

Business Practice Manual for Market Instruments

Version 91

Last Revised: March 26, 2025

Approval History

Approval Date: March 27, 2009

Effective Date: March 31, 2009

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BPM Owner's Title: Director, Operations Readiness

Revision History

Version	Date	Description
91	3/26/2025	PRR 1609 Update to OASIS report on nodal limits regarding Convergence bidding
90	12/23/2024	PRR 1598 Clarification on OASIS posting of CAISO system demand
89	12/2/2024	PRR 1592 Addition of new price correction summary report on OASIS PRR 1591 Updates to the hourly energy shaping factor from the price formation enhancements phase 2 initiative
88	10/28/2024	PRR 1586 Addition of two new fields to GRDT to support FERC Order 2222
87	9/27/2024	PRR 1581 Rules of bidding above soft offer cap as result of price formation project
86	7/1/2024	PRR 1574 Addition of new Real Time Advisory Shutdown Instructions Customer Market Results Interface report PRR 1558 New OASIS report labeled ATC for PWT Requests
85	4/9/2024	PRR 1546 New market active resource constraint report on customer market results interface
84	11/29/2023	PRR 1539 These BPM updates are being made to reflect the more recent default variable operations and maintenance (VOM) adders as a result of the 2023 VOM Cost Review.
83	10/26/2023	PRR 1537 New customer market results interface report that displays Hold state-of-charge exceptional dispatch data PRR 1534 Updated for the full functionality of the WA WEIM GHG enhancements project. These changes undo the previous edits made related to the interim alternative solution implemented for this project and reflect the more permanent, full functionality

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		<p>PRR 1531 Two new customer market results interface reports that display market priority types</p> <p>PRR1524 Provide information on new OASIS reports created by the MIC enhancements project.</p>
82	10/2/2023	<p>PRR 1516 Bidding limitations for non-generating resources and default energy bid changes associated with energy storage enhancements track 1;</p> <p>PRR 1517 Transition cost bid adjustments, reference level change request clarifications, hydro default energy bid update; wholesale electricity price calculation update</p>
81	7/31/2023	PRR 1511 Clarifications regarding the use limit plan data template and opportunity costs for use-limited resources
80	6/29/2023	<p>PRR 1496 Updating fuel region prices</p> <p>PRR 1500 Open access same time information system and CAISO market results interface report changes for resource sufficiency evaluation enhancements phase 2 project</p> <p>PRR 1502 Clarifications to component level dispatchable flag</p>
79	4/28/2023	PRR 1507 Related to the Washington WEIM GHG Enhancements project which includes updated calculations for default energy bids and commitment costs for resources subject to Washington's GHG compliance program. This is a temporary alternative solution that will remain in effect until the full functionality can be implemented (expected in Fall 2023)
78	4/5/2023	PRR 1484 Updates due to hybrid resources phase 2b
77	3/17/2023	Corrected inadvertently missed edits in approved PRR 1357 (FERC 831 phase 2 project) found in Attachment O and Attachment D.8.2.
76	1/31/2023	<p>PRR 1480 Updated section on hydro default energy bid submissions to provide more guidance WEIM entities</p> <p>PRR 1479 Added description of the residual unit commitment under supply infeasibility and enforced constraints report</p> <p>PRR 1471 Flexible ramping product deliverability</p>
75	12/5/2022	PRR 1467 Reliability demand response resource enhancements phase 2 supporting resource data template Changes
74	10/13/2022	Corrected edit from PRR 1442 MIN_PUMP_CST attribute in Section B.2.1
73	8/25/2022	PRR 1446 Updates to the list of acceptable use limitations, clarifications to the calculation of opportunity cost adders for use-limited resources
72	7/28/2022	<p>PRR 1442 Allowing for the bidding of negative pumping costs.</p> <p>PRR 1402 Updates to after-market cost recovery and reference</p>

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		level calculator change requests for Extremely Long Start resources
71	6/29/2022	<p>PRR 1439 New OASIS and CMRI reports and additions for the RSE and TSMSP projects. Specifically for the RSE project, a new CMRI report for Resource Bid Range Capacity and new field additions to the existing Flex Ramp Capacity and Bid Capacity Test Data reports. For TSMSP, new OASIS reports for Load Adjustments and Schedule Reductions. This is effective June 1 2022.</p> <p>PRR 1434 Reliability Demand Response Resource Bidding Enhancements in real time market</p>
70	6/1/2022	PRR 1414 Change to short and long start definitions
69	5/18/2022	<p>PRR 1393 Variable operations and maintenance cost changes</p> <p>PRR 1405 BPM edits related to Energy storage and distributed energy resources phase 4 cleanup</p>
68	11/17/2021	<p>PRR 1386 Hybrid resources phase 2A changes. Targeted for 11/30/2021</p> <p>PRR 1381 Enhancement to the Default Energy Bids calculations for the storage resources related to energy costs, variable costs, and price based opportunity costs. Target Date: 11/1/2021</p>
67	08/12/2021	<p>PRR 1353 Provide clarification that the negative SUPP component for EIRs is a result of market curtailment.</p> <p>PRR1357 Changes related to FERC Order 831 Phase 2, adding Appendix P that details the Max Import Bid Price calculation, and other miscellaneous edits.</p>
66	6/29/2021	<p>PRR 1340 To clarify the expectation of the types of costs that can be included in the Average Costs field the Generator Resource Data Template. (B.2.4, B.2.5)</p> <p>PRR 1346 This change is related to summer readiness initiative focus on Master File changes. (Att B)</p> <p>PRR 1354 These changes are being made to further clarify the CAISO's practices around the processing Reference Level Change Requests. The CAISO is also clarifying the content of certain CMRI reports (C,O,10)</p>
65	6/03/2021	PRR 1336 This is related to FEREC Order 831 compliance filing. This phase of FERC order 831 compliance filing is related to the price-screening methodology for import bids greater than \$1,000/MWh.

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64	3/30/2021	<p>PRR 1321 This is a result of a discussion with market participants. The change is intended to clarify how some PDRs will get dispatch information from CMRI. The material was developed in a training document and we are memorializing it in the BPM.</p> <p>Additional changes to add more clarity to section 8</p>
63	2/1/2021	<p>PRR 1304 New process related to requests for some negotiated rates.</p>
62	10/28/2020	<p>PRR 1281 Changes and enhancements are related to user display, new reports for added market transparency based on feedback from market participants in the Energy Imbalance Market.</p>
61	10/07/2020	<p>PRR 1203 This update is for adding functionality to make Reference Level Change Requests and re-defines Proxy Costs and Default Bids through the Commitment Cost and Default Energy Bid initiative (CCDEBE).</p> <p>PRR 1245 This update is related to part 3B of energy storage and distributed energy resource (ESDER) multi-phased initiative Effective date:10/1/2020</p> <p>PRR 1261 This is due to FERC order 841 where the ISO will do modification to ensure NGR resources do not incur charges for which the resource has a negative energy. So we added a new generator attribute for designating NGRs as eligible for exemption from the wholesale charges for negative energy.</p> <p>PRR 1263 This is due to the increase in behind the meter production, ISO added enhancements to include EBTMP along with gross metering submissions by the SC. ISO will publish, as aggregated by TAC Area at an hourly time interval, Excess Behind the Meter Production performance in an OASIS report for market participants.</p> <p>PRR 1267 This is due to the market settlement timeline initiative that will allow CAISO and Market Participants sufficient time to resolve disputes, reduce Market Participant financial exposure, and extend the flexibility in publishing settlement statements and weekly invoices.</p> <p>PRR 1268 With the upgrade of the ADS platform, few enhancements that provide both operational and market efficiencies were added. The detailed enhancements are</p>

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		documented in the Business Requirement Specification, and the impacts to Market Instruments due to these enhancements are included in this PRR.
60	07/02/2020	PRR1242 (Attachment D) The ISO changed the formulation of the weighting factor that applies to the long-term component of the Hydro Default Energy Bid to a dynamic weighting factor that considers index prices in highest to lowest ranking order. The ISO also clarifies fallback logic when power prices are missing and the liquidity criteria for considering additional pricing hubs. Additionally, removed old language that expired long time ago in section 8.2 related to virtual bid position limits.
59	04/29/2020	PRR1230 Modifications to the Master File Procedures section B.1 that provide additional clarifications and defined timelines for review of Masterfile changes, including timelines for submission of supporting documentation and ISO response. Additional administrative changes to the Addendum at the end of this BPM that details the changes due to FERC order that made the remaining Aliso Canyon changes permanent and added authority for the use of the Monday-only Index. I incorporate these changes into the main body of this BPM.
58	01/29/2020	PRR1212 This is to clarify the business processes surrounding the treatment of Major Maintenance Adders. In the situation of a scheduling coordinator change, the ISO proposes to provide the new scheduling coordinator a 30-day grace period during which they may be eligible to use a temporary MMA value.
57	12/26/2019	PRR1208 This change clarifies that if a gas transportation company offers a fixed rate for transportation, the CAISO's calculation of transportation costs in the fuel region prices will not include the fixed rate component and only include applicable volumetric components. Effective date 1/1/2020 Other miscellaneous changes: removal of the "CRR Revenue Adjustments Details" report from OASIS section.
56	10/28/2019	PRR1181 Adding clarity to the process to support Tariff Section 4.6.4 Identification of Generating Units. Effective date is once the PRR is published. PRR1190 These changes are to support the Local Market Power Mitigation Enhancements 2018 Project (LMPME), it offers a new Hydro Default Energy Bid Option which is described in Attachment B and Attachment D. The Tariff amendment for LMPME is ER19-2347. Additional changes to Attachment B to support EDSER3 changes for Fall 2019. Effective date: November 13, 2019.

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		PRR1193 Enhancements are made to the RMR and CPM procurement mechanisms to “modernize” the RMR agreement, combine all retirement-related backstop procurement under RMR, and to clarify when the ISO would use its RMR versus CPM backstop procurement authority. Expected date of Fall release 2019.
55	09/26/2019	PRR1173 Added new report, Transmission Loss, to display the WEIM & CAISO Bas clearing results for the 5-minute interval.
54	09/09/2019	PRR1165 Changes mainly related to the Resource Tab data including additional field for RDT with definition and business rules. PRR1166 This change is to include opportunity costs in generated minimum load costs and startup costs in SIBR. This is due to the Commitment Cost Enhancement 3 (CCE3) that was implemented in May 2019. This SIBR rule was implemented on 6/29/19.
53	05/02/2019	PRR1141 This is related to the stakeholder feedback for improvements for business needs related to the WEIM resource sufficiency evaluation. Effective date is 4/16/19 PRR1143 Updating the content of attachment J by simply referencing the Reliability Requirements BPM for the market rules content.
52	04/02/2019	PRR1129 Added comment in sec B.2.2 table to clarify the Participating Generator Agreement Flag for the Generator Resource Data Template. PRR1135 The Commitment Cost Enhancements Phase 3 initiative changes the definition of Use-Limited Resources and allows Use-Limited Resources to include opportunity costs in their commitment costs or default energy bids, where applicable. Effective date: April 1, 2019 This will impact the following attachments: Attachment D Attachment G Attachment H New Attachment N Section 8.2.1.3 PRR1149 Attachment B updates due to Commitment Cost Enhancement Phase 3 project. Effective Date: April 1, 2019
51	02/27/2019	PRR1115 Updating Greenhouse Gas allowance price inputs and fallback logic. Attachments C & K.

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		PRR1118 new report definition in section 12.4 due to FERC 844
		PRR1145 Addition of a new CRR Revenue Adjustments Detail report definition due to CRR 1B enhancement project.
50	11/05/2018	PRR1110 Due to the extension of Aliso Canyon Tariff provisions. CAISO will extend the temporary measures beyond December 16 th . New report definition due to CRR 1B project.
48	08/08/2018	PRR1065 - Section G.1 update is to improve the efficiency of the monthly validation of registered costs process. Other miscellaneous updates to sections 10 and 12 for report definitions.
47	02-13-2018	PRRs 1034 & 1037 <ul style="list-style-type: none"> Due to the extension of Aliso Canyon Tariff provisions. CAISO will extend the temporary measures beyond November 30, 2017. Miscellaneous updates to paragraph 10.1
46	10-30-2017	PRR 1013 New fuel regions and electric regions for use in commitment costs. This is due to Bidding Rules Enhancement part B project.
45	10-06-2017	PRR 1003 includes two changes; (1) Changing the scaling factors to the gas price index due to Aliso Canyon. Effective August 1 st , 2017. <ul style="list-style-type: none"> (2) Revisions to Attachment D and Attachment L to include possible scenarios leading to renegotiation of a default energy bid under negotiated rate option, a major maintenance adder and negotiated variable operations and maintenance (O&M) adder.
44	04-06-2017	PRR 971 Attachment B revision to comply with to comply with the latest GRDT and IRDT data definitions.
43	02-02-2017	PRR 952 Due to Aliso Canyon phase 2 gas-electric coordination initiative and the interim tariff revisions from December 1, 2016 through November 30, 2017. Effective date December 1, 2016 Miscellaneous corrections, to include updates for gas regions in Appendix C, and updates for Appendix D.
42	10-07-2016	PRR 922 ESDER 1 Changes for NGR. DA initial SOC value and option to not use energy limits or SOC in market optimization. Sections: 4.1.1, 5, 5.1.1.2.1, 5.1.1.2.2, 5.1.1.4, 8.1.1, B-Master File Update Process PRR 936 new reports addition due to WEIM year one phase 2, Flexible Ramping Product, and Forecasting data transparency.
40	09-01-2016	PRR 910 Adding Addendum to this document due to Aliso Canyon gas-electric initiative and interim tariff revisions. PRR 916 changes due to the bidding rule initiative.

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39	11-24-2015	PRR 870 Energy bid validation rules updates section 8.2 PRR 871 Balancing authority area GPI &EPI calculation Attachments C & M
38	10-01-2015	PRR 852 Transition cost edits and addition of proxy cost option description. PRR 850 Updating language in sections B.2.2, C.4, D.5, G.2
37	05-4/2015	PRR829 added a new section M to describe the Electricity Price Index calculation
36	03-05-2015	PRR 824 added a new language due to price spike process pursuant to Tariff section 39.7.1.1.3(b)
35	12-11-2014	PRR 809 changes CMRI to Customer Market Results Interface PRR 782 changes were made to MMA attachment L. PRR 780 changes to replace the acronym SLIC by outage management system PRR 753 for Changes in support of Reliability Demand Response Resource (RDRR) initiative. Changes made to sections 3.2, 5, 5.1.1, 5.1.3, 5.1.4, 5.1.5, 7.1, 8.2.1.3 and Attachment B sections B.2.2, B.2.5, and B.2.7
33	05-06-2014	PRRs 703, 717, 718 , changes were made for FERC order 764
33	05-06-2014	PRR 735 , changes were made to Attachments G,K
33	05-06-2014	PRR 722 was a temporary process for GPI, after expiration, PRR 723 was published describing the permanent solution for GPI update
32	04-07-2014	PRR 721 for FERC order 784 for posting historical one-minute and ten-minute average Area Control Error (ACE) data on OASIS.
31	01-06-2014	PRR 694 for Corrections Clarifications 2013. Changes made to Sections 10.2.7 and 11.4.
30	11-07-2013	PRR 691 for Commitment costs refinement – major maintenance and GMC. PRR 689 for adding CAISO demand forecast report for seventh day out. Change made to section 12.3
29	10-02-2013	PRR 681 to add archiving policy for CMRI reports. New section 10.4 added.
28	06-04-2013	PRR 661 for demand response net benefits test. Changes made to Appendix Attachment C sections C.1 and C.3. New section C.4 added.

