Release User Group Agenda

September 21, 2021   *10:00 a.m.–11:00 a.m.* (Pacific Time)

Web Conference Information	Conference Call Information
Web Address: https://caiso.webex.com/meet/RUG Meeting Number: 960 941 245 Audio connection instructions will be available after connecting to the web conference. When prompted, select "Call me" and enter the phone number you will use during the call. You will be called by the conference shortly.	*1-844-517-1271 US Toll Free* *+1-682-268-6591 US Toll* *Access code: 960 941 245*
Calls and webinars are recorded for stakeholder convenience, allowing those who are unable to attend to listen to the recordings after the meetings. The recordings will be publicly available on the ISO web page for a limited time following the meetings. The recordings, and any related transcriptions, should not be reprinted without the ISO's permission.	

Release User Group Agenda

September 21, 2021   *10:00 a.m. – 11:00 a.m. (Pacific Time)*

Time	Topic	Facilitator
10:00 – 10:05	Agenda & ISO Roll call	Trang Vo
10:05 – 10:45	Release Plan	Adrian Chiosea Janet Morris Bill Bonnell

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Upcoming ISO virtual training programs

Training Courses and workshops	Date and time
Short-Long Start Definitions Training (Tentative)	TBD
ISO Workshop - Intro to ISO Markets	October 5 and 6, 2021 (9am – noon)
ISO Workshop – Market Transactions	October 12 and 13, 2021 (9am – noon)
Variable Operations and Maintenance Cost Review (Tentative)	October 14, 2021 (11am – noon)
ISO Workshop – ISO Settlements	October 18 and 19, 2021 (9am – noon)
Email us at CustomerReadiness@caiso.com for any training or readiness related questions	

CustomerReadiness@caiso.com

Learning Center

Visit our **Learning Center** web page to access our training calendar, register for courses and find other informational resources: http://www.caiso.com/participate/Pages/LearningCenter/default.aspx

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ISO computer based training is always available

CustomerReadiness@caiso.com

New Modules
Outage Modifications in OMS
RIMS WebSDK Upgrade
OSI Enhancements 2021: MRI-S Monitoring Data
Real-Time Settlements Review Phase 2
Hybrid Resources Phase 2a
ESDER Phase 4
Today's Outlook: RA Capacity Trends
CIDI Enhancements
Outage Management System (webOMS) Enhancements
Process for Submitting Ongoing Obligations in CIDI
FERC Order 831 Market Simulation Scenarios
FERC Order 831 Import Bidding and Market Parameters
Resource Adequacy Enhancements Phase 1
Summer 2021 Readiness – Part 1
Summer 2021 Readiness – Part 2
Summer 2021 Readiness – Part 3

SC Training Topics
Day-Ahead Overview
Real-Time Overview
Master File Process
Market Pricing
Bids and Self-Schedules
Full Network Model
Settlements Process
Day-Ahead Settlements
Real-Time Settlements
Metering Overview
Ongoing Obligations
Credit Management
And many more….

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Release Plan Summary: 2021

Independent 2021
- ADS AS Test & Data Retention
- EIM Enhancements 2021 Phase 2
- Variable Operations and Maintenance Cost Review
- Operations Systems Improvements 2021 Enhancements
- RIMS UI Framework Upgrade

Fall 2021
- Energy Storage and Distributed Energy Resources Phase 4
- Hybrid Resources Phase 2-A
- EIM Base Schedule Submission Deadline Phase 1
- Real-Time Settlement Review Phase 2
- Intertie Shadow Pricing Resolution
- Short-Long Start Definitions

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Release Plan Summary: 2022

EIM Spring 2022 - March, April
- Energy Imbalance Market (EIM) 2022 - Avista
- Energy Imbalance Market (EIM) 2022 – Bonneville Power Administration
- Energy Imbalance Market (EIM) 2022 – Tacoma Power
- Energy Imbalance Market (EIM) 2022 - Tucson Electric Power

Spring 2022 - May 1
- Flexible Ramping Product Improvements Deliverability
- EIM Base Schedule Submission Deadline Phase 2
- Hybrid Resources Phase 2-B

Fall 2022 (tentative – subject to change pending Policy and planning activities)
- External Load Forward Scheduling Rights Process
- Resource Sufficiency Evaluation
- Day Ahead Market Enhancements
- TAC Structure Enhancements
- Resource Adequacy Enhancements Track 2
- Maximum Import Capacity Enhancements
- Transmission Register Replacement
- NOPR - Managing Transmission Line Ratings

2021 Independent

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2021 - ADS AS Test

- The California ISO, in conjunction with ADS users, has completed testing of the Unannounced AS Test functionality for Spin and Non-Spin.

- This feature was activated in the production environment on Monday, September 13, 2021. From that time, Operators will no longer receive a phone call to begin their Unannounced AS Test. From that point forward this will be an automated process in ADS. The ISO will utilize the phone call option as an alternate method only as a backup.

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- Resource Performance Verification Operating Procedure 5370, section 3.1.1.2.2 was updated to reflect this change. The updated version is effective and posted to our website on Monday, September 13. The procedure can be found on our website under Rules > Operating Procedures or by the following link: http://www.caiso.com/rules/Pages/OperatingProcedures/Default.aspx.

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2021 – ADS Data Retention

- Initially included in ADS Replacement project scope for 30 days
- Revised to 90 days based on customer feedback/use-cases
- Postponed to decouple retention changes from the ADS replacement effort to make the transition easier
- CAISO to pursue implementing data retention timeline
- Operationally, data needs to be archived for optimal ADS performance.
- Please plan and download/export the data needed beyond 90 days before archive
- Target timeline for implementing the 90 days Data Retention is October 2021. (exact date is TBD).
- Future Goal – planning underway to further reduce data retention to 30 days

2021 – EIM Enhancements 2021 Phase 2

Project Information	Details/Date
High Level Business Problem or Need	To collectively address important issues identified by EIM market participants through Customer Inquiry, Dispute and Information system (CIDI) requests to improve the visibility, functions and features in Energy Imbalance Market (EIM).
High Level Project Scope	• BAAOP: Specify parameters for Shared ramping capability constraint. • BAAOP: Separate ETSR Base from ETSR detail display
BPM Changes	EIM, Market Instruments
Tariff Change	Section 29.4
Impacted Systems	RTM/BAAOP, RTM/Integration, CMRI, RTM/BAAOP

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2021 – EIM Enhancements 2021 Phase 2 (cont'd)

System	High Level Changes
Real-Time Market (RTM) /Real-Time Base Schedule (RTBS)	• Offline units with Base schedule • centralized activation/de-activation means of this functionality • System shall consider offline resources that are cycling as available for the balancing, bid range capacity, and flexible ramp sufficiency tests if capable for startup within the next hour. Same for shutdown
Real-Time Market (RTM)	• Shared ramping capability constraint • UI for EIM entity input parameters for ramp sharing • Use in the optimization for each resource based on BAA ramp share parameters

