

Business Requirements Specification

Summer 2021 Readiness - Market Enhancements

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Revision History

Date	Version	Description
3/25/2021	1.0	Updated BRS according to the final policy proposal
4/28/2021	2.0	<ul style="list-style-type: none"> • Updated BRS according to the final policy proposal on Load, Export and Wheel priorities: <ul style="list-style-type: none"> ○ Added requirements in section 5.1.1 for the requirements. ○ Updated the market simulation requirements in section 5.8.1. ○ Clarified SUMR21-BRQ260, SUMR21-BRQ262. • SUMR21-BRQ320: <ul style="list-style-type: none"> ○ Added for clarity. • Clarified the verbiage of tight system conditions for the following: <ul style="list-style-type: none"> ○ SUMR21-BRQ325 ○ SUMR21-BRQ330 ○ SUMR21-BRQ340 ○ SUMR21-BRQ350 ○ SUMR21-BRQ360 ○ SUMR21-BRQ370 ○ SUMR21-BRQ390 • SUMR21-BRQ440: <ul style="list-style-type: none"> ○ Updated to explicitly clarify that the AWE shall not cross day boundary. • SUMR21-BRQ605: <ul style="list-style-type: none"> ○ Updated default value of 2nd RTCD to 0 minute. • SUMR21-BRQ610: <ul style="list-style-type: none"> ○ Clarified UI field names. • SUMR21-BRQ617: <ul style="list-style-type: none"> ○ Clarified Advisory EOH MSOC in the notes.
<u>5/27/2021</u>	<u>2.1</u>	<ul style="list-style-type: none"> • <u>Clarified SUMR21-BRQ129 and SUMR21-BRQ136.</u> • <u>Updated SUMR21-BRQ153, SUMR21-BRQ154, and added SUMR21-BRQ155 for post-HASP, allocate capacity for individual wheel, and prioritize the wheel export leg on import congested direction.</u> • <u>Updated SUMR21-BRQ156 for ED for post-HASP energy.</u> • <u>Clarified SUMR21-BRQ165</u> • <u>Updated SUMR21-BRQ170 for CIRA, for pro-rata</u> • <u>Added SUMR21-BRQ171 separate RA capacity and RA obligation.</u> • <u>Added SUMR21-BRQ172 for RAAIM receive RA obligation</u>

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		<ul style="list-style-type: none"> • <u>Updated SUMR21-BRQ262, add calculation for uncertainty without credit for capacity test.</u> • <u>Added SUMR21-BRQ595 to publish RDRR market schedules in the same manner as PDR (existing function).</u> • <u>Clarified SUMR21-BRQ710</u> • <u>Added SUMR21-MSIM710.</u>
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1 Introduction

This Business requirements specification (BRS) supports Market enhancements for summer 2021 readiness project.

1.1 Purpose

A historic heat storm impacted western US for several consecutive days in mid-August 2020, causing energy supply shortages that led to two rotating power outages in the ISO footprint on August 14th and 15th. CAISO proposes following market enhancements to prepare for this upcoming summer:

1. Export, load, and wheeling priorities
2. EIM coordination and resource sufficiency test review
3. Import market incentives during tight system conditions
4. Real-time price enhancements
5. Reliability demand response dispatch and real-time price impacts
6. Management of storage resources during tight system conditions
7. OASIS report and interconnection process enhancements

1.2 References

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

- <https://stakeholdercenter.caiso.com/StakeholderInitiatives/Market-enhancements-for-summer-2021-readiness>

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2.1 Checklist

The ISO retains intellectual property ownership of the following:

- Related Business Practice Manuals
- All rights reserved for works included within this BRS document

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2.2 Acronyms and Definitions Tables

Please refer to Appendix A for a list of Acronyms and Definitions.

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3 Details of Business Need/Problem

3.1 Description

Business Opportunity/Problem Statement:	
What:	<p>CAISO proposes enhancements to address:</p> <ol style="list-style-type: none"> 1. Export, load, and wheeling priorities 2. EIM coordination and resource sufficiency test review 3. Import market incentives during tight system conditions 4. Real-time price enhancements 5. Reliability demand response dispatch and real-time price impacts 6. Management of storage resources during tight system conditions. 7. OASIS report and interconnection process enhancements <p>The CAISO's objectives for these enhancements are to:</p> <ul style="list-style-type: none"> • Equitably balance the reliability of serving CAISO balancing authority area load with the reliability of exports, while providing open access to the CAISO transmission system. • Better ensure each balancing authority area participates in the EIM with sufficient resources. • Provide improved incentives for supply to be available during tight system conditions.
When:	<p>These proposed enhancements are focused on changes that will be feasible for the CAISO and stakeholders to implement by summer 2021.</p>
Why do we have this opportunity/problem:	<p>The proposed changes are in response to the findings in the CAISO/CPUC/CEC Root Cause Analysis of last summer's controlled load shedding, the CAISO's own analysis, and stakeholder concerns. ISO commits to the development of actions to prevent supply gaps in advance of summer 2021.</p>

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Business Opportunity/Problem Statement:	
Who does this opportunity/problem impact:	<ul style="list-style-type: none"> • Market Participants • Policy • Legal • Customer Service

4 Business Impacts

4.1 Business Practice Manuals (BPM)

BPM	Description of Impact(s)
Demand Response	<ul style="list-style-type: none"> • Update RDRR 60, 15 and 5 minute dispatch.
Energy Imbalance Market	<ul style="list-style-type: none"> • Update resource sufficiency evaluation process. • Include uncertainty requirement in capacity test.
Generator Interconnection and Deliverability Allocation Procedures	<ul style="list-style-type: none"> • Remove 100MW / 125% cap on behind-the-meter expansion requests.
Market Instruments	<ul style="list-style-type: none"> • Update for gross import/export by tie via OASIS.
Market Operations	<ul style="list-style-type: none"> • Update for operating reserve release under tight system conditions. • Update to add verbiage to ensure Storage Resources have sufficient SOC to support regulation up and regulation down awards for at least 30 Minutes in RTM. • Update for Advisory MSOC display changes to storage resources under tight system conditions.

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BPM	Description of Impact(s)
	<ul style="list-style-type: none"> Update Load, export and wheeling priority.
Settlements and Billing	<ul style="list-style-type: none"> Update provide make-whole payment and allocation for real-time market hourly block imports during tight system conditions.

4.2 Other

Impact	Description (optional)
Market Simulation	Yes
Market Participant Impact	Yes
External Training	Yes
Policy Initiative	Yes

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5 Business Requirements

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

5.1 Business Process: Manage DAM and RTM Export, Load and Wheel Priorities

- Validate the PT export and PT wheel schedule
- Set the different penalty price in DAM and RTM for Export, Load and Wheel Export Leg based on export and wheel priorities
- Set the different penalty price in DAM and RTM for Wheel Import Leg based on wheel priorities
- Notify SC of supporting resource if it support PT Export
- Perform a post-HASP process to pro rata allocate available transmission capacity between CAISO Load and Priority Wheel Through transactions if HASP cannot meet CAISO Forecast of CAISO Demand or fully accommodate a Priority Wheeling Through transaction, constrained in import direction or path 26 N-S direction.

5.1.1 Business Requirements

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
SUMR21-BRQ100	Identify Resource that can support PT Export <ul style="list-style-type: none"> • Define a flag for the generating resource indicate whether it can be designated for export, with default is NO. The resource must be CAISO internal supply resource. • Receive SC submitted flag, indicate the resource can be designated for export, through Resource Data Template (RDT). • Pass the flag to the market. 	Core	Master File, GRDT

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	<p>By submitting the flag for designated resource, the SC can confirm:</p> <ul style="list-style-type: none"> theThe resource is capable at the time of bid submission of supporting an hourly block schedule over the entire relevant operating hour equal to the PT export quantity. aA variable energy resource (VER) can support the export quantity in all 15-minute intervals. theThe resource has been forward contracted only with an external load serving entity. <p>Also:</p> <ul style="list-style-type: none"> Designated resource must participate in RUC up to the PT export Designated resource must bid in RTM up to the PT export The designated capacity must be the deliverable capacity of a resource with Full Capacity Deliverability Status, Partial Capacity Deliverability Status, or Interim Deliverability Status that is shown on the CAISO's NQC list. 		
SUMR21-BRQ102	<p>Define wheel schedule as a high priority wheel (PT wheel):</p> <ul style="list-style-type: none"> Register export system resource prior to the start of the month. Define a wheel PT flag for the registered export system resource, default is NO. Receive and process SC submitted wheel PT flag indicate the export resource that can be designated for PT wheel and MW quantity, based on normal MF timeline through Intertie Resource Data Template (IntertieRDT, add flag and MW). passPass to the market. <p>By submitsubmitting PT wheel flag, SC can notify ISO:</p> <ul style="list-style-type: none"> PT Wheel supported by a firm supply contract to serve load in another BAA outside the CAISO for the month. PT Wheel supported by monthly firm transmission contract from source to CAISO scheduling point for HE 07:00-22:00, Monday through Friday, excluding NERC holidays. 	Core	Master File, IntertieRDT

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	<ul style="list-style-type: none"> The SC must notify the CAISO 45 days ahead of the month of the MW quantity (single quantity, no time-dependent) of the wheel. For July and August, 2021, PT wheel showing must be made on June 29, 2021. 		
SUMR21-BRQ112	<p>SIBR receive supporting resource flag that can support Export</p> <p>System shall receive <u>a</u> flag for generation resource from MF determining<u>that determines</u> whether the resource can or cannot potentially support a self-scheduled export.</p>	Core	SIBR
SUMR21-BRQ113	<p>SC submit PT self-scheduled (SS) export:</p> <p>System shall receive:</p> <ul style="list-style-type: none"> <u>SC submitted Self-scheduled export with designated Supporting Resource ID (PT Export SS))</u>. 	Existing	SIBR
SUMR21-BRQ114	<p>Set RUC RA obligation for supporting resources to support self-scheduled PT exports</p> <p>For supporting resource RUC bid, system shall:</p> <ul style="list-style-type: none"> Insert/replace/extend RUC RA obligation. RUC availability bids (\$0/MW) shall cover the capacity range that supports the sum of PT self-schedules PT exports which are associated with the resource. Set supporting resource the portion above the PT export quantity to the submitted RUC availability bid price. 	Core	SIBR
SUMR21-BRQ122	<p>System shall validate supporting resource, setting priority DAPT or DALPT of the export in DAM</p> <p>For PT Self-scheduled export <u>with designated Supporting Resource ID:</u></p>	Core	SIBR

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	<ul style="list-style-type: none"> Supporting resource shall be the resources that have <u>a</u> flag to support export. The resource total supported PT export capacity shall be limited to the non-RA capacity bid in the market excluding ancillary services self-provision and awards, as applicable. If the resource total supported PT export capacity is not sufficient to cover all associated PT export self-schedules, all these PT self-schedules shall be converted to DALPT export self-schedules. <p>For Self-scheduled export without <u>a</u> designated resource ID:</p> <ul style="list-style-type: none"> <u> </u> The- submitted export schedule without designated resource shall be DALPT export. 		
SUMR21-BRQ123	<p>System shall publish export and associated priority, designated supporting resource in DAM</p> <ul style="list-style-type: none"> Pass the priority associate with each export and export leg of wheel to the market. <p>Note:</p> <p>Use existing SIBR clean bid with new self-schedule type enumerations:</p> <p>DAPT, DALPT, RTPT, RTLPT</p>	Core	SIBR
SUMR21-BRQ124	<p>Notify the designated supporting resource SC in DAM</p> <ul style="list-style-type: none"> System shall notify the SC of the designated Resource that its resource supporting DAPT export. The notification shall include: <ul style="list-style-type: none"> SC of export, export resource ID, market, start/end time SC of designated resource, designated resource ID, designated MW 	Core	SIBR



ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
SUMR21-BRQ125	<p>Validate the wheel schedule export leg with PT flag as high priority DAPT in DAM</p> <p>Validate wheel schedule be DAPT export:</p> <ul style="list-style-type: none"> • The wheel schedule must be submitted as self-scheduled wheel. • The wheel schedule export leg is a registered export system resource with wheel PT flag. • The wheel schedule export leg is limited by the register PT MW. If it is exceed the PT MW, invalid<u>invalidate</u> the submission. • The wheel schedule export is not associated with any supporting resource. The wheel schedule import leg is not aan RA Import Resources. 	Core	SIBR
SUMR21-BRQ126	<p>Specify the wheel schedule TOR or ETC priority in market in DAM</p> <p>Self-scheduled wheel shall have the TOR/ETC priority if the import leg or export leg use TOR/ETC right.</p>	Existing	SIBR
SUMR21-BRQ127	<p>Specify the wheel schedule export leg as lower priority DALPT in DAM</p> <p>Specify wheel export leg with DALPT if:</p> <ul style="list-style-type: none"> • The wheel schedule must be submitted as self-scheduled wheel. • The wheel schedule export is not associated with any supporting resource. • The import leg is not aan RA Import Resource-Resources. 	Core	SIBR
SUMR21-BRQ128	<p>Specify economic wheel</p> <ul style="list-style-type: none"> • For economic bid wheel schedule, energy bid price shall not be negative for the import leg in wheel schedule. 	Core	SIBR

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
SUMR21-BRQ129	Set penalty price for import leg in self-schedule wheel <ul style="list-style-type: none"> • For a self-schedule wheel with export leg DAPT, import leg shall be modeled as self-schedule import penalty price in MPM, IFM and RUC. • For a self-schedule wheel with export leg DALPT, the import leg shall be modeled configurable penalty cost<u>price</u> in MPM, IFM and RUC. 	Core	MPM, IFM, RUC
SUMR21-BRQ136	Set up the different penalty cost for different priority export and load in MPM, IFM and RUC: <ul style="list-style-type: none"> • DAPT priority • DALPT priority <p>Note: Priority parameter setting for corresponding MPM, IFM, RUC <u>per policy</u>.</p> <p>TOR/ETC schedule priority is higher than DAPT.</p> <p>DAPT priority <u>applyapplies</u> to DAPT exports and DAPT wheel export leg, CAISO forecasted Load or demand forecast.</p> <p>DALPT priority <u>applyapplies</u> to DALPT export and DALPT wheel export leg.</p> <p>Use economic bid for the economic export and economic wheel.</p>	Core	MPM, IFM, RUC

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
SUMR21-BRQ137	<p>Optimize export schedule and designated supporting resource independently, an existing function in market:</p> <ul style="list-style-type: none"> • Self-scheduled Export and its designated resource are independently optimized in MPM, IFM, <u>and</u> RUC. • Publish the export schedule and designated resource awards. 	Existing	MPM, IFM, RUC
SUMR21-BRQ138	<p>RTM Import resource MOO be RA import instead of RUC schedule if RUC PBC is relaxed</p> <p>SIBR enforces Must Offer Obligation (MOO) for RA import resources in RTM for the corresponding RA Capacity in Trading Hours with a RUC under-generation power balance constraint relaxation.</p>	Core	SIBR
SUMR21-BRQ139	<p>For self-schedule export with DAPT that not re-bid in RTM:</p> <ul style="list-style-type: none"> • If the supporting resource RUC schedule can support DAPT export schedule, system shall set DAPT export schedule equal to DAPT export that cleared in RUC, (Example 5.1 Export D)-) • System shall set DALPT export schedule equal to the difference between Export RUC schedule and DAPT export schedule ((Example 5.1 Export D)-) • If the supporting resource RUC schedule cannot support export DAPT schedule, system shall convert total DAPT schedule in DAM to DALPT schedule in RTM. (Example 5.1 Export C)-) 	Core	SIBR

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	<ul style="list-style-type: none"> The supporting resource must submit bid cover the RUC award in RTM (existing). Please see Example 5.1 		
SUMR21-BRQ140	<p>Self-schedule PT export submitted or re-submitted in RTM - tier 1 validation for export with DAPT:</p> <p><i>For Self-scheduled export with designated supporting resource:</i></p> <ul style="list-style-type: none"> Designated resource shall be the supporting resources defined in MF. The SS export receive DAPT priority in RTM, the amount of the less of export DAPT schedule in RUC and supporting resource RUC schedule (Example 5.1 Export A1). The SS export receive DALPT priority in RTM, the amount of the difference between SS export RUC schedule and supporting resource RUC schedule If the SS Export in RTM exceed the supporting resource RUC schedule (Example 5.1 Export B1). The SS export receive RTLPT priority in RTM, the amount of the difference between SS export RTM schedule and SS Export RUC schedule If the SS Export in RTM exceed the SS export RUC schedule (Example 5.1 Export B1). For the export to receive DAPT priority in RTM, sum of applicable PT self-schedule exports designated<u>designating</u> the one supporting resource shall not exceed the supporting resource's RUC schedule. Otherwise, all applicable exports will convert to DALPT. The supporting resource for DAPT export shall be the same resource in RTM compare with it used in DAM. <p>Please see Example 5.1</p>	Core	SIBR

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	<p>Note: In general, one supporting resource can support multiple exports, each export only has one PT priority, DAPT (Tier 1 validation) or RTPT (Tier 2 validation).</p>		
SUMR21-BRQ141	<p>Self-schedule PT export submitted or re-submitted in RTM - tier 2 validation for RTPT</p> <ul style="list-style-type: none"> • If the SS export has no RUC schedule, the SS export with supporting resource in RTM is only eligible RTPT and/or RTLPT export (Example 5.1 Export A2). • For the SS export to receive RTPT priority, the amount is up to the difference between supporting resource RTM bid and RUC schedule, reduced by RA capacity. (Example 5.1 Export A2). • For the SS export to receive RTLPT priority, the amount is up to the difference between SS export RTM schedule and supporting resource RTM bid. (Example 5.1 Export A2). • The supporting resource for RTPT export can be the same or a different resource in RTM relative to what is compare with it used in DAM: <ul style="list-style-type: none"> • f supporting resource is a different resource, theThe SS export is only eligible for-RTPT /and/or RTLPT export. <p>Please see <u>Example 5.1</u></p>	Core	SIBR
SUMR21-BRQ142	<p>Self-schedule LPT export submitted or re-submitted in RTM:</p> <p><i>For the self-schedule export without designated supporting resource:</i></p> <ul style="list-style-type: none"> • Specify the export schedule with DALPT for the amount not exceed the RUC export. 	Core	SIBR

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	<ul style="list-style-type: none"> • Specify the export schedule with RTLPT for the amount of the export exceed the RUC export. • Specify the export schedule with RTLPT if the export has no RUC schedule. <p>Please see <u>Example 5.1</u></p>		
SUMR21-BRQ143	<p>If NOT re-bid in RTM, System shall set DAPT wheel or DALPT wheel schedule equal to RUC schedule</p> <p>If NOT re-bid in RTM:</p> <ul style="list-style-type: none"> • Export leg with a DAPT wheel Self-Schedule equal to its lower of RUC Schedule or DA PT SS. • Export leg with a DALPT wheel Self-Schedule equal to the positive difference between its RUC Schedule and the DA PT SS. 	Core	SIBR
SUMR21-BRQ144	<p>Self-schedule wheel submit or re-submit in RTM</p> <p><i>If the self-scheduled wheel export leg has PT flag:</i></p> <ul style="list-style-type: none"> • The export leg shall be DAPT wheel export up to the RUC wheel schedule. The MW exceed RUC schedule shall be RTPT wheel export, limited by PT export eligible MW. • The wheel schedule export leg is not associated with any supporting resource. <p><i>If the self-scheduled wheel export leg has no wheel PT flag:</i></p> <ul style="list-style-type: none"> • The export leg shall be DALPT wheel export up to the RUC wheel schedule. The MW exceed RUC schedule shall be RTLPT export. 	Core	SIBR

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SUMR21-BRQ145	System shall pass the priority associate <u>associated</u> with each export to the market: Include 4 export priorities: <ul style="list-style-type: none"> • <u>1.</u> DAPT • <u>2.</u> RTPT • <u>3.</u> DALPT • <u>4.</u> RTLPT 	Core	SIBR
SUMR21-BRQ146	Notify the designated resource SC in RTM <ul style="list-style-type: none"> • System shall notify the SC of the designated Resource that its resource supporting DAPT and RTPT export. The notification shall include: <ul style="list-style-type: none"> ○ SC of export resource, export resource ID, market, start/end time ○ SC of designated resource, designated resource ID, designated MW 	Core	SIBR
SUMR21-BRQ150	Set the penalty cost according to the wheel schedule priorities and export priority in RTM <ul style="list-style-type: none"> • DAPT priority • RTPT priority • DALPT priority • RTLPT Priority <p>Note:</p> <p>The PT priority is below TOR/ETC schedule priority.</p> <p>Per policy, set penalty parameter as following:</p> <p>PT priority apply to DAPT exports, DAPT wheel export leg, RTPT exports, RTPT wheel export leg. Same penalty cost apply to CAISO forecasted Load or demand forecast.</p>	Core	STUC, RTPD, RTD, RTCD

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	DALPT priority apply to DALPT export and DALPT wheel export leg. Use economic bid for the economic export and economic wheel. RTLPT priority apply to RTLPT export and RTLPT wheel export leg.		
SUMR21-BRQ151	Set penalty price for import leg in self-schedule wheel <ul style="list-style-type: none"> • <u>For self-scheduled wheel schedule using TOR or ETC right in either import and/or export leg, the import leg shall have the TOR/ETC penalty price.</u> • • Corresponding DAPT wheel export leg and RTPT wheel export leg, the schedule import leg shall be modeled as self-schedule import penalty price in RTM. • • Corresponding DALPT wheel export leg and RTLPT wheel export leg, the import leg shall be modeled configurable penalty cost in RTM. 	Core	STUC, RTPD, RTD, RTCD
SUMR21-BRQ153	System shall build administrative process post- HASP uneconomic adjustment to pro rata allocate import and internal transmission to high priority wheels and native load. <ul style="list-style-type: none"> • Build a switch to activate/deactivate the HASP administrative process function, applicable for both Import and flow-gate. • <u>If the HASP optimal solution results in an under-generation power balance constraint relaxation and/or uneconomic adjustments of PT wheeling self-schedules that compete with imports on a congested intertie in the import direction (e.g., MALIN500 or NOB), an administrative schedule adjustment is</u> 	Core	HASP

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	<p>performed among imports (that not in wheels) and PT wheels through that intertie as follows:</p> <ul style="list-style-type: none"> • a. The adjusted total PT wheel schedule is determined as follows: Adjusted Total PT Wheel Schedule = $\min(\text{Total PT Wheel Self-Schedule, Import Limit}) * \text{Import Limit} / D$ where the Total PT Wheel Self-Schedule is the sum of RTM PT wheel self-schedules through the congested intertie, individually limited by (110%, configurable factor) times their respective RUC schedule. b. The adjusted total import schedule is determined as follows: Adjusted Total Import Schedule = $\min(\text{Total RA Import Bid/Self-Schedule, Import Limit}) * \text{Import Limit} / D$ where the Total RA Import Bid/Self-Schedule is the sum of RA import bids (the Upper Economic Limits) or self-schedules on the congested intertie; Import Limit is market import limit be net of TOR/ETC import self-schedules. c. The denominator D is calculated as follows: $D = \min(\text{Total PT Wheel Self-Schedule, Import Limit}) + \min(\text{Total RA Import Bid/Self-Schedule, Import Limit})$ d. If there are multiple congested interties in the import direction, the above administrative schedule adjustment is performed separately for each congested intertie. e. The individual PT wheel schedules are determined by allocating the allotted Adjusted Total PT Wheel Schedule pro rata, <u>after the wheel that export leg on the import congested direction.</u> <ul style="list-style-type: none"> ○ <u>In the second tier of the post-HASP Administrative Schedule Adjustment where individual PT Wheels are scheduled up to the total PT Wheel schedule allotment from the first tier, individual PT Wheels with an export leg on an intertie congested in the import direction will receive scheduling priority (scheduled first), followed by the rest of the individual PT Wheels that will be scheduled pro rata on the remaining total PT Wheel schedule allotment. This differentiation is needed because PT Wheels with export legs on import-</u> 		

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	<p style="color: red;"><u>congested interties provide counter flow for import schedules on those interties.</u></p> <p style="color: red;"><u>o If the sum of the individual PT Wheel schedules with an export leg on an intertie congested in the import direction exceeds the total PT Wheel schedule allotment, they will be scheduled pro rata and they will be clearly identified in the relevant post-HASP Administrative Schedule Adjustment display to alert the Operator that manual action is required to obtain a finally feasible schedule.</u></p> <p>f. The individual import schedules, RA and non-RA alike, are determined by allocating the allotted Adjusted Total Import Schedule in merit order (pro rata on self-schedules first, followed by bids in economic order).</p> <p>Note: <u>Update Market Operations BPM</u></p>		
SUMR21-BRQ154	<p>System shall apply similar administrative process to internal transmission after HASP if Path26 causes HASP uneconomic adjustment-</p> <p>If the HASP optimal solution results in an under-generation power balance constraint relaxation and/or uneconomic adjustments of PT wheeling self-schedules that compete with RA supply (imports, generating resources, and NGRs) through a congested flowgate (e.g., Path 26 North to South), an administrative schedule adjustment is performed among supply schedules and PT wheels through that flowgate as follows:</p> <p>a. The adjusted total PT wheel schedule is determined as follows: Adjusted Total PT Wheel Schedule = min(Total PT Wheel Self-Schedule, Path26 N-S Limit) * Path26 N-S Limit / D where the Total PT Wheel Self-Schedule is the sum of RTM PT wheel self-schedules through Path 26 in the N-S direction, individually limited by (110% configurable factor) times their respective RUC schedule.</p> <p>b. The adjusted total supply schedule flow is determined as follows: Adjusted Total Supply Schedule Flow = min(0, Total RA</p>	Core	HASP

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	<p>Supply Bid/Self-Schedule – PG&E TAC Demand Forecast, Path26 N-S Limit) * Path26 N-S Limit / D where the Total RA Import Bid/Self-Schedule is the sum of RA import bids (the Upper Economic Limits) or self-schedules from RA Resources (imports, generators, NGRs) north of Path 26, only up to the respective RA Capacity; Path26 N-S Limit is net of TOR/ETC self-schedules north of path 26.</p> <p>c. The denominator D is calculated as follows: $D = \min(\text{Total PT Wheel Self-Schedule, Path26 N-S Limit}) + \min(0, \text{Total RA Supply Bid/Self-Schedule} - \text{PG\&E TAC Demand Forecast, Path26 N-S Limit})$</p> <p>d. The adjusted total import schedule north of Path 26 is determined as follows: $\text{Adjusted Total Import Schedule} = \text{Adjusted Total Supply Schedule Flow} - \text{Total Internal Supply Schedule} + \text{PG\&E TAC Demand Forecast}$ where the Total Internal Supply Schedule is the sum of all internal supply schedules (generators, NGRs) north of Path 26, RA and non-RA alike, as calculated in HASP.</p> <p>e. The individual PT wheel schedules are determined by allocating the allotted Adjusted Total PT Wheel Schedule pro rata, <u>after the wheel that export leg on the import congested direction, same as BRQ153 e.</u></p> <p>f. The individual internal supply schedules north of Path 26, RA and non-RA alike, are not adjusted; they remain at the HASP optimal solution that considers marginal losses and transmission congestion.</p> <p>g. The individual import schedules north of Path 26, RA and non-RA alike, are determined by allocating the Adjusted Total Import Schedule in merit order (pro rata on self-schedules first, followed by bids in economic order).</p> <p>h. Any transmission constraint violations due to these schedule adjustments are resolved in subsequent FMM runs.</p>		
<u>SUMR21-BRQ155</u>	<u>Operator review and sending pro-rata adjustment as HASP results</u>	<u>Core</u>	<u>HASP</u>

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	<ul style="list-style-type: none"> <u>Pro-rata allocation and adjustment of schedule shall be presented to the operator in the instruction review period before sending the results.</u> <u>The results of pro-rata adjustments on import and PT wheel shall be sending as normal HASP results. Publish the adjusted schedules, unless a schedule is blocked by the operator, in which case the optimal schedule will be published.</u> 		
SUMR21-BRQ156	<p>If conditions are set <u>Set Exceptional Dispatch (ED) for the system to generate aimports with bids the incremental energy that result from post-HASP solutionprocess</u></p> <p><u>If system apply post-HASP adjustment and the adjustment is not blocked by the operator</u>, then the system shall automatically create an exceptional dispatch <u>(ED)</u> instruction for each</p> <ul style="list-style-type: none"> <u>The import</u> inter-tie resource (static tie, transaction, tie gen, dynamic resource) that<u>with bids</u> <u>In situations when the post-HASP dispatch is greater than the HASP optimal solution</u> <p><u>Note:</u></p> <p><u>No need to set ED for self-scheduled Imports and self-scheduled wheels. Exceptional Dispatch Energy has a post-HASP solution and is published, similar to System Emergency EDrules in tariff and settlements in which the resource is paid or charged at bid or better. The self-scheduled imports are price taker.</u></p>	Core	RTM
SUMR21-BRQ159	The exceptional dispatch instructions created by the post-HASP solution shall be respected by following RTPD, RTD, and STUC.	Core	RTM
SUMR21-BRQ160	<p>Expand scope of UI for export by priority in Hourly/FMM Intertie review screen</p> <ul style="list-style-type: none"> Currently, there is functionality in market on Hourly/FMM intertie review for PT/LPT exports which are displayed on UI for operator review before sending instruction out. With this implementation, there will be DAPT, RTPT, DALPT, and RTLPT. System will allow operator review and control the 	Core	RTPD, RTD

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	instruction of self-scheduled the export and wheeling import/export by priority category. <ul style="list-style-type: none"> • <u>Also include HASP Pro-rata allocation and adjustment of schedule.</u> 		
SUMR21-BRQ165	<p>Set Sunset date for wheel PT/LPT priorities</p> <ul style="list-style-type: none"> • May 31st, 2022 is sunset date for wheel PT/LPT priorities. • MF deactivate the Flag for wheel export leg system resource. • <u>Deactivate Intertie RDT wheel flag.</u> • After sunset, in the DAM and RTM, all the SS wheeling schedules shall become: <ul style="list-style-type: none"> ○ Priority for export leg equal to load ○ Priority for import leg equal to SS import • No longer perform the post-HASP pro-rata allocation for intertie and Path 26. <p><u>Note:</u></p> <ul style="list-style-type: none"> • <u>No Sunset for PT/LPT export</u> 	Core	MF, SIBR, DAM, RTM
SUMR21-BRQ170	<p>Calculate outages <u>pro-rata</u> impact RA and non-RA capacity on a supporting resource.</p> <ul style="list-style-type: none"> • The SC of supporting resource shall notify ISO if their RA capacity changes, else, submit RA capacity and substitution Capacity (using existing function), else, <u>To account for the</u> • <u>If no submission, for the resource with MF defined support resource flag, to account for both planned and forced outages, system shall pro-rata allocate the outage MW between the RA capacity and the remainder of the resource's capacity up to its Pmax.</u> 	Core	CIRA



ID#	Business Feature	Requirement Type	Potential Application(s) Impacted														
	<ul style="list-style-type: none"> For an outage that does not start, every 24 hours, check the substitution, replace the pro-rata with submitted substitution. For a planned outage that starts without substitution, CIRA shall treat it as forced outage, pro-rata RA/non-RA capacity for outage for the MF defined supporting resource <p>Examples: Example 1: forced outage without submission and substitution, system allocate outage pro-rata RA and Non-RA</p> <table border="1" data-bbox="240 919 1105 1045"> <thead> <tr> <th>Unit W/MF flag</th> <th>Pmax</th> <th>RA/CPM MW</th> <th>Derate from OMS</th> <th>Pro rata-RA Capacity</th> <th>SIBR RA MW</th> <th>RAAIM RA obligation</th> </tr> </thead> <tbody> <tr> <td>Res1</td> <td>400</td> <td>300</td> <td>50</td> <td>262.5</td> <td>262.5</td> <td>300</td> </tr> </tbody> </table> <ul style="list-style-type: none"> 	Unit W/MF flag	Pmax	RA/CPM MW	Derate from OMS	Pro rata-RA Capacity	SIBR RA MW	RAAIM RA obligation	Res1	400	300	50	262.5	262.5	300		
Unit W/MF flag	Pmax	RA/CPM MW	Derate from OMS	Pro rata-RA Capacity	SIBR RA MW	RAAIM RA obligation											
Res1	400	300	50	262.5	262.5	300											
<p><u>SUMR21-BRQ171</u></p>	<p><u>Calculate separate values of RA capacity and RA obligation for the all RA resources</u></p> <ul style="list-style-type: none"> Separate the values of RA capacity with pro-rata outage and the RA obligation for the resource that corresponding the RA/CPM MW adjusted by the substitution for RA resource For other resources without MF defined supporting resource flag, NO outage pro-rata allocation between RA and non-RA capacity. Existing outage rules apply. Publish RA capacity and RA obligation for the all the RA resources. 	<p><u>Core</u></p>	<p><u>CIRA</u></p>														
<p><u>SUMR21-BRQ172</u></p>	<p><u>Settle RA incentive based on RA obligation:</u></p> <ul style="list-style-type: none"> Settlement shall use RAIM RA obligation of the RA resources to calculate the RA incentive. 	<p><u>Core</u></p>	<p><u>Settlement</u></p>														

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Example 5.1:

Resource	DAM Bid	Supporting Resource	DAM Priority	RUC Schedule	RTM Bid	Supporting Resource	RTM Priority	Comments
Export A1	100 PT 20 LPT	Generator A	80 DAPT 40 DALPT	120	60 PT	Generator A	60 DAPT	Tier-1; must not bid above 60 PT, or it will lose all
Export A2					30 PT 30 LPT	Generator A	30 RTPT 30 RTLPT	Tier-2
Generator A	80			60	90			
Export B1	100 PT 20 LPT	Generator B	80 DAPT 40 DALPT	100	60 PT 50 LPT	Generator B	60 DAPT 40 DALPT 10 RTLPT	Tier-1; must not bid above 60 PT, or it will lose all
Export B2					10 PT 10 LPT	Generator B	10 RTPT 10 RTLPT	
Generator B	80			60	70			
Export C	100 PT 20 LPT	Generator C	80 DAPT 40 DALPT	100			100 DALPT	Tier-1; must rebid to claim 60 PT
Generator C	80			60	70			
Export D	100 PT 20 LPT	Generator D	80 DAPT 40 DALPT	100			80 DAPT 20 DALPT	Tier-1; Supporting Resource RUC schedule sufficient, no rebid required.
Generator D	80			80	80			

DAPT = RTPT = Load/Demand > DALPT > RTLPT

Resource	DAM Bid	Supporting Resource	DAM Priority	RUC Schedule	RTM Bid	Supporting Resource	RTM Priority	Comments
Export A1	100 PT 20 LPT	Generator A	80 DAPT 40 DALPT	120	60 PT	Generator A	60 DAPT	Tier-1; must not bid above 60 PT, or it will lose all
Export A2					30 PT 30 LPT	Generator A	30 RTPT 30 RTLPT	Tier-2
Generator A	80			60	90			
Export B1	100 PT 20 LPT	Generator B	80 DAPT 40 DALPT	100	60 PT 50 LPT	Generator B	60 DAPT 40 DALPT 10 RTLPT	Tier-1; must not bid above 60 PT, or it will lose all
Export B2					10 PT 10 LPT	Generator B	10 RTPT 10 RTLPT	
Generator B	80			60	70			
Export C	100 PT 20 LPT	Generator C	80 DAPT 40 DALPT	100			100 DALPT	Tier-1; must rebid to claim 60 PT
Generator C	80			60	70			
Export D	100 PT 20 LPT	Generator D	80 DAPT 40 DALPT	100			80 DAPT 20 DALPT	Tier-1; Supporting Resource RUC schedule sufficient, no rebid required.
Generator D	80			80	80			

DAPT = RTPT = Load/Demand > DALPT > RTLPT

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5.2 Business Process: Manage RTM EIM Coordination and Resource Sufficiency Test

- Perform capacity test after flex ramp test. Include the uncertainty requirements in the capacity test (RTBS)
- Account resource derate in the capacity test (RTBS)
- Fix defect on double count mirror resource
- Require auto-~~matching~~mirroring for mirror resources _mirroring system resource at ISO SP(MF)
- Set priority for base intertie schedules and base ETSR for EIM entities higher than other base schedules (RTM)
- Running out of advisory transfer for EIM BAA under contingency
 - Use last RTD advisory pre-contingency for EIM transfer (RTM)

5.2.1 Business Requirements

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
SUMR21-BRQ210	<p>Account resource availability in EIM base schedule capacity test</p> <ul style="list-style-type: none"> • Receive resource outage/derate data- • Receive resource _Manual Dispatch instruction- • <u>Account resource outage/derate and manual dispatch for next trading hour 15- minute intervals in the bid range capacity and perform the EIM base schedule Capacity test.</u> 	Core	RTBS
SUMR21-BRQ212	<p>Account for the mirror resource in the EIM BAA</p> <p>The mirror resource in CAISO scheduling point shall only be counted in EIM BAA base schedule flex ramp test and capacity test, not in ISO.</p>	Core	RTBS

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SUMR21-BRQ240	<p>Set auto-matchingmirroring for specified mirror resources</p> <ul style="list-style-type: none"> • Require the auto-mirror flag for the mirror resources that are mirroring system resources at CAISO interties. • EIM entity shall provide the auto-mirror mapping between mirror system resources and registered ETIE, ITIE, TG and TNGR. <p>Note:</p> <p>The MF set auto-mirror for the mirror resource that mirroring system resource. In the RTM, the auto-mirroring function will ensure the mirror resource reflect the system resource changes. This is an existing function in the market.</p> <p>Outreach to EIM entities to provide this mapping.</p>	Core	Master File
SUMR21-BRQ250	<p>Adjust penalty cost for base ETSR, base intertie schedule</p> <ul style="list-style-type: none"> • Adjust penalty cost for base ETSR and base intertie schedules higher than other base schedules. 	Core	RTM
SUMR21-BRQ255	<p>Use last advisory RTD schedules</p> <p>If the contingency operation extendextends beyond the advisory horizon of the last pre-contingency RTD run, market shall use the last solved advisory real-time dispatch (RTD) results to set EIM transfers.</p>	Core	RTM

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SUMR21-BRQ260	<p>Perform Independent flexible ramping test first</p> <ul style="list-style-type: none"> • System shall always run the flexible ramping test first for each EIM BAA. • Pass the net load uncertainty requirement used in Flexible ramping test to the following Capacity test. <p>Note: Uncertainty requirement is defined as each balancing authority area’s calculated flexible ramping requirement minus the diversity benefit. The diversity benefit is limited by the net import/export capability, <u>the</u> same value used in the Flexible ramping test.</p>	Core	RTBS
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SUMR21-BRQ262	<p>Include the uncertainty requirements in the capacity test <u>if function is enabled</u>:</p> <ul style="list-style-type: none"> Retain ability for the CAISO to enable / disable the uncertainty requirement from the capacity test.- <i>Add max(0, the non-negative</i> <u>Calculate</u> uncertainty <u>upward and downward</u> requirement from Flexible Ramping sufficiency <u>for the capacity test</u> as following: <i>max[(Flex Up Uncertainty – Net Import Capability), ((Diversity Benefit Factor * Flex Up Uncertainty))]</i> <i>max[(Flex Dn Uncertainty – Net Export Capability), ((Diversity Benefit Factor * Flex Dn Uncertainty))]</i> <u>Add the calculated uncertainty requirement for capacity test</u> in the capacity test requirement, <u>if function is enabled</u>. Perform capacity test after the flexible ramping test for each BAA in the EIM. 	Core	RTBS
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SUMR21-BRQ264	Always perform both capacity test and flexible ramping test <ul style="list-style-type: none"> • Regardless of fail or pass, always perform both tests, flexible ramping test first and then capacity test for each BAA in the EIM. • Only both flexible ramping test and capacity test are pass, the RSE<u>Resource Sufficiency Evaluation (RSE)</u> is deemed successful for the corresponding trading hour 15-minute intervals that tested. • Either one or both tests are failed, the RSE is deemed failed for the trading hour 15-minute interval EIM BAA. The existing rule to limit EIM transfer applies. 	Core	RTBS
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5.3 Business Process: Manage RTM Import & Export Market Incentives during Tight System Conditions

5.3.1 Business Requirements

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
SUMR21-BRQ320	<p>Consume Tight System Conditions Indicator (AWE Date/Time Windows):</p> <ul style="list-style-type: none"> • On daily basis, System shall automatically consume the following tight system conditions indicators for current calendar day (T) and next calendar day (T+1): <ul style="list-style-type: none"> ○ AWE Start Date/Time ○ AWE End Date/Time ○ AWE Type 	Core	Settlements
SUMR21-BRQ325	<p>Identifications of Interties that are Eligible for a Bid Cost Make-Whole Payment during Tight System Conditions</p> <p>During tight system conditions (“Operating Reserve Deficiency” AWE date/time window), System shall identify the following interties to be eligible for a bid cost make-whole payment:</p> <ul style="list-style-type: none"> • Each HASP Block Intertie Import Schedules, that bid into RTM, based upon the FMM Optimal Energy above the DA Schedule Energy, or 	Core	Settlements

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	<ul style="list-style-type: none"> Each HASP Block Intertie Export Schedules, that bid into RTM, based upon the FMM Optimal Energy below the DA Schedule Energy. 		
SUMR21-BRQ330	<p>Calculation of Make-Whole Energy for RTM Incremental Import and Decremental Export Interties during Tight System Conditions</p> <p>During tight system conditions (“Operating Reserve Deficiency” AWE date/time window), System shall calculate the FMM make-whole energy (MWh) for interties that are identified to be eligible for bid cost make-whole payment.</p> <p>Note: Refer to SUMR21-BRQ325.</p>	Core	Settlements
SUMR21-BRQ340	<p>Calculation of Make-Whole Prices for RTM Incremental Import and Decremental Export Interties during Tight System Conditions</p> <p>During tight system conditions (“Operating Reserve Deficiency” AWE</p>	Core	Settlements

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	date/time window), System shall calculate the make-whole RTM hourly prices for RTM incremental import and decremental export interties as the positive difference between: <ul style="list-style-type: none"> • HASP Block Intertie Schedule bid, and • Relevant hourly average FMM LMPs for the applicable Trading Hour. 		
SUMR21-BRQ350	<p>Provide Make-Whole Payment for RTM Incremental Import and Decremental Export Interties during Tight System Conditions</p> <p>During tight system conditions (“Operating Reserve Deficiency” AWE date/time window), and for each HASP block intertie incremental import or decremental export schedules, System shall calculate make-whole payment as the multiplication of:</p> <ul style="list-style-type: none"> • Calculated FMM Make-Whole Energy (SUMR21-BRQ330), and 	Core	Settlements

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	<ul style="list-style-type: none"> Calculated Hourly Make-Whole RTM Prices (SUMR21-BRQ340) 		
SUMR21-BRQ360	<p>Exclusion of Import and Export Interties from Make-Whole Payment during Tight System Conditions</p> <p>During tight system conditions (“Operating Reserve Deficiency” AWE date/time window), System shall exclude any import or export resources/transaction ids from receiving make-whole payment that are subject to:</p> <ul style="list-style-type: none"> HASP reversal rules, or Intertie deviation settlement rules. HASP Block Intertie Schedules that are part of a wheeling through transaction 	Core	Settlements
SUMR21-BRQ370	<p>Allocate Make-Whole Uplift Cost to CAISO Measured Demand during Tight System Conditions</p> <p>During tight system conditions (“Operating Reserve Deficiency” AWE date/time window), System shall be updated to:</p> <ul style="list-style-type: none"> Allocate the Make-Whole Costs to: 	Core	Settlements

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	<ul style="list-style-type: none"> ○ CISO measured demand less valid and balanced ETCs, TORs or Converted Rights Self-Schedules. ○ MSS Aggregation Net Measured Demand, for MSS that have elected net settlement. ○ Net negative deviation, for Load following MSSs. 		
SUMR21-BRQ390	<p>Capability to Suspend Make-Whole Payment Rule Provisions during Tight System Conditions</p> <ul style="list-style-type: none"> • System shall provide the capability to configuration<u>configure</u> users to suspend the entire make-whole payment rule provisions during tight system conditions if CAISO assessed that there are adverse market outcomes resulting from that rule based on effective trade dates. • The adverse market outcome shall be categorized by make whole payments not resulting in incremental supply. • System shall provide the capability to 	Core	Settlements

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	configuration users to discontinue any suspension or limitation at any time it determines such suspension or limitation is no longer appropriate. <ul style="list-style-type: none"> • The suspension and un-suspension shall be based on effective trade dates (no intra-trade dates). 		

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5.4 Business Process: Manage RTM Real-Time Price Enhancements

5.4.1 Business Requirements

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
SUMR21-BRQ440	<p>Identification of Tight System Conditions</p> <ul style="list-style-type: none"> • System shall provide ISO operators the capability to specify date/time window for tight system conditions (AWE date/time window) for current calendar day (T) and next calendar day (T+1) via UI. • The operator entered AWE date/time window shall cover date/time (expanded to top of the hour) of any combinations of the following: <ul style="list-style-type: none"> ○ DA alert notice issued by 3 p.m. in the day before an operating day that states the CAISO anticipates an operating reserve deficiency for specified hours. Note: AWE Type of: <ul style="list-style-type: none"> ▪ Operating Reserve Deficiency – <ul style="list-style-type: none"> • Alert ○ <u>A Warning notice or emergency stage 1-3 in real-time during an operating day that states the CAISO anticipates or is experiencing an operating reserve deficiency during specified hours.</u> 	Core	RTM

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	<p>Note:</p> <ul style="list-style-type: none"> ⊖ AWE Type of: <ul style="list-style-type: none"> ▪ Operating Reserve Deficiency – <ul style="list-style-type: none"> • Warning • Emergency Stage 1 • Emergency Stage 2 • Emergency Stage 3 • There shall be at most one contiguous AWE date/time window per a calendar day and it shall not cross day boundary. <p>Notes<u>Note:</u></p> <ul style="list-style-type: none"> • Implementation: System shall set AWE type for Operator-entered AWE records to “Operating Reserve Deficiency”. 		
SUMR21-BRQ450	<p>Release of All Applicable (Contingent & non-Contingent) Operating Reserves at the Bid Cap Price</p> <ul style="list-style-type: none"> • For the specified “Operating Reserve Deficiency” AWE date/time window and if the ISO operators triggered one of the below functionalities, system shall release applicable (contingent & non-contingent) operating reserve capacities at 	Core	<ul style="list-style-type: none"> • RTM

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	<p>the bid cap price for all passes of RTM for either:</p> <ul style="list-style-type: none"> ○ Flag In All (all spin and non-spin operating reserve shall be released), or ○ Flag In Non-Spin (only non-spin operating reserve shall be released) <ul style="list-style-type: none"> ● For the specified “Operating Reserve Deficiency” AWE date/time window and if the ISO operators triggered one of the below functionalities, system shall reset the release of applicable (contingent & non-contingent) operating reserve capacities for all passes of RTM for the corresponding triggered functionality in the previous bullet: <ul style="list-style-type: none"> ○ Flag Out All (if Flag In All was triggered), or ○ Flag Out Non-Spin (if Flag In Non-Spin was triggered) <p>Notes:</p> <ul style="list-style-type: none"> ● Bid cap price will be dependent and updated based on bid cap logic that is described in FERC Order 831 BRS. ● Outside “Operating Reserve Deficiency” AWE date/time 		

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	window, existing functionalities shall persist.		

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5.5 Business Process: Manage DAM and RTM Reliability Demand Response Resource (RDRR) Dispatch and Real-time Price Impacts

- Incorporate the RDRR/PDR dispatch into load forecast ALFS: ALFS, DAM/RTM.
- Define RDRR 60-, 15-, 5-minute resource.
- Dispatch RDRR in RTPD and RTD, 60-minute RDRR is price taker.
- Operator activates function that enable 15-minute and 5-minute RDRR dispatch, then market will allow 15-minute and 5-minute RDRR set the price.
- Allow RDRR bid in RTM, spread MW between 95%-100% of soft bid cap, to send price signals if RDRR set price.

5.5.1 Business Requirements

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
SUMR21-BRQ505	Incorporate the RDRR and PDR market award into market load forecast <ul style="list-style-type: none"> • The forecast interval shall be aligning RTPD and RTD binding and advisory awards intervals. • Base ALFS load forecast: For the forecast interval, system shall perform base ALFS forecast (regular load following forecast). • Market load forecast: Add back the latest RDRR and PDR binding and advisory awards to the base ALFS load forecast to produce market load requirement forecast. • Publish Base ALFS load forecast and market load forecast. 	Core	ALFS
SUMR21-BRQ520	Define RDRR 60, 15, 5-minute resource System shall define an eligible RDRR resource, in the same manner as PDR, for <ul style="list-style-type: none"> • 60-minute RDRR or • 15-minute RDRR or • 5-minute RDRR 	Core	Master File

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
SUMR21-BRQ522	Set RDRR Pmin in MF Set Discrete RDRR Pmin and Non-discrete RDRR Pmin in the same manner as regular generation resource.	Existing	Master File
SUMR21-BRQ525	Require RDRR bid in RTM Require RDRR bid in RTM, between 95% -100% of soft bid cap.	Existing	SIBR, RTM
SUMR21-BRQ530	60 minute RDRR dispatch <ul style="list-style-type: none"> • Commit and Dispatch 60-minute RDRR in HASP, same way as for 60-minute PDR. • Hold the RDRR HASP dispatch in subsequent RTPD and RTD. • 60-minute RDRR is a price takers, cannot set the price in RTPD and RTD. 	Core	HASP
SUMR21-BRQ535	15-minute and 5-minute RDRR resource dispatch in RTPD <ul style="list-style-type: none"> • Commit and Dispatch 15, 5-minute RDRR in RTPD, same way as for 15-minute PDR, will account for RDRR's start-up and minimum run times. • Hold the RDRR RTPD dispatch in subsequent RTD. • If the operator does enable the RDRR dispatch button, RDRR resource is optimally dispatched and RDRR is allowed to set price in RTPD even if it is discrete. • If the operator does not enable the RDRR dispatch button, 15-minute RDRR resource cannot set price in RTPD. 	Core	RTPD



ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
SUMR21-BRQ538	<p>5-minute RDRR dispatch in RTD</p> <ul style="list-style-type: none"> If the operator enables the RDRR dispatch button, 5-minute RDRR resource is optimally dispatched and RDRR is allowed to set price in RTPD. If the operator does not enable the RDRR dispatch button, 15-minute RDRR resource cannot set price in RTPD. 	Core	RTD
SUMR21-BRQ540	<p>Enable/Disable RDRR for all, region or subregion</p> <p>Operator action:</p> <ul style="list-style-type: none"> Specify start/end time for selected regions: all, region and subregion. Click RDRR dispatch Enable button for selected RDRR region(s) to Enable RDRR in the Region(s) or subregion(s). Click Disable to cancel Enable. 	Core	RTPD, RTD
SUMR21-BRQ542	<p>System build an activate flag for RDRR optimal dispatch and set price</p> <p>When the flag is zero, RDRR should behave same as today. When the flag is one, RDRR shall be optimal dispatched and allowed to set price.</p>	Core	RTM
SUMR21-BRQ545	<p>Allow RDRR set price:</p> <p>If operator enables the RDRR dispatch function:</p>	Core	HASP, RTPD, RTD

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	System shall allow RDRR to set the price: <ul style="list-style-type: none"> Discrete RDRR (hourly, 15-min, or 5-min) shall be treated as on/off at Pmax in the scheduling run (STUC, HASP, FMM, or RTD), but in the pricing run with a zero Pmin as non-discrete, allow RDRR to set the price. For non-discrete RDRR, use bid curve submitted by SC run in schedule run and pricing run, and allow RDRR to set the price. 		
SUMR21-BRQ590	Settlement: <ul style="list-style-type: none"> Same as PDR, exclude BCR for Hourly RDRR. Same as PDR, include BCR for 15-minute RDRR. 	Existing Function	Settlements
<u>SUMR21-BRQ595</u>	<u>Publish RDRR market schedules in the same manner as PDR</u> <ul style="list-style-type: none"> <u>System shall publish RDRR 5-minute dispatch instruction in ADS, using existing RDRR function in ADS.</u> <u>System shall publish RDRR hourly and 15-minute schedule in CMRI, same manner as for PDR, specified in section 10.1.1 of the Market Instruments BPM.</u> 	<u>Existing Function</u>	<u>CMRI, ADS</u>

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5.6 Business Process: < Management of Storage Resources during Tight System Conditions >

5.6.1 Business Requirements

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted								
SUMR21-BRQ605	<p>Ensure Storage Resources have Sufficient SOC to Support Regulation Up and Regulation Down Awards for at Least Configurable X Minutes in RTM</p> <ul style="list-style-type: none"> In scheduling and awarding storage resources, System shall automatically ensure these resources shall have SOC that can maintain the awarded Regulation Up and Regulation Down for at least “x” minutes (user-configurable). This applies to RTPD and RTD, RTCD passes. The configurable “x” time parameters shall be independent for each market pass for each regulation types. For each of the Regulation Up and Regulation Down, the configurable “x” minutes shall be defaulted to: <table border="1" style="margin-left: 40px;"> <tr> <td style="text-align: center;">RTPD</td> <td style="text-align: center;">30 min</td> </tr> <tr> <td style="text-align: center;">RTD</td> <td style="text-align: center;">30 min</td> </tr> <tr> <td style="text-align: center;">1st RTCD</td> <td style="text-align: center;">20 min</td> </tr> <tr> <td style="text-align: center;">2nd RTCD</td> <td style="text-align: center;">0 min</td> </tr> </table>	RTPD	30 min	RTD	30 min	1 st RTCD	20 min	2 nd RTCD	0 min	Core	<ul style="list-style-type: none"> RTM
RTPD	30 min										
RTD	30 min										
1 st RTCD	20 min										
2 nd RTCD	0 min										

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
SUMR21-BRQ610	Creating AGC Storage Resource UI <ul style="list-style-type: none"> • System shall be updated to provide a UI for operators to view storage resources related data and SOC in AGC. • It shall provide operators the ability to visualize a system summary of the storage fleet with details for each online storage resource including: <ul style="list-style-type: none"> ○ Current SOC Telemetry ○ Maximum/Minimum Operating SOC Limits (Note: This will not be impacted by binding min EOH SOC) ○ Capacity and SOC aggregated for the storage fleet at the transmission level 	Core	<ul style="list-style-type: none"> • EMS
SUMR21-BRQ617	Displaying Advisory EOH MSOC Details for Operators <p>System shall furnish a UI for operators to view the following read-only EOH MSOC details, including:</p> <ul style="list-style-type: none"> • Advisory EOH MSOC for storage resources <p>Note:</p> <ul style="list-style-type: none"> • Implementation: This UI is also part of Resource Adequacy Enhancement Track 1 BRS. 	Core	<ul style="list-style-type: none"> • RTM

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
	<ul style="list-style-type: none"> • Advisory EOH MSOC: <ul style="list-style-type: none"> ○ areAre Min EOH SOC that are furnished to operators but will NOT be enforced in RTM. ○ areAre calculated for all storage resources (RA and non-RA) for all trade days (regardless of whether the trade day has RUC under-gen infeasibility). ○ mayMay be used by CAISO Operators to issue a traditional MW ED for a storage resource to charge it to a specific SOC at specific time to assist in tight system conditions and capacity shortages. 		

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5.7 Business Process: Manage OASIS Reports and Planning

- New OASIS report showing gross exports and imports by intertie

5.7.1 Business Requirements

ID#	Business Feature	Requirement Type	Potential Application (s) Impacted
SUMR21-BRQ700	System shall publish gross import/export by tie by BAA for CAISO: <ul style="list-style-type: none"> • Calculate schedule by tie and by import and export direction by BA. • Publish gross import and export by tie and by direction for CAISO BAA only. 	Core	IFM, RTPD, RTD
SUMR21-BRQ710	Report <u>binding interval</u> gross exports and imports by intertie for CAISO: <ul style="list-style-type: none"> • Report the schedule breakdown by tie by direction for CAISO for IFM, RUC, RTPD and RTD. • Allow user to view and download the report in the same manner as the report EIM transfer by tie. 	Core	OASIS

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5.8 Business Process: <Market/Business Simulation>

This section shall provide a basis for the development of the Market/Business Simulation Scenarios. These requirements will provide guidance on the market participant impacts, inputs into the Scenarios, endpoints to the Scenarios and reasons for potential Scenarios. The guidance on market participant impacts shall be gathered from the requirements that impact rules, interfaces, applications/reports, new system processes, new/modified data models and new user roles. The source and sink systems shall be determined through the development of the system context diagram and the web service requirements. The Reason for the Potential Scenario column will be to offer guidance regarding what potential Scenarios, and their context, may be needed for this project. This section applies to all policy development projects, market enhancements, technology enhancements, operation enhancements, Energy Imbalance Market (EIM) implementations and Reliability Coordination (RC) service implementations.

In the Reason for Potential Scenario column, the Business Analyst must select one or more of the following reasons:

- **Rule Impacts:** Generalized changes in market rules, bidding rules, settlements rules, market design changes, or other business rules.
- **Interface changes:** Changes that impact templates (e.g. the Resource Adequacy {RA} supply plan), user interface (UI), and application programming interface (API) (e.g. retrievals of new shadow settlement data).
- **New application/report:** Changes that cause addition/modification of market software or reports, especially when market data input is required by the market participant.
- **New system process:** Modification of data flow in systems, especially if the new process requires the market participant to demonstrate proficiency prior to production.
- **New/Modified model data:** Addition or substantial modification of model data as a market solution provided by the ISO.
- **New user role:** The addition or modification of access permissions for a user role applied to specific business units within an EIM entity or market participant organization (e.g. Load Serving Entity (LSE) as a Local Regulatory Authority (LRA) role). Scenarios are beneficial for market participants taking on a new function or process within their organization.

5.8.1 Business Requirements

ID#	Guidance on Market Participant Impacts	Source System	Sink System	Reason for Potential Scenario
SUMR21-MSIM100	SC submitted flag and indicate that the resource can support PT export, through Resource Data Template (RDT).	MP	Master File	1. Rule Impacts

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ID#	Guidance on Market Participant Impacts	Source System	Sink System	Reason for Potential Scenario
				2. Interface changes 4. New system process
SUMR21-MSIM102	SC submitted flag and MW for the export leg of wheeling schedule through intertie Data Template (IRDT) for PT wheel	MP	Master File	1. Rule Impacts 2. Interface changes 4. New system process
SUMR21-MSIM113	SC submit self-scheduled export use existing function: <ul style="list-style-type: none"> • SC submitted Self-scheduled export with designated Supporting Resource ID. • Self-scheduled export without designated resource ID. 	MP	SIBR	1. Rule Impacts
SUMR21-MSIM124	Notify the designated resource SC <ul style="list-style-type: none"> • System shall notify the SC of the designated Resource that its resource is supporting DAPT, RTPT export. The notification shall include: <ul style="list-style-type: none"> ○ SC of export, export resource ID, market, start/end time ○ SC of designated resource, designated resource ID, designated MW 	SIBR	MP	2. Interface changes 4. New system process
SUMR21-MSIM128	Submit the wheel through schedule Self-scheduled or Economic bid in market System applies new validation rule for setting the priority	MP	SIBR	1. Rule Impacts

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ID#	Guidance on Market Participant Impacts	Source System	Sink System	Reason for Potential Scenario
SUMR21-MSIM262	<p>Include the uncertainty requirements in the capacity test if function is enabled</p> <ul style="list-style-type: none"> • Perform Independent flexible ramping test first. • Add the uncertainty requirement from Flexible Ramping sufficiency test in the capacity test requirement. 	RTM	BAAOP	4. New system process
SUMR21-MSIM320	<p>RTM Import & Export Market Incentives during Tight System Conditions</p> <ul style="list-style-type: none"> • Set up a scenario where: <ul style="list-style-type: none"> ○ Tight system conditions exist. (CAISO to create conditions in RTM conducive to buying energy at relatively high prices.) ○ CAISO issues an “Operating Reserve Deficiency” AWE for specific hours in DA and RT. ○ SC’s submit bids in RTM for block interties for several hours, around \$100, to either increase the import relative to DA schedule or decrease the export relative to DA schedule. ○ CAISO market systems will schedule incremental imports and decremental exports in HASP, consistent with the tight system conditions. ○ CAISO will perform price corrections as necessary to simulate lower prices in FMM relative to HASP, i.e. well below the \$100 bid price 	<ul style="list-style-type: none"> •SIBR •RTM 	MRI-S [Settlements]	1. Rule Impact

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ID#	Guidance on Market Participant Impacts	Source System	Sink System	Reason for Potential Scenario
	<ul style="list-style-type: none"> • Follow the results in the sink systems. Specifically: <ul style="list-style-type: none"> ○ MRI-S [Settlements]: <ul style="list-style-type: none"> ▪ Verify make-whole settlements for RTM Import & Export. 			
SUMR21-MSIM420	<p>Release of All Applicable (Contingent & non-Contingent) Operating Reserves at the Bid Cap Price</p> <ul style="list-style-type: none"> • Set up a scenario where: <ul style="list-style-type: none"> ○ Tight system conditions exist. (CAISO to create conditions in RTM conducive to buying energy at the bid cap.) ○ CAISO issues an “Operating Reserve Deficiency” AWE for specific hours in DA and RT. ○ Resources submit competitive energy bids for capacity covered by ancillary services. ○ Operator released operating reserve at bid cap price. ○ CAISO market systems will dispatch resources into their ancillary services capacity range if the local price reaches or exceeds the bid cap. • Follow the results in the sink systems. Specifically: <ul style="list-style-type: none"> ○ CMRI: <ul style="list-style-type: none"> ▪ Verify that at times during the tight system conditions period, resources are 	<ul style="list-style-type: none"> •SIBR •RTM 	<ul style="list-style-type: none"> •CMRI •OASIS 	1. Rule Impact



ID#	Guidance on Market Participant Impacts	Source System	Sink System	Reason for Potential Scenario
	<p>dispatched into their ancillary services capacity range and their resource-specific price is at or above the bid cap.</p> <ul style="list-style-type: none"> ▪ Verify that at times during the tight system conditions period, expected energy allocated within the ancillary services capacity range is priced at the bid cap instead of at their originally submitted energy bid price. 			
SUMR21-MSIM525	<p>RDRR Enable dispatch in RTM</p> <ul style="list-style-type: none"> • Require RDRR bid in RTM, between 95% -100% of soft bid cap • Operator Enable RDRR for all, region or sub-region • Allow RDRR set price 	SIBR RTM	<ul style="list-style-type: none"> •RTM •CMRI (RDRR dispatch) •OASIS (LMP) 	<p>2. Interface changes</p> <p>4. New system process</p>
SUMR21-MSIM620	<p>Ensure Storage Resources have Sufficient SOC to Support Regulation Up and Regulation Down Awards for at Least 30 Minutes in RTM</p> <ul style="list-style-type: none"> • Set up a scenario where: <ul style="list-style-type: none"> ○ Storage resources submit competitive regulation up and regulation down bids in RTM. • Follow the results in the sink systems. Specifically: 	•SIBR	<ul style="list-style-type: none"> •ADS •BAAOP •CMRI 	1. Rule Impact



ID#	Guidance on Market Participant Impacts	Source System	Sink System	Reason for Potential Scenario
	<ul style="list-style-type: none"> ○ ADS, BAAOP, CMRI: <ul style="list-style-type: none"> ▪ Verify storage resources RT regulation up and down awards 			
SUMR21-MSIM640	<p>Operator Utilization of Traditional ED for Storage Resources</p> <ul style="list-style-type: none"> • Set up a scenario where: <ul style="list-style-type: none"> ○ RUC under generation infeasibility occurs for some hours of same RTM trade day. ○ CAISO issues traditional max GOTO EDs for storage resources with a GOTO below zero, instructing them to charge as necessary. • Follow the results in the sink systems. Specifically: <ul style="list-style-type: none"> ○ ADS, BAAOP, CMRI: <ul style="list-style-type: none"> ▪ Verify storage resources dispatch follow issued EDs (existing functionality). ○ MRI-S [Settlements]: <ul style="list-style-type: none"> ▪ Verify storage resources settlements per existing EDs rules (existing functionality). 	•RTM	<ul style="list-style-type: none"> •ADS •BAAOP •CMRI •MRI-S [Settlements] 	4. New system process
SUMR21-MSIM710	Receive Report gross exports and imports by intertie for CAISO.	• OASIS	• MP	2. Interface changes

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Appendix-A – Acronym Definition

Acronym	Definition
A2A	Application-to-Application
ABC	Available Balancing Capacity
ACL	Access Control List
ADS	Automatic Dispatch System
AGC	Automatic Generation Control
AIM	Access and Identity Management
ALFS	Automated Load Forecast System
Anode	Aggregate Node
API	Application Program Interface
Apnode	Aggregate Pricing Node
AS	Ancillary Services
AUX	Auxiliary
AWE	ISO Alerts, Warnings and Emergencies (AWE)
B2B	Business-to-Business
BA	Business Analyst
BAA	Balancing Authority Area
BAAOP	Balancing Authority Area Operations Portal
BCR	Bid Cost Recovery
BPM	Business Process Manual
BRS	Business Requirement Specifications
BSAP	Base Schedule Aggregation Portal

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Acronym	Definition
BSC	Base Schedule Coordinator
CAISO	California Independent System Operator
CB	Convergence Bidding
CC	Commitment Cost
CCDEBE	Commitment Costs and Default Energy Bid Enhancements
CDN	Conformed Dispatch Notice
CIM	Common Information Model
CIP	Critical Infrastructure Protection
CIRA	Customer Interface for Resource Adequacy
CISO	California Independent System Operator
CMRI	Customer Market Results Interface
Cnode	Connectivity Node
COG	Constrained-Output Generator
CPM	Capacity Procurement Mechanism
CRN	Contract Reference Number
CRR	Congestion Revenue Rights
CRRS	Congestion Revenue Rights Settlements (aka CRR Clawback system)
CSS	Critical Systems Support
DA	Day-Ahead
DACA	Day-Ahead Contingency Analysis
DALPT	Day-Ahead Lower Price Taker

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Acronym	Definition
DAM	Day-Ahead Market
DAPT	Day-Ahead Price Taker
DART	Day-Ahead Reliability Tool
DCPA	Dynamic Competitive Path Assessment
DEB	Default Energy Bid
DCC	Default Commitment Cost
DGAP	Default Generation Aggregation Point
DMLC	Default Minimum Load Cost
DMM	Department of Market Monitoring
DOP	Dispatch Operating Point
DOT	Dispatch Operating Target
DSA	Dynamic Stability Analysis
DSTC	Default State Transition Cost
DSUC	Default Start Up Cost
ECIC	Energy Costs and Index Calculator
ED	Exceptional Dispatch
EDAM	Extended Day-Ahead Market
EDR	Enterprise Data Repository
EE	Expected Energy
EEA	Expected Energy Allocation
EESC	Energy Imbalance Market Entity Scheduling Coordinator

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Acronym	Definition
EFC	Effective Flexible Capacity
EIM	Energy Imbalance Market
EIMNPR	Energy Imbalance Market Non-Participating Resource
EIMPR	Energy Imbalance Market Participating Resource
EMM	Enterprise Model Management
EMMS	Enterprise Model Management System
EMNA	Energy Management Network Application
EMS	Energy Management System
EOH	End Of Hour
EPI	Electricity Price Index
ESL	Energy Storage Limit (in MWh)
ESP	Electronic Security Perimeter
ETC	Existing Transmission Contract
ETSR	Energy Transfer System Resources
FERC	Federal Energy Regulatory Commission
FMCA	Fifteen-Minute Contingency Analysis
FMM	Fifteen-Minute Market
FMU	Frequently Mitigated Unit
FNM	Full Network Model
FODD	FERC Outgoing Data Depository
FRD	Flexible Ramp Down

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Acronym	Definition
FRU	Flexible Ramp Up
GDF	Generation Distribution Factor
GHG	Green House Gas
GIP	Generator Interconnection Procedure
GMC	Grid Management Charge
GPI	Gas Price Index
GRDT	Generator Resource Data Template
GUI	Graphical User Interface
HASP	Hour-Ahead Scheduling Process
HAVGC	Heat Average Cost (for non-gas resources)
HR	Heat Rate
IAIQ	IT Architecture, Integration and QA
ICE	InterContinental Exchange
ICM	Infrastructure Contracts and Management
ID	Identifier
IFM	Integrated Forward Market
ISL	Intertie Scheduling Limit
ISO	California Independent System Operator
IOOC	Integrated Optimal Outage Coordination
IT	Information Technology
ITC	Inter-Tie Constraint

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Acronym	Definition
ITPD	Information Technology Product Development
ITPM	Information Technology Product Management
ITS	Interchange Transaction Scheduler
JOU	Joint Owned Unit
LACA	Look-Ahead Contingency Analysis
LEL	Lower Economic Limit
LMP	Locational Marginal Price
LMPM	Locational Market Power Mitigation
LOL	Lower Operating Limit
LPT	Lower Price Taker
LRA	Local Regulatory Authority
LSE	Load Serving Entity
LTCA	Long-Term Contingency Analysis
MCI	Model and Contract Implementation
MD	Manual Dispatch
MDT	Minimum Down Time
MDS	Maximum Daily Startups
MF	Master File
MLAC	Minimum Load Average Cost
MLC	Minimum Load Cost
MLHAVGC	Minimum Load Heat Average Cost (for non-gas resources)

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Acronym	Definition
MLHR	Minimum Load Heat Rate
MMA	Major Maintenance Adder
MMAMLC	Major Maintenance Adder for Minimum Load Cost
MMASUC	Major Maintenance Adder for Start Up Cost
MMG	Manage Markets & Grid
MMR	Manage Market & Reliability
MOS	Manage Operations Support & Settlements
MPM	Market Power Mitigation
MQS	Market Quality System
MRID	Master Resource IDentifier
MRI-S	Market Results Interface – Settlements
MSS	Metered Sub System
MSSA	Metered Sub System Agreement
MSG	Multi-Stage Generator
MSOC	Minimum State Of Charge
MUT	Minimum Up Time
MV&A	Market Validation & Analysis
MVT	Market Validation Tool
N/A	Not Applicable
NA	Network Application
NDEB	Negotiated Default Energy Bid

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Acronym	Definition
NGR	Non-Generating Resource
NM	Network Model
NQC	Net Qualifying Capacity
OASIS	Open Access Same-time information System
OATI	Open Access Technology International
OC	Opportunity Cost
OCC	Opportunity Cost Calculator
ODCP	On Demand Capacity Procurement
OES	Operations Engineering Services
OMS	Outage Management System
OTS	Operations Training Simulator
PAM	Program and Application Management
PBC	Power Balance Constraint
PC	Pre-Calculation
PCA	Price Correction Admin
PCT	Price Correction Tools
PDR	Proxy Demand Resource
PI	Plant Information
PL	Participating Load
Pmax	Maximum Generation Capacity
Pmin	Minimum Generation Capacity

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Acronym	Definition
PMO	Program Management Office
PNM	Public New Mexico
Pnode	Pricing Node
POC	Point Of Contact
PRSC	Participating Resource Scheduling Coordinator
PSH	Pump Storage Hydro
PSTD	Power Systems Technology Development
PSTO	Power Systems Technology Operations
PT	Price Taker
PTO	Participating Transmission Owner
QRB	Quality Review Board
RA	Resource Adequacy
RC	Reliability Coordinator
RC-BSAP	Reliability Coordinator - Base Schedule Aggregation Portal
RCD	Reliability Capacity Down
RCSA	Reliability Coordinator Service Agreement
RCU	Reliability Capacity Up
RDRR	Reliability Demand Response Resource
RDT	Resource Data Template
RIG	Remote Intelligent Gateway
RIMS	Resource Interconnection Management System

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Acronym	Definition
RMR	Reliability Must Run
ROPR	Operating Reserve Ramp Rate
RR	Ramp Rate
RREG	Regulation Ramp Rate
RSE	Resource Sufficiency Evaluation
RT	Real-Time
RTBS	Real-Time Base Scheduler
RTCA	Real-Time Contingency Analysis
RTCD	Real-Time Contingency Dispatch
RTD	Real-Time Dispatch
RTLPT	Real-Time Lower Price Taker
RTPD	Real-Time Pre-Dispatch
RTPT	Real-Time Price Taker
RTM	Real-Time Market
RTUC	Real-Time Unit Commitment
RUC	Residual Unit Commitment
SADS	System And Design Specifications
SAMQ	Security, Architecture, Model Management & Quality
SC	Scheduling Coordinator
SCME	Scheduling Coordinator Meter Entity
SE	State Estimator

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Acronym	Definition
SIBR	Scheduling Infrastructure and Business Rules
SME	Subject Matter Expert
SOA	Service-Oriented Architecture
SOC	State Of Charge
SQMD	Settlements Quality Meter Data
SRS	System Requirement Specifications
SS	Self-Schedule
STC	State Transition Cost
STF	Short-Term Forecast
STC	State Transition Cost
STT	State Transition Time
STUC	Short-Term Unit Commitment
SUC	Start Up Cost
SUE	Start Up Energy
SUF	Start Up Fuel
SUT	Start Up Time
T	Trading Hour
TBD	To Be Determined
TEP	Tucson Electric Power
TG	Tie Generator
TNA	Transmission Network Application

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Acronym	Definition
TNGR	Tie Non-Generating Resource
TOP	Transmission Operator Provider
TOR	Transmission Ownership Contract
UAT	User Acceptance Testing
UEL	Upper Economic Limit
UI	User Interface
UIE	Uninstructed Energy Imbalance
UL	User Limited
UOL	Upper Operating Limit
VER	Variable Energy Resource
VOM	Variable Operations & Maintenance
VOMC	Variable Operations & Maintenance Cost
WebOMS	Web-based Outage Management System
XML	Extensible Markup Language
XSD	XML Schema Definition
ZIL	Zero Impedance Line