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		PRR 656 for pay for performance regulation. Changes made to sections 3.2, 6.1, 6.2, 6.3.1, 6.3.2, 10.1, 12.1, and 12.5.
27	05-12-2013	PRR 654 for Treatment of Market Participants with Suspended Market-Based Rate Authority. Changes made to sections 5.1.1.1.4, 5.1.1.2.1, 5.1.4.1.4, 5.1.4.2.1, 6.1, 7.1, 8.2, 8.2.1.3, Appendix Attachment D section D.3, and Appendix Attachment H. PRR 650 for Local market power mitigation implementation phase 2. Changes made to sections 10.1, 12.1, and 12.4.
26	03-12-2013	PRR 638 for Circular Scheduling. New section 3.4.3 added.
25	01-09-2013	PRR 629 for Commitment costs refinement 2012 - Greenhouse Gas cost adder. Changes made to sections 8.2.1.3, 12.1, Appendix Attachment B section B.2, Appendix Attachment D section D.5, Appendix Attachment F example 1, Appendix Attachment G sections G.1.1, G.1.2, and G.4, and Appendix Attachment H. Added new Appendix sections: Attachment G section G.3 and Attachment K.
24	12-10-2012	PRR 596 for Changes to support flexible ramping settlement. Change made to section 12.1. PRR 598 for Regulatory Must Take - Combined Heat and Power. Changes made to sections 5.1.3.1.3 and 5.1.5.1.3, and Appendix Attachment B sections B.2.1 and B.2.2. PRR 609 for Data Release 3. Changes made to sections 10.2, 12.3, 12.4, and 12.7. Added new sections 10.2.6, 10.2.7 and 10.2.8.
23	11-12-2012	PRR 570 for Contingency dispatch enhancements part 1. Change made to section 11.1. PRR 583 for Additional changes to support Transmission Reliability Margin functionality. Change made to section 12.2. PRR 587 for Changes to support non-generator resources and regulation energy management. Changes made to sections 4, 5, 5.1.1.2.1, 5.1.1.2.2, 5.1.1.4, 5.1.3.1, 5.1.4.2.1, 5.1.4.4, 5.1.5.1, 6.2, 7.1, and Appendix Attachment B sections B.2.1, B.2.2, and B.2.4. Added new section 4.1.1.
22	06-06-2012	PRR 549 for Changes to support Transmission Reliability Margin functionality. Changes made to section 8.2.2 and 12.2.
21	05-07-2012	PRR 540 for Bidding enforcement rules for NRS-RA resources. New Appendix Attachment J added. PRR 545 to Remove RDRR language from BPM for Market Instruments. Changes made to sections 3.2, 5, 5.1.1, 5.1.3,

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		5.1.4, 5.1.5, 7.1, and Appendix Attachment B sections B.2.2, B.2.5, and B.2.7
20	03-30-2012	<p>PRR 531 for changes to support local market power mitigation enhancements. Changes made to sections 2.1.1, 2.1.2, 2.2.1, 2.2.2, 5.1.3, 10.1, 12.1, and 12.4, Appendix Attachment D sections D.1, D.7, and Appendix Attachment E sections E.2, E.3, and E.4.</p> <p>PRR 536 for Changes to support Multi-stage generation enhancements functionality. Changes made to sections 5.1.1.3, 5.1.4.3, 5.1.5.1.5, and Appendix Attachment A.</p> <p>PRR 537 for Changes to support operation and maintenance cost adder review and update 2012. Changes made to sections 4.1, 8.2.1.3, and appendix Attachment B section B.2.2, appendix Attachment D sections D.5, D.5.4 and D.5.5, appendix Attachment F, and appendix Attachment G section G.1.2.</p>
19	02-17-2012	PRR 520 to Clarify the CRN report definition. Change made to section 10.1
18	12-08-2011	<p>PRR 486 for Changes to support generated bids and outage reporting for NRS RA resources. Changes made to sections 8.2.1.3 and B.2.3. Added new attachment I.</p> <p>PRR 494 for Changes in support of Flexible Ramping Constraint initiative. Changes made to sections 10.1 and 12.1.</p>
17	10-28-2011	<p>PRR 472 for New OASIS reports - contingency run. Changes made to sections 12.1 and 12.4.</p> <p>PRR 478 for changes to support the 72 hr RUC initiative. Changes made to sections 2.1.3 and 2.1.4.</p> <p>PRR 481 for changes to support the grouping constraints initiative. Change made to section B.2.1. Added new section B.3.</p>
16	09-19-2011	PRR 455 for Changes in support of RDRR initiative. Tariff effective 4/1/12. Changes made to sections 3.2, 5, 5.1.1, 5.1.3, 5.1.4, 5.1.5, 7.1, and Appendix Attachment B sections B.2.2, B.2.5, and B.2.7
15	06-13-2011	<p>PRR 425 for changes to RUC Availability Bids for RA resources. Changes made to sections 3.3 and 7.1</p> <p>PRR 427 for changes associated with the Ramping Flexibility Nomogram initiative. Change made to section 12.1.</p>
14	05-18-2011	PRR 384 for changes to Open/Isolated Intertie Handling. Inserted new section 8.2.2 and renumbered existing sections 8.2.2 and 8.2.3. Appended new fields to tables described in

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		Attachment B sections B.2.2 and B.2.4. PRR 412 for changes to Bidding and Mitigation of Commitment Costs. Changes made to sections 4.1, 5.1.1.1.1, 5.1.1.1.2, 8.2.1.3, and attachment D section D.5.4. Appended new fields to the table described in attachment B section B.2.1.
13	04-07-2011	PRR 285 for changes to Attachment C detailing the use and timing of the Gas Price Index for Default Energy Bids. PRR 381 for changes to Attachment G related to an update in the gas delivery points. Replaced SoCal Border with City Gate.
12	01-28-2011	PRR 341 for changes associated with the Convergence Bidding Initiative.
11	01-05-2011	PRR 357 for changes Attachment G, Section G.2. Updated language associated with the gas transportation rate for SCE and SDG&E.
10	12-06-2010	PRR 278 for changes associated with the Multi-Stage Generation initiative. PRR 309 for changes associated with the Transition Components of the Multi-Stage Generation initiative. Attachment H added to BPM for this functionality. Miscellaneous changes as defined in PRR 278 attachments. PRR 308 for changes to section 5.1.1.1.4 (formerly, this was section 5.1.1.1.3)
9	10-06-2010	PRR 306 Language/Link changes in Sections 10., 11.4, and 12
8	09-14-2010	PRR 282 Clarification Language for Wheeling Through Transactions (Section 3.4.1)
7	08-10-2010	PRR 161 entries for PDR
6	07-14-2010	PRR 217 for Phase 1 Data Release – Transmission Constraints Section 12.1 Prices, Section 10.2 added for Transmission Reports in CMRI, Section D1 correction of language for non RMR DEB calculation.
5	03-31-2010	PRR 172 AS HASP Tariff changes, misc. terminology reference clean up.) PRR 169 Emergency change Use of the Gas Price Index in Default Energy Bid/ SIBR generated bid and Start Up/ Minimum Load calculations.
4	01-15-2010	Startup/MinLoad revisions based off new Tariff language. Main body for reference to 30 days vs. 6 month, Att. E, and Att. G.(PRR 133)

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3	12-31-2009	Standard Capacity Product (SCP) and Day-Ahead AS Must Offer Obligation changes, 2 new OASIS reports, some minor edits. (PRR 88)
2	08-11-2009	Master File Update for Appendix B for UI / API interface PRR 38; Replaced MRTU term with California ISO Nodal Market; misc. reference (hyperlink) / Rules cleanup. (PRR 38)
1.0	03-27-2009	Initial Posting

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1. Introduction

Welcome to the CAISO *BPM for Market Instruments*. In this Introduction you will find the following information:

The purpose of the CAISO BPMs

What you can expect from this CAISO BPM

Other CAISO BPMs or documents that provide related or additional information

1.1 Purpose of CAISO Business Practice Manuals

The Business Practice Manuals (BPMs) developed by CAISO are intended to contain implementation detail, consistent with and supported by the CAISO Tariff, including: instructions, rules, procedures, examples, and guidelines for the administration, operation, planning, and accounting requirements of CAISO and the markets. Exhibit 1-1 lists CAISO BPMs.

Exhibit 1-1: CAISO BPMs

Title
BPM for Candidate CRR Holder Registration
BPM for Change Management
BPM for Compliance Monitoring
BPM for Congestion Revenue Rights
BPM for Credit Management
BPM for Definitions & Acronyms
BPM for Managing Full Network Model
BPM for Market Instruments
BPM for Market Operations
BPM for Metering
BPM for Outage Management
BPM for Reliability Requirements
BPM for Rules of Conduct
BPM for Scheduling Coordinator Certification and Termination
BPM for Settlements and Billing
BPM for Transmission Planning Process

1.2 References

Other reference information related to this BPM includes:

- Other CAISO BPMs
- CAISO Tariff
- SIBR Tutorial

Interface Specification for Market Results Services

1.3 Acronyms & Specialized Terms

The definition of acronyms and words beginning with capitalized letters are given in the *BPM for Definitions & Acronyms* and as stated below.

2. Markets & Market Processes

Welcome to the *Markets & Market Processes* section of the CAISO *BPM for Market Instruments*. In this section you will find the following information:

A high level description of the Day-Ahead and Real-Time Markets

A description of the products and services traded through CAISO

Market bidding timelines and primary activities of CAISO

2.1 Day-Ahead Market Processes

The Day-Ahead Market (DAM) for both virtual and physical Bids closes at 1000 hours on the day before the Trading Day and consists of a sequence of processes that determine the hourly locational marginal prices (LMPs) for Energy, ~~Ancillary Services and AS, and Imbalance Reserves~~ as well as the ~~incremental~~ procurement of Reliability Capacity in the Residual Unit Commitment (RUC). ~~The DAM also determines -while also determining-~~ Reliability Must Run (RMR) dispatch levels and mitigates ~~ing~~ Bids that may be in excess of Local Market Power Mitigation limits. These processes are co-optimized to produce a Day-Ahead Schedule at least cost while meeting local reliability ~~and system-wide ramping~~ needs.

The LMPs resulting from these processes are used for the Day-Ahead Settlement. The following subsections present an overview of these processes for the Trading Day.

2.1.1 ~~Market Power Mitigation Determination~~ Market Power Mitigation for IFM

The Market Power Mitigation (MPM) function ~~for the Integrated Forward Market (IFM)~~ determines the Bids ~~for Energy and Imbalance Reserve Up~~ that are subject to bid mitigation based on specified criteria. If the criteria are met, the MPM mitigates the affected Bids for the relevant Trading Hours of the Trading Day. The MPM function is performed prior to the ~~Integrated Forward Market~~ IFM process.

The details of Market Power Mitigation are provided in CAISO Tariff Section 31.2 and its subsections and are described in more detail in the *BPM for Market Operations*.

2.1.2 Integrated Forward Market

The Integrated Forward Market (IFM) is a market for trading Energy and Ancillary Services (AS), and Imbalance Reserves (IRU and IRD) for each Trading Hour of the Trading Day. The IFM uses Clean Bids for Energy and AS these products from SIBR, ~~(these Bids that have passed the Bid validation and processing procedures)~~, RMR Proxy Bids, and the mitigated Bids to the extent necessary following the MPM process in order to clear the Supply and Demand Bids and to procure Ancillary Services and Imbalance Reserves to meet CAISO's AS requirements at least Bid Costs over the Trading Day.

2.1.3 Market Power Mitigation for RUC

Following the IFM and prior to the RUC, a separate market power mitigation pass is run to assess bids for Reliability Capacity. This process identifies and mitigates potentially uncompetitive bids for Reliability Capacity Up to ensure that the procurement of this capacity is not subject to exercises of local market power. Mitigated Reliability Capacity bids are then used as inputs to the RUC process.

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2.1.3.2.1.4 Residual Unit Commitment

The Residual Unit Commitment (RUC) process is a reliability function that procures Reliability Capacity Up (RCU) and Reliability Capacity Down (RCD). This process ensures there is sufficient physical resource capacity available to meet the CAISO Forecast of CAISO Demand. for committing resources and procuring RUC capacity not reflected in the Day Ahead Schedule following the IFM (as Energy or AS capacity), in order to meet the difference between the CAISO Forecast of CAISO Demand (including locational differences) and the Demand reflected in the Day Ahead Schedules for each Trading Hour of the Trading Day.

- RCU is procured to meet the difference between the CAISO Forecast and the physical supply scheduled in the IFM.
- RCD is procured to provide downward dispatch capability when the physical supply scheduled in the IFM exceeds the CAISO Forecast.

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Resources that meet the definition of Short Start Units based on cycle time are provided commitment instructions through either the RTUC or STUC based on the unit's Start-Up time. Long Start Units can receive a binding commitment instruction in RUC. Short Start Units in general do not receive a binding commitment instruction in RUC. Units are notified at the end of the DAM if they are selected for RUC. Such resource commitment decisions are determined in

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~~the Real Time Market. Resources that meet the definition of Short Start Units based on cycle time, are provided commitment instructions are issued through either the RTUC or STUC based on the unit's Start Up time. Long Start Units can receive a binding commitment instruction in RUC. Non-binding commitment instructions for Extremely Long Start Resources are produced through RUC and are reviewed by the CAISO Operator through the Extremely Long Start Unit Commitment process. The CAISO Operator will manually confirm and communicate any binding commitment instructions.~~

2.1.42.1.5 Extremely Long-Start Unit Commitment

The commitment of resources that require a start up time of greater than 18 hours or notification earlier than the publication of the Day-Ahead Schedule will be considered in the RUC and the Extremely Long-Start Commitment process. This process will be executed after the completion of the DAM. Bids for ELS units are used for both the current Trading Day and Trading Day D+1. Extra Long Start (ELS) units will receive binding commitment instructions in the Extra Long Commitment (ELC) process. The ELC process is detailed in the *BPM for Market Operations Section 6.8.1*.

It should be noted that current SIBR Rules associated for RA For Long Start Units (that are registered in the Masterfile as Must Offer Obligations) will create bids as necessary for these resources in the DAM.

~~While the Must-Offer Obligation resource is not obligated to bid, the CAISO inserting bids does not commit or dispatch the long-start ELS resource for RT because as a long start the commitment time would follow fall outside of the RTM horizon. However if the resource has self-committed in the Real Time Market, then the CAISO believes that having an RA obligation to offer its RA capacity is consistent with RA policy in similar way as how short start resources are treated because the resource is physically capable of providing its RA capacity.~~

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2.2 Products & Services

2.3.3 ~~Residual Unit Commitment~~ Reliability Capacity

~~Residual~~ The Residual Unit Commitment (RUC) process procures Reliability Capacity to ensure there is sufficient physical resource capacity available to meet the CAISO Forecast of CAISO

Demand. This is a day-ahead reliability function performed after the Integrated Forward Market (IFM) clears.