Real-Time Market (RTM)/Real-Time Unit Commitment (RTUC) [(HASP, STUC, FMM)]	• Cycling resource with base schedule in Market
	• centralized activation/de-activation means of this functionality
	   o Real-Time Markets shall have the capability to automatically start-up an offline resource that is cycling if it is economic to run.
	   o Similarly, Real-Time Markets shall have the capability to automatically shut down an online resource that is cycling if is not economic to run.
	   o Consider EIM resources with positive base schedules above minimum load and with three-part bids as cycling during the relevant trade hour (i.e. optimize its unit commitment on the basis of its bids), with the following exceptions:
	   o Self-schedule exists
	   o Ancillary service base schedule exists (except when non-spin for an offline resource capable of startup within 10-minutes)
	   o Flexible ramp award exists (except when flex ramp up award for an offline resource capable of startup within 5-minutes)
	   o Inter-temporal constraint (startup time, minimum up time, minimum down time, maximum daily starts) prevents cycling
	• Real-time market horizon has limitation, where resource startup time plus minimum up time exceeds 240 minutes
	• Cycling shall include both startup and shutdown unit commitment decisions on basis of three-part bids (economic energy bid, startup, minimum load) and applicable temporal constraints.
	• A positive base schedule from a resource without an energy bid shall still be treated as a self-schedule.

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2021 – EIM Enhancements 2021 Phase 2 (cont'd)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	N/A	
External BRS	Milestone: Post External BRS	April 6, 2021	✓
Configuration Guides	Post Draft Configuration Guides	N/A	
Tech Spec	Create ISO Interface Spec (Tech spec)	N/A	
Tariff	File Tariff	N/A	
Production Activation	EIM Enhancements 2021 Phase 2 ETSR UI Shared Ramping Constraint	Dec 1, 2021 April 1, 2022	

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2021 – Variable Operations & Maintenance Cost Review

Project Information	Details/Date
High Level Business Problem or Need	This project proposes to change the structure of how operations and maintenance (O&M) costs are estimated for use in the CAISO markets.
High Level Project Scope	**Scope 1:** Clarifying the categorization principles for variable operations and variable maintenance costs **Scope 2:** Changing the default O&M adder values that can be used in lieu of negotiated values **Scope 3:** Allow market participants to reflect their variable O&M costs in start-up costs, minimum load costs, and/or default energy bids, thus replacing the current cost framework consisting of major maintenance adders and variable O&M adders.
BPM Changes	Market Instruments
Tariff Change	30.4.5, 39.7.1.1.2
Impacted Systems	SIBR, Master File, IFM/RTM, Settlements
Suggested actions:	FERC has approved the proposed tariff revisions filed on 3/3/2021, thus the new default O&M adder values will go into effect on 1/1/2022. From 5/17/21 to 6/18/21 market participants were given an opportunity to negotiate new O&M adders and/or renegotiate legacy MMAs and variable O&M adders to be consistent with the new O&M adder framework. Applications not submitted during this spring timeframe are not guaranteed to be completed prior to 1/1/2022. Any existing negotiated variable O&M adder and major maintenance adders existing on 1/1/2022 will be "grandfathered" in under the new cost framework. The CAISO has released further instructions via the draft BPM in May 2021, see http://www.caiso.com/Documents/BPMforMarketInstruments-AttachmentL-DRAFT.pdf .

System	High Level Changes
Scheduling Infrastructure Business Rules (SIBR)	<u>Scope 3:</u> SIBR will receive the variable minimum load O&M adder and variable start-up O&M adder from Master File. For default variable minimum load O&M adder and default variable start-up O&M adders, system must be enhanced to perform an automated calculation (*Min load O&M Adder = Default Min load O&M Adder * Resource's PMAX or Start up O&M Adder = Default start up O&M Adder * Resource's PMAX*). If the resource has elected for a negotiated variable minimum load O&M adder or negotiated variable start-up O&M adder, the value can be used directly without the need to multiply with the Pmax. SIBR rules will need to be updated to reflect the latest terminology: Major Maintenance Adder to new terms "Variable Start-up O&M adder" and "Variable Minimum Load O&M adder".
Master File	<u>Scope 2:</u> Default variable energy O&M adder, default variable minimum load O&M adder and default variable start-up O&M adders will be stored on a resource- and configuration-specific level. Two new flags will need to be added at the resource/configuration level: ○ Default or Negotiated Variable Energy O&M Adder (naming change: Variable Energy O&M Adder replaces the Variable O&M Adder) ○ Default/Negotiated Variable Minimum Load O&M Adder and Default/Negotiated Variable Start-up O&M Adder (both new) The one new flag and the two new adder values must be visible within the Resource Data Template (RDT).

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2021 – Variable Operations & Maintenance Cost Review   (cont'd)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Nov 18, 2020	✓
Tariff	File Tariff	March 3, 2021	✓
External BRS	Milestone: Post External BRS	Mar 25, 2021	✓
BPMs	Post Draft BPM Changes	May 7, 2021	✓
Negotiations	Phase 1 Negotiations Begin	May 17, 2021	✓
Config Guides	Post Draft Config Guides	N/A	N/A
Tech Spec	Create ISO Interface Spec (Tech spec)	May 28, 2021	✓
Negotiations	Phase 1 Negotiations Deadline	June 18, 2021	✓
External Training	Deliver External Training	Oct 14, 2021	
Production	Effective Date	Jan 1, 2022	

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2021 - Operations Systems Improvements 2021 Enhancements

Project Information	Description
High Level Business Problem or Need	• The goal of this project is to deliver timely systems improvements that support efficient day-to-day work and operations. The project aims to improve market robustness, performance, and the technology foundation for system grid reliability by updating functionality and interfaces to reduce workarounds, automating manual processes and addressing functionality enhancements. A list of specific high priority improvements will be the scope for the project. A number of these improvements may have an impact on the way in which customers interact with CAISO systems.
Affected Systems	• A preliminary list of enhancements is included on the next slide. PLEASE NOTE: This list may change as the project progresses and priority are factored. The goal is to provide advanced notification of changes whenever possible
Schedule	• External BRS v1.1 now available on CAISO.com • MAP Stage Availability TBD* • Customer Training TBD* • PROD TBD* * The plans for testing and deployment will vary between improvement items as these may be released individually or in groups. More information on specific improvements will be made available as planning and schedules are solidified.

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2021 - Operations Systems Improvements 2021 Enhancements

List of Proposed Improvements*

*PLEASE NOTE: This list may change as the project progresses and priorities are factored. The goal is to provide advanced notification of changes whenever possible

System	Summary Description	Next Step
DRRS	Creating an automated notification for Registration IDs with an End Date less than x business days	PROD – Sept
Market	Ability to block/unblock ETSRs for a specified Time interval	PROD - Sept
Market	ED Records Shall be Identified as Current or Non-Current within RTM	PROD - Oct
MRI -Settlements	Automate PTO submission of TAC Rates	PROD - Oct
ADS	Add advance filter, additional color scheme, change grid color	PROD - Nov
Market	Modify Unit Details UI currently in Coming Soon	PROD - Nov
MRI -Settlements	Request for all monitoring data to be viewable in MRI-S	Unstructured Mkt Sim – Sept 7
OMS	Ignore redundant curtailment points in API requests for aggregate children	Complete
OMS	FNM - Changes to Switch Display View	Complete
CIRA	Publish bilateral trades from CIRA to OASIS	TBD
CIRA	EFC data to OASIS Phase 3	TBD
OASIS	Outage Report Changes to the 'Curtailed and Non-Operational Generation' report	TBD
OMS	✓ Differentiate the SC & ACL for EIM external BA from CAISO BA	Complete
OMS	✓ Outage Report Changes to the 'Curtailed and Non-Operational Generation' report (with Summer 2021)	Complete
OMS	✓ NGR Outage process efficiency. (with Summer 2021)	Complete
OMS	✓ Further define when a COMMUNICATION or RELAY WORK outage does or does not impact a RAS	Complete
OMS	✓ FNM - Equipment Name should not be blank in the Outage Summary	Complete
Market	✓ Have resource "SOC_YN" flag to in the UI	Complete

2021 - RIMS UI Framework Upgrade

- The California ISO has implemented Resource Interconnection Management System (RIMS) and RIMSPUB changes along with URL changes on Monday, September 13, 2021.

- These RIMS and RIMSPUB changes impacts IPs and URLs. Please open the entire 45.42.16.0/21 network on port 443 (HTTPS) for our new IP space. The URL transition is transparent as long as you have white-listed the IP address and are accessing the tools via the portals (RC Portal, Market Participant Portal, EIM Portal). Please note that after the cutover you may receive an additional certificate prompt. If you experience an access issue please contact our Service Desk at (916) 351.2309 or servicedesk@caiso.com.

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- A training presentation describing the RIMS Enhancements, including URLS links, is available in the ISO Learning Center under New Modules at: http://www.caiso.com/participate/Pages/LearningCenter/default.aspx.

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2021 Fall Release

Fall 2021 Release - Overview

	BRS	Config Guide	Tech Spec	Mkt Sim Scenarios	Tariff	Training	Market Sim	Production Activation
Fall 2021 Release	**04/01/21**	**05/28/21**	**05/28/21**	**July 2021**	**07/23/21**	**09/10/21**	**Aug 30 - Oct 1, 2021**	**11/01/21**
ESDER Phase 4 BOG 9/30/20	02/03/21 08/05/21	05/27/21	05/28 MF 06/04 CMRI, OASIS 07/30 SIBR	06/30 08/05	Filed 3/19/21 (Amend) Filed 8/27/21 (Amend)	08/31/21	08/30/21 – 10/15/21	11/01/21
Hybrid Resources Phase 2-A BOG 11/18/20	03/26/21 08/04/21	N/A	05/27 MF	N/A	Filed 9/8/21	08/30/21	08/30/21 – 10/01/21	11/17/21
EIM Base Schedule Submission Deadline - Phase 1 BOG 12/17/20	01/15/21	N/A	N/A	03/05	Refiled 8/3/21	03/04/21	Apr 15 – Apr 23, 2021	11/01/21
Real-Time Settlement Review Phase 2 BOG 12/17/20	01/21/21	05/27/21	N/A	07/13	Filed, approved 4/30/21	08/25/21	08/30/21 – 10/01/21	11/01/21
Intertie Shadow Pricing Resolution	01/25/21	05/27/21	06/04 OASIS	N/A	N/A	N/A	08/30/21 – 10/15/21	11/01/21
Short-Long Start Definitions	06/21/21 08/26/21	05/27/21	N/A	N/A	File TBD	TBD	Start 10/04/21	Early 2022

California ISO

Fall 2021 – Energy Storage and Distributed Energy Resources Phase 4

Project Information	Details/Date
High Level Business Problem or Need	• Number and diversity of NGR energy storage resources continue to grow and represent an important part of the future grid. This initiative focuses on lowering barriers and enhancing the ability of these resources to participate in the CAISO's market.

High Level Project Scope	For non-REM LESRs:
	    Allowing End-Of-Hour (EOH) State-of-charge (SOC) biddable parameter in RTM.
	    Modification of Settlements RTM Bid Cost Recovery (BCR) to account for EOH SOC and Self-scheduling
	    Enhanced Default Energy Bids (DEB) calculations for storage resources for DAM and RTM that take into account Energy Costs, Storage-Based Variable Costs, and Price-Based Opportunity Costs
	    Applying Market Power Mitigation (MPM). **Note:** Sufficiently small "Safe Harbor" resources that do not have market power will be exempted from bid mitigation in DAM and RTM.
	For PDR, PDR-LSR curtailment and RDRR resources, consider Maximum Daily Run Time (MDRT) parameter.

BPM Changes	Demand Response, Energy Imbalance Market, Market Instruments, Market Operations, Settlements and Billing
Tariff Change	Section 4, 11, 30, 31, 34, 39, Appendix A, Appendix B
Impacted Systems	IFM/RTM, ALFS, CMRI, Master File, OASIS, SIBR, Settlements

Integrated Forward Market (IFM)	• Calculate DEB for all storage resources to account for: 1. Energy cost, 2. Variable cost, and 3. Opportunity cost
	• Energy cost (including accounting for round-trip efficiency)
	• Applies to NGR LESR non-REM resources only.
	• For NGR LESR non-REM resources:
	• For PDR, PDR-LSR curtailment and RDRR resources, add Max Daily Run Time (MDRT) as constraint in the optimization.
	• **Variable cost** (including Cell degradation cost [also called Cycling Cost])
	• **Opportunity cost**
	    ○ For DA DEB: calculated as the fourth highest hourly DA LMP price of the previous trade day IFM, scaled by the DA Bilateral hub index prices (DAB) between the two days.
	    ○ For RTM DEB: calculated as the fourth highest hourly DA LMP price of the same trade day IFM.
	• Calculated DEB will be daily value for each storage resource (one value DAM and another for RTM). If Negotiated Rate Option is chosen, the NDEB shall follow existing process same as non-storage resources.

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System	High Level Changes
Automated Load Forecast System (ALFS)	• Forecasting tools need to be tuned to reflect changes of the way NGR storage get dispatched.
CAISO Market Results Interface (CMRI)	• Update Default Energy Bid Curve report to add new Default Bid Type for storage resources. • Applies to NGR LESR non-REM resources only.

Master File (MF)	• Define the following parameters for each NGR energy storage resource (LESR non-REM only) with an effective date:
	    ○ Variable Cost (including Cycling Cost [also called Cell Degradation Cost])
	    ○ Mapping between NGR energy storage resources and bilateral hub index (ICE hub)
	• Define Max Daily Run Time (MDRT) for PDR, PDR-LSR curtailment and RDRR resources with an effective date

Open Access Same Time Information System (OASIS)	• Publish masked hourly EOH SOC public bids for NGR energy storage resources on T+90 (90 days after the trade date). • Applies to NGR LESR non-REM resources only.
Scheduling Infrastructure and Business Rules (SIBR)	• Add optional Min and Max End-Of-Hour (EOH) State Of Charge (SOC) as hourly biddable real-time parameters (in MWh) for NGRs. **Note**: Does not apply to DA bids. • Add validation for Min EOH SOC <= Max EOH SOC, validation for Min and Max EOH SOC to be within most restrictive of biddable Energy Storage Limits and MF registered Energy Storage Limits. • EOH SOC biddable parameters shall apply to NGR energy storage resources that have SOC management. Do not send EOH SOC parameters to STUC in advisory payloads. • Applies to NGR LESR non-REM resources only.
Settlements	• For accepted RTM EOH SOC bids in an hour, disqualify the resource from receiving RTM Bid Cost shortfall for that hour and the previous hour (flagged hours). • For RTM self-schedules in an hour, disqualify the resource from receiving RTM Bid Cost shortfall for the previous hour (flagged hour). • The RTM bid cost/revenue shortfall assessment shall be evaluated at each 5-minute interval of the flagged hours. • Existence of ED/MD instruction shall nullify the new BCR rules similar to how ED/MD instruction nullify existing RTM BCR rules for self-schedules resources. • RTM BCR rules applies to charging and discharging. • Business will verify that no rule changes to Metering Energy Adjustment Factors (MEAF). • There is no change to the AS award components of the RTM BCR settlement due EOH constraint or self-schedules. • There is no change to the DAM BCR settlement due EOH constraint or self-schedules. • **No impact for:** Exemption of variable output DRs that bids their <u>true</u> availability from RAAIM, similar to wind and solar is also be tied to ELCC approach adoption by the CPUC and implementation of DAME and RAE initiatives. • Applies to NGR LESR non-REM resources only.

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Fall 2021 – Energy Storage and Distributed Energy Resources Phase 4 (cont'd)

System	High Level Changes

Real-Time Market (RTM)	• For NGR LESR non-REM resources:
	    ○ Add hourly EOH SOC Min and Max as constraints in the optimization.
	    ○ RTM shall dispatch resources economically or uneconomically to satisfy most restrictive constraints among EOH SOC constraints and registered and bid-in energy storage limits.
	    ○ EOH SOC constraints shall take precedence over economic outcome of the optimization, including but not limited to energy bid curve and ancillary services bid.
	    ○ Respecting ancillary services awards, schedules, and obligations take precedence over satisfying EOH SOC constraints. This also applies to awarded AS in lower markets.
	    ○ EOH constraint shall apply to the last market interval of the hour (e.g. last 15-min for FMM [00:45-01:00] and last 5-min for RTD [00:55-01:00]).
	    ○ When the RTD end of horizon is earlier than the last interval of the hour where EOH SOC exist, align EOH SOC constraints between FMM and RTD, by adding implied End of Horizon SOC in RTD, using EOH SOC and the schedule MW from FMM.
	    ○ ED or MD shall have higher priority than meeting EOH SOC constraints.
	    ○ Apply LMPM to NGR energy storage resources for the entire operating range (discharging and charging).
	• For PDR, PDR-LSR curtailment and RDRR resources:
	    ○ Add Max Daily Run Time (MDRT) for DR resources as constraint in the optimization. Null shall be considered as no constraint.

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval - default energy bid proposal	Dec 17, 2020	✓
	Obtain Board of Governors Approval - final proposal	Sep 30, 2020	✓
External BRS	Publish External BRS	Feb 03, 2021 July 30, 2021	✓
Config Guides	Post Draft Config Guides	May 28, 2021	✓
Tech Spec	Publish Technical Specification	May 28, 2021 - MF Jun 4, 2021 - CMRI, OASIS Jul 30, 2021 – SIBR	✓ ✓ ✓
Tariff	File Tariff - tariff amendment (ER21-1487 File Tariff	Mar 19, 2021 Aug 27, 2021	✓ ✓
External Training	Deliver External Training	Aug 31, 2021	✓
Market Sim	Market Sim Window	Aug 30, 2021 - Oct 15, 2021	
Production Activation	ESDER Phase 4	Nov 01, 2021	

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Fall 2021 – Hybrid Resources Phases 2-A and 2-B - Overview

Project Information	Details/Date
High Level Business Problem or Need	The ISO launched this stakeholder initiative to identify new or enhanced market rules and business processes needed to accommodate hybrid resources, resources that consist of two sets of market rule changes that will facilitate mixed-fuel type project participation (hybrid and co-located resources) in the ISO markets.
High Level Project Scope	**Phase 2** focuses on modifications that will explore how hybrid generation resources can be registered and configured to operate within the ISO market. The initiative will further develop solutions allowing developers to maximize the benefits of their resource's configuration. Additionally, hybrid resource configurations also raise new operational and forecasting challenges that the ISO plans to address during this initiative. The Phase 2 project has been split into two separate implementations, phases 2-A and 2-B, to support strategic delivery timing. Phase 2-B information is available under the Spring 2022 release section. **Phase 2-A** is scheduled to implement Fall 2021. This phase focuses on implementing Ancillary Services (AS) and High Sustainable Limit (HSL) functionality with a focus on the EMS, IFM/RTM, ALFS, Settlements, and CMRI systems. **Phase 2-B** is scheduled to implement Spring 2022. This project phase focuses on implementing the Hybrid Dynamic Limit functionality along with all remaining project scope to include changes to systems RIMS, Master File, EMS, SIBR, IFM/RTM, OASIS, ALFS, Settlements, MRI-S Metering, CMRI, Today's Outlook, ISO Today Mobile Application, Monthly Renewables Performance Report, Wind and Solar Real-Time Dispatch Curtailment Report', and the Over Supply Page. **External BRS Posting:** An updated External BRS v1.1 has been posted.
BPM Changes	Direct Telemetry, Market Instruments, Market Operations, Metering, Settlements and Billing
Tariff Changes	Proposed sections 4.18, 34.1.6.3, 30.5.6.1 Sections 27.13, 8.4.1.1(g), 8.4.3, Appendix K, Parts A, B and C, 8.2.3, 8.4.5, 34.7, 11.6.6, 4.8.2, 40.9.2 (b) (D)
Impacted Systems	ALFS, CMRI, Reporting, IFM/RTM, Master File, OASIS, RIMS, Settlements, MRI-S Metering, SIBR, Today's Outlook, ISO Today Mobile Application, Monthly Renewables Performance Report, Wind and Solar Real-Time Dispatch Curtailment Report, Over Supply Page.

Fall 2021 – Hybrid Resources Phase 2-A

System	High Level Changes
Automated Load Forecast System (ALFS)	• Identification of variable energy resources (VER) • New forecast type for hybrid resources • Forecast for hybrid resources that elect for ISO forecast
CAISO Market Results Interface (CMRI)	• Updates to include resource specific forecast data for hybrid resources (VER components).
Reporting	• Potential: Update report(s) for resource tagging changes: Solar Total tag, Wind Total Tag, Battery Total Tag (Renewable watch, Curtailment Report, ISO Today), and new Hybrid Total Tag
Integrated Forward Market (IFM)/Real-Time Market (RTM)	• When any resource behind an ACC constraint has an AS award, all resources behind that ACC constraint must follow their DOT and receive the must follow flag • Create a new user interface to display the hybrid summary • Include dispatchable generation calculation in RTD and RTPD for co-located resources • Modify 'Must Follow DOT' flag for AS cleared or AS dispatched award ○ Must Follow DOT Flag must turn to 'Y' for Ancillary Service Cleared by resource ID • HSL needs to be integrated with the persistent methodology for co-located resources: Validation rules must be developed for the HSL • Validate the dynamic operating limits • Software that takes the submitted limit and haircuts the energy bid used in each interval of the market time horizon • Limit the economic dispatch of a hybrid resource in the real-time market based on data submitted to SIBR • For co-located resources and hybrids, add new user interfaces • Dynamic Limit functionality: • Display a hybrid resources upper limit and lower limit • Display VER availability • Display ambient derates • Provide the capability to submit energy-not-available thru the functionality
Settlements	• Consume new VER Component ID for forecasting fee • Updates to forecast fee calculation based on meter data submitted for the VER components that elect ISO forecast

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Fall 2021 – Hybrid Resources Phase 2-A (cont'd)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Nov 18, 2020	✓
External BRS	Milestone: Post External BRS	Mar 24, 2021	✓
	Revised BRS to specify scope for Phase 2-A (Fall 2021) and Phase 2-B (Spring 2022)	Aug 03, 2021	✓
Config Guides	Post Draft Configuration Guides	N/A	
Tech Spec	Create ISO Interface Spec (Tech spec)	May 28, 2021	✓
Structured Scenarios	Post proposed scenarios	N/A	
Tariff	File Tariff	Sep 8, 2021	✓
External Training	Deliver External Training	August 30, 2021	✓
Market Sim	Market Sim Window	Aug 30, 2021 - Oct 1, 2021	
Production Activation	Hybrid Resources Phase 2-A	Nov 17, 2021	

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Fall 2021 – Base Schedule Submission Deadline Phase 1

Project Information	Details/Date
High Level Business Problem or Need	• Provide EIM Scheduling Coordinators with additional flexibility to submit more accurate base schedules closer to the operating hour. • Update tariff rules and market systems to allow EIM Entities to submit base schedules with energy below a resource's minimum load. • Allow CAISO and EIM Entities to more accurately capture the startup energy of large conventional resources within their Resource Sufficiency Evaluations (RSE), thus increasing their ability to pass the RSE while lowering their exposure to uninstructed imbalance energy settlement. *across Phase 1 & 2

High Level Project Scope	**Phase 1:**
	Inclusion of startup energy below a resource's minimum load:
	•Include startup energy in an EIM base schedule
	      o Include startup energy in the resource sufficiency evaluation (RSE)
	      o Reduction of imbalance energy settlement
	
	Phase 2, Fall 2021:
	Updates to the base schedule submission timeline
	    •Move market closing for the final binding EIM base schedule submissions from T-40 to T-30 -
	        oAdding additional RSE at T-40

BPM Changes	EIM Market Instruments Market Operations Settlements *across Phase 1 & 2
Tariff Change	11.8.6.3 BCR Settlement 29.11 Startup Energy Settlement 29.34 Base Schedules below Pmin and Submission Timeline Adjustment *across Phase 1 & 2
Impacted Systems	**Phase 1**: RTM, Settlements, BSAP, RCBSAP, CMRI **Phase 2, Fall 2021**: RTM, BSAP, ITS, CMRI

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Fall 2021 – Base Schedule Submission Deadline Phase 1 (cont'd)

System	High Level Changes
RTM	**Phase 1:** • Include startup energy in balancing test only for EIM entities • EIM RSE to include energy below minimum load (startup energy) would only be on the balancing test • Startup energy will not be included as part of CAISO's RSE **Phase 2, Fall 2021:** • Shorten the run time of the current T-37.5 RTPD interval • Move start time to after T-30 • Result publication remains at T-22.5 • Final RSE will begin following T-30 deadline • Add additional RSE test
Settlements	**Phase 1:** • Settlements will treat startup energy as part of a EIM base schedule (not paid/charged for energy) • Deviations from the base schedule to be settled as uninstructed imbalance energy (UIE) • The intervals where BASE Schedules reflect Start Up Energy, should be considered self-committed startups • Startup energy will not be included as part of CAISO's RSE • Update calculation for Bid Cost Recovery (BCR) transfer amounts (if this initiative precedes Real-Time Settlements initiative then requirements will be taken from Real-Time Settlement initiative for the BCR calculation)
BSAP	**Phase 1:** • Modify the logic of the BSAP to allow for startup energy to be submitted as part of an EIM entity's base schedule • EIM base schedules to include a resources entire energy output, including portions below minimum load **Phase 2, Fall 2021:** • Send base schedule to market at T-30
RCBSAP	**Phase 1:** Modify the logic of the RCBSAP to allow for startup energy to be submitted as part of an EIM entity's base schedule
ITS	**Phase 2, Fall 2021:** • ITS will need to adjust the timing of RTPD publication checks and adjustments to account for the RTPD change from T-37.5 RTPD to T-30 • RTPD 5 run will be decreased to around five and a half minutes • RTPD 5 run will be considered late at T-22.5 • RTPD 4 should start at T-21.5 • Payload times need to be adjusted
CMRI	**Phase 1:** • Leverage existing EIM Base Schedule report in CMRI Base schedule energy below Pmin reflected **Phase 2, Fall 2021:** • Additional payload consumed at T-30 for test results • Receive results from RTPD 5 run by T-22.5

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Fall 2021 – Base Schedule Submission Deadline Phase 1 (cont'd)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Dec 17, 2020	✓
External BRS	Milestone: Post External BRS	Jan 15, 2021	✓
Config Guides	Post Draft Config Guides	Jan 19, 2021	✓
Tech Spec	Create ISO Interface Spec (Tech spec)	N/A	
Tariff	File Tariff	Jan 27, 2021	✓
	Re-file Tariff	Aug 03, 2021	✓
BPMs	Draft BPM changes	N/A	
External Training	Deliver External Training	Mar 04, 2021	✓
Market Sim	Market Sim Window	Apr 15, 2021 - Apr 23, 2021	✓
Production Activation	EIM BSSD Phase 1_Start-up Energy	Nov 01, 2021	

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Fall 2021 – Real Time Settlements Review Phase 2

Project Information	Details/Date
High Level Project Scope	Clarify Tariff language that involves a market rule change that will allow an EIM entity not to settle Unaccounted for Energy (UFE) for each EIM entity.
BPM Changes	Settlements & Billing Market Operations Energy Imbalance Market
Tariff Change	29.11 (q), (r), (c) (2), 11.8.6.3
Impacted Systems	Settlements, Master File, RTBS

System	High Level Changes
Settlements	• Configuration settlement changes for UFE charge codes
Master File (MF)	• Need to establish a base transfer system resources at a transfer location between EIM BAAs and the default the Settlement Flag = Y
Real Time Base Schedule (RTBS)	• System shall receive the transmission loss percentage from Master File. **Note:** This requirement moves the maintenance of this data set to Master File.

Fall 2021 – Real Time Settlements Review Phase 2 (cont'd)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Dec 17, 2020	✓
External BRS	Milestone: Post External BRS	Jan 21, 2021	✓
Config Guides	Post Draft Config Guides	May 27, 2021	✓
Tech Spec	Create ISO Interface Spec (Tech spec)	N/A	NA
BPMs	Draft BPM changes	Aug 20, 2021	✓
External Training	Deliver External Training	Aug 25, 2021	✓
Market Sim	Market Sim Window	Aug 30, 2021 - Oct 1, 2021	
Production Activation	Real Time Settlements Review Phase 2	Nov 01, 2021	

California ISO

Fall 2021 – Intertie Shadow Pricing Resolution

Project Information	Details/Date
High Level Business Opportunity	**What:** Fix AS shadow price ambiguity in OASIS. **When:** It occurs at the Malin500 intertie 4-5 days per year. **Why do we have this opportunity:** The shadow price is appearing in OASIS, however it is not labelled as being for AS, and thus participants incorrectly assume it is for EA. This causes confusion when it does not match expected shadow prices.
High Level Project Scope	Add a feature to OASIS to indicate whether shadow prices are from ancillary services alone (AS) or Energy + Ancillary Services (EA) Use AS shadow price in calculating AS resource price
BPM Changes	Market Instruments
Tariff Change	11.10.1.1.1, 11.10.1.2.1
Impacted Systems	OASIS, Settlements

System	High Level Changes
OASIS	Existing OASIS shadow-price related reports to indicate whether the Intertie Transmission Constraint (ITC) or Intertie Scheduling Limit (ISL) Shadow Price was congested due to either (1) Energy and Ancillary Service [EA] or (2) Ancillary Service [AS] only for each market interval (suggested identifier attribute "Limit Type"). • Market runs DA, RTPD, RTD = report: Intertie Constraint Shadow Prices • Market run real-time Contingency Dispatch = report: Contingency Dispatch Intertie Constraint Shadow Prices • Market runs DA, RTPD, RTD MPM process = report: MPM Intertie Constraint Shadow Prices The report must publish the market output "Limit Type" result per interval, as well any post-market corrections.
Settlements	Settlements shall map to TIE CONGESTION component to define AS Imports Congestion Shadow Price in the import & export direction. • For Regulation Up, Non-Spinning Reserve, and Spinning Reserve, the tie congestion component will reflect the shadow prices of EA and AS type in the import direction. • The direction drives the value that goes into the Upward AS • For Regulation Down, the tie congestion component will reflect the shadow prices of EA and AS types in the export direction. • The direction drives the value that goes into the Downward AS

Fall 2021 – Intertie Shadow Pricing Resolution (cont'd)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Board of Governors Approval	N/A	
External BRS	Milestone: Post External BRS	Jan 25, 2021	✓
Config Guides	Post Draft Config Guides	May 28, 2021	✓
Tech Spec	Publish Tech Spec	Jun 4, 2021	✓
Tariff	Tariff updates	N/A	
BPMs	Publish BPMs	N/A	
External Training	Deliver External Training	N/A	
Market Sim	Market Sim Window - Unstructured	Aug 30, 2021 - Oct 15, 2021	
Production Activation	Intertie Shadow Pricing Resolution	Nov 1, 2021	

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Fall 2021 – Short-Long Start Definitions

Project Information	Details
High Level Business Problem or Need	- To align market applications and business processes with revised ISO Tariff definitions of Short and Long Start resources. - To simplify and streamline CAISO definitions regarding startup classifications. - To clarify operational and settlement communication and outcomes for EIM and ISO market participants.
High Level Project Scope	- Update current ISO Tariff definitions and business practice manuals. - The Medium Start definition will be removed and rolled into the Short Start definition. - Clarify operational and settlement communication and outcomes for EIM and ISO market participants.
BPM Changes	- Definitions & Acronyms - Market Instruments - Market Operations - Reliability Requirements - Settlements & Billing
Tariff Change	The tariff is being changed to 1) align the market and settlement systems, and 2) align to the existing real-time optimization horizon. Sections: 34.3.1, 34.3.2, 34.6 40.6.2

Impacted systems	Details
Market Quality System (MQS)	Auxiliary Processes (Startup, Minimum Load, and Transition Cost BCR pre-qualification) shall consider a resource to be eligible for real-time commitment if the sum of startup time and minimum up time is 240 minutes or less (was previously startup time 270 minutes or less.)
SIBR	Update bid insertion rules to account for changes to Short Start and Long Start definitions under tariff revisions; account for the DA/RT unit commitment 240 minute cycle time for Short Start units (was previously 270 minutes). As previously implemented, Long Start units will not have bid-insertion performed in real-time markets if not committed in the Day-Ahead Market.
Integrated Forward Market, Real Time Market (IFM, RTM)	• Update IFM and RTM market systems to have the DA binding commitment cycle time (startup time + minimum up time) changed from 270 to 240 minutes. • No software impacts to Operator Displays.
Settlements	Settlement systems shall account for new tariff startup definitions when applying DA/RT Bid Cost Recovery, AS Non-Spin/Spin No Pay, and RAAIM Pre-Calc calculations.

Fall 2021 – Short-Long Start Definitions

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	N/A	
External BRS	Post External BRS	Jun 21, 2021	✔
Config Guides	Post Draft Config Guides	May 27, 2021	✔
Tech Spec	Create ISO Interface Spec (Tech spec)	N/A	
Tariff	File Tariff	TBD	
BPMs	Post Draft BPM changes	TBD	
External Training	Deliver External Training	TBD	
Market Sim	Market Sim Window	Start Oct 04, 2021	
Production Activation	Short-Long Start Definitions	Early 2022	

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2022 Spring Release

Spring 2022 – EIM integrations for Avista, BPA, Tacoma Power, Tucson Electric Power

Project Info	Details/Date
Application Software Changes	Implementation of Avista, BPA, Tacoma Power, and Tucson Electric Power as EIM Entities
BPM Changes	EIM BPM will be updated if needed to reflect new modeling scenarios identified during implementation and feedback from Avista, BPA, Tacoma Power, and Tucson Electric Power .
Market Simulation	October 1, 2021 - February 3, 2022
Parallel Operations	February 2022 thru March 2022

Milestone Type	Milestone Name	Dates			
		Avista	BPA	Tacoma Power	Tucson Electric Power
Market Sim	Market Sim Window	10/1/21 - 11/30/21	10/1/21 - 11/30/21	10/4/21 - 12/3/21	12/1/20 - 1/31/21
Parallel Operations	Parallel Operations	Feb 2020 thru Mar 2022			
Tariff	File Readiness Certification	Mar 2022			
Production	Activation	3/2/22	3/2/22	3/2/22	4/1/22

Spring 2022 – Flexible Ramping Product Improvements Deliverability

Project Information	Details/Date
High Level Project Scope	The scope of the project FRP Deliverability is: 1. Procurement of FRP for BAA's that fails the flex test is separate for each BAA. 2. Procurement of FRP for BAA's that pass the flex test for the entire group of BAA. 3. Transmission constraints and transfer limits are enforced in FRP deployment scenarios 4. Distributing the uncertainty requirement in each BAA load and VER locations versus just load 5. Distributing the demand curve surplus variable as a decision variable at load aggregation points (LAP) versus Balancing Authority Areas (BAA) 6. To establish the Locational Marginal Capacity Prices (LMCP) for FRP
BPM Changes	Market Instruments, Market Operations
Tariff Change	Yes
Impacted Systems	RTM, Settlements, CMRI/OASIS

System	High Level Changes
Real Time Markets (RTM)	• RTM to be impacted based on the change in the FRP procurement systems. • Input data needed for forecasted advisory in the binding interval for RTPD for approx. 40 work days or weekends. • New demand curve calculation is needed.
Settlements	• Prices are nodal therefore mechanics for cost allocation pricing to be changed • Nodal FRP prices
CAISO Market Results Interface (CMRI)/ Open Access Same time Information (OASIS)	• Publish Resource Nodal prices for the FRP awards (CMRI) • Publish requirements for FRP per BAA and BAA group (OASIS) • Publish surplus by LAP (OASIS) • Publish the nodal FRP prices (OASIS)

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Spring 2022 – Flexible Ramping Product Improvements Deliverability

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Sept 30, 2020	✓
External BRS	Publish External BRS	Jan 28, 2021	✓
Config Guides	Post Draft Config Guides	TBD	
Tech Spec	Publish Technical Specification	N/A	
Tariff	File Tariff	TBD	
BPMs	Publish Draft BPM updates	TBD	
External Training	Deliver External Training	TBD	
Market Sim	Market Sim Window	Start Feb, 2022	
Production Activation	FRP Deliverability	May 01, 2022	

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Spring 2022 – EIM Base Schedule Submission Deadline Phase 2

Project Information	Details/Date
High Level Business Problem or Need	Provide EIM Scheduling Coordinators with additional flexibility to submit more accurate base schedules closer to the operating hour. Allow CAISO and EIM Entities to more accurately capture the startup energy of large conventional resources within their Resource Sufficiency Evaluations (RSE), thus increasing their ability to pass the RSE while lowering their exposure to uninstructed imbalance energy settlement.
High Level Project Scope	Updates to the base schedule submission timeline • Move market closing for the final binding EIM base schedule submissions from T-40 to T-30, and add additional RSE at T-40 • Note: Base Schedule Validation outlined in the Policy paper will be covered in existing Market Validation processes so no additional manual or automated business process requirements are needed for Tariff compliance.
BPM Changes	EIM, MI, MO, Settlements
Tariff Change	No
Impacted Systems	RTM, Settlements, BSAP, RCBSAP, ITS, ADS, CMRI/OASIS

Spring 2022 – EIM Base Schedule Submission Deadline Phase 2 (cont'd)

System	High Level Changes
Real-Time Market (RTM)	**Phase 2:** • Shorten the run time of the current T-37.5 RTPD interval • Move start time to after T-30 • Result publication remains at T-22.5 • Final RSE will begin following T-30 deadline • Add additional RSE test
Base Schedule Aggregation Portal (BSAP)	**Phase 2:** • Send base schedule to market at T-30
Interchange Transaction Scheduler (ITS)	**Phase 2:** • ITS will need to adjust the timing of RTPD publication checks and adjustments to account for the RTPD change from T-37.5 RTPD to T-30 • RTPD 5 run will be decreased to around five and a half minutes • RTPD 5 run will be considered late at T-22.5 • RTPD 4 should start at T-21.5 • Payload times need to be adjusted
CAISO Market Results Interface (CMRI)	**Phase 2:** • Additional payload consumed at T-30 for test results • Receive results from RTPD 5 run by T-22.5

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Spring 2022 – EIM Base Schedule Submission Deadline Phase 2 (cont'd)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Dec 17, 2020	✔
External BRS	Milestone: Post External BRS	Jan 15, 2021	✔
Production Activation	EIM Base Schedule Submission Deadline Phase 2	May 01, 2022	

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Spring 2022 – Hybrid Resources Phases 2-B - Overview

Project Information	Details/Date
High Level Business Problem or Need	The ISO launched this stakeholder initiative to identify new or enhanced market rules and business processes needed to accommodate hybrid resources, resources that consist of two sets of market rule changes that will facilitate mixed-fuel type project participation (hybrid and co-located resources) in the ISO markets.
High Level Project Scope	**Phase 2** focuses on modifications that will explore how hybrid generation resources can be registered and configured to operate within the ISO market. The initiative will further develop solutions allowing developers to maximize the benefits of their resource's configuration. Additionally, hybrid resource configurations also raise new operational and forecasting challenges that the ISO plans to address during this initiative. The Phase 2 project has been split into two separate implementations, phases 2-A and 2-B, to support strategic delivery timing. Phase 2-B information is available under the Spring 2022 release section. **Phase 2-A** is scheduled to implement Fall 2021. This phase focuses on implementing Ancillary Services (AS) and High Sustainable Limit (HSL) functionality with a focus on the EMS, IFM/RTM, ALFS, Settlements, and CMRI systems. **Phase 2-B** is scheduled to implement Spring 2022. This project phase focuses on implementing the Hybrid Dynamic Limit functionality along with all remaining project scope to include changes to systems RIMS, Master File, EMS, SIBR, IFM/RTM, OASIS, ALFS, Settlements, MRI-S Metering, CMRI, Today's Outlook, ISO Today Mobile Application, Monthly Renewables Performance Report, Wind and Solar Real-Time Dispatch Curtailment Report', and the Over Supply Page. **External BRS Posting:** An updated External BRS v1.1 has been posted.
BPM Changes	Direct Telemetry, Market Instruments, Market Operations, Metering, Settlements and Billing
Tariff Changes	Proposed sections 4.18, 34.1.6.3, 30.5.6.1 Sections 27.13, 8.4.1.1(g), 8.4.3, Appendix K, Parts A, B and C, 8.2.3, 8.4.5, 34.7, 11.6.6, 4.8.2, 40.9.2 (b) (D)
Impacted Systems	ALFS, CMRI, Reporting, IFM/RTM, Master File, OASIS, RIMS, Settlements, MRI-S Metering, SIBR, Today's Outlook, ISO Today Mobile Application, Monthly Renewables Performance Report, Wind and Solar Real-Time Dispatch Curtailment Report, Over Supply Page.

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Spring 2022 – Hybrid Resources Phase 2-B (Cont'd)

System	High Level Changes
Automated Load Forecast System (ALFS)	• Identification of variable energy resources (VER) • New forecast type for hybrid resources • Forecast for hybrid resources that elect for ISO forecast
CAISO Market Results Interface (CMRI)	• Updates to include resource specific forecast data for hybrid resources (VER components).
Reporting	• Potential: Update report(s) for resource tagging changes: Solar Total tag, Wind Total Tag, Battery Total Tag (Renewable watch, Curtailment Report, ISO Today), and new Hybrid Total Tag
Integrated Forward Market (IFM)/Real-Time Market (RTM)	• When any resource behind an ACC constraint has an AS award, all resources behind that ACC constraint must follow their DOT and receive the must follow flag • Create a new user interface to display the hybrid summary • Include dispatchable generation calculation in RTD and RTPD for co-located resources • Modify 'Must Follow DOT' flag for AS cleared or AS dispatched award ◦ Must Follow DOT Flag must turn to 'Y' for Ancillary Service Cleared by resource ID • HSL needs to be integrated with the persistent methodology for co-located resources: Validation rules must be developed for the HSL • Validate the dynamic operating limits • Software that takes the submitted limit and haircuts the energy bid used in each interval of the market time horizon • Limit the economic dispatch of a hybrid resource in the real-time market based on data submitted to SIBR • For co-located resources and hybrids, add new user interfaces • Dynamic Limit functionality: • Display a hybrid resources upper limit and lower limit • Display VER availability • Display ambient derates • Provide the capability to submit energy-not-available thru the functionality

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Spring 2022 – Hybrid Resources Phase 2-B (Cont'd)

System	High Level Changes
Master File (MF)	• Enhance MF to identify Hybrid resources • Create a new categorization in MF to identify hybrid resources to handle dynamic limits • Add the ability to store the state-or-charge minimum and maximum limit • Identification of variable energy resources (VER) • Enhance MF to map hybrid resource to individual VER component(s) • **Note:** Renewable registration for VER components is currently mapped to Resource ID; will need further automation to map to individual VER component • New unit type to identify a hybrid resource under the existing NGR model • New identification of individual renewable components that make up a hybrid resource • Ability to elect for ISO forecast or SC submitted forecast to be at the renewable component level • Make the new categorization of hybrid resources along with associated attributes available for downstream applications • Add a MF rule to make sure the 'MOO Qualified Flag' is set to "N" for hybrid resources • Modifications to support the need for a few MF resource attributes (for example, fuel type, technology type, QF Flag, VER NGR flag, etc.) that need to be associated to the VER components that make up the hybrid resources • Map PI Tags (VER actual and meteorological tags) to each Resource ID or VER component. **Note:** System to be determined per Architecture Definition
Open Access Same Time Information (OASIS)	• Updates to create a new category for hybrid resources to be included in the forecast data reports.
Settlements	• Consume new VER Component ID for forecasting fee • Updates to forecast fee calculation based on meter data submitted for the VER components that elect ISO forecast
Metering (MRI-S)	• Ability to receive meter data at the VER Component ID level for hybrid resources • Updates for Western Renewable Energy Generation Information System (WREGIS) reporting of meter data on the Hybrid components
Scheduling Infrastructure and Business Rules (SIBR)	• Treat all hybrid resources as non REM NGRs • Flagging must be configured to ensure bid insertion does not occur • SIBR rules and new rule flow needs to be created to receive and validate the dynamic operating limits • Software that allows market participant to submit their dynamic limit • Allow submission of upper and lower economic limits for each 5-minute interval in a three hour window for hybrid resources • Validation of upper and lower economic limits • Validate the dynamic operating limits

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System	High Level Changes

Resource Interconnection Management System (RIMS)	• Enhance to identify Hybrid resources
	• RIMS will need to add a new Milestone type under App & Study > Project Summary > Status Report and Milestones: add Milestone Type "Co-located / Hybrid"
	• Under MPAI > General Info, below the drop box for additional fuel type, add "Co-located/Hybrid:" and add a drop down box with three choices – blank, "Co-located" and "Hybrid." App & Study will provide this information to MPAI when the project is pulled from App & Study.
	• Collect topographical map and Site Information for hybrid resources
	• Reference Tariff Appendix Q: Automation of existing manual processes for all renewable resources (resources ID or VER component) - Site Sheets and Topo Maps
	    Impacts and Design Suggestions:
	    ○ Automate the **Site Sheets** to automatically validate and review for accuracy by creating validation checks for the submitter.
	        ➢ Allow the submitter to enter all of their information in a web form (one form for solar resources and one for wind resources).
	        ➢ Incorporate validation check on information submitted to ensure all fields are entered correctly and match Appendix Q formatting (e.g., WGS84 coordinates, resource type filled out, address provided is a legitimate address).
	        ➢ Add a web form check option to determine if primary met station equipment is LiDAR or not.
	        ➢ Information entered into the system can be compiled into a site sheet (XLSX or PDF format), but the information can also be stored in a database for retrieval and query.
	    ○ Automate **Topo Maps** validation checks.
	        ➢ Require submitter to enter a list of coordinates for necessary elements on the topo map (project corners, met station location, and/or turbine locations) via a web form. The web form could then cross reference coordinates with the site sheet to confirm all information has been entered accurately and correctly.
	        ➢ Require submitter to upload a digital copy (PDF) of their topo map.
	        ➢ Require submitter to upload a picture of the physical site.

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Ways to participate in releases

- Visit the Release Planning page
  - http://www.caiso.com/informed/Pages/ReleasePlanning/Default.aspx

- Attend meetings
  - Release Users Group (RUG) bi-weekly meetings
    - Initiative status updates
    - System change updates on independent releases
  - Market Simulation calls
    - Visit the ISO calendar at www.caiso.com for meeting dates and times and add events to your calendar
    - Typically held on Mondays and Thursdays
  - Market Performance and Planning Forum
    - Bi-monthly review of market performance issues
    - High level discussion of release planning, implementation and new market enhancements

What to look for on the calendar…