM Transfer (T).
• The formulae are the same. For example, for an optimized ETSR, the difference between its limit and the optimal value in the previous interval | Core | - RTM
- ADS
- Integration |

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	contributes to NIC/NEC for the current interval; however, for a base ETSR, there is no such contribution because it is fixed.		
EIM17-BRQ-10040	• Settlements shall have no impact. Static and dynamic ETSRs shall effectively have zero base schedules.	Existing Functionality	- Settlements
EIM17-BRQ-10060	• BSAP shall have no impact. Existing rules shall still apply to base ETSRs.	Existing Functionality	- BSAP
EIM17-BRQ-10080	• There shall be no Expected Energy calculation for any ETSR, including base ETSRs.	Existing Functionality	- MQS
EIM17-BRQ-10100	• All ETSR schedules (base, 15min, and 5min) shall be published.	Existing Functionality	- CMRI
EIM17-BRQ-10120	• All ETSR schedules (base, 15min, and 5min) shall be published.	Existing Functionality	- OASIS
EIM17-BRQ-10140	• ADS shall have no impact. Existing rules shall still apply.	Existing Functionality	- ADS

~~3.7 Business Process: Net Interchange Histogram: Combine the Import/Export Under/Over Scheduling Histograms to a Single Net Interchange Under/Over Histogram~~

~~**Note:** This item has been de-scoped from this project and will be targeted as an independent effort.~~

4. Appendices

4.1 Appendix-1: Acronym Definition

Acronym	Definition
ADS	Automatic Dispatch System
AIM	Access and Identity Management
ALFS	Automated Load Forecast System
Anode	Aggregate Node
API	Application Program Interface
Apnode	Aggregate Pricing Node
AS	Ancillary Services
AUX	Auxiliary
B2B	Business-to-Business
BA	Business Analyst
BAA	Balancing Authority Area
BAAOP	Balancing Authority Area Operations Portal
BASE	Base Scheduled Energy
BCR	Bid Cost Recovery
BD	Bill Determinant
BPM	Business Process Manual
BRS	Business Requirement Specifications
BSAP	Base Schedule Aggregation Portal
BSC	Base Schedule Coordinator
CAISO	California Independent System Operator
CDN	Conformed Dispatch Notice
CG	Configuration Guide
CIM	Common Information Model
CIP	Critical Infrastructure Protection
CIRA	Customer Interface for Resource Adequacy
CISO	California Independent System Operator
CLAP	
CMRI	Customer Market Results Interface
Cnode	Connectivity Node
COG	Constrained-Output Generator
CPM	Capacity Procurement Mechanism
CRN	Contract Reference Number
CRR	Congestion Revenue Rights
CSS	Critical Systems Support
DA	Day-Ahead
DAM	Day-Ahead Market
DCPA	Dynamic Competitive Path Assessment
DDR	Dispactable Demand Resource
DEB	Default Energy Bid
DGR	Distributed Generation Resourse
DLAP	Default Load Aggregation Point
DMM	Department of Market Monitoring

Acronym	Definition
DOP	Dispatch Operating Point
DOT	Dispatch Operating Target
DSA	Dynamic Stability Analysis
ECIC	Energy Costs and Index Calculator
ED	Exceptional Dispatch
EDR	Enterprise Data Repository
EE	Expected Energy
EEA	Expected Energy Allocation
EFC	Effective Flexible Capacity
EIDE	Electric Industry Data Exchange
EIM	Energy Imbalance Market
ELAP	EIM Load Aggregation Point
EMM	Enterprise Model Management
EMMS	Enterprise Model Management System
EMS	Energy Management System
EPI	Electricity Price Index
ESP	Electronic Security Perimeter
ETIE	Export Intertie
ETSR	Energy Transfer System Resources
FMM	Fifteen Minute Market
FNM	Full Network Model
FRDC	Flex Ramping Down Capacity
FRUC	Flex Ramping Upr Capacity
FSP	Forecast Service Provider
GDF	Generation Distribution Factor
GHG	Green House Gas
GIP	Generator Interconnection Procedure
GMC	Grid Management Charge
GOTS	Grid Operations Training Simulator
GRDT	Generator Resource Data Template
GUI	Graphical User Interface
~~HourlyRTMLAPMCCPrice Q'AA'mdh~~	~~Hourly Real Time Market LAP Marginal Cost of Congestion (MCC) for Apnode A.~~
~~HourlyRTMLAPMCLPrice AA'mdh~~	~~Hourly Real Time Market LAP Marginal Cost of Losses (MCL) for Apnode A.~~
~~HourlyRTMLAPPrice AA'mdh~~	~~Hourly Real Time Market LAP Price for Apnode A'.~~
~~HourlyRTMLAPSMECPrice AA'mdh~~	~~Hourly Real Time Market LAP System Marginal Energy Cost (SMEC) for Apnode A.~~
ID	Identifier
IFM	Integrated Forward Market
ISO	California Independent System Operator
IOOC	Integrated Optimal Outage Coordination
IT	Information Technology
ITIE	Import Intertie
ITPD	Information Technology Product Development
ITPM	Information Technology Product Management
ITS	Interchange Transaction Scheduler

Acronym	Definition
LAP	Load Aggregation Point
LEL	Lower Economic Limit
LMP	Locational Marginal Price
LMPM	Locational Market Power Mitigation
LOL	Lower Operating Limit
MCC	Marginal Congestion Component
MCI	Model and Contract Implementation
MCL	Marginal Cost of Losses
MD	Manual Dispatch
MF	Master File
MGC	
MLC	Minimum Load Cost
MOS	Manage Operations Support & Settlements
MOTS	Market Operations Training Simulator
MP	Market Participant
MPM	market Power Mitigation
MQS	Market Quality System
MRID	Master Resource IDentifier
MRI-S	Multi-Stage Generator
MSG	Market Results Interface - Settlements
MVQA	Market Validation Quality & Analysis
MVT	Market Validation Tool
N/A	Not Applicable
NEC	Net Export Capability
NGR	Non-Generating Resource
NIC	Net Import Capability
NM	Network Model
NQC	Net Qualifying Capacity
NSI	Net Scheduled Interchange
OASIS	Open Access Same-time information System
ODCP	On Demand Capacity Procurement
OES	Operations Engineering Services
OMS	Outage Management System
OTS	Operations Training Simulator
PC	Pre-Calculation
PCA	Price Correction Admin
PCT	Price Correction Tools
PDR	Proxy Demenad Resource
PeakRC	Peak reliability Coordinator
PI	Plant Information
Pmax	Maximum Generation Capacity
Pmin	Minimum Generation Capacity
Pnode	Pricing Node
PSTD	Power Systems Technology Development
PSTO	Power Systems Technology Operations
QRB	Quality Review Board
RA	Resource Adequacy

Acronym	Definition
RDT	Resource Data Template
ROC	Rate Of Change
RT	Real-Time
RTD	Real-Time Dispatch
RTPD	Real-Time Pre-Dispatch
RTM	Real-Time Market
RTMO	Real-Time Market Operator
RTUC	Real-Time Unit Commitment
RUC	Residual Unit Commitment
SADS	System And Design Specifications
SBR	Shared-BAA Resource
SC	Scheduling Coordinator
SCME	Scheduling Coordinator Meter Entity
SIBR	Scheduling Infrastructure and Business Rules
SME	Subject Matter Expert
SMEC	System Marginal Energy Cost
SOA	Service-Oriented Architecture
SRS	System Requirement Specifications
STC	State Transition Cost
STF	Short-Term Forecast
STUC	Short-Term Unit Commitment
SUC	Start Up Cost
SUPP	Supplemental
SUT	Start Up Time
T	Trading Hour
TAC	Transmission Access Charges
TBD	To Be Determined
TG	Tie Generator
UEL	Upper Economic Limit
UI	User Interface
UIE	Uninstructed Energy Imbalance
UOL	Upper Operating Limit
VER	Variable Energy Resource
WebOMS	Web-based Outage Management System
XML	Extensible Markup Language
XSD	XML Schema Definition
ZIL	Zero Impedance Line

4.2 Appendix-2: Detailed Calculations of Alternative OASIS Report for all RT LAP Prices

4.2.1 PC Real Time Price (version 5.15)

- o BPM - CG PC Real Time Price
- o Link: https://bpmcm.caiso.com/Pages/SnBBPMDetails.aspx?BPM=Settlements%20and%20Billing

4.2.1.1 Outputs

. Output Req ID	Name		
24	HourlyRTMLAPPrice $_{AA'mdh}$	Hourly Real Time Market LAP Price for Apnode A'.
25	HourlyRTMLAPSMECPrice $_{AA'mdh}$	Hourly Real Time Market LAP System Marginal Energy Cost (SMEC) for Apnode A.
26	HourlyRTMLAPMCCPrice $_{Q'AA'mdh}$	Hourly Real Time Market LAP Marginal Cost of Congestion (MCC) for Apnode A.
27	HourlyRTMLAPMCLPrice $_{AA'mdh}$	Hourly Real Time Market LAP Marginal Cost of Losses (MCL) for Apnode A.

4.2.1.2 Inputs – Independent

Input Req ID	Variable Name	Description
5	==*DispatchIntervalRTDLAPPrice*== *uM'AA'mdhcif*	Dispatch Interval RTD LAP Locational Marginal Price (LMP) for Aggregate Pricing Node, A. ($/MWh) Where Aggregated Pricing Node Type A' = 'DEFAULT' or 'CUSTOM'
6	==*DispatchIntervalRTDLAPMCCPrice*== *uQ'M'AA'mdhcif*	Dispatch Interval RTD LAP Marginal Cost of Congestion Price (MCC) for Aggregate Pricing Node, A. ($/MWh) Where Aggregated Pricing Node Type A' = 'DEFAULT' or 'CUSTOM'
9	==*FMMIntervalLAPLMPPrice*== *uM'AA'mdhc*	The FMM Interval Locational Marginal Price (LMP) for Aggregated Pricing Node A'. ($/MWh) Where Aggregated Pricing Node Type A' = 'DEFAULT' or 'CUSTOM'
10	==*FMMIntervalLAPMCCPrice*== *uQM'AA'mdhc*	The FMM Interval Marginal Cost of Congestion (MCC) for Aggregated Pricing Node A'. ($/MWh) Where Aggregated Pricing Node Type A' = 'DEFAULT' or 'CUSTOM'

~~Input Req ID~~	~~Variable Name~~	~~Description~~
~~11~~	~~FMMIntervalLAPMCLPrice uM'AA'mdhc~~	~~The FMM Interval Marginal Cost of Losses (MCL) for Aggregated Pricing Node A'. ($/MWh) Where Aggregated Pricing Node Type A' = 'DEFAULT' or 'CUSTOM'~~
~~12~~	~~DispatchIntervalRTDLAPMCLPrice uM'AA'mdhcif~~	~~Dispatch Interval RTD LAP Marginal Cost of Losses Price (MCC) for Aggregate Pricing Node, A. ($/MWh) Where Aggregated Pricing Node Type A' = 'DEFAULT' or 'CUSTOM'~~
~~13~~	~~FMMIntervalLAPSMECPrice uM'AA'mdhc~~	~~The FMM Interval LAP System Marginal Energy (SMEC) for Aggregated Pricing Node A'. ($/MWh) Where Aggregated Pricing Node Type A' = 'DEFAULT' or 'CUSTOM'~~
~~14~~	~~DispatchIntervalRTDLAPSMECPrice uM'AA'mdhcif~~	~~Dispatch Interval RTD LAP System Marginal Energy (SMEC) for Aggregate Pricing Node, A. ($/MWh) Where Aggregated Pricing Node Type A' = 'DEFAULT' or 'CUSTOM'~~
~~24~~	~~FMMEIMLAPBidAdderPrice AA'mdhc~~	~~FMM EIM LAP Bid Adder Price by Apnode ($/MWh).~~

~~Input Req ID~~	~~Variable Name~~	~~Description~~
~~25~~	~~RTDEIMLAPBidAdderPrice~~ ~~AA'mdhcif~~	~~RTD EIM LAP Bid Adder Price by Apnode ($/MWh).~~
~~26~~	~~BAResBaseLoadSchedule~~ ~~BrtuT'I'Q'M'AA'R'W'F'S'VL'pmdh~~	~~The final Base Schedule for Load resources in an EIM Balancing Authority Area~~

4.2.1.3 Inputs - From PC Real Time Energy Quantity

Input Req ID	Variable Name	Predecessor Charge Code/ Pre-calc Configuration
4	15MDAMFMMLAPChangeQuantity AA'mdhc	Real Time Energy – Pre Calc
5	5MFMMRTDLAPChangeQuantity mdhcif	Real Time Energy – Pre Calc

4.2.1.4 Intermediate Variables

Output Req ID	Name	Description
28	*HourlyLAPLimitLMPFlag AA'mdh*	Hourly LAP Limit LMP Flag for Apnode A. Value of "1" indicates that the Hourly Weighted Average LAP LMP Price exceeds the Upper Positive Boundary LMP or is lower the lowest negative LMP
29	*HourlyLAPLimitSMECFlag AA'mdh*	Hourly LAP Limit SMEC Flag for Apnode A. Value of "1" indicates that the Hourly Weighted Average LAP SMEC Price exceeds the Upper Positive Boundary SMEC or is lower the lowest negative SMEC.
30	*HourlyLAPLimitMCCFlag AA'mdh*	Hourly LAP Limit MCC Flag for Apnode A. Value of "1" indicates that the Hourly Weighted Average LAP MCC Price exceeds the Upper Positive Boundary MCC or is lower the lowest negative MCC.
31	*HourlyLAPLimitMCLFlag AA'mdh*	Hourly LAP Limit MCL Flag for Apnode A. Value of "1" indicates that the Hourly Weighted Average LAP MCL Price exceeds the Upper Positive Boundary MCL or is lower the lowest negative MCL.
32	*HourlyWeightedAverage1LAPLMPPrice AA'mdh*	Hourly Weighted Average LAP LMP Price calculated based upon the sum of Hourly Weighted Average 1 LAP SMEC, Hourly Weighted Average 1 LAP MCC, and Hourly Weighted Average 1 LAP MCL for Apnode A.

~~Output Req ID~~	~~Name~~	~~Description~~
~~33~~	~~HourlyWeightedAverage1LAPSMECPrice AA'mdh~~	~~Hourly Weighted Average LAP SMEC Price calculated based upon the four FMM Interval LAP SMEC Prices, the twelve RTD Interval LAP SMEC Prices, the deviation of the 15-minute CAISO Forecast of CAISO Demand from the CAISO Demand Scheduled in Day Ahead Market, and the deviation of the five-minute CAISO Forecast of CAISO Demand from the 15-minute CAISO Forecast of CAISO Demand for Apnode A.~~
~~34~~	~~HourlyWeightedAverage1LAPMCCPrice AA'mdh~~	~~Hourly Weighted Average LAP MCC Price calculated based upon the four FMM Interval LAP MCC Prices, the twelve RTD Interval LAP MCC Prices, the deviation of the 15-minute CAISO Forecast of CAISO Demand from the CAISO Demand Scheduled in Day Ahead Market, and the deviation of the five-minute CAISO Forecast of CAISO Demand from the 15-minute CAISO Forecast of CAISO Demand for Apnode A.~~
~~35~~	~~HourlyWeightedAverage1LAPMCLPrice AA'mdh~~	~~Hourly Weighted Average LAP MCL Price calculated based upon the four FMM Interval LAP MCL Prices, the twelve RTD Interval LAP MCL Prices, the deviation of the 15-minute CAISO Forecast of CAISO Demand from the CAISO Demand Scheduled in Day Ahead Market, and the deviation of the five-minute CAISO Forecast of CAISO Demand from the 15-minute CAISO Forecast of CAISO Demand for Apnode A.~~

~~Output Req ID~~	~~Name~~	~~Description~~
~~36~~	~~HourlyWeightedAverage2LAPLMPPrice AA'mdh~~	~~Hourly Weighted Average LAP LMP Price calculated based upon the sum of Hourly Weighted Average 2 LAP SMEC, Hourly Weighted Average 2 LAP MCC, and Hourly Weighted Average 2 LAP MCL for Apnode A.~~
~~37~~	~~HourlyWeightedAverage2LAPSMECPrice AA'mdh~~	~~Hourly Weighted Average LAP SMEC Price calculated based upon the four FMM Interval LAP SMEC Prices, the twelve RTD Interval LAP SMEC Prices, the gross deviation of the 15-minute CAISO Forecast of CAISO Demand from the CAISO Demand Scheduled in Day Ahead Market, and the gross deviation of the five-minute CAISO Forecast of CAISO Demand from the 15-minute CAISO Forecast of CAISO Demand for Apnode A.~~
~~38~~	~~HourlyWeightedAverage2LAPMCCPrice AA'mdh~~	~~Hourly Weighted Average LAP MCC Price calculated based upon the four FMM Interval LAP MCC Prices, the twelve RTD Interval LAP MCC Prices, the gross deviation of the 15-minute CAISO Forecast of CAISO Demand from the CAISO Demand Scheduled in Day Ahead Market, and the gross deviation of the five-minute CAISO Forecast of CAISO Demand from the 15-minute CAISO Forecast of CAISO Demand for Apnode A.~~

~~Output Req ID~~	~~Name~~	~~Description~~
~~39~~	~~HourlyWeightedAverage2LAPMCLPrice AA'mdh~~	~~Hourly Weighted Average LAP MCL Price calculated based upon the four FMM Interval LAP MCL Prices, the twelve RTD Interval LAP MCL Prices, the gross deviation of the 15-minute CAISO Forecast of CAISO Demand from the CAISO Demand Scheduled in Day Ahead Market, and the gross deviation of the five-minute CAISO Forecast of CAISO Demand from the 15-minute CAISO Forecast of CAISO Demand for Apnode A.~~
~~40~~	~~15MDAMFMMLAPChangeSMECAmount AA'mdhc~~	~~The Total 15 Minute LAP SMEC Deviation Amount calculated as product of Load deviation between DAM Load Schedules and FMM Forecast and the FMM LAP SMEC by Apnode~~
~~41~~	~~5MFMMRTDLAPChangeSMECAmount AA'mdhcif~~	~~The Total 5 Minute LAP Deviation Amount calculated as product of Load deviation between FMM Forecast and RTD Forecast and the corresponding RTD LAP SMEC by Apnode~~
~~42~~	~~BAALAP15MDAMFMMChangeMCCAmount Q'AA'mdhc~~	~~The Total 15 Minute LAP MCC Deviation Amount calculated as product of Load deviation between DAM Load Schedules and FMM Forecast and the FMM LAP MCC by Apnode~~
~~43~~	~~BAALAP5MFMMRTDChangeMCCAmount Q'AA'mdhcif~~	~~The Total 5 Minute LAP MCC Deviation Amount calculated as product of Load deviation between FMM Forecast and RTD Forecast and the corresponding RTD LAP MCC by Apnode~~

~~Output Req ID~~	~~Name~~	~~Description~~
44	*BAALAP15MDAMFMMGrossChangeMCCAmount Q'AA'mdhc*	~~The Total 15 Minute LAP MCC Deviation Amount calculated as product of gross Load deviation between DAM Load Schedules and FMM Forecast and the FMM LAP MCC by Apnode~~
45	*BAALAP5MFMMRTDGrossChangeMCCAmount Q'AA'mdhcif*	~~The Total 5 Minute LAP MCC Deviation Amount calculated as product of gross Load deviation between FMM Forecast and RTD Forecast and the corresponding RTD LAP MCC by Apnode~~
46	*15MDAMFMMLAPChangeMCLAmount AA'mdhc*	~~The Total 15 Minute LAP MCL Deviation Amount calculated as product of Load deviation between DAM Load Schedules and FMM Forecast and the FMM LAP MCL by Apnode~~
47	*5MFMMRTDLAPChangeMCLAmount AA'mdhcif*	~~The Total 5 Minute LAP MCL Deviation Amount calculated as product of Load deviation between FMM Forecast and RTD Forecast and the corresponding RTD LAP MCL by Apnode~~
48	*HourlyFMMRTDMaxLAPLMPPrice AA'mdh*	~~The Upper Boundary LAP LMP Price for APnode A.~~ ~~It represents the maximum positive LMP for specific Apnode A and Trading Hour.~~
49	*HourlyFMMRTDMaxLAPSMECPrice AA'mdh*	~~The Upper Boundary LAP SMEC Price for APnode A.~~ ~~It represents the maximum positive SMEC for specific Apnode A and Trading Hour.~~
50	*HourlyFMMRTDMaxLAPMCCPrice AA'mdh*	~~The Upper Boundary LAP MCC Price for APnode A.~~ ~~It represents the maximum positive MCC for specific Apnode A and Trading Hour.~~

~~Output Req ID~~	~~Name~~	~~Description~~
~~51~~	~~HourlyFMMRTDMaxLAPMCLPrice AA'mdh~~	~~The Upper Boundary LAP MCL Price for APnode A.~~ ~~It represents the maximum positive MCL for specific Apnode A and Trading Hour.~~
~~52~~	~~HourlyFMMRTDMinLAPLMPPrice AA'mdh~~	~~The Lower Boundary LAP LMP Price for APnode A.~~ ~~It represents the lowest negative LMP for specific Apnode A and Trading Hour.~~
~~53~~	~~HourlyFMMRTDMinLAPSMECPrice AA'mdh~~	~~The Lower Boundary LAP SMEC Price for APnode A.~~ ~~It represents the lowest negative SMEC for specific Apnode A and Trading Hour.~~
~~54~~	~~HourlyFMMRTDMinLAPMCCPrice AA'mdh~~	~~The Lower Boundary LAP MCC Price for APnode A.~~ ~~It represents the lowest negative MCC for specific Apnode A and Trading Hour.~~
~~55~~	~~HourlyFMMRTDMinLAPMCLPrice AA'mdh~~	~~The Lower Boundary LAP MCL Price for APnode A.~~ ~~It represents the lowest negative MCL for specific Apnode A and Trading Hour.~~
~~56~~	~~HourlyFMMIntervalMaxLAPLMPPRice AA'mdh~~	~~The maximum FMM LAP LMP Price for APnode A.~~ ~~It represents the maximum positive FMM LMP for specific Apnode A and Trading Hour.~~
~~57~~	~~HourlyFMMIntervalMaxLAPSMECPrice AA'mdh~~	~~The maximum FMM LAP SMEC Price for APnode A.~~ ~~It represents the maximum positive FMM SMEC for specific Apnode A and Trading Hour.~~
~~58~~	~~HourlyFMMIntervalMaxLAPMCCPrice AA'mdh~~	~~The maximum FMM LAP MCC Price for APnode A.~~ ~~It represents the maximum positive FMM MCC for specific Apnode A and Trading Hour.~~

~~Output Req ID~~	~~Name~~	~~Description~~
~~59~~	~~HourlyFMMIntervalMaxLAPMCLPrice AA'mdh~~	~~The maximum FMM LAP MCL Price for APnode A.~~ ~~It represents the maximum positive FMM MCL for specific Apnode A and Trading Hour.~~
~~60~~	~~HourlyFMMIntervalMinLAPLMPPrice AA'mdh~~	~~The Minimum LAP FMM LMP Price for APnode A.~~ ~~It represents the lowest negative FMM LMP for specific Apnode A and Trading Hour.~~
~~61~~	~~HourlyFMMIntervalMinLAPSMECPrice AA'mdh~~	~~The Minimum LAP FMM SMEC Price for APnode A.~~ ~~It represents the lowest negative FMM SMEC for specific Apnode A and Trading Hour.~~
~~62~~	~~HourlyFMMIntervalMinLAPMCCPrice AA'mdh~~	~~The Minimum LAP FMM MCC Price for APnode A.~~ ~~It represents the lowest negative FMM MCC for specific Apnode A and Trading Hour.~~
~~63~~	~~HourlyFMMIntervalMinLAPMCLPrice AA'mdh~~	~~The Minimum LAP FMM MCL Price for APnode A.~~ ~~It represents the lowest negative FMM MCL for specific Apnode A and Trading Hour.~~
~~64~~	~~HourlyRTDIntervalMaxLAPLMPPRice AA'mdh~~	~~The maximum RTD LAP LMP Price for APnode A.~~ ~~It represents the maximum positive RTD LMP for specific Apnode A and Trading Hour.~~
~~65~~	~~HourlyRTDIntervalMaxLAPSMECPrice AA'mdh~~	~~The maximum RTD LAP SMEC Price for APnode A.~~ ~~It represents the maximum positive RTD SMEC for specific Apnode A and Trading Hour.~~
~~66~~	~~HourlyRTDIntervalMaxLAPMCCPrice AA'mdh~~	~~The maximum RTD LAP MCC Price for APnode A.~~ ~~It represents the maximum positive RTD MCC for specific Apnode A and Trading Hour.~~

Output Req ID	Name	Description
67	HourlyRTDIntervalMaxLAPMCLPrice AA'mdh	The maximum RTD LAP MCL Price for APnode A. It represents the maximum positive RTD MCL for specific Apnode A and Trading Hour.
68	HourlyRTDIntervalMinLAPLMPPrice AA'mdh	The Minimum LAP RTD LMP Price for APnode A. It represents the lowest negative RTD LMP for specific Apnode A and Trading Hour.
69	HourlyRTDIntervalMinLAPSMECPrice AA'mdh	The Minimum LAP RTD SMEC Price for APnode A. It represents the lowest negative RTD SMEC for specific Apnode A and Trading Hour.
70	HourlyRTDIntervalMinLAPMCCPrice AA'mdh	The Minimum LAP RTD MCC Price for APnode A. It represents the lowest negative RTD MCC for specific Apnode A and Trading Hour.
71	HourlyRTDIntervalMinLAPMCLPrice AA'mdh	The Minimum LAP RTD MCL Price for APnode A. It represents the lowest negative RTD MCL for specific Apnode A and Trading Hour.
85	HourlyAverageFMMLMPPrice AA'mdh	Hourly Simple Average FMM LMP Price by APnode ID A'
86	HourlyAverageFMMSMECPrice AA'mdh	Hourly Simple Average FMM SMEC Price by APnode ID A'
87	HourlyAverageBAAFMMMCCPrice Q'AA'mdh	Hourly Simple Average FMM MCC Price by APnode ID A' and Balancing Authority Area Q'
88	HourlyAverageFMMMCLPrice AA'mdh	Hourly Simple Average FMM MCL Price by APnode ID A'
89	HourlyRTMLAPSUBFlag AA'mdh	Hourly Real Time Market LAP Substitution Flag by APnode ID A'
90	HourlyGrossLAPForecastDeviationQuantity AA'mdh	Hourly Gross LAP Forecast Deviation Quantity by APnode ID A'
91	HourlyDALAPLoadQuantity AA'mdh	Hourly Day Ahead LAP Load Quantity by APnode ID A'

~~Output Req ID~~	~~Name~~	~~Description~~
~~93~~	~~15MDAMFMMLAPGrossChangeSMECAmount AA'mdhc~~	~~The Total 15 Minute LAP SMEC Deviation Amount calculated as product of gross Load deviation between DAM Load Schedules and FMM Forecast and the FMM LAP SMEC by Apnode~~
~~94~~	~~5MFMMRTDLAPGrossChangeSMECAmount AA'mdhcif~~	~~The Total 5 Minute LAP Deviation Amount calculated as product of gross Load deviation between FMM Forecast and RTD Forecast and the corresponding RTD LAP SMEC by Apnode~~
~~95~~	~~15MDAMFMMLAPGrossChangeMCLAmount AA'mdhc~~	~~The Total 15 Minute LAP MCL Deviation Amount calculated as product of gross Load deviation between DAM Load Schedules and FMM Forecast and the FMM LAP MCL by Apnode~~
~~96~~	~~5MFMMRTDLAPGrossChangeMCLAmount AA'mdhcif~~	~~The Total 5 Minute LAP MCL Deviation Amount calculated as product of gross Load deviation between FMM Forecast and RTD Forecast and the corresponding RTD LAP MCL by Apnode~~
~~97~~	~~HourlyWeightedAverage1BAALAPMCCPrice Q'AA'mdh~~	~~Hourly Weighted Average LAP MCC Price calculated based upon the four FMM Interval LAP MCC Prices, the twelve RTD Interval LAP MCC Prices, the deviation of the 15-minute Forecast of EIM Area Demand from the CAISO Demand Scheduled in Day Ahead Market or EIM Base Schedules, and the deviation of the five-minute Forecast of EIM Area Demand from the 15-minute Forecast of EIM Area Demand for Apnode A.~~

~~Output Req ID~~	~~Name~~	~~Description~~
~~98~~	~~HourlyWeightedAverage2BAALAPMCCPrice Q'AA'mdh~~	~~Hourly Weighted Average LAP MCC Price calculated based upon the four FMM Interval LAP MCC Prices, the twelve RTD Interval LAP MCC Prices, the absolute deviation of the 15-minute Forecast of EIM Area Demand from the CAISO Demand Scheduled in Day Ahead Market or EIM Base Schedules, and the absolute deviation of the five-minute Forecast of Balancing Authority Area Demand from the 15-minute Forecast of EIM Area Demand for Apnode A.~~
~~112~~	~~15MFMMAvgLAPSMECPrice AA'mdhc~~	~~15-minute Interval FMM Average LAP SMEC Price for Apnode A'. Includes EIM FMM Bid Adder Price~~
~~113~~	~~SettlementIntervalRTDAvgLAPSMECPrice AA'mdhcif~~	~~Settlement Interval RTD Average LAP SMEC Price for Apnode A'. Includes EIM RTD Bid Adder Price~~
~~114~~	~~HourlyBaseLAPLoadQuantity AA'mdh~~	~~Hourly Base LAP Load Quantity by APnode ID A'~~

4.2.1.5 Subscripts

Subscript Symbol	Subscript Description
B	Business Associate (BA)
r	Resource ID
t	Resource Type
u	UDC, Utility Distribution Company (UDC) in this context can either be a Electric Utility (IOU) or an MSS entity
T'	Entity Type
b	Bid Segment
h	Trading Hour
i	Settlement Interval
f	Dispatch Interval
Q'	Balancing Authority Area
M'	MSS Subgroup
R'	Penalty Location ID
O	Exceptional Dispatch instruction settlement type
A'	Aggregated Price Node Type
A	Aggregated Price Node
Q	Intertie ID
P	Price Node
F'	Entity Component Type
S'	Entity Component Subtype
V	RUC Participation Flag
W'	MSS Emissions Pay Flag
L'	Load Following Selection Flag

4.2.1.6 Formulas

4.2.1.6.1 #3.6.16# HourlyRTMLAPPrice $_{AA'mdh}$

IF

HourlyRTMLAPSUBFlag $_{AA'mdh}$ = 1
THEN

HourlyRTMLAPPrice $_{AA'mdh}$ = HourlyAverageFMMLMPPrice $_{AA'mdh}$
ELSE

IF

HourlyLAPLimitLMPFlag $_{AA'mdh}$ + HourlyLAPLimitSMECFlag $_{AA'mdh}$ + HourlyLAPLimitMCCFlag $_{AA'mdh}$ +

HourlyLAPLimitMCLFlag $_{AA'mdh}$ >= 1

THEN

HourlyRTMLAPPrice $_{AA'mdh}$ = HourlyWeightedAverage2LAPLMPPrice $_{AA'mdh}$

ELSE

HourlyRTMLAPPrice $_{AA'mdh}$ = HourlyWeightedAverage1LAPLMPPrice $_{AA'mdh}$

4.2.1.6.2 #3.6.17# HourlyRTMLAPSMECPrice $_{AA'mdh}$

IF

HourlyRTMLAPSUBFlag $_{AA'mdh}$ = 1
THEN

HourlyRTMLAPSMECPrice $_{AA'mdh}$ = HourlyAverageFMMSMECPrice $_{AA'mdh}$
ELSE

IF

HourlyLAPLimitLMPFlag $_{AA'mdh}$ + HourlyLAPLimitSMECFlag $_{AA'mdh}$ + HourlyLAPLimitMCCFlag $_{AA'mdh}$ +

HourlyLAPLimitMCLFlag $_{AA'mdh}$ >= 1

THEN

HourlyRTMLAPSMECPrice $_{AA'mdh}$ = HourlyWeightedAverage2LAPSMECPrice $_{AA'mdh}$

ELSE

HourlyRTMLAPSMECPrice $_{AA'mdh}$ = HourlyWeightedAverage1LAPSMECPrice $_{AA'mdh}$

4.2.1.6.3 #3.6.18# HourlyRTMLAPMCCPrice $_{Q'AA'mdh}$

IF

HourlyRTMLAPSUBFlag $_{AA'mdh}$ = 1

THEN

$HourlyRTMLAPMCCPrice_{Q'AA'mdh} = HourlyAverageBAAFMMMCCPrice_{Q'AA'mdh}$

ELSE

IF

$HourlyLAPLimitLMPFlag_{AA'mdh} + HourlyLAPLimitSMECFlag_{AA'mdh} + HourlyLAPLimitMCCFlag_{AA'mdh} + HourlyLAPLimitMCLFlag_{AA'mdh} >= 1$

THEN

$HourlyRTMLAPMCCPrice_{Q'AA'mdh} = HourlyWeightedAverage2BAALAPMCCPrice_{Q'AA'mdh}$

ELSE

$HourlyRTMLAPMCCPrice_{Q'AA'mdh} = HourlyWeightedAverage1BAALAPMCCPrice_{Q'AA'mdh}$

4.2.1.6.4   #3.6.19# HourlyRTMLAPMCLPrice $_{AA'mdh}$

IF

$HourlyRTMLAPSUBFlag_{AA'mdh} = 1$

THEN

$HourlyRTMLAPMCLPrice_{AA'mdh} = HourlyAverageFMMMCLPrice_{AA'mdh}$

ELSE

IF

$HourlyLAPLimitLMPFlag_{AA'mdh} + HourlyLAPLimitSMECFlag_{AA'mdh} + HourlyLAPLimitMCCFlag_{AA'mdh} + HourlyLAPLimitMCLFlag_{AA'mdh} >= 1$

THEN

$HourlyRTMLAPMCLPrice_{AA'mdh} = HourlyWeightedAverage2LAPMCLPrice_{AA'mdh}$

ELSE

$HourlyRTMLAPMCLPrice_{AA'mdh} = HourlyWeightedAverage1LAPMCLPrice_{AA'mdh}$

4.2.1.6.5   #3.6.20# HourlyLAPLimitLMPFlag $_{AA'mdh}$

IF

$HourlyWeightedAverage1LAPLMPPrice_{AA'mdh} > HourlyFMMRTDMaxLAPLMPPrice_{AA'mdh}$

OR IF

~~HourlyWeightedAverage1LAPLMPPrice $_{AA'mdh}$ < HourlyFMMRTDMinLAPLMPPrice $_{AA'mdh}$~~

~~THEN~~
~~HourlyLAPLimitLMPFlag $_{AA'mdh}$ = 1~~

~~ELSE~~
~~HourlyLAPLimitLMPFlag $_{AA'mdh}$ = 0~~

~~4.2.1.6.6~~ ~~#3.6.21# HourlyLAPLimitSMECFlag $_{AA'mdh}$~~

~~IF~~
~~HourlyWeightedAverage1LAPSMECPrice $_{AA'mdh}$ > HourlyFMMRTDMaxLAPSMECPrice $_{AA'mdh}$~~

~~OR IF~~
~~HourlyWeightedAverage1LAPSMECPrice $_{AA'mdh}$ < HourlyFMMRTDMinLAPSMECPrice $_{AA'mdh}$~~

~~THEN~~
~~HourlyLAPLimitSMECFlag $_{AA'mdh}$ = 1~~

~~ELSE~~
~~HourlyLAPLimitSMECFlag $_{AA'mdh}$ = 0~~

~~4.2.1.6.7~~ ~~#3.6.22# HourlyLAPLimitMCCFlag $_{AA'mdh}$~~

~~IF~~
~~HourlyWeightedAverage1LAPMCCPrice $_{AA'mdh}$ > HourlyFMMRTDMaxLAPMCCPrice $_{AA'mdh}$~~

~~OR IF~~
~~HourlyWeightedAverage1LAPMCCPrice $_{AA'mdh}$ < HourlyFMMRTDMinLAPMCCPrice $_{AA'mdh}$~~

~~THEN~~
~~HourlyLAPLimitMCCFlag $_{AA'mdh}$ = 1~~

~~ELSE~~
~~HourlyLAPLimitMCCFlag $_{AA'mdh}$ = 0~~

~~4.2.1.6.8~~ ~~#3.6.23# HourlyLAPLimitMCLFlag $_{AA'mdh}$~~

IF

HourlyWeightedAverage1LAPMCLPrice $_{AA'mdh}$ > HourlyFMMRTDMaxLAPMCLPrice $_{AA'mdh}$

OR IF

HourlyWeightedAverage1LAPMCLPrice $_{AA'mdh}$ < HourlyFMMRTDMinLAPMCLPrice $_{AA'mdh}$

THEN

HourlyLAPLimitMCLFlag $_{AA'mdh}$ = 1

ELSE

HourlyLAPLimitMCLFlag $_{AA'mdh}$ = 0

4.2.1.6.9 #3.6.24# HourlyWeightedAverage1LAPLMPPrice $_{AA'mdh}$

HourlyWeightedAverage1LAPLMPPrice $_{AA'mdh}$ = HourlyWeightedAverage1LAPSMECPrice $_{AA'mdh}$ + HourlyWeightedAverage1LAPMCCPrice $_{AA'mdh}$ + HourlyWeightedAverage1LAPMCLPrice $_{AA'mdh}$

4.2.1.6.10 #3.6.25# HourlyWeightedAverage1LAPSMECPrice $_{AA'mdh}$

$$\text{HourlyWeightedAverage1LAPSMECPrice}_{AA'mdh} = (\sum_{c} \text{15MDAMFMMLAPChangeSMECAmount}_{AA'mdhc} + \sum_{c}\sum_{c \in f} \text{5MFMMRTDLAPChangeSMECAmount}_{AA'mdhcif}) / (\sum_{c} \text{15MDAMFMMLAPChangeQuantity}_{AA'mdhc} + \sum_{c}\sum_{c \in f} \text{5MFMMRTDLAPChangeQuantity}_{AA'mdhcif})$$

4.2.1.6.11 #3.6.26# HourlyWeightedAverage1LAPMCCPrice $_{AA'mdh}$

$$\text{HourlyWeightedAverage1LAPMCCPrice}_{AA'mdh} = \sum_{Q'} \text{HourlyWeightedAverage1BAALAPMCCPrice}_{Q'AA'mdh}$$

4.2.1.6.12 #3.6.27# HourlyWeightedAverage1BAALAPMCCPrice $_{Q'AA'mdh}$

$$\text{HourlyWeightedAverage1BAALAPMCCPrice}_{Q'AA'mdh} = (\sum_{c} (\text{BAALAP15MDAMFMMChangeMCCAmount}$$

$$Q'AA'mdhc) + \sum_{c}\sum_{c \in f} (\text{BAALAP5MFMMRTDChangeMCCAmount } Q'AA'mdhcif)) / (\sum_{c}$$

$$(\text{15MDAMFMMLAPChangeQuantity } AA'mdhc) + \sum_{c}\sum_{c \in f} (\text{5MFMMRTDLAPChangeQuantity } AA'mdhcif))$$

4.2.1.6.13 #3.6.28# HourlyWeightedAverage1LAPMCLPrice $_{AA'mdh}$

$$\text{HourlyWeightedAverage1LAPMCLPrice}_{AA'mdh} = (\sum_{c} \text{15MDAMFMMLAPChangeMCLAmount } AA'mdhc + \sum_{c}\sum_{c \in f}$$

$$\text{5MFMMRTDLAPChangeMCLAmount } AA'mdhcif) / (\sum_{c} \text{15MDAMFMMLAPChangeQuantity } AA'mdhc + \sum_{c}\sum_{c \in f}$$

$$\text{5MFMMRTDLAPChangeQuantity } AA'mdhcif)$$

4.2.1.6.14 #3.6.29# HourlyWeightedAverage2LAPLMPPrice $_{AA'mdh}$

$$\text{HourlyWeightedAverage2LAPLMPPrice}_{AA'mdh} = \text{HourlyWeightedAverage2LAPSMECPrice}_{AA'mdh} +$$

$$\text{HourlyWeightedAverage2LAPMCCPrice}_{AA'mdh} + \text{HourlyWeightedAverage2LAPMCLPrice}_{AA'mdh}$$

4.2.1.6.15 #3.6.30# HourlyWeightedAverage2LAPSMECPrice $_{AA'mdh}$

$$\text{HourlyWeightedAverage2LAPSMECPrice}_{AA'mdh} = (\sum_{c} (\text{15MDAMFMMLAPGrossChangeSMECAmount } AA'mdhc) +$$

$$\sum_{c}\sum_{c \in f} (\text{5MFMMRTDLAPGrossChangeSMECAmount } AA'mdhcif)) / (\sum_{c} \text{abs (15MDAMFMMLAPChangeQuantity}$$

$$AA'mdhc) + \sum_{c}\sum_{c \in f} \text{abs (5MFMMRTDLAPChangeQuantity } AA'mdhcif))$$

4.2.1.6.16 #3.6.31# HourlyWeightedAverage2LAPMCCPrice $_{AA'mdh}$

$$\text{HourlyWeightedAverage2LAPMCCPrice}_{AA'mdh} = \sum_{Q'} \text{HourlyWeightedAverage2BAALAPMCCPrice}_{Q'AA'mdh}$$

4.2.1.6.17 #3.6.32# HourlyWeightedAverage2BAALAPMCCPrice $_{Q'AA'mdh}$

$$HourlyWeightedAverage2BAALAPMCCPrice_{Q'AA'mdh} = (\sum_c (BAALAP15MDAMFMMGrossChangeMCCAmount_{Q'AA'mdhc}) + \sum_c \sum_{c \in f} (BAALAP5MFMMRTDGrossChangeMCCAmount_{Q'AA'mdhcif})) / (\sum_c abs (15MDAMFMMLAPChangeQuantity_{AA'mdhc}) + \sum_c \sum_{c \in f} abs (5MFMMRTDLAPChangeQuantity_{AA'mdhcif}))$$

4.2.1.6.18 #3.6.33# HourlyWeightedAverage2LAPMCLPrice $_{AA'mdh}$

$$HourlyWeightedAverage2LAPMCLPrice_{AA'mdh} = (\sum_c (15MDAMFMMLAPGrossChangeMCLAmount_{AA'mdhc}) + \sum_c \sum_{c \in f} (5MFMMRTDLAPGrossChangeMCLAmount_{AA'mdhcif})) / (\sum_c abs (15MDAMFMMLAPChangeQuantity_{AA'mdhc}) + \sum_c \sum_{c \in f} abs (5MFMMRTDLAPChangeQuantity_{AA'mdhcif}))$$

4.2.1.6.19 #3.6.34# 15MDAMFMMLAPChangeSMECAmount $_{AA'mdhc}$

$$15MDAMFMMLAPChangeSMECAmount_{AA'mdhc} = 15MDAMFMMLAPChangeQuantity_{AA'mdhc} * \sum_u \sum_{M'} FMMIntervalLAPSMECPrice_{uM'AA'mdhc}$$

4.2.1.6.20 #3.6.35# 15MDAMFMMLAPGrossChangeSMECAmount $_{AA'mdhc}$

$$15MDAMFMMLAPGrossChangeSMECAmount_{AA'mdhc} = ABS(15MDAMFMMLAPChangeQuantity_{AA'mdhc}) * \sum_u \sum_{M'} FMMIntervalLAPSMECPrice_{uM'AA'mdhc}$$

4.2.1.6.21 #3.6.36# 5MFMMRTDLAPChangeSMECAmount $_{AA'mdhcif}$

5MFMMRTDLAPChangeSMECAmount AA'mdhcif = 5MFMMRTDLAPChangeQuantity AA'mdhcif * SettlementIntervalRTDAvgLAPSMECPrice AA'mdhcif

4.2.1.6.22 #3.6.37# 5MFMMRTDLAPGrossChangeSMECAmount AA'mdhcif

5MFMMRTDLAPGrossChangeSMECAmount AA'mdhcif = ABS (5MFMMRTDLAPChangeQuantity AA'mdhcif) * SettlementIntervalRTDAvgLAPSMECPrice AA'mdhcif

4.2.1.6.23 #3.6.38# BAALAP15MDAMFMMChangeMCCAmount Q'AA'mdhc

BAALAP15MDAMFMMChangeMCCAmount Q'AA'mdhc = 15MDAMFMMLAPChangeQuantity AA'mdhc * $\sum_{u}\sum_{M'}$ FMMIntervalLAPMCCPrice uQ'M'AA'mdhc

4.2.1.6.24 #3.6.39# BAALAP15MDAMFMMGrossChangeMCCAmount Q'AA'mdhc

BAALAP15MDAMFMMGrossChangeMCCAmount Q'AA'mdhc = ABS (15MDAMFMMLAPChangeQuantity AA'mdhc) * $\sum_{u}\sum_{M'}$ FMMIntervalLAPMCCPrice uQ'M'AA'mdhc

4.2.1.6.25 #3.6.40# BAALAP5MFMMRTDChangeMCCAmount Q'AA'mdhcif

BAALAP5MFMMRTDChangeMCCAmount Q'AA'mdhcif = 5MFMMRTDLAPChangeQuantity AA'mdhcif * $\sum_{u}\sum_{M'}$ DispatchIntervalRTDLAPMCCPrice uQ'M'AA'mdhcif

4.2.1.6.26 #3.6.41# BAALAP5MFMMRTDGrossChangeMCCAmount Q'AA'mdhcif

BAALAP5MFMMRTDGrossChangeMCCAmount Q'AA'mdhc = ABS (5MFMMRTDLAPChangeQuantity AA'mdhcif) * $\sum_{u}\sum_{M'}$ DispatchIntervalRTDLAPMCCPrice uQ'M'AA'mdhcif

4.2.1.6.27 ~~#.6.42#~~ 15MDAMFMMLAPChangeMCLAmount ~~AA'mdhc~~

$$15MDAMFMMLAPChangeMCLAmount_{AA'mdhc} = 15MDAMFMMLAPChangeQuantity_{AA'mdhc} * \sum_{u}\sum_{M'} FMMIntervalLAPMCLPrice_{uM'AA'mdhc}$$

4.2.1.6.28 ~~#3.6.43#~~ 15MDAMFMMLAPGrossChangeMCLAmount ~~AA'mdhc~~

$$15MDAMFMMLAPGrossChangeMCLAmount_{AA'mdhc} = ABS(15MDAMFMMLAPChangeQuantity_{AA'mdhc}) * \sum_{u}\sum_{M'} FMMIntervalLAPMCLPrice_{uM'AA'mdhc}$$

4.2.1.6.29 ~~#3.6.44#~~ 5MFMMRTDLAPChangeMCLAmount ~~AA'mdhcif~~

$$5MFMMRTDLAPChangeMCLAmount_{AA'mdhcif} = 5MFMMRTDLAPChangeQuantity_{AA'mdhcif} * \sum_{u}\sum_{M'} DispatchIntervalRTDLAPMCLPrice_{uM'AA'mdhcif}$$

4.2.1.6.30 ~~#3.6.45#~~ 5MFMMRTDLAPGrossChangeMCLAmount ~~AA'mdhcif~~

$$5MFMMRTDLAPGrossChangeMCLAmount_{AA'mdhcif} = ABS(5MFMMRTDLAPChangeQuantity_{AA'mdhcif}) * \sum_{u}\sum_{M'} DispatchIntervalRTDLAPMCLPrice_{uM'AA'mdhcif}$$

4.2.1.6.31 ~~#3.6.46#~~ HourlyFMMRTDMaxLAPLMPPrice ~~AA'mdh~~

$$HourlyFMMRTDMaxLAPLMPPrice_{AA'mdh} = Max (HourlyFMMIntervalMaxLAPLMPPrice_{AA'mdh}, HourlyRTDIntervalMaxLAPLMPPrice_{AA'mdh})$$

4.2.1.6.32 ~~#3.6.47#~~ HourlyFMMRTDMaxLAPSMECPrice ~~AA'mdh~~

~~HourlyFMMRTDMaxLAPSMECPrice $_{AA'mdh}$ = Max (HourlyFMMIntervalMaxLAPSMECPrice $_{AA'mdh}$, HourlyRTDIntervalMaxLAPSMECPrice $_{AA'mdh}$)~~

~~**4.2.1.6.33 #3.6.48# HourlyFMMRTDMaxLAPMCCPrice $_{AA'mdh}$**~~

~~HourlyFMMRTDMaxLAPMCCPrice $_{AA'mdh}$ = Max (HourlyFMMIntervalMaxLAPMCCPrice $_{AA'mdh}$, HourlyRTDIntervalMaxLAPMCCPrice $_{AA'mdh}$)~~

~~**4.2.1.6.34 #3.6.49# HourlyFMMRTDMaxLAPMCLPrice $_{AA'mdh}$**~~

~~HourlyFMMRTDMaxLAPMCLPrice $_{AA'mdh}$ = Max (HourlyFMMIntervalMaxLAPMCLPrice $_{AA'mdh}$, HourlyRTDIntervalMaxLAPMCLPrice $_{AA'mdh}$)~~

~~**4.2.1.6.35 #3.6.50# HourlyFMMIntervalMaxLAPLMPPrice $_{AA'mdh}$**~~

~~HourlyFMMIntervalMaxLAPLMPPrice $_{AA'mdh}$ = $\sum_{u}\sum_{M'}\sum_{c}$ INTMAX (FMMIntervalLAPLMPPrice $_{uM'AA'mdhc}$)~~

~~**4.2.1.6.36 #3.6.51# HourlyFMMIntervalMaxLAPSMECPrice $_{AA'mdh}$**~~

~~HourlyFMMIntervalMaxLAPSMECPrice $_{AA'mdh}$ = $\sum_{u}\sum_{Q'}\sum_{M'}\sum_{c}$ INTMAX (FMMIntervalLAPMCCPrice $_{uQ'M'AA'mdhc}$)~~

~~**4.2.1.6.37 #3.6.52# HourlyFMMIntervalMaxLAPMCCPrice $_{AA'mdh}$**~~

~~HourlyFMMIntervalMaxLAPMCCPrice $_{AA'mdh}$ = $\sum_{u}\sum_{M'}\sum_{c}$ INTMAX (FMMIntervalLAPMCCPrice $_{uM'AA'mdhc}$)~~

~~**4.2.1.6.38 #3.6.53# HourlyFMMIntervalMaxLAPMCLPrice $_{AA'mdh}$**~~

$$\text{HourlyFMMIntervalMaxLAPMCLPrice}_{AA'mdh} = \sum_{u}\sum_{M'}\sum_{c} \text{INTMAX (FMMIntervalLAPMCLPrice}_{uM'AA'mdhc})$$

4.2.1.6.39   #3.6.54# HourlyRTDIntervalMaxLAPLMPPrice$_{AA'mdh}$

$$\text{HourlyRTDIntervalMaxLAPLMPPrice}_{AA'mdh} = \sum_{u}\sum_{M'}\sum_{c}\sum_{c\in f} \text{INTMAX (DispatchIntervalRTDLAPPrice}_{uM'AA'mdhcif})$$

4.2.1.6.40   #3.6.55# HourlyRTDIntervalMaxLAPSMECPrice$_{AA'mdh}$

$$\text{HourlyRTDIntervalMaxLAPSMECPrice}_{AA'mdh} = \sum_{c}\sum_{c\in f} \text{INTMAX (SettlementIntervalRTDAvgLAPSMECPrice}_{AA'mdhcif})$$

4.2.1.6.41   #3.6.56# HourlyRTDIntervalMaxLAPMCCPrice$_{AA'mdh}$

$$\text{HourlyRTDIntervalMaxLAPMCCPrice}_{AA'mdh} = \sum_{u}\sum_{Q'}\sum_{M'}\sum_{c}\sum_{c\in f} \text{INTMAX (DispatchIntervalRTDLAPMCCPrice}_{uQ'M'AA'mdhcif})$$

4.2.1.6.42   #3.6.57# HourlyRTDIntervalMaxLAPMCLPrice$_{AA'mdh}$

$$\text{HourlyRTDIntervalMaxLAPMCLPrice}_{AA'mdh} = \sum_{u}\sum_{M'}\sum_{c}\sum_{c\in f} \text{INTMAX (DispatchIntervalRTDLAPMCLPrice}_{uM'AA'mdhcif})$$

4.2.1.6.43   #3.6.58# HourlyFMMRTDMinLAPLMPPrice$_{AA'mdh}$

$$\text{HourlyFMMRTDMinLAPLMPPrice}_{AA'mdh} = \text{Min (HourlyFMMIntervalMinLAPLMPPrice}_{AA'mdh}, \text{HourlyRTDIntervalMinLAPLMPPrice}_{AA'mdh})$$

4.2.1.6.44   #3.6.59# HourlyFMMRTDMinLAPSMECPrice$_{AA'mdh}$

HourlyFMMRTDMinLAPSMECPrice $_{AA'mdh}$ = Min (HourlyFMMIntervalMinLAPSMECPrice $_{AA'mdh}$, HourlyRTDIntervalMinLAPSMECPrice $_{AA'mdh}$)

4.2.1.6.45   #3.6.60# HourlyFMMRTDMinLAPMCCPrice $_{AA'mdh}$

HourlyFMMRTDMinLAPMCCPrice $_{AA'mdh}$ = Min (HourlyFMMIntervalMinLAPMCCPrice $_{AA'mdh}$, HourlyRTDIntervalMinLAPMCCPrice $_{AA'mdh}$)

4.2.1.6.46   #3.6.61# HourlyFMMRTDMinLAPMCLPrice $_{AA'mdh}$

HourlyFMMRTDMinLAPMCLPrice $_{AA'mdh}$ = Min (HourlyFMMIntervalMinLAPMCLPrice $_{AA'mdh}$, HourlyRTDIntervalMinLAPMCLPrice $_{AA'mdh}$)

4.2.1.6.47   #3.6.62# HourlyFMMIntervalMinLAPLMPPrice $_{AA'mdh}$

$$\text{HourlyFMMIntervalMinLAPLMPPrice}_{AA'mdh} = \sum_{u}\sum_{M'}\sum_{c} \text{INTMIN (FMMIntervalLAPLMPPrice}_{uM'AA'mdhc})$$

4.2.1.6.48   #3.6.63# HourlyFMMIntervalMinLAPSMECPrice $_{AA'mdh}$

$$\text{HourlyFMMIntervalMinLAPSMECPrice}_{AA'mdh} = \sum_{u}\sum_{M'}\sum_{c} \text{INTMIN (FMMIntervalLAPSMECPrice}_{uM'AA'mdhc})$$

4.2.1.6.49   #3.6.64# HourlyFMMIntervalMinLAPMCCPrice $_{AA'mdh}$

$$\text{HourlyFMMIntervalMinLAPMCCPrice}_{AA'mdh} = \sum_{u}\sum_{Q'}\sum_{M'}\sum_{c} \text{INTMIN (FMMIntervalLAPMCCPrice}_{uQ'M'AA'mdhc})$$

4.2.1.6.50   #3.6.65# HourlyFMMIntervalMinLAPMCLPrice $_{AA'mdh}$

$$\text{HourlyFMMIntervalMinLAPMCLPrice}_{AA'mdh} = \sum_{u}\sum_{M'}\sum_{c} \text{INTMIN (FMMIntervalLAPMCLPrice}_{uM'AA'mdhc})$$

4.2.1.6.51 #3.6.66# HourlyRTDIntervalMinLAPLMPPrice $_{AA'mdh}$

$$HourlyRTDIntervalMinLAPLMPPrice_{AA'mdh} = \sum_u \sum_{M'} \sum_c \sum_{c \in f} INTMIN\ (DispatchIntervalRTDLAPPrice_{uM'AA'mdhcif})$$

4.2.1.6.52 #3.6.67# HourlyRTDIntervalMinLAPSMECPrice $_{AA'mdh}$

$$HourlyRTDIntervalMinLAPSMECPrice_{AA'mdh} = \sum_u \sum_{M'} \sum_c \sum_{c \in f} INTMIN\ (SettlementIntervalRTDAvgLAPSMECPrice_{AA'mdhcif})$$

4.2.1.6.53 #3.6.68# HourlyRTDIntervalMinLAPMCCPrice $_{AA'mdh}$

$$HourlyRTDIntervalMinLAPMCCPrice_{AA'mdh} = \sum_u \sum_{Q'} \sum_{M'} \sum_c \sum_{c \in f} INTMIN\ (DispatchIntervalRTDLAPMCCPrice_{uQ'M'AA'mdhcif})$$

4.2.1.6.54 #3.6.69# HourlyRTDIntervalMinLAPMCLPrice $_{AA'mdh}$

$$HourlyRTDIntervalMinLAPMCLPrice_{AA'mdh} = \sum_u \sum_{M'} \sum_c \sum_{c \in f} INTMIN\ (DispatchIntervalRTDLAPMCLPrice_{uM'AA'mdhcif})$$

4.2.1.6.55 #3.6.75# HourlyAverageFMMLMPPrice

$$HourlyAverageFMMLMPPrice_{AA'mdh} = Average \sum_u \sum_{M'} \sum_c FMMIntervalLAPLMPPrice_{uM'AA'mdhc}$$

4.2.1.6.56 #3.6.76# HourlyAverageFMMSMECPrice

$$HourlyAverageFMMSMECPrice_{AA'mdh} = Average \sum_c 15MFMMAvgLAPSMECPrice$$

4.2.1.6.57 #3.6.77# 15MFMMAvgLAPSMECPrice

$$15MFMMAvgLAPSMECPrice_{AA'mdhc} = \frac{\sum_u \sum_{M'}}{} \quad Average\ (\ FMMIntervalLAPSMECPrice_{uM'AA'mdhc} + FMMEIMLAPBidAdderPrice_{AA'mdhc}\ )$$

4.2.1.6.58 #3.6.78# HourlyAverageBAAFMMMCCPrice $Q'AA'mdh$

$$HourlyAverageBAAFMMMCCPrice_{Q'AA'mdh} = Average\ \frac{\sum_u \sum_{M'} \sum_c}{}\ FMMIntervalLAPMCCPrice_{uQ'M'AA'mdhc}$$

4.2.1.6.59 #3.6.79# SettlementIntervalRTDAvgLAPSMECPrice

$$SettlementIntervalRTDAvgLAPSMECPrice_{AA'mdhcif} = \frac{\sum_u \sum_{M'}}{} \quad Average\ (DispatchIntervalRTDLAPSMECPrice_{uM'AA'mdhcif} + RTDEIMLAPBidAdderPrice_{AA'mdhcif})$$

4.2.1.6.60 #3.6.80# HourlyAverageFMMMCLMPPrice

$$HourlyAverageFMMMCLPrice_{AA'mdh} = Average\ \frac{\sum_u \sum_{M'} \sum_c}{}\ FMMIntervalLAPMCLPrice_{uM'AA'mdhc}$$

4.2.1.6.61 #3.6.81# HourlyRTMLAPSUBFlag

IF

abs (HourlyGrossLAPForecastDeviationQuantity$_{AA'mdh}$ + HourlyDALAPLoadQuantity$_{AA'mdh}$ + HourlyBaseLAPLoadQuantity$_{AA'mdh}$) < Tolerance

or

abs(HourlyGrossLAPForecastDeviationQuantity$_{AA'mdh}$) < Tolerance

HourlyRTMLAPSUBFlag$_{AA'mdh}$ = 1

ELSE

HourlyRTMLAPSUBFlag$_{AA'mdh}$ = 0

Where Tolerance = 1E-06 (configurable)

4.2.1.6.62 #3.6.82# HourlyGrossLAPForecastDeviationQuantity

$$HourlyGrossLAPForecastDeviationQuantity_{AA'mdh} = (\ \sum_c\ abs\ (15MDAMFMMLAPChangeQuantity_{AA'mdhc}) + \sum_c \sum_{c \in f}\ abs\ (5MFMMRTDLAPChangeQuantity_{AA'mdhcif}\ ))$$

4.2.1.6.63   #3.6.83# HourlyDALAPLoadQuantity

$$\text{HourlyDALAPLoadQuantity}_{AA'mdh} = \sum_{B}\sum_{r}\sum_{t}\sum_{u}\sum_{T'}\sum_{I'}\sum_{M'}\sum_{R'}\sum_{W'}\sum_{p}\sum_{F'}\sum_{S'}\sum_{V}\sum_{L'}\sum_{Q'} \text{DALoadSchedule}_{BrtuT'I'Q'M'AA'R'W'F'S'VL'pmdh}$$

4.2.1.6.64   #3.6.84# HourlyBaseLAPLoadQuantity

$$\text{HourlyBaseLAPLoadQuantity}_{AA'mdh} = \sum_{B}\sum_{r}\sum_{t}\sum_{u}\sum_{T'}\sum_{I'}\sum_{M'}\sum_{R'}\sum_{W'}\sum_{p}\sum_{F'}\sum_{S'}\sum_{V}\sum_{L'}\sum_{Q'} (\text{BAResBaseLoadSchedule}_{BrtuT'I'Q'M'AA'R'W'F'S'VL'pmdh})$$

4.2.2 PC Real Time Energy Quantity (version 5.14)

- BPM - CG PC Real Time Energy Quantity
- Link: https://bpmcm.caiso.com/Pages/SnBBPMDetails.aspx?BPM=Settlements%20and%20Billing

4.2.2.1 Outputs

Output ID	Name	Description
33	15MDAMFMMLAPChangeQuantity *AA'mdhc*	Represents the quantity difference between the Day Ahead LAP Load Schedules and the 15 minute FMM LAP Load Forecast
35	5MFMMRTDLAPChangeQuantity *AA'mdhcif*	Represents the forecast quantity difference between the 15 minute FMM LAP Load Forecast and the 5 minute RTD LAP Load Forecast

4.2.2.2 Inputs – Independent

Input Req ID	Variable Name	Description
12	DALoadSchedule BrtuT'I'Q'M'AA'R'W'F'S'vVL'pmdh	DA Load Schedule is the energy scheduled in Day-Ahead Market to be consumed by End-Use Customer. (Load Schedule quantity is a negative value).
26	15MFMMLAPForecastQuantity AA'mdhe	The 15 Minute FMM forecast by DLAP/CLAP (MW)
27	5MRTDLAPForecastQuantity AA'mdhcif	The 5 Minute RTD forecast by DLAP/CLAP (MW)
29	BAResBaseLoadSchedule BrtuT'I'Q'M'AA'R'W'F'S'vVL'pmdhcif	The final Base Schedule for Load resources in an EIM Balancing Authority Area

4.2.2.3 Intermediate Variables

Output ID	Name	Description
34	15MDAMLAPLoadScheduleQuantity $AA'mdhc$	Represents the 15 Minute Day Ahead Market LAP Load Schedule Quantity
36	5MFMMLAPForecastQuantity $AA'mdhcif$	Represents the 5 Minute FMM LAP Load Forecast

4.2.2.4 Formulas

4.2.2.4.1 #3.6.18# 15MDAMFMMLAPChangeQuantity

15MDAMFMMLAPChangeQuantity AA'mdhc = (15MFMMLAPForecastQuantity AA'mdhc / 4) – 15MDAMLAPLoadScheduleQuantity AA'mdhc

4.2.2.4.2 #3.6.19# 15MDAMLAPLoadScheduleQuantity

$$15\text{MDAMLAPLoadScheduleQuantity } AA'mdhc = \sum_{B}\sum_{r}\sum_{t}\sum_{u}\sum_{T'}\sum_{I'}\sum_{M'}\sum_{R'}\sum_{p}\sum_{W'} \sum_{F'}\sum_{S'}\sum_{V}\sum_{L'}\sum_{Q'} - \sum_{v}$$

((DALoadSchedule BrtuT'I'Q'M'AA'R'pW'F'S'vVL'mdh + BAResBaseLoadSchedule BrtuT'I'Q'M'AA'R'W'F'S'VL'pmdhcif) / 4)

4.2.2.4.3 #3.6.20# 5MFMMRTDLAPChangeQuantity

5MFMMRTDLAPChangeQuantity AA'mdhcif = 5MRTDLAPForecastQuantity AA'mdhcif – 5MFMMLAPForecastQuantity AA'mdhcif

4.2.2.4.4 #3.6.21# 5MFMMLAPForecastQuantity AA'mdhcif

5MFMMLAPForecastQuantity AA'mdhcif = (.25 * 15MFMMLAPForecastQuantity AA'mdhc) / 3

~~4.3 Appendix-3: N/A to External BRS~~

~~4.4~~ ~~Appendix 4: SBR Parent/Children's Technical Characteristics Derivation & Responsibilities~~

~~Source~~	~~DATA FIELD~~	~~Child match parent~~	~~Child derived from parent based on percentage share~~	~~Child independent from parent~~	~~Comments~~
~~Parameters~~					
~~MF~~	~~FUEL_TYPE~~	~~¥~~			
~~MF~~	~~GEN_TECH_TYPE~~	~~¥~~			
~~MF~~	~~FUEL_REGN~~	~~¥~~			
~~MF~~	~~CERT_DAM~~			~~¥~~	
~~MF~~	~~CERT_RTM~~			~~¥~~	
~~MF~~	~~AS flags (spin, non-spin, reg)~~	~~¥~~			
~~MF~~	~~RAMP UP/DOWN~~	~~¥~~			
~~MF~~	~~MAX_GEN~~		~~¥~~		
~~MF~~	~~MIN_GEN~~		~~¥~~		
~~MF~~	~~MAX_STRT~~	~~¥~~			
~~MF~~	~~MIN_OFF~~	~~¥~~			
~~MF~~	~~MIN_ON~~	~~¥~~			
~~MF~~	~~Operation Maintenance cost~~		~~¥~~		
~~MF~~	~~startup ramp time~~	~~¥~~			
~~MF~~	~~GHG_EMISSION_RATE~~	~~¥~~			
~~MF~~	~~EIM_PARTICIPATING~~			~~¥~~	
~~MF~~	~~ODCP_OFFER~~			~~¥~~	
~~MF~~	~~METER_DATA_INTERVAL~~			~~¥~~	
~~MF~~	~~ISO_POLLED (Indicate if meter data is polled by ISO)~~	~~¥~~			~~Child meter cannot be polled/submitted by ISO. It shall be submitted by child's SC.~~
~~Ramp Rate~~					
~~MF~~	~~RAMP_MW_OUTPUT~~		~~¥~~		
~~MF~~	~~RAMP_MIN_RATE~~		~~¥~~		
~~MF~~	~~RAMP_MAX_RATE~~		~~¥~~		
~~Heat Rate~~					
~~MF~~	~~HEAT_MW_OUTPUT~~		~~¥~~		
~~MF~~	~~HEAT_RATE~~	~~¥~~			
~~MF~~	~~HEAT_AVG_COST~~	~~¥~~			

Source	DATA FIELD	Child match parent	Child derived from parent based on percentage share	Child independent from parent	Comments
MF	HEAT_EMISSION_RATE	Y			

Startup Curve

Source	DATA FIELD	Child match parent	Child derived from parent based on percentage share	Child independent from parent	Comments
MF	STRT_DOWN_TIME	Y			
MF	STARTUP_TIME	Y			
MF	STARTUP_COST		Y		
MF	STARTUP_AUX		Y		
MF	STARTUP_FUEL		Y		

Configuration

Source	DATA FIELD	Child match parent	Child derived from parent based on percentage share	Child independent from parent	Comments
MF	MAX_GEN		Y		
MF	MIN_GEN		Y		
MF	MIN_ON	Y			
MF	MIN_OFF	Y			
MF	STARTUP_YN	Y			
MF	SHUTDOWN_YN	Y			
MF	STARTUP_RAMP_TIME	Y			
MF	AS flags (spin, non-spin, reg)	Y			

Transition

Source	DATA FIELD	Child match parent	Child derived from parent based on percentage share	Child independent from parent	Comments
MF	FROM_CONFIG_ID	Y			
MF	TO_CONFIG_ID	Y			
MF	TRANS_TIME	Y			
MF	NOTIFICATION_TIME	Y			
MF	MAX_DAILY_TRANS	Y			
MF	TRANS_MIDPOINT_MW		Y		
MF	TRANS_MIDPOINT_TIME	Y			

Configuration Ramp Rate

Source	DATA FIELD	Child match parent	Child derived from parent based on percentage share	Child independent from parent	Comments
MF	RAMP_MW_OUTPUT		Y		
MF	RAMP_MIN_RATE		Y		
MF	RAMP_MAX_RATE		Y		

Configuration Heat Rate

Source	DATA FIELD	Child match parent	Child derived from parent based on percentage share	Child independent from parent	Comments
MF	HEAT_MW_OUTPUT		Y		
MF	HEAT_RATE	Y			
MF	HEAT_AVG_COST	Y			
MF	HEAT_EMISSION_RATE	Y			

~~Source~~	~~DATA FIELD~~	~~Child match parent~~	~~Child derived from parent based on percentage share~~	~~Child independent from parent~~	~~Comments~~
~~Configuration Startup Curve~~					
~~MF~~	~~STRT_DOWN_TIME~~	~~Y~~			
~~MF~~	~~STARTUP_TIME~~	~~Y~~			
~~MF~~	~~STARTUP_COST~~		~~Y~~		
~~MF~~	~~STARTUP_AUX~~		~~Y~~		
~~MF~~	~~STARTUP_FUEL~~		~~Y~~		
~~Non-MF Data~~					
~~ECIC~~	~~EPI~~	~~Y~~			~~• Apply to:~~ ~~- All ISO resources~~ ~~- All EIM resources~~
~~ECIC~~	~~DEBs~~				~~• Apply to:~~ ~~- All ISO resources~~ ~~- All EIM resources~~ ~~- Child DEB's will be derived from parent DEB using different methodology.~~
~~ECIC~~	~~GHG adder: MinLoad, Startup, Energy Bid with GHG compliance in MF (yes flag)~~		~~Y~~		~~• Apply to:~~ ~~- All ISO resources~~
~~ECIC~~	~~Major Maintenance Adder (MMA): MinLoad, Startup~~		~~Y~~		~~• Apply to:~~ ~~- All ISO resources~~ ~~- Participating EIM resources~~
~~ECIC~~	~~GHG Bid Cap With emission rates in MF~~		~~Y~~		~~• Apply to:~~ ~~- All EIM resources~~