Reliability Capacity is procured as two distinct market products: Reliability Capacity Up (RCU) and Reliability Capacity Down (RCD).

- Reliability Capacity Up (RCU) is the incremental upward capacity procured in the RUC process when the physical supply scheduled in the IFM is insufficient to meet the CAISO Forecast of CAISO Demand. RCU awards represent a resource's capability to increase its output in real-time.
- Reliability Capacity Down (RCD) is the incremental downward dispatch capability procured in the RUC process when the physical supply scheduled in the IFM exceeds the CAISO Forecast of CAISO Demand. RCD awards represent a resource's capability to decrease its output in real-time.

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Scheduling Coordinators submit bids to provide RCU and RCD. The price and availability of this capacity depends on the Reliability Capacity bids submitted and the optimized RCU and RCD awards from the RUC process. Awarded capacity is compensated at the relevant locational marginal price for RCU or RCD.

All resources that receive a Reliability Capacity award have a must-offer obligation in the Real-Time Market for the awarded capacity. Unit Commitment (RUC) Capacity is the positive difference between the RUC Schedule and the greater of the Day Ahead Schedule and the Minimum Load level of a resource. The price and availability of this type of capacity depends on the RUC Availability Bids and the optimized RUC Awards.

The RUC Schedule is the total MW per hour amount of capacity committed through the RUC process, including the MW per hour amount committed in the Day Ahead Schedule.

-

2.3.5 Imbalance Reserves

Imbalance Reserves are a market product procured in the Integrated Forward Market (IFM) to ensure sufficient flexible ramping capability is reserved to manage uncertainty and variability between the day-ahead and real-time markets. Imbalance Reserves are awarded to resources that are dispatchable in the fifteen-minute market, and the awards are limited by a resource's 30-minute ramping capability.

Imbalance Reserves consist of two distinct products:

- Imbalance Reserves Up (IRU) is upward ramping capability procured in the IFM to manage situations where real-time net load is higher than forecasted in the day-ahead.
- Imbalance Reserves Down (IRD) is downward ramping capability procured in the IFM to manage situations where real-time net load is lower than forecasted in the day-ahead.

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The availability of this product depends on the Imbalance Reserve Bids submitted by Scheduling Coordinators. Resources with awarded capacity are compensated at the locational marginal price for the respective Imbalance Reserve product. An Imbalance Reserve award results in a real-time must-offer obligation for the awarded capacity.

2.4 Market Interfaces

CAISO's portal provides a framework in which to deploy the User Interfaces (UIs) of CAISO's business applications. The portal allows SCs to access multiple CAISO business applications using a single point of entry and a single digital certificate.

The following CAISO business applications are accessible through the portal:

- SIBR
- CMRI
- CRR
- BAPI
- outage management system

OASIS (Available but does not require a digital certificate, public information)

SCs interact with CAISO Markets through market interfaces. These market interfaces are described in more detail below.

2.4.1 SIBR

The Scheduling Infrastructure and Business Rules (SIBR) system performs the following tasks:

- Provides an SC interface to submit Bids and Inter-SC Trades (IST).
- Accepts Bids (including Reference Level Change Requests) and IST for Energy, Ancillary Services, Imbalance Reserves, Reliability Capacity, and other Energy related products and services (e.g., IFM Load Uplift Obligation) from SCs that are certified to interact with CAISO.

- Applies business rules to validate and process submitted Bids and IST to ensure that those Bids and IST are valid and modifies Bids for correctness where necessary.
- Applies business rules to generate DAM and RTM Bids for resources under the Resource Adequacy requirements and RTM Bids for resources with Day-Ahead ~~Ancillary Services or RUC Awards~~ awards for Ancillary Services, Imbalance Reserves (IRU/IRD), or Reliability Capacity (RCU/RCD), if these resources do not have valid Bids ~~and RTM Bids used in the STUC process in RTM for the extended time horizon~~ to meet their must-offer obligations. This also applies to RTM Bids used in the STUC process in RTM for the extended time horizon. Refer to section 7.7 of the Market Operations BPM.
- Provides SCs information about their Bid and IST validation, modification, and Bid generation.
- Forwards the final Clean Bids and IST to the relevant CAISO Market.
- Provides short-term data storage and reports.

The details of submitting Bids into SIBR are describe in Section 5 (Energy Bids), Section 6 (Ancillary Services Bids), and Section 7 (~~RUC Availability~~ Reliability Capacity Bids).

3. Overview of Market Instruments

Welcome to the *Overview of Market Instruments* section of the CAISO BPM for Market Instruments. In this section you will find the following information:

Definition of market instruments

A brief overview of the types of market instruments available in CAISO Markets. The details of the market instruments, and how they operate are provided in the following sections

Market instruments include Bids, Self-Schedules and Inter-SC Trades (ISTs). A Bid is, in essence, an offer to buy or sell Energy (for Virtual Supply and Virtual Demand Bids, Energy is the only product that is applicable), ~~RUC Availability~~ Reliability Capacity, Imbalance Reserves, or Ancillary Services, including Self-Schedules, submitted by Scheduling Coordinators. A Bid in CAISO SIBR system contains all Bid products, services, and Bid components being offered to a specified CAISO Market from a resource. An IST is a transaction between two SCs that is facilitated in CAISO's settlement process.

Economic Bids specify prices for MWh amounts of Energy offered. Self-Schedules do not have any prices associated with MWh.

Another market instrument available through CAISO Markets is the CRR. Details about the CRR allocation, auction, and settlement provisions are covered in detail in the *CAISO BPM for Congestion Revenue Rights*.

3.1.2 Reference Level Change Requests

Reference Levels (a term encompassing Default Energy Bids, Default Minimum Load Bids, Default Start-Up Bids, also referred to as Default Bids in SIBR) are cost-based bids calculated by the CAISO for some resource types for use in:

- Generating energy bids for resources that have a Resource Adequacy must-offer requirement or that have an obligation to bid in the real-time markets due to Day-Ahead Ancillary Service, Imbalance Reserve (IRU/IRD), ~~or~~ Reliability Capacity or RUC Awards, but did not submit an energy bid. In some cases, bids are generated for use in STUC beyond the normal real-time horizon.
- Mitigating resources that are determined to potentially wield local market power
- Limit Start-Up Bids and Minimum Load Bids
- Bid Cost Recovery under various scenarios
- Cost-verifying energy bids that are above maximum of the Soft Energy Bid Cap and Default Energy Bid

To the extent that an SC determines that the fuel or fuel-equivalent cost used in a CAISO-calculated Reference Level does not represent their actual or expected fuel or fuel equivalent costs, the SC may submit an automated or manual Reference Level Change Request. Automated Reference Level Change Requests are limited by an upper boundary known as a Reasonableness Threshold, via SIBR. Manual Reference Level Change Requests may be made via a CIDI ticket submittal. See more information about how to make these automated and manual Reference Level Change Requests in Attachment O in this BPM.

Reference Level Change Requests are also the CAISO's method of pre-market cost verification of certain resource type's incremental energy costs. Pre-market cost verification is necessary for these resources to submit Supply Bids above maximum of the Soft Energy Bid Cap and Default Energy Bid. This is explained further in Section 5.1 and in Attachment P.

The automated Reference Level Change Requests submission rules are described in detail in Section 5 (Energy Bids). The calculations for the Reference Levels and Reasonableness

Threshold values, as well as the rules for submission of Reference Level Change Requests, are also found in Attachment O.

3.3 Residual Unit Commitment Availability Reliability Capacity Bids

SCs may submit Reliability Capacity Bids on behalf of eligible resources to provide capacity in the RUC process. Reliability Capacity is procured to ensure sufficient physical supply is available to meet the CAISO Forecast of CAISO Demand.

Reliability Capacity is procured as two distinct products:

- Reliability Capacity Up (RCU) is procured to provide upward dispatch capability.
- Reliability Capacity Down (RCD) is procured to provide downward dispatch capability.

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SCs may submit bids for RCU and RCD on behalf of eligible capacity. An RA resource that is required to participate in RUC must submit a bid to provide RCU up to its RA capacity; bidding for RCD is optional. A Reliability Capacity award results in a must-offer obligation in the Real-Time Market.

For Reliability Capacity Bids details, see Section 7 (Reliability Capacity Bids) and Attachment A (Bid Validation Rules).

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SCs may submit RUC Availability Bids on behalf of eligible capacity that is not subject to a RUC obligation. See section 6.7.2.6 of the BPM for Market Operations. SCs with eligible capacity that is subject to a RUC obligation have no bidding requirement as the RUC obligated capacity will be optimized automatically using a \$0/MW per hour RUC Availability Bid.

Upon publication of the DAM results, the CAISO notifies SCs of any RUC Awards (through CMRI). RUC Availability payments are based on RUC selection, irrespective of whether the Generating Unit is required to Start Up or not. A Generating Unit receives a Start Up instruction at the appropriate time. If the CAISO instructs a Generating Unit subject to a RUC Award to Start Up, the unit is eligible for RUC Cost Compensation, which includes Start Up and Minimum Load Cost compensation, and Bid Cost Recovery, in addition to the RUC Availability payment. For RUC Availability Bids details see Section 7 (Residual Unit Commitment Availability Bids) and attachment A (Bid Validation Rules).

~~The RUC Award is the portion of the RUC Capacity that is not subject to an LRMR Dispatch and is not RA Capacity. RUC Capacity is the portion of the RUC Schedule excluding the minimum load and any DA Energy Schedule. RUC Capacity that is subject to an LRMR Dispatch and RA Capacity are not entitled to RUC Availability payments. RUC Award is entitled to RUC Availability payment regardless of its Start up time. In other words, RUC Awards from Short Start Units are entitled to RUC Availability payment. This is based on CAISO Tariff Section 31.5.6, Eligibility for RUC Compensation.~~

3.5 Inter-SC Trades

CAISO facilitates Inter-SC Trades (ISTs) of Energy, Ancillary Services, and IFM Load Uplift Obligation through the settlement process. ISTs do not have any impact on the scheduling or dispatch of resources. They affect only the financial settlement process. Only trades that SCs want to settle through CAISO are submitted in the IST process. All other trades are settled bilaterally between individual SCs. There is no limit on the number of ISTs each SC may participate in.

ISTs for the Day-Ahead Market may be submitted beginning seven days prior to the Trading Day up to 11:00 hours (HE 11) the day prior to the Trading Day. ISTs for the Real-Time Market may be submitted beginning at 00:00 hours the day prior to the Trading Hour up to 45 minute prior to the Trading Hour.

Inter-SC Trades in the RTM are submitted incrementally to the DAM Inter-SC Trades.

3.5.1 Inter-SC Trades of Energy

The role of Inter-SC Trades (IST) of Energy is to facilitate contractual deliver and settlement of bilateral power purchase contracts. Inter-SC Trades are a settlement service that the CAISO offers to parties of bilateral contracts as a means to offset CAISO settlements charges against the bilateral contractual payment responsibilities. CAISO facilitates Inter-SC Trades of Energy through the settlement process. An IST of Energy consists of a quantity in MWs traded between two SCs for a specific Trading Hour at a specific location. There are two types of ISTs:

Physical Trades (PHY) – where the Inter-SC Trade is backed by a physical resource (applies to Generating Units only). There is no limit on the number of PHY ISTs in which an SC can participate. The SC for the physical resource that supports the PHY can submit a Bid, including a Self-Schedule Bid into the relevant market. In the event that sufficient Generation is not scheduled to meet the quantity of the PHY IST, the difference is converted to a Converted Physical Trade (CPT) and settled at the relevant Trading Hub price.

ISTs at Aggregated Pricing Nodes that are also defined Trading Hubs or LAPs (APN) – where the IST is not backed by a physical resource. SC's may participate in one APN IST per SC counterparty at each APN Location, that is either a defined Trading Hub or LAP, per Trading Hour. For example, there can only be one IST per hour between SC1 and SC 2 at the Existing Generation Zone Trading Hub NP15. The CAISO will facilitate ISTs (APN) only at Existing Zone Generation Trading Hubs and Default LAPs.

3.5.2 Inter-SC Trades of Ancillary Services

CAISO also facilitates ISTs of Ancillary Services obligation, i.e., the obligation to pay AS Charges for the amount of Demand represented by the SC. There are four types of AS that SCs can trade:

- Regulation Up
- Regulation Down
- Spinning Reserve

Non-Spinning Reserve

An IST of AS consists of a quantity in MWs traded between two SCs for a specific Trading Hour and for a specific Ancillary Service type¹. The IST of AS is a trade of the obligation to pay CAISO charges for Ancillary Services. CAISO settles with the two parties to the trade based on the quantity of the AS Obligation traded times the user rate for the AS Inter-SC Trades for the specific Trading Hour. Once the SC responsible for the Demand has traded its AS obligation, the SC to which the obligation has been traded may meet that obligation with Self-Provided AS or purchasing AS from CAISO.

Since CAISO charges a single user rate for each AS per hour, separate ISTs for AS are not required for both the DAM and the RTM. Hence, SCs may submit ISTs for Ancillary Services only in RTM beginning 0000 hours of the day prior to the Trading Day and up to 45 minutes prior to the Trading Hour. This is based on CAISO Tariff Sections 28.2.3, 28.2.2 and 6.5.4.1.2.

¹ Since CAISO charges a single system wide tariff for each AS, specification of a location for AS ISTs is not required.

3.5.3 Inter-SC Trades of IFM Load Uplift Obligation

CAISO facilitates ISTs of the IFM Load Uplift Obligation² between SCs. Inter-SC Trades of IFM Load Uplift Obligation enable a SC to transfer any amount of the IFM Load Uplift Obligation (MW) to another SC. An IST of IFM Load Uplift Obligation consists of a quantity in MWs traded between two SCs for a specific Trading Hour of the IFM.

Since CAISO charges a single user rate for IFM Load Uplift Obligation per hour, separate ISTs for IFM Load Uplift Obligation are not required for both the DAM and the RTM. Hence, SCs submit ISTs only in the RTM for IFM Load Uplift Obligation beginning 0000 hours of the day prior to the Trading Day, up to 45 minutes prior to the Trading Hour. Trades of IFM Load Uplift Obligation are not location specific, since CAISO calculates a system-wide user rate for this charge. This is based on CAISO Tariff Sections 28.2.3, 28.2.2 and 6.5.4.1.2.

3.6 Imbalance Reserve Bids

The CAISO procures Imbalance Reserves in the IFM to ensure sufficient flexible ramping capability between the day-ahead and real-time markets. A bid to supply Imbalance Reserves is an offer to provide dispatchable ramping capability and can be submitted for upward capability (Imbalance Reserves Up or IRU) or downward capability (Imbalance Reserves Down or IRD).

SCs may submit Imbalance Reserve Bids for eligible resources. To be eligible, a resource must be dispatchable in the fifteen-minute market.

An Imbalance Reserve award in the DAM creates a must-offer obligation in the RTM.

The details of the Imbalance Reserve bid instrument and the associated obligations are as follows:

- **Bidding in the DAM:** SCs submit separate bids for IRU and IRD for each Trading Hour. The bid is a single-segment bid, consisting of a single price (\$/MW) and single capacity quantity (MW). The bid price is capped at \$55/MW.

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² IFM Load Uplift Obligation is calculated net of the cost of AS.

- **Economic Energy Bid Requirement:** A resource submitting an Imbalance Reserve Bid must also submit an economic energy bid for the portion of its capacity range that overlaps with the Imbalance Reserve Bid.
- **Real-Time Obligation:** A resource that receives an IRU or IRD award is obligated to make that awarded capacity available to the RTM via economic energy bids.

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The specific validation rules and components for Imbalance Reserve Bids are described in detail in [Section 6.4 \(Imbalance Reserve Bid Components\)](#). Settlement details are available in the [BPM for Settlements and Billing](#).

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4. Bid Requirements

Welcome to the *Bid Requirements* section of the CAISO *BPM for Market Instruments*. In this section you will find the following information:

A list of the Bid components that are constant across a Trading Day

A list of the Bid components that can change hourly

A table describing the bidding limitations for Non-Generator Resources (NGRs)

Day-Ahead Bids and Self-Schedules include information on each of the 24 Trading Hours in the Trading Day. Some Bid components are constant for the Trading Day, while other components can vary from hour to hour. Exhibit 4-1 shows which Bid components are constant across the Trading Day – referred to in the exhibit as Daily Requirements – and those that can change hourly – Hourly Requirements.

4.1 Daily & Hourly Bid Components

This section is based on CAISO Tariff Section 30.4 Default Start-Up Bids, Default Minimum Load Bids, and Default Transition Bids and Section 39.6.1.6. (Start-Up and Minimum Load Costs are not applicable to Virtual Bids).

Bid components are divided into two categories:

Daily Bid components – These Bid components are constant across all Trading Hours in a Trading Day and do not change for that Trading Day, except for Start-Up, Minimum Load and Transition Bids which can be re-bid in RTM.

Hourly Bid components – These Bid components can vary in each Trading Hour of the Trading Day.

With the exception of three Bid components (Start-Up, Minimum Load and Transition Bids), all Bid components can vary each day, and are submitted by SCs as part of their DAM and RTM Bids. For Start-Up and Minimum Load Bid components, the SC selects one of two alternatives to validate their bids: Registered Cost or Proxy Cost. The elections are independent; that is, a Scheduling Coordinator electing either the Proxy Cost option or Registered Cost option for Start-Up Costs may make a different election for Minimum Load Costs. The Start-Up and Minimum Load Bid components are constant for each Trading Day for the period submitted.

If Registered Cost is selected for Start-Up and/ or Minimum Load, the SC submits information for Start-Up and/ or Minimum Load respectively to CAISO for entry into the Master File. Subject to the applicable cap, these values can be updated every 30 days through the Master File Update process that is described in Attachment B. Start-Up and Minimum Load Costs under the Registered Cost Option may not exceed 150 percent of the unit's Projected Proxy Start-Up and Minimum Load Costs. If the SC selects the Registered Cost Option, the values will be fixed for 30 days unless the resources costs, as calculated pursuant to the Proxy Cost option, exceed the Registered Cost option, in which case the SC may switch to the Proxy Cost option for the balance of the 30 day period. (see Attachment G for details).

If the Proxy Cost option is selected, the Start-Up and Minimum Load Bid components are calculated daily for each Generating Unit based on the daily gas price and also includes:

- Auxiliary power costs (for Start-Up)
- O&M costs (can be included in Start-Up and Minimum Load, see Attachment L, the adder is a value registered in the Master File)
- Greenhouse gas allowance Start-Up and Minimum Load costs if applicable (see Attachment K)
- Market Services Charge and System Operations Charge components of the Grid Management Charge (GMC) (for Start-Up), the Market Services Charge and System Operations Charge components of the GMC and the Bid Segment Fee component (for Minimum Load)
- Opportunity costs may also be added if the resource is Use-Limited (see Attachment N)

The process that CAISO uses to calculate the daily fuel region price is described in Attachment C, and there is an example in section 8.2.1.3 for a Generated Bid.

The SC is also allowed to submit a Start-Up and/or Minimum Load Bid Cost as part of a generator’s Bid in the Day-Ahead Market (DAM) and or the Real-Time Market (RTM) as long as the SC elected the Proxy Cost option and the submitted Bid is not negative and is less than or equal to the Default Minimum Load Bid and Default Start-Up Bid which are calculated using the daily fuel region price, or the cost submitted by the SC and validated by CAISO via the Reference Level Change Request process (see Attachment O). RTM submissions will not be used if the resources was committed in the DAM, the DAM Daily Components will be copied to the RTM bid.

Transition Cost will be calculated for upward transitions as the positive difference between the Start-Up costs of the two configurations that are part of the transition. The Transition Cost will be zero for all downward transitions. If a resource is Use-Limited and eligible for opportunity costs, the Start-Up opportunity cost is removed from the Start-Up Costs of the two configurations prior to the calculation, and the Transition opportunity cost is added in afterwards.

The details of the Bid components are described in subsequent sections.

Exhibit 4.1.1: Daily & Hourly Bid Components

	Daily Components	Hourly Components	Submitted through SIBR	Comment
Start-Up Bid	✓		Yes, only if proxy cost option is currently effective for Start-Up Cost in Master File.	If the resource has elected to use <u>Registered Cost</u> , the Start-Up Bid used is that registered in the Master File. If the resource has elected the <u>Proxy Cost</u> option, the SC can submit a Start-Up Bid through SIBR in either DAM or RTM. SIBR would use the submitted Start-Up Bid if it is not negative and is less than or equal to the Default Start-Up Bid calculated based on daily gas prices.
Start-Up Cost		✓	Yes, only if proxy cost option is currently effective for Start-Up Cost in Master File.	Subject to validation against a Reasonableness Threshold Start-Up Bid if a Reference Level Change Request has been made.

	Daily Components	Hourly Components	Submitted through SIBR	Comment
Minimum Load Bid	✓		Yes, only if Proxy Cost option is currently effective for Minimum Load Cost in Master File.	If the resource has elected to use <u>Registered Cost</u> , the Minimum Load Bid used is that registered in the Master File. If the resource has elected the <u>Proxy Cost</u> option, the SC can submit a Minimum Load Bid through SIBR in either DAM or RTM. SIBR would use the submitted Minimum Load Bid if it is not negative and is less than or equal to the Default Minimum Load Bid calculated based on daily gas prices.
Minimum Load Cost	✓		Yes, only if proxy cost option is currently effective for Start-Up Cost in Master File.	Subject to validation against a Reasonableness Threshold Minimum Load Bid if a Reference Level Change Request has been made.
Transition Bid	✓		Yes, these values are calculated as defined in Attachment H, based on the calculated start-up costs for each configuration	For a Multi-Stage Generating Resources, the dollar cost per feasible transition associated with moving from one online configuration to another. SC can submit Transition Cost through SIBR in either DAM or RTM. The calculation is the same for all MSG regardless of the Cost option.
Transition Cost	✓		Not submitted as a separate bid component.	If a Reference Level Change Request is accepted for the resource's Revised Default Startup Bid(s) for any associated

	Daily Components	Hourly Components	Submitted through SIBR	Comment
				configuration, the CAISO will recalculate any affected Default Transition Bids to reflect the Revised Default Startup Bid(s).
Energy Bid Curve		✓	✓	
Default Energy Bid Curve		✓	✓	Subject to validation against a Reasonableness Threshold Default Energy Bid if a Reference Level Change Request has been made.
Self-Schedule		✓	✓	
<u>Imbalance Reserves Up (IRU)</u>		✓	✓	<u>A single-segment hourly bid for upward ramping capability in the IFM. Bid is capped at \$55/MWh. Award creates an RTM must-offer obligation.</u>
<u>Imbalance Reserves Down (IRD)</u>		✓	✓	<u>A single-segment hourly bid for downward ramping capability in the IFM. Bid is capped at \$55/MWh. Award creates an RTM must-offer obligation.</u>
<u>Reliability Capacity Up (RCU)</u>		✓	✓	<u>A single-segment hourly bid to provide upward capacity in the RUC process. Bid is capped at \$250/MWh.</u>
<u>Reliability Capacity Down (RCD)</u>		✓	✓	<u>A single-segment hourly bid to provide downward dispatch capability in the RUC process. Bid is capped at \$250/MWh.</u>
Ancillary Services				Bid cannot contain more than certified quantities for each

	Daily Components	Hourly Components	Submitted through SIBR	Comment
				service.
Regulation Down		✓	✓	
Regulation Up		✓	✓	
Spinning Reserve		✓	✓	
Non-Spinning Reserve		✓	✓	
Ramp Rate	✓		✓	Bid by SC, within limits of the minimum and maximum Ramp Rates in the Master File.
Operational Ramp Rate	✓		✓	
Operating Reserve Ramp Rate	✓		✓	
Regulation Ramp Rate	✓		✓	
Contingency Dispatch Indicator	✓		✓	Must be selected if any AS is part of the Bid/Schedule.
Intertie Minimum Hourly Block (DA)		✓	✓	For Non-Dynamic System Resources, specifies minimum number of hours that an intertie bid must be awarded in the DA market, if economic. If no Minimum Hourly Block is set, it defaults to 1.
Dispatch Option		✓	✓	A Bid option that determines the participation of an Intertie resource in the Real-Time Market: <ul style="list-style-type: none"> Hourly: submission of a HASP Block Intertie Schedules Once: submission of an Economic Hourly Block Bid with Intra-Hour option. 15min: dispatched in each 15 minute Interval of a

	Daily Components	Hourly Components	Submitted through SIBR	Comment
				Trading Hour with a flat Dispatch for all 5 minute Dispatch Intervals of that 15 minute Interval. Dynamic: dispatched in each 5 minute Dispatch Interval of a Trading Hour.
Pump Shut-Down Cost		✓	✓	
Pumping Cost		✓	✓	
Energy Limit (Maximum and Minimum Daily)	✓		✓	
RUC		✓	✓	
Capacity Limit		✓	✓	(Unrelated to Capacity Limit Indicator). Specifies an upward limit on the total Energy and Ancillary Service and Imbalance Reserves awards for a given hour. Limit must be set no lower than the maximum of the highest energy bid or the RA obligation amount. Used mainly for partial RA or non-RA resources who want to limit the total award when bidding multiple services.
Distribution Factors		✓	✓	These apply to Generating Units only. Generation Distribution Factors are provided on a per-unit basis. SC may submit through SIBR. If none

	Daily Components	Hourly Components	Submitted through SIBR	Comment
				are provided through SIBR, CAISO will use Generation Distribution Factors (GDF) from the GDF Library based on historical generation pattern.
VER Forecast		✓	✓	If a Variable Energy Resource (VER) chooses to supply an energy forecast, the forecast shall be submitted through the automated load forecast system (ALFS). Forecast is submitted for a configurable rolling time horizon as often as every 5 minutes.

4.2 Bidding limitations for NGRs

NGRs are resources that operate as either Generation or Load and that can be dispatched to any operating level within their entire capacity range but are also constrained by a MWh limit to (1) generate Energy, (2) curtail the consumption of Energy, or (3) consume Energy.

More generally, NGRs are resources that have a continuous operating range from a negative to a positive power injection; i.e., these resources can operate continuously by either consuming energy or providing energy, and can seamlessly switch between generating and consuming electrical energy. An NGR functions like a generation resource and can provide energy and AS services. Because of the continuous operating range, NGRs do not have minimum load operating points, state configurations, forbidden operating regions, or offline status (unless on outage). Therefore, they do not have startup, shutdown, minimum load, or transition costs.

The regulation energy management (REM) option allows non-generator resources that require an offset of energy in the real time market to provide regulation. NGRs that select this option can only participate in the ISO's regulation markets.

NGRs encompass a variety of different resource types, and a subset of those resource types are subject to Local Market Power Mitigation (LMPM). As described in sections 2.1.1 and 2.2.1 of this BPM, generating resources (e.g. hydro, thermal resources, VERs) are subject to LMPM. A subset of NGRs - non-REM energy storage resources - are also subject to LMPM, with the exception of non-REM storage resources. This mitigation exemption is explained in further detail in the BPM for Market Operations section 6.5.6.

As described further in Attachment P, NGRs may submit Energy Bids above the Soft Energy Bid Cap. NGRs registered as LESR are required to bid energy in the in the RTM in the opposite direction of their DA AS awards and/or RT bid or self-provision. This shall apply to all AS awards (spin/non-spin, regulation up, and regulation down), and energy bids must be greater than or equal to 50% of the AS service awards and/or self-provision. Regulation Up, Spin, and Non spin awards require a charging bid. Regulation down awards require a discharging bid.

Compared to generating resources, NGRs have unique considerations and limitations for various bid components. The following table describes the special bidding limitations for NGR's.

Exhibit 4.2.1: Bidding limitations for NGRs

Bid component	Allowed for non REM?	Allowed for REM?	Comment
Start-Up Cost/Bid	No	No	By nature NGRs do not have startup costs.
Minimum Load Cost/Bid	No	No	By nature NGRs do not have minimum load costs.
Transition Cost/Bid	No	No	By nature NGRs do not have transition costs.
Energy Bid Curve	Yes	No	NGRs selecting the REM option are not allowed to participate in the energy market.
Default Energy Bid Curve	Yes	No	NGRs may select a Default Energy Bid calculation methodology as outlined in Attachment D.
Self-Schedule	Yes	No	Because NGRs selecting the REM option are not allowed to participate in the energy market, they cannot self-schedule. Non-REM NGRs can self-schedule as price takers only.
Ancillary Services			NGRs are not allowed to self-provide Ancillary Services
Regulation Down	Yes	Yes	

Bid component	Allowed for non REM?	Allowed for REM?	Comment
Regulation Up	Yes	Yes	
Spinning Reserve	Yes	No	NGRs selecting the REM option are only allowed to supply regulation.
Non-Spinning Reserve	Yes	No	NGRs selecting the REM option are only allowed to supply regulation.
<u>Imbalance Reserve Up (IRU)</u>	<u>Yes</u>	<u>No</u>	<u>Eligible for non-REM NGRs. IRU represents upward ramping capability and is associated with the resource's discharging range (positive MW).</u>
<u>Imbalance Reserve Down (IRD)</u>	<u>Yes</u>	<u>No</u>	<u>Eligible for non-REM NGRs. IRD represents downward ramping capability and is associated with the resource's charging range (negative MW).</u>
<u>Reliability Capacity Up (RCU)</u>	<u>Yes</u>	<u>No</u>	<u>Eligible for non-REM NGRs. RCU is procured in the RUC process and represents upward capacity, associated with the discharging range.</u>
<u>Reliability Capacity Down (RCD)</u>	<u>Yes</u>	<u>No</u>	<u>Eligible for non-REM NGRs. RCD is procured in the RUC process and represents downward capacity, associated with the charging range.</u>
Operational Ramp Rate	Yes	Yes	NGRs are limited to two segments. One ramp rate for charging and one ramp rate for discharging
Operating Reserve Ramp Rate	No	No	NGRs are not allowed to submit Operating Reserve Ramp Rates. Operational Ramp rate shall be used for procurement of AS.
Regulation Ramp Rate	No	No	NGRs are not allowed to submit Regulation Ramp Rates. Operational Ramp rate shall be used for procurement of AS.
Contingency Dispatch Indicator	Yes	N/A	Does not apply to REM resources because they cannot supply spinning or non-spinning reserve.
Intertie Minimum Hourly Block	N/A	N/A	Does not apply to NGRs because NGRs must be located within the CAISO balancing authority.

Bid component	Allowed for non REM?	Allowed for REM?	Comment
Dispatch Option	N/A	N/A	Does not apply to NGRs because NGRs must be located within the CAISO balancing authority.
Pump Shut-Down Cost	No	No	By nature NGRs do not have pump shut-down costs.
Pumping Cost	No	No	By nature NGRs do not have pumping costs.
Daily Energy Limit (Maximum and Minimum Daily)	No	No	N/A, however NGRs do bid an upper and lower charge limit.
RUC	No	No	NGR Resources do not participate in RUC
Default Energy Bid Adjustment Curve	No	No	Does not apply to REM resources because they are not subject to Local Market Power Mitigation
Default Minimum Load Bid Adjustment	No	No	Because NGRs don't submit minimum load cost bids this bid component is not necessary
Default Start-Up Cost Adjustment	No	No	Because NGRs don't submit startup cost bids, this bid component is not necessary
Capacity Limit	Yes	Yes	
Distribution Factors	Yes	Yes	Assumption is that all underlying resources are operating in the same mode, either all must be in charging mode or all must be in discharging mode.
VER Forecast	N/A	N/A	Does not apply to NGRs because NGRs cannot be a VER.
<i>The following bid components apply to NGRs only</i>			
Lower State of Charge Limit	Yes	Yes	Lowest stored energy that should be maintained in the device. Cannot be lower than the minimum stored energy value registered in the Master File.
Upper State of Charge Limit	Yes	Yes	Highest stored energy that should be maintained in the device. Cannot be higher than the maximum stored energy value registered in the Master File. (Also referred to in the GRDT as the Maximum Continuous Energy

Bid component	Allowed for non REM?	Allowed for REM?	Comment
			Limit).
Initial DA State of Charge (SOC)	Yes	No	The initial SOC in MWh for the resource on the first participation interval of the trading day in the Day Ahead Market. If not provided, value is determined based on the ending SOC from previous day if available, or zero (0MWh) if not available from previous day. Note: For the real time market operations, SOC values are submitted and utilized by EMS every 4 seconds via telemetry. EMS provides SOC values to the Real Time Market approximately every 1 minute.
End of Hour State of Charge (EOH SOC)	Yes	No	Submitted in a minimum and maximum range; intended to assist storage resources in managing their use throughout the day. Scheduling Coordinators will be able to submit an EOH SOC MWh value with their bids in the real-time market.

5. Energy Bids

Welcome to the Energy Bids section of the CAISO BPM for Market Instruments. In this section you will find the following information:

A general description of the Energy Bid components

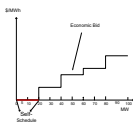
A description of the Bid requirements for Supply Bids

A description of the Bid requirements for Demand Bids

For physical Bids SCs submit Energy Bids to participate in CAISO Markets for Energy. Bids are submitted by SCs for each market (DAM and RTM) for the resources associated with each SC. SCs submit Bids for each resource. A single Energy Bid can include both Economic Bid components and Self-Schedule components, as shown in Exhibit 5-1, as well as operational information that applies to the entire range of Economic Bid components and Self-Schedule components. Exhibit 5-1 shows a Bid that contains a Self-Schedule of 20 MW, and an Economic Bid of 80MW.

For Virtual Bids at a location SCs must submit in the DAM with an Energy Bid which will only contain the Economic Bid Components.

Exhibit 5-1: Example of Energy Bid with Self-Schedule & Economic Bid Components



SCs submit Energy Bids for the following types of resources:

Generating Unit – Bids for certain types of Generating Units have additional Bid validation requirements. These include: Physical Scheduling Plant, a Pumped-Storage Hydro Unit, a System Unit, a Generating Unit fueled by natural gas, and Multi-Stage Generating Resources (MSG). In addition there are resources that are modeled like a Generating Unit (i.e. Inter-Tie Generators or Dynamic Resource-Specific Generating Resources and Proxy Demand Resources, Proxy Demand Resource-Load Shift Resources, and Reliability Demand Response Resources) that are also subject to the bidding rules associated to Generating Units.

Export Resource – Demand at a Scheduling Point.

- **System Resource (an Import Resource)** – can be registered as firm, non-firm, wheeling, a Dynamic System Resource, or unit contingent. For Non-Dynamic System Resources registered as an Hourly Pre-dispatch in the Master File, bid options include a flag to require the bid to be considered as an hourly block schedule, and a flag to allow a single curtailment for the remainder of the hour for accepted block schedules. For Non-Dynamic System Resources not registered as an Hourly Pre-dispatch in the Master File, resources may participate as a 15 minute dispatchable resource in addition to the above options.

Participating Load – Load that has executed a Participating Load Agreement, including Pumping Load.

Non-Participating Load – Load that has not executed a Participating Load Agreement, internal to the CAISO Balancing Authority Area and cannot submit Bids for Ancillary Services.

Multi-Stage Generating Resources - Consistent with the rules in the CAISO Tariff, Generating Units and Dynamic Resource-Specific System Resources can be modeled and participate in the CAISO Markets as MSGs.

Virtual Resources—Virtual Supply or Virtual Demand Bids at a given Eligible PNode or Eligible Aggregated PNode.

Non-Generator Resources— NGRs are resources that have a continuous operating range from a negative to a positive power injection. NGRs are generally treated like Generating Units, but some bidding limitations apply due to their unique operating characteristics. See section 4.1.1 for more details.

Eligible Intermittent Resources – (EIR) is a Variable Energy Resource that is registered with the ISO as a Generating Unit or a Dynamic System Resource. A Variable Energy Resource is powered by an energy source that is renewable, and cannot be stored, and has uncontrolled variability. An EIR is treated similar to a Generating Unit or a System Resource by the CAISO systems. However, to be dispatched for energy in the real-time market the EIR must either supply the CAISO with a short term forecast of its output or use the CAISO's resource specific forecast. Depending on whether the resource self-schedules or bids economically, the CAISO will either use the forecast value as an adjustment to the self-schedule or as an upper economic operating limit. See the *BPM for Market Operations* for details.

The following sections describe the details associated with different components of the Energy Bids.

5.1 Supply Bids

(The content of this section is based on CAISO Tariff Section 30.5.2, Supply Bids)

Physical Supply Bids can be both Economic Bids for Supply and Self-Schedule Bids for Supply. The same resource can submit both Economic and Self-Schedule Bids for Supply for the same Trading Hour. Virtual Supply Bids will be Economic Bids only. Supply Bids can be submitted in the IFM based on market timelines and SIBR rules. Scheduling Coordinators submitting these Bid components for a Multi-Stage Generating Resource must do so at the registered MSG Configuration level and not at the Generating Unit or Dynamic Resource-Specific System Resources. Scheduling Coordinators must utilize the MSG Configuration ID for this purpose.

Scheduling Coordinators may register the number of Multi-Stage Generating Resource configurations as are reasonably appropriate for the unit based on the operating characteristics of the unit, which may not, however, exceed a total of ten configurations and cannot be fewer than two configurations.

There may be multiple MSG Configurations in a single bid, but each MSG Configuration must be submitted under the single MSG Configuration ID.

Each Energy Supply Bid is uniquely identified by:

Scheduling Coordinator ID – This is the identification of the SC that submits the Bid. (For Virtual Bids the Scheduling Coordinator must be associated to a single Convergence Bidding Entity)

Market Type – Either DAM or RTM. (DAM only for Virtual Supply Bids)

Bid period – Identifies the specific CAISO Market for which the Bid applies. For a DAM Bid, the Bid period is the specific Trading Day. The Bid in the DAM is considered to be for a 24 hour period but any Bid component that is designated as hourly can differ for each hour. For a RTM Bid, the Bid is for a specific Trading Hour.

Resource ID – Identifies the resource. It must be a valid resource associated with the SC specified in the Bid. In order to participate in CAISO Markets, the resource must be certified.

This is described in more detail in the *BPM for Scheduling Coordinator Certification and Decertification*.

Configuration ID (MSG resources only) - and Multi-Stage Generating Resource configuration ID as applicable.

Location - Eligible PNode or Eligible Aggregated PNode for Virtual Supply Bids.

Transaction ID - Identification characters generated by the CAISO when Bids are submitted by Scheduling Coordinators at Interties for resources whose characteristics are not registered in the Master File such as Non-Dynamic System Resources. The Transaction IDs remain associated with specific transactions represented in the Bid from Bid validation through Settlement of the Bid if cleared through the CAISO Markets. Transaction IDs are not assigned to Bids associated with resources whose characteristics are registered in the Master File such as Resource Adequacy Capacity, Transmission Ownership Rights, Existing Transmission Contracts, resources certified for Ancillary Services or other contractual agreements that the CAISO is required to honor

5.1.1 Day-Ahead Economic Bids for Supply

Day-Ahead Economic Bids for Supply must include two types of information that the SCs submit to CAISO:

- Financial Information (detailed in Section 5.1.1.1 below)
- Operating Information (detailed in Section 5.1.1.2 below)

5.1.1.1 Financial Information

Financial information includes the cost components of Bids, and any associated operating limitations.

5.1.1.1.1 Start-Up Bid Component

This Bid component applies only to Generating Units (and to Dynamic and Non-Dynamic Resource-Specific System Resources, Proxy Demand Resources, Proxy Demand Resource-Load-Shift Resources, and Reliability Demand Response Resources, which are modeled in the same way as Generating Units). Start-Up Bid component contains:

Start-Up Time – The Start-Up Time is a staircase curve with up to three segments reflecting the conditions for Start-Up (Warm, Intermediate and Cold). The Start-Up Time (expressed in minutes) is expressed as a function of Cooling Time (expressed in minutes) and can range from zero to infinity. **(CAISO inserts registered Master File Data).**

Start-Up Bid Cost – The Start-Up Bid Cost is a staircase curve with up to three segments reflecting the conditions for Start-Up (Warm, Intermediate and Cold). Start-Up Bid Cost is expressed in \$, as a function of Cooling Time (in minutes) and can range from zero to infinity.³ The value used for Start-Up Cost is determined as follows:

If the SC has elected the Registered Cost option for Start-Up Cost and the SC submits registered value, CAISO overwrites any submitted Bid component with the Start-Up Cost data from the Master File. Under this option, the registered value can be changed every 30 days through the Master File change process.

If the SC has elected the Proxy Cost option for the Start-Up Cost, the CAISO calculates this value daily using the daily fuel region price SCs may include Start-Up Bids into their DAM Bid submissions as long as the Start-Up Bid value is not negative and is less than or equal to the Default Start-Up Bid value calculated using the daily fuel region price, or a validated Start-Up Bid Cost value submitted by the SC.

If the SC does not submit a Start-Up Bid, the CAISO uses 100% of the Proxy Start-Up Cost plus 100% of the Start-Up opportunity cost, if applicable. When the submitted Start-Up Bid is greater than the calculated Default Start-Up Bid, the CAISO uses the Default Start-Up Bid calculated using the daily fuel region price. The process used by CAISO to calculate the daily fuel region price is described in Attachment C.

Example of Start-Up Bid Component

	Cooling Time (Minutes)	Start-Up Time (Minutes)	Start-Up Bid Cost (\$)
Warm	0	600	6,500
Intermediate	240	1390	9,800
Cold	480	1400	12,000

The Start-Up Bid component is a daily Bid component and can be bid into both the DAM and the RTM. RTM submissions will not be used if the resources was committed in the DAM, the DAM Daily Components will be copied to the RTM bid.

If the SC has selected Registered Cost option for the Start-Up Cost, this value can be changed every 30 days through the Master File change process. Whenever the Start-Up Bid Cost submitted by the SC is overwritten, the CAISO notifies the SC that the daily Start-Up Bid Cost has been overwritten by the default values when the Bid confirmation is provided to the SC.

5.1.1.1.2 Default Start-Up Cost Adjustment Curve

The Default Start-Up Cost adjustment curve component applies only to Generating Units (and to Dynamic and Non-Dynamic Resource-Specific System Resources, Proxy Demand Resources, and Reliability Demand Response Resources, which are modeled in the same way as Generating Units), and only to those units which have selected the Proxy Cost Option. The Default Start-Up Cost adjustment curve provides the functionality to submit a Reference Level Change Request for a Default Start-Up Bid. Attachment O provides information on Reference Level Change Requests. The Default Start-Up Cost adjustment component contains:

Start-Up Time – The Start-Up Time is a staircase curve with up to three segments reflecting the conditions for Start-Up (Warm, Intermediate and Cold). The Start-Up Time (expressed in minutes) is expressed as a function of Cooling Time (expressed in minutes) and can range from zero to infinity. **(CAISO inserts registered Master File Data).**

Start-Up Cost Curve – The Start-Up Cost Curve is a staircase curve with up to three segments reflecting the conditions for Start-Up (Warm, Intermediate and Cold). Start-Up Bid Cost is expressed in \$, as a function of Cooling Time (in minutes) and can range from zero to infinity. The value used for Start-Up Cost Curve is determined as follows:

SCs may include Start-Up Bids into their Bid submissions as long as the Start-Up Bid Cost value is not negative. The Start-Up Bid Cost Curve will also be validated against the Reasonableness Threshold. The Reasonableness Threshold value is calculated using the daily Gas Price Index multiplied by a volatility scalar. See Attachment O for details on the Reasonableness Threshold Start-Up Bid calculation and details on Reference Level Change Requests.

Example of Start-Up Cost adjustment Component

	Cooling Time (Minutes)	Start-Up Time (Minutes)	Start-Up Bid Cost (\$)
Warm	0	600	6,650
Intermediate	240	1390	9,820
Cold	480	1400	12,010

Once the Reference Level Change Request is validated, the Start-Up Cost adjustment is used in validation of the Start-Up Bid Component.

5.1.1.1.3 Minimum Load Bid Component

The Minimum Load Bid component applies to Generating Units (and to Dynamic and Non-Dynamic Resource-Specific System Resources, Proxy Demand Resources, Proxy Demand Resource-Load-Shift Resources, and Reliability Demand Response Resources, which are modeled in the same way as Generating Units). The Minimum Load Bid component contains:

The hourly Minimum Load Bid Cost of operating the Generating Unit at Minimum Load, expressed in \$/hr.⁴

The Minimum Load Bid can be bid into both the DAM and the RTM. RTM submissions will not be used if the resources was committed in the DAM, the DAM Daily Components will be copied to the RTM bid.

If the SC has elected the Registered Cost option for Minimum Load Cost, and the SC submits data for this component, CAISO overwrites the Bid component with the data from the Master File. If the SC selected Registered Cost Minimum Load Cost, this value can be changed every 30 days through the Master File.

If the SC has elected the Proxy Cost option for Minimum Load Cost, CAISO calculates this value daily based on the daily fuel region price. . SCs may include Minimum Load Bids into their DAM Bid as long as the value is not negative and is less than or equal to the Default Minimum Load Bid value calculated using the daily fuel region price. If the SC does not submit a Minimum Load Bid, the CAISO uses 100% of the Proxy Minimum Load Cost Index plus 100% of the run-hour opportunity cost, if applicable.

Minimum Load Bids will be validated by the CAISO and shall not exceed the Minimum Load Cost Hard Cap.

5.1.1.1.4 Default Minimum Load Bid Adjustment Component

The Default Minimum Load Bid adjustment curve component applies to Generating Units (and to Dynamic and Non-Dynamic Resource-Specific System Resources, Proxy Demand Resources, and Reliability Demand Response Resources, which are modeled in the same way as Generating Units) which have selected the Proxy Cost Option. The Default Minimum Load Bid adjustment curve provides the functionality to submit a Reference Level Change Request for a Default Minimum Load Bid. Attachment O provides information on Reference Level Changes Requests. The Default Minimum Load Bid adjustment component contains:

Minimum Load Cost Curve - The Minimum Load Costs of operating the Generating Unit at Minimum Load, expressed in \$/hr.

SCs may include Minimum Load Bid Costs into their Bids as long as the value is not negative. The Minimum Load Bid Cost Curve will also be validated against the Reasonableness Threshold. The Reasonableness Threshold value is calculated using the daily Gas Price Index multiplied by a volatility scalar. See Attachment O for details on the Reasonableness Threshold Minimum Load Bid calculation and details on Reference Level Change Requests. In addition, Reasonableness Threshold Minimum Load Bids are subject to the Minimum Load Cost Hard Cap.

Once the Reference Level Change Request is validated, the Minimum Load Cost adjustment is used in validation of the Minimum Load Bid Component.

5.1.1.1.5 Transition Bid Component

This Bid component applies to Multi-Stage Generating Resources only and contains the transition related requirements for an MSG's movement between MSG Configurations. The transition Bid contains:

Transition Time – The notification time for completing a MSG State Transition between MSG Configurations. **(CAISO inserts registered Master File Data if none is entered).**

Transition Cost Curve– The Transition Cost Curve is the price incurred for a MSG State Transition between Online Generating Resource States and is a biddable parameter. SCs may include Transition Bids into their DAM Bid as long as the value is not negative. If the SC does not submit a Transition Bid, the CAISO uses 100% of the Proxy Transition Cost plus 100% of the transition cost opportunity cost, if applicable. **(CAISO calculates the Transition Cost as described in Attachment H.)**

Transition Definition – The Transition Definition is Transition data composed of **Initial and Final Online Generating Resource States** (the From Configuration and the To Configuration)

5.1.1.1.6 Energy Bid Curve

Energy Bid Curve is required to be submitted on behalf of a resource providing RA Capacity that has an obligation to offer Energy into the DAM, as described in the BPM for Reliability Requirements, unless a Bid on behalf of the unit is submitted as a Self-Schedule. For all other resources, the Energy Bid Curve component is optional. Specific requirements for submitting Energy Bid Curves are detailed in Attachment A.

The Energy Bid Curve component contains:

An Energy Bid Curve of up to 10 segments (defined by 11 pairs) of Energy offer price (\$/MWh) and operating level (MW) for each of the 10 segments. The Energy Bid Curve begins at the Minimum Load level or the sum of its Self-Schedules, whichever is greater, of the Generating Unit.

Resources which have had their market-based rate authority suspended per CAISO Tariff Appendix II and wish to submit an Energy Bid Curve may only submit at a price of \$0/MWh, or the Scheduling Coordinator may submit a Self-Schedule.

Example of Energy Bid Curve Component for a Generating Unit with a PMin of 70MW and a PMax of 500 MW

Segment	Operating Level (MW)	Energy Price \$/MWh
1	70	25
2	150	30
3	200	35
4	250	40
5	300	45
6	340	50
7	375	55
8	400	60
9	450	65
10	475	75
	500	75

Segment 1 is from 70.01 MW to 150.00 MW at an Energy price of \$25/MWh; Segment 2 is from 150.01 MW to 200.00 MW, at an Energy price of \$30/MWh etc.

The Energy Bid Curve must be monotonically increasing. Separate Energy Bid Curves are submitted for each Trading Hour of the Trading Day. The Energy Bid Curve will be validated by the CAISO upon submission to ensure that the Energy Bid Curve complies with bid validation rules. Energy Bids are subject to the Hard Energy Bid Cap. Energy Bid Curves in excess of the Hard Energy Bid Cap will be rejected.

In addition, supply Energy offers in excess of the Soft Energy Bid Cap may require a Reference Level Change Request, the CAISO's method of pre-market cost verification. More information can be found in Attachments O.1.3 and Attachment P.

If the Reference Level Change Request for incremental energy costs is accepted, the supply Energy offer can then be submitted up to the higher of the Soft Energy Bid Cap and the supply resource's Default Energy Bid or revised Default Energy Bid. If the supply Energy offer exceeds the revised Default Energy Bid, the supply Energy offer will be modified to the revised Default Energy Bid.

Proxy Demand Resources and Reliability Demand Response Resources subject to the Marginal Real-Time Dispatch Option can submit single or multi-segment Energy Bid Curves in the Day-Ahead, similar to generation resources, as long as the Energy offer price is no lower than the current effective net benefits test threshold Market Clearing Price. Reliability Demand Response

Resources subject to the Discrete Real-Time Dispatch Option cannot submit any Energy Bid Curves in the Day-Ahead.

5.1.1.1.7 Default Energy Bid Adjustment Curve

The Default Energy Bid adjustment curve component applies to Generating Units for which Default Energy Bids are calculated (all Generating Units except for PDR and RDRR), except for units which have selected the Hydro Default Energy Bid Option. The Default Energy Bid adjustment curve provides the functionality to submit an Automated Reference Level Change Request for a Default Energy Bid. The Default Energy Bid adjustment curve also serves as one of the ways that the CAISO cost-verifies supply Energy offers in excess of the Soft Energy Bid Cap. The other method is the Manual Reference Level Change Request, although a Manual Reference Level Change Request updates all reference levels, not just the DEB. Attachment O provides information on Reference Level Change Requests. The Default Energy Bid Curve component contains:

Energy Bid Curve - An Energy Bid Curve of up to 10 segments (defined by 11 pairs) of Energy cost (\$/MWh) and operating level (MW) for each of the 10 segments. The Default Energy Bid Curve begins at the Minimum Load level of the Generating Unit. The Energy Bid Curve must be monotonically increasing. Separate Energy Bid Curves are submitted for each Trading Hour of the Trading Day. The format of the submittal is the same as for the Energy Bid Curve in the previous section.

The segment MW values of the Default Energy Bid adjustment curve must match the MW values of the Default Energy Bid curve. The Default Energy Bid adjustment curve will be validated against the Reasonableness Threshold. The cost of each segment must not exceed the corresponding segment of the Reasonableness Threshold DEB. The Reasonableness Threshold value is calculated using the variable cost option, using the daily Gas Price Index (for gas-fired resources) or the Master File-registered Average Cost (for non-gas resources) and a volatility scalar. See Attachment O for details on the Reasonableness Threshold Default Energy Bid calculation and for details on Reference Level Change Request. In addition, Reasonableness Threshold DEB curves are subject to the Hard Energy Bid Cap. Default Energy Bid adjustments with any segments that exceed the Hard Energy Bid Cap will be rejected.

Once a Reference Level Change Request for the DEB is validated, the Default Energy Bid adjustment curve replaces the Default Energy Bid Curve calculated by the CAISO, and is used for mitigation, bid cost recovery, and, for validating the Energy Bid Curve for supply Energy offers that exceed the Soft Energy Bid Cap.

5.1.1.2 Operating Information

Energy Supply Bids also contain operating information components that specify constraints on the operation of a Generating Unit or Participating Load.

5.1.1.2.1 Ramp Rate Component

SCs can submit three different types of Ramp Rate information. However, SCs may only submit Operational Ramp Rates for NGRs. In addition to its regular purpose, the Operational Ramp Rate for NGRs will also be used for procurement and dispatch of Ancillary Services.

Operational Ramp Rate (Required if submitting Economic Bid for Supply) – The Operational Ramp Rate of resources limits the Energy schedule changes from one time period to the next in the SCUC. The Operational Ramp Rate is used for scheduling and dispatch when the Generating Unit is not providing Regulation. The Ramp Rate function allows the SCs to declare the Ramp Rate at different operating levels. The Operational Ramp Rate component is a staircase curve of up to four segments (in addition to the Ramp Rate segments needed for modeling Forbidden Operating Regions, which are entered in the Master File⁵) comprising the Ramp Rate, expressed in MW/minute and associated operating levels, expressed in MW. NGRs are limited to two segments, with one segment defining the charging range (negative side) and the other defining the discharging range (positive side).

If a resource is subject to CAISO Tariff Appendix II, the responsible Scheduling Coordinator must submit an Operational Ramp Rate equal to the maximum Operational Ramp Rate registered in the Master File.

Example of Operational Ramp Rate for a Generating Unit with a PMin of 70 MW and a PMax of 500 MW with no Forbidden Operating Regions

MW	MW/Min
70	5
150	8
300	7

⁵ Ramp Rates and Forbidden Regions are merged to create a single Clean Bid.

MW	MW/Min
400	8
500	8

Example of Operational Ramp Rate for a Generating Unit with a PMin of 100 MW and a PMax of 600 MW with Forbidden Operating Regions

The resource has four Forbidden Operating Regions stored in the Master File:

- 160 – 200 MW effective Ramp Rate 2 MW/Min
- 280 – 300 MW effective Ramp Rate 3 MW/Min
- 400 – 410 MW effective Ramp Rate 4 MW/Min
- 490 – 500 MW effective Ramp Rate 5 MW/Min

SC submits a four segment Ramp Rate with no Forbidden Operating Regions in its Bid:

MW	MW/Min
100	6
200	7
300	8
400	9
600	9

The final composition of the Ramp Rate after the IFM pulls in the Forbidden Operating Regions from the Master File is:

MW	MW/Min
100	6
160	2
200	7
280	3
300	8
400	4
410	9
490	5
500	9

MW	MW/Min
600	9

Operating Reserve Ramp Rate (Required if submitting Bid for Operating Reserve) The Operating Reserve Ramp Rate is a single value included in Ancillary Services Bids for Spinning Reserves and Non-Spinning Reserves that represents the Ramp Rate of a resource used in the procurement of Operating Reserve capacity. Further details of this Bid component are described in Section 6 (Ancillary Services Bids).

If a resource is subject to CAISO Tariff Appendix II, the responsible Scheduling Coordinator must submit an Operating Reserve Ramp Rate equal to the maximum Operating Reserve Ramp Rate registered in the Master File.

Regulation Ramp Rate (Required if submitting Bid for Regulation Up or Regulation Down)⁶ The Regulation Ramp Rate is a single value included in Ancillary Services Bids for Regulation Up and Regulation Down that represents the Ramp Rate of a resource used in the procurement and dispatch of Regulation Up or Regulation Down capacity. Further details of this Bid component are described in Section 6 (Ancillary Services Bids).

If a resource is subject to CAISO Tariff Appendix II, the responsible scheduling coordinator must submit a Regulation Ramp Rate equal to the maximum Regulation Ramp Rate registered in the Master File.

All three Ramp Rate components are constant across the Trading Day.

5.1.1.2.2 Energy Limit Bid Component

A Scheduling Coordinator is not required to submit this Bid component, for resources that do not have Energy Limits. NGRs are not considered Use-Limited Resources and do not submit this Bid component.

Energy Limit constraints apply to a prescribed list of Use-Limited Resources (designated in the Master File) that can generate limited amounts of Energy for a given period of time due to hydro conditions, emission allowances or other regulatory or design considerations. Use-Limited

⁶ The Regulation Ramp Rate cannot be greater than any segment of the Operational Ramp Rate that is in the Bid.

Resources may indicate an Energy Limit in their DAM Bids that applies to their schedule and dispatch throughout the Trading Day. The Energy Limit Bid component contains:

- Maximum Daily Energy Limit (MWh)
Minimum Daily Energy Limit (MWh). This value must not be greater than zero.

In Generation mode the Minimum value would be 0, in the pumping mode it would be a negative number.

The Energy Limit component is fixed for the entire Trading Day and is submitted only in the DAM.

5.1.1.2.3 Distribution Curve Bid Component

The Distribution Curve Bid component contains, for each resource contained in a Physical Scheduling Plant, System Unit, Multi-Stage Generating Resource, or Proxy Demand Resource (excluding Reliability Demand Response Resources), the following information:

Distribution Location – Defined as the Connectivity Node (CNode) associated with the resource

Distribution Factor – Generation Distribution Factor for the resource located at the Distribution Location. Distribution Factors are non-negative numbers that sum to one (1) for the Aggregated Generating Resource, Proxy Demand Resource, Proxy Demand Resource-Load-Shift Resources,

Note: For a Multi-State Generating Resource, each Configuration can specify the Distribution Location and Factor.

5.1.1.2.4 Pump Mode of Pumped-Storage Hydro Units & Participating Load⁷

(Required for Pumped-Storage Hydro Units and Pumping Load resources)

⁷ See Section 5.2.1.1 for a complete discussion of bidding rules, including for Energy Bids, for Aggregated Participating Load.

Pumped-Storage Hydro Units and Pumping Load can operate in the mode of Generating Unit or Participating Load and can submit Bid components for both modes. Participating Load is treated in the same manner as the pumping component of the Pumped-Storage Hydro Units.

⁸In addition to the Start-Up Cost component and the Minimum Load Cost component (associated with operating in generating mode), Pumped-Storage Hydro Units submit the following three Bid components:

Pump Shut-Down Cost, expressed in \$

A Pumping Level, expressed in MW (positive value)

Pumping Cost – The hourly cost of pumping, expressed in \$/Hr, if the resource is registered as a Pumped-Storage Hydro Unit. The value bid for Pumping Cost must not be lower than a minimum cost registered in the Master File. The bid value can be positive or zero, indicating that the resource will pay no more than the bid value for the power needed to run the pump, or negative, indicating that the resource will be paid no less than the bid value for the power needed to run the pump.

Exhibit 5-2: Pumped-Storage Hydro Unit Bid Component with both Generation and Demand

Pumped-Storage Hydro in Pump Mode Bid Components	<i>Compared to</i>	Pumped-Storage Hydro in Generator Mode Bid Components
Shut-Down Cost –		Generator’s Start Up Cost
Pumping Level		MW Operating Point
Pumping Cost		Energy Bid component

⁸ While Participating Load is treated as negative generation in the IFM, SCs enter a positive value in the Bid.

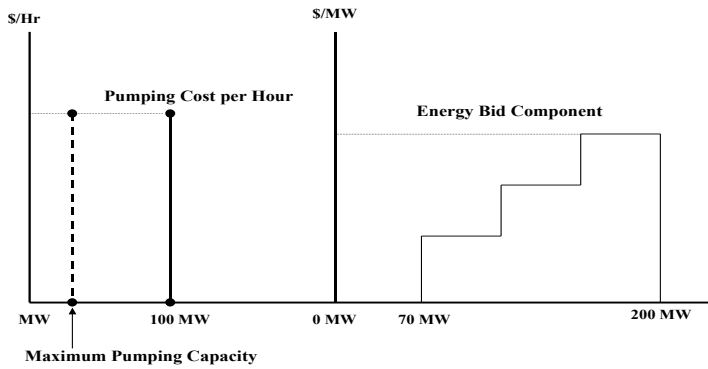


Exhibit 5-2 shows a Bid for a Pumped-Storage Hydro Unit that contains both Generation and Demand components for the same Trading Hour. In the above example, the Generation PMin is 70MW and the PMax is 200 MW. The unit submits a pumping bid of 100 MW.

5.1.1.3 Multi-Stage Generating Resources

A Scheduling Coordinator cannot submit a Bid to the CAISO Markets for a MSG Configuration into which the Multi-Stage Generating Resource cannot transition due to lack of Bids for the specific Multi-Stage Generating Resource in other MSG Configurations that are required for the requisite MSG Transition.

In order for a Multi-Stage Generating Resource to meet any Resource Adequacy must-offer obligations, the responsible Scheduling Coordinator must submit either an Economic Bid or Self-Schedule for every MSG Configuration in the registered Default Resource Adequacy Path into the Day-Ahead Market, as feasible. If a Multi-Stage Generating Resource holding a Resource Adequacy must-offer obligation fails to meet this requirement, then the ISO will create a Generated Bid or extend an existing bid, as applicable, for every MSG Configuration in the registered Default Resource Adequacy Path.

For the Day-Ahead Market, a Multi-Stage Generating Resource, whether or not holding a Resource Adequacy must-offer obligation, must submit bids from all configurations whose configuration PMax is at a MW output level between the maximum bid-in Energy MW and the higher of the Self-Scheduled Energy MW and the Multi-Stage Generating Resource plant-level PMin. If a Multi-Stage Generating Resource fails to meet this requirement, then the ISO will create a Generated Bid for every MSG Configuration from which a Bid was required.

5.1.1.4 Non-Generator Resources

Non-Generator Resources (NGRs) may submit a Lower Charge Limit (LCL) for each trading day, which is the lowest stored energy that should be maintained in the resource. This value, in MWh, cannot be lower than the Minimum Stored Energy Limit registered in the Master File. . If this component is not provided, the ISO will use the Minimum Continuous Energy Limit value stored in Master File.

In addition, NGRs may submit an Upper Charge Limit (UCL) for each trading day, which is the highest stored energy that should be allowed in the resource. This value, in MWh, cannot be higher than the Maximum Stored Energy limit in the Master File. If this component is not provided, the ISO will use the Maximum Continuous Energy Limit value stored in Master File.

Non-Generator Resources may submit an initial SOC in MWh for the resource to indicate the available energy on the first participation interval of the trading day in the Day Ahead Market. If not provided, the value is determined based on the ending SOC from the previous day if available, or zero (0 MWh) if not available from previous day.

5.1.2 Day-Ahead Economic Virtual Bids for Supply

Day-Ahead Economic Virtual Bids for Supply are limited to the Energy Curve defined in the Bid. For Virtual Bids this is required and the Resource Type selected must be Virtual Supply. Virtual Supply Bids must start at zero (0) MW. The construction of the Energy Bid Curve can be seen in the example below.

Example of Energy Bid Curve Component for a Virtual Supply Bid

Segment	Operating Level (MW)	Energy Price \$/MWh
1	0	25
2	150	30
3	200	35
4	250	40
5	300	45
6	340	50
7	375	55

Segment	Operating Level (MW)	Energy Price \$/MWh
8	400	60
9	450	65
10	475	75
	500	75

The Energy Bid Curve must be monotonically increasing. Virtual Supply Bids will be validated by the CAISO upon submission to ensure that the Energy Bid Curve complies with bid validation rules. Virtual Supply Bids are subject to the energy bid caps described further in Attachment P..

5.1.3 Day-Ahead Self-Schedule Bids for Supply

This section is based on the CAISO Tariff Section 31.4, Uneconomic Adjustments in the IFM

Generating Units may submit a Self-Schedule Bid for Supply for each Trading Hour of the Trading Day. Proxy Demand Resources are limited to Self-schedule only up to the Minimum Load for the resource. Reliability Demand Response Resources (RDRR) can participate in the Day-Ahead Market using Bids similar to Bids used by Proxy Demand Resources in the Day-Ahead Market. RDRR are not allowed to submit Self-Schedule Bids. Any Day-Ahead Schedule for the resource will automatically become a Self-Schedule for the applicable Real-Time hour. The Day-Ahead Schedule is a binding Real-Time Market award even though the RDRR will not receive a real-time dispatch. If the triggering event for utilizing real-time bids on behalf of RDRRs does not occur based on the procedure set forth in Section 7.1 of the BPM for Market Operations, the RDRRs will not receive any Real-Time Dispatch Instruction.

A Self-Schedule Bid component indicates self-commitment by the Generating Unit – i.e., the IFM does not economically commit or de-commit a resource in a Self-Scheduled resource. SCs can submit different types of Self-Schedule Bids that receive different scheduling priorities in the IFM, consistent with registration in the Master File. The list in decreasing order of priority is:

Legacy Reliability Must-Run (LRMR) Unit (manually dispatched prior to the DAM or committed through the MPM process)

Transmission Ownership Right (TOR)

Existing Transmission Contract (ETC) *Note: Converted Rights (CVR) will be submitted into SIBR using the “Self Schedule ETC” Product Type (DAM only) and have the same priority as ETC.

Regulatory Must-Run and Regulatory Must-Take (RMT) Generation

Price Taker (PT)

5.1.3.1 Utilizing Self-Schedule Priorities

The following sections describe the types of Self-Schedule components an SC can submit, in decreasing order of priority. NGRs can only submit Price Taker Self-Schedules.

It is important to note that a TOR, ETC or Wheel that is submitted in the DAM result, if awarded translates into a RT Self-Schedule if no bid or schedule is submitted. In order to preserve the priority of an ETC, TOR, or Wheel the ETC, TOR, or Wheel must be resubmitted in the RTM.

Converted Right (CVR) contracts do not have priority in the RTM.

5.1.3.1.1 Transmission Ownership Right Self-Schedule Bid Component

(Required for TORs)

This is based on CAISO Tariff Section 17, Transmission Ownership Rights ("TOR").

A TOR Self-Schedule Bid component contains:

- TOR Self-Schedule Identifier – TOR
- TOR Contract Reference Number (CRN)
TOR Self-Schedule capacity, expressed in MW

TOR Self-Schedules must be submitted balanced between source and sink, and must be within the ownership rights for that TOR, as specified in the Transmission Rights and Curtailment Instructions (TRTC) provided in advance to the CAISO. Sources and sinks must use the same TOR Contract Reference Number. The Contract Reference Number must be registered in the Master File prior to the TOR Self-Schedule taking place. (CAISO Tariff Section 17.3.1, Validation of TOR Self-Schedules).

5.1.3.1.2 Existing Transmission Contract Self-Schedule Bid Component

(Required for ETCs and CVRs)

An ETC Self-Schedule Bid component contains:

- ETC Self-Schedule Identifier – ETC

- ETC/CVR Contract Reference Number (CRN) *Note: CVRs are also defined by the CRN.

ETC/CVR Self-Schedule capacity, expressed in MW

ETC/CVR Self-Schedules must be submitted balanced between source and sink, and must not exceed the MW amount for the ETC referenced in the Bid, as specified in the TRTC provided in advance to the CAISO. Sources and sinks must use the same ETC/CVR Contract Reference Number. The Contract Reference Number must be registered in the Master File prior to the ETC/CVR Self-Schedule taking place. (See CAISO Tariff Section 16.6.1, Validation of ETC/CVR Self-Schedules).

5.1.3.1.3 Regulatory Must-Run/-Take Self-Schedule Bid Component

(Required for RMTs)

A RMT Self-Schedule Bid component contains:

- Self-Schedule Identifier – RMT
 - RMT Reference
- Self-Schedule capacity, expressed in MW

Note, Combined Heat and Power (CHP) resources eligible for RMT are only allowed to submit a RMT self-schedule up to the RMTMax values in the Master File, which may identify a single value or both on and off-peak values. See CAISO Tariff definition for resources eligible for Regulatory Must-Run and Regulatory-Must Take scheduling.

5.1.3.1.4 Price Taker Self-Schedule Bid Component

(Optional for all SCs)

The PT Self-Schedule Bid component contains:

- Self-Schedule capacity, expressed in MW
- Self-Schedule Identifier – PT
- Supporting Resource (Exports only)

5.1.3.1.5 Lower Price Taker Self-Schedule Bid Component

(Optional for all SCs, used for Exports Only)

The LPT Self-Schedule Bid component contains:

- Self-Schedule capacity, expressed in MW
Self-Schedule Identifier – L PT

5.1.4 Real-Time Economic Bids for Supply

Real-Time Economic Bids for Supply are similar to Day-Ahead Economic Bids for Supply with the major difference that Real-Time Bids are for one Trading Hour, while Day-Ahead Bids are for each Trading Hour in the Trading Day. As with Day-Ahead Economic Bids for Supply, Real-Time Economic Bids for Supply consist of daily and hourly components. If the SC submits daily components for a resource in the Day-Ahead Bid, it is not necessary to submit the components again in the RTM.

5.1.4.1 Financial Information

The following sections define the financial information that SCs submit for the RTM Economic Bids for Supply.

5.1.4.1.1 Start-Up Bid Component

This Bid component applies only to Generating Units, Proxy Demand Resources, and Proxy Demand Resource-Load-Shift Resources. The Start-Up component contains:

Start-Up Time – The Start-Up Time is a staircase curve with up to three segments reflecting the conditions for Start-Up (Warm, Intermediate and Cold). The Start-Up Time (expressed in minutes) is expressed as a function of Cooling Time (expressed in minutes) and can range from zero to infinity. **(CAISO inserts registered Master File Data).**

Start-Up Bid Cost – The Start-Up Bid Cost component is a staircase curve with up to three segments reflecting the conditions for Start-Up (Warm, Intermediate and Cold). Start-Up Bid Cost is expressed in \$, as a function of Cooling Time (in minutes) and can range from zero to infinity. The actual value used for each Generating Unit is limited by values submitted to the Master File, or calculated using daily gas prices. See section 5.1.1.1.1 for details.

Example of Start-up Bid Component

	Cooling Time (Minutes)	Start-Up Time (Minutes)	Start-Up Bid Cost (\$)
Warm	0	600	6,500

Intermediate	240	1390	9,800
Cold	480	1400	12,000

The Start-Up Bid Cost is constant for the entire Trading Day. If a Start-Up Bid is used (i.e. the resource is committed) in the DAM, the same value is used in the RTM and will override any RTM Start-Up Bid entries by the SC. CAISO notifies the SC that the Start-Up Bid has been overwritten by the DAM values when the Bid confirmation is provided to the SC.

5.1.4.1.2 Default Start-Up Cost Adjustment Curve

The Default Start-Up Cost adjustment curve component applies only to Generating Units (and to Dynamic and Non-Dynamic Resource-Specific System Resources, Proxy Demand Resources, and Reliability Demand Response Resources, which are modeled in the same way as Generating Units), and only to those units which have selected the Proxy Cost option. The Default Start-Up Cost adjustment curve provides the functionality to submit a Reference Level Change Request for a Default Start-Up Bid. The Default Start-Up Cost Adjustment Curve for Real-Time is the same as the one for Day-Ahead. See section 5.1.1.1.2 for details.

5.1.4.1.3 Minimum Load Bid Component

This Bid component applies only to Generating Units, Proxy Demand Resources, and Proxy Demand Resource-Load-Shift Resources. The Minimum Load Bid component contains:

The hourly cost of operating the Generating Unit at Minimum Load, expressed in \$/hr See section 5.1.1.1.3 for details.

If a Minimum Load Bid component is used (i.e. the resource is committed) in the DAM, the same value is used in the RTM and will override any RTM Minimum Load Bid entries by the SC for those hours the resource was committed in the DAM. CAISO notifies the SC that the Minimum Load Bid is overwritten by the DAM values when the Bid confirmation is provided to the SC.

5.1.4.1.4 Default Minimum Load Bid Adjustment Component

The Default Minimum Load Bid adjustment component applies to Generating Units (and to Dynamic and Non-Dynamic Resource-Specific System Resources, Proxy Demand Resources, and Reliability Demand Response Resources, which are modeled in the same way as Generating Units), which have selected the Proxy Cost Option. The Default Minimum Load Bid adjustment curve provides the functionality to submit a Reference Level Change Request for a Default Minimum Load Bid. The Minimum Load Cost component for Real-Time is the same as the one for Day-Ahead. See section 5.1.1.1.4 for details.

5.1.4.1.5 Transition Bid Component

This Bid component applies only to Multi-Stage Generating Units. The transition process of a MSG resource between Generating Resource States. Transition component contains:

Transition Time – The Transition Time The notification time for completing a MSG State Transition between Online Generating Resource States. **(CAISO inserts registered Master File Data if none is entered).**

Transition Bid Cost – The Transition Bid Cost is the price incurred for a MSG State Transition between Online Generating Resource States and is a biddable parameter. **See** section 5.1.1.1.5 for details.

Transition Definition – The Transition Definition is Transition data composed of **Initial and Final Online Generating Resource States** (the From Configuration and the To Configuration)

5.1.4.1.6 Energy Curve Bid Component

Energy Bid Curve is required to be submitted on behalf of a Generating Unit or Dynamic System Resource providing RA Capacity that has an obligation to offer Energy into the RTM, as described in the BPM for Reliability Requirements unless a Bid on behalf of the unit is submitted as a Self-Schedule. For all other Generating Units, the Energy Bid Curve component is optional. Specific requirements for submitting Energy Bid Curves are referenced in Attachment A of this BPM.

The Energy Curve Bid component contains:

An Energy Bid Curve of up to 10 segments (defined by 11 pairs) of Energy price (\$/MWh) and operating level (MW) for each of the 10 segments. The Energy Bid Curve begins at the Generating Unit's Minimum Load level or the Self-Schedule.

For resources subject to CAISO Tariff Appendix II, the responsible Scheduling Coordinator may only submit an Energy Bid Curve that contains a price of \$0/MWh, or the Scheduling Coordinator may submit a Self-Schedule.

Example of Energy Bid Component for a Generating Unit with a PMin of 70 MW and a PMax of 500 MW

Segment	Operating Level (MW)	Energy Price \$/MWh
1	70	25
2	150	30
3	200	35
4	250	40
5	300	45
6	340	50
7	375	55
8	400	60
9	450	65
10	475	75
	500	75

The Energy Bid Curve must be monotonically increasing. The Energy Bid Curve will be validated by the CAISO upon submission to ensure that the Energy Bid Curve complies with bid validation rules. Energy Bids are subject to the Hard Energy Bid Cap. Energy Bid Curves in excess of the Hard Energy Bid Cap will be rejected.

In addition, supply Energy offers in excess of the Soft Energy Bid Cap may require a Reference Level Change Request, the CAISO's method of pre-market cost verification. More information can be found in Attachment O.1.3 and Attachment P.

If the Reference Level Change Request for incremental energy costs is accepted, the supply Energy offer can then be submitted up to the revised Default Energy Bid. If the supply Energy offer exceeds the revised Default Energy Bid, the supply Energy offer will be modified to the revised Default Energy Bid. If the supply Energy offer exceeds the Hard Energy Bid Cap, it will be rejected.

Energy offer prices for Proxy Demand Resources must be no lower than the current effective net benefits test threshold Market Clearing Price.

When submitting Energy Bids in the Real-Time, Reliability Demand Response Resources must select Energy offer prices that are 95-100% of the maximum Soft Energy Bid cap stated in the CAISO Tariff.

Reliability Demand Response Resources that have selected the Marginal Real-Time Dispatch Option may submit an Energy Bid Curve consisting of either a single segment or multiple segments in the Real-Time. Reliability Demand Response Resources that have selected the Discrete Real-Time Dispatch Option may only submit an Energy Bid Curve consisting of a single segment in the Real-Time.

5.1.4.1.7 Default Energy Bid Reference Level Change Request

The Default Energy Bid Reference Level Change Request component applies to Generating Units for which Default Energy Bids are calculated (all Generating Units except for PDR and RDRR), except for units which have selected the Hydro Default Energy Bid Option. The Default Energy Bid Reference Level Change Request function for Real-Time is the same as the one for Day-Ahead. See section 5.1.1.1.7 for details.

5.1.4.1.8 Pumped-Storage Hydro Units

(Required for Pumped-Storage Hydro Units)

In addition to the Start-Up Cost component and the Minimum Load Cost component, Pump-Storage Hydro Units submit the following three Bid components:

Pump Shut-Down Cost – If the resource is registered as a Pumped-Storage Hydro Unit. The Pump Shut-Down Cost is expressed in \$

A Pumping Level (expressed in MW) – If the resource is registered as a Pumped-Storage Hydro Unit.

Pumping Cost – The hourly cost of pumping, expressed in \$/hr, if the Generating Unit is registered as a Pumped-Storage Hydro Unit. The value bid for Pumping Cost must not be lower than a minimum cost registered in the Master File. The bid value can be positive or zero, indicating that the resource will pay no more than the bid value for the power needed to run the pump, or negative, indicating that the resource will be paid no less than the bid value for the power needed to run the pump.

5.1.4.2 Operating Information

Supply Bids on behalf of Generating Units also contain operating information components that specify constraints on the operation of a Generating Unit.

5.1.4.2.1 Ramp Rate Component

The Operational Ramp Rate of resources reflects the limitations of the resources' abilities to alter output from one time period to the next and is honored in the SCUC. The Operational Ramp Rate constraints are determined by the Operational Ramp Rate function, or the Regulation Ramp Rate (if the Generating Unit provides Regulation) multiplied by a time interval, (e.g., 60 minutes). The Operational Ramp Rate is used for scheduling and dispatch when the Generating Unit is not providing Regulation. For NGRs, however, the Operational Ramp Rate will also be used for procurement and dispatch of Ancillary Services in addition to its regular purpose. SCs may only submit Operational Ramp Rates for NGRs. The Ramp Rate function allows the SCs to declare the Ramp Rate at different operating levels. This Bid component contains:

Operational Ramp Rate (Required) –The Operational Ramp Rate component is a staircase curve of up to four segments comprising the Ramp Rate, expressed in MW/minute and associated operating levels, expressed in MW. NGRs are limited to two segments, with one segment defining the charging range (negative side) and the other defining the discharging range (positive side).

If a resource is subject to CAISO Tariff Appendix II, the responsible Scheduling Coordinator must submit an Operational Ramp Rate equal to the maximum Operational Ramp Rate registered in the Master File.

MW	MW/Min
70	5
150	8
300	7
400	8
500	8

Operating Reserve Ramp Rate (Required if SC is submitting Bid for Operating Reserve) – The Operating Reserve Ramp Rate is a single number included in Ancillary Services Bids for Spinning Reserves and Non-Spinning Reserves that represents the Ramp Rate of a resource used in the procurement of Operating Reserve capacity. Further details of this Bid component are described in Section 6 (Ancillary Services Bids).

If a resource is subject to CAISO Tariff Appendix II, the responsible Scheduling Coordinator must submit an Operating Reserve Ramp Rate equal to the maximum Operating Reserve Ramp Rate registered in the Master File.

Regulation Ramp Rate (Required if SC is submitting Bid for Regulation Up or Down) –

The Regulation Ramp Rate is a single number included in Ancillary Services Bids for Regulation Up and Regulation Down that represents the Ramp Rate of a resource used in the procurement and dispatch of Regulation Up or Regulation Down capacity. Further details of this Bid component are described in Section 6 (Ancillary Services Bids).

If a resource is subject to CAISO Tariff Appendix II, the responsible Scheduling Coordinator must submit a Regulation Ramp Rate equal to the maximum Regulation Ramp Rate registered in the Master File.

All three Ramp Rate components are constant across the Trading Day. If the SC has submitted an Operational Ramp Rate for a previous Trading Hour, it is not necessary to resubmit the information for the current Trading Hour.

5.1.4.2.2 Distribution Bid Component

The Distribution Curve component contains, for each Physical Scheduling Plant, System Unit or Proxy Demand Resource (excluding Reliability Demand Response Resources), the following information:

Distribution Location – Defined as the Connectivity Node (CNode) associated with the Generating Unit.

Distribution Factor – Generation Distribution Factor for the Generating Unit located at the Distribution Location. Distribution Factors are non-negative numbers that sum to one (1) for the Aggregated Generating Resource or Proxy Demand Resource, or Proxy Demand Resource-Load Shift Resources.

5.1.4.3 Multi-Stage Generating Resources

For Multi-Stage Generating Resources that receive a Day-Ahead Schedule, are awarded a RUC Schedule, or receive an Ancillary Services Award the Scheduling Coordinator must submit an Energy Bid, which may consist of a Self- Schedule, in the Real-Time Market for the same Trading Hour(s) for either the same MSG Configuration scheduled or awarded in the Integrated Forward Market or committed in RUC. In addition, the Scheduling Coordinator for such Multi-Stage Generating Resources may also submit Bids into the Real-Time Market for up to six other MSG Configurations provided that the MSG Transitions between the MSG Configurations bid into the Real-Time Market are feasible and the transition from the previous Trading Hour are also feasible. For the Trading Hours that Multi-Stage Generating Resources do not have a CAISO Schedule or award from a prior CAISO Market run, the Scheduling Coordinator can submit up to six MSG Configurations into the RTM.

A Scheduling Coordinator cannot submit a Bid to the CAISO Markets for a MSG Configuration into which the Multi-Stage Generating Resource cannot transition due to lack of Bids for the specific Multi-Stage Generating Resource in other MSG Configurations that are required for the requisite MSG Transition.

In order for Multi-Stage Generating Resource to meet any Resource Adequacy must-offer obligations, the responsible Scheduling Coordinator must submit either an Economic Bid or Self-Schedule for every MSG Configuration in the registered Default Resource Adequacy Path into the Real-Time Market, as feasible. If a Multi-Stage Generating Resource holding a Resource Adequacy must-offer obligation fails to meet this requirement, then the ISO will create a Generated Bid or extend an existing bid, as applicable, for every MSG Configuration in the registered Default Resource Adequacy Path.

For the Real-Time Market, a Multi-Stage Generating Resource, whether or not holding a Resource Adequacy must-offer obligation, must submit bids from all configurations whose configuration PMax is at a MW output level between the maximum bid-in Energy MW and the higher of the Self-Scheduled Energy MW and the Multi-Stage Generating Resource plant-level PMin. If a Multi-Stage Generating Resource fails to meet this requirement, then the ISO will create a Generated Bid for every MSG Configuration from which a Bid was required.

If in any given Trading Hour the Multi-Stage Generating Resource was awarded Regulation or Operating Reserves in the IFM, any Self-Schedules the Scheduling Coordinator submits for that Multi-Stage Generating Resource in the RTM must be either for the same MSG Configuration for which Regulation or Operating Reserve is Awarded in IFM for that Multi-Stage Generating Resource in that given Trading Hour, or a MSG Configuration which is capable of delivering the entire amount Regulation or Operating Reserve awarded in the IFM. In addition to that, any Submissions to Self-Provide Ancillary Services the Scheduling Coordinator submits for that Multi-Stage Generating Resource in the RTM must be for the same MSG Configuration for which Regulation or Operating Reserve is Awarded in IFM for that Multi-Stage Generating Resource in that given Trading Hour.

5.1.4.4 Non-Generator Resources

Non-Generator Resources (NGRs) may submit a Lower State of Charge Limit (LCL) for each trading day, which is the lowest stored energy that should be maintained in the resource. This value, in MWh, cannot be lower than Minimum Stored Energy Limit registered in the Master File (also referred to as the Minimum Continuous Energy Limit). If this component is not provided, the ISO will use the Minimum Stored Energy Limit value stored in Master File.

In addition, NGRs may submit an Upper State Of Charge Limit (UCL) for each trading day, which is the highest stored energy that should be allowed in the resource. This value, in MWh,

cannot be higher than the Maximum Stored Energy limit in the Master File (also referred to as the Maximum Continuous Energy Limit). If this component is not provided, the ISO will use the Maximum Stored Energy Limit value stored in Master File.

Note: These two limits have to be bid the same as in the Day-Ahead Market.

NGRs that are classified as non-REM storage resources may submit end of hour (EOH) state of charge (SOC) bid parameters as an optional, real-time only bid parameter resources to allow for easier management of the SOC in real-time. The EOH SOC is an hourly value submitted as a range with an upper and lower state of charge limit. The market will dispatch the resource so that the SOC ends the hour within the submitted range, while respecting Master File stored energy limits and minimum and maximum energy bid limits. Ancillary service awards will be protected above the EOH SOC bids, in accordance with the SOC requirements described in section 2.5.9 of the BPM for Market Operations. However, a resource may receive uneconomic energy dispatches if necessary to achieve the EOH SOC submitted by the Scheduling Coordinator. Bid cost recovery for resources that submit state-of-charge parameters will be settled pursuant to Section 11.6.6 of the tariff.

5.1.5 Real-Time Self-Schedule Bids for Supply

Real-Time Self-Schedule Bids for Supply contain information on nominated Self-Schedule quantities, and operational information. The operational information to be included with a Real-Time Self-Schedule is the same as that which is submitted with an Economic Bid for Supply.

5.1.5.1 Self-Schedule Quantities

A Real-Time Energy Bid can contain Self-Schedule quantities. Self-Schedule quantities contain the capacity the SC wants to include in the Self-Schedule Bid and the type of Self-Schedule. Real-Time Market Self-Schedule quantities are for a single Trading Hour. The following sections describe the types of Self-Schedule components an SC can submit, in decreasing order of priority. NGRs can only submit Price Taker Self-Schedules.

A Reliability Demand Response Resource is not allowed to submit a Self-Schedule Bid in Real-Time. Any Day-Ahead awards for the resource will automatically become a Self-Schedule for the applicable Real-Time hour. The Day-Ahead Schedule is a binding Real-Time Market award even though the RDRR will not receive a real-time dispatch. If the triggering event for utilizing real-time bids on behalf of RDRRs does not occur the RDRRs will not receive any Real-Time Dispatch Instructions.

It is important to note that a TOR/ETC/Wheel that is submitted in the DAM result, if accepted, in a Day Ahead Schedule. In order to preserve an ETC/TOR/Wheel the ETC/TOR/Wheel must be resubmitted in the RTM.

5.1.5.1.1 Transmission Ownership Right Self-Schedule Bid Component

(Required for TORs)

A Transmission Ownership Right (TOR) Self-Schedule Bid component contains:

- TOR Self-Schedule Identifier – TOR
- TOR Contract Reference Number (CRN)

TOR Self-Schedule capacity, expressed in MW

TOR Self-Schedules must be submitted balanced between source and sink, and must be within the allotted ownership rights for that TOR, as specified in the TRTC provided in advance to the CAISO. Sources and sinks must use the same TOR Contract Reference Number. The Contract Reference Number must be registered in the Master File prior to the TOR Self-Schedule taking place. (CAISO Tariff Section 17.3.1, Validation of TOR Self-Schedules).

5.1.5.1.2 Existing Transmission Contract Self-Schedule Bid Component

(Required for ETCs)

An Existing Transmission Contract (ETC) Self-Schedule Bid component contains:

- ETC Self-Schedule Identifier – ETC
- ETC Contract Reference Number (CRN)
- ETC Self-Schedule capacity, expressed in MW

ETC Self-Schedules must be submitted balanced between source and sink, and must not exceed the MW amount for the ETC referenced in the Bid, as specified in the TRTC provided in advance to the CAISO. Sources and sinks must use the same ETC Contract Reference Number. The Contract Reference Number must be registered in the Master File prior to the ETC Self-Schedule taking place. (See CAISO Tariff Section 16.6.1, Validation of ETC Self-Schedules).

5.1.5.1.3 Regulatory Must-Run/-Take Generation Self-Schedule Bid Component

(Required for RMTs)

A Regulatory Must-Take/Regulatory Must-Run (RMT) Generation Bid component contains:

- Self-Schedule Identifier – RMT
- RMT Generation Reference – These are registered in the Master File
- Self-Schedule capacity, expressed in MW

Note, Combined Heat and Power (CHP) resources eligible for RMT are only allowed to submit a RMT self-schedule up to the RMTMax values in the Master File, which may identify a single value or both on and off-peak values. See CAISO Tariff definition for resources eligible for Regulatory Must-Run and Regulatory-Must Take scheduling.

5.1.5.1.4 Price Taker Self-Schedule Bid Component

The PT Self-Schedule Bid component contains:

- Self-Schedule capacity, expressed in MW
- Self-Schedule Identifier – PT

5.1.5.1.5 Multi-Stage Generating Resources

For any given Trading Hour, a Scheduling Coordinator may submit Self-Schedules and/or Submissions to Self-Provide Ancillary Services in only one MSG Configuration for each Generating Unit or Dynamic Resource-Specific System Resource.

For Multi-Stage Generating resources, any Self-Schedules the Scheduling Coordinator submits for that Multi-Stage Generating Resource in the RTM must be either for the same configuration for which Regulation or Operating Reserve is awarded in IFM for that Multi-Stage Generating Resource in that given Trading Hour, or a MSG Configuration which is capable of delivering the entire amount Regulation or Operating Reserve awarded in the IFM. In addition to that, any Submissions to Self-Provide Ancillary Services the Scheduling Coordinator submits for that Multi-Stage Generating Resource in the RTM must be for the same MSG Configuration for which Regulation or Operating Reserve is Awarded in IFM for that Multi-Stage Generating Resource in that given Trading Hour.

In any given Trading Hour in which a Scheduling Coordinator has submitted a Self-Schedule for a Multi-Stage Generating Resource, the Scheduling Coordinator may also submit Bids for other MSG Configurations provided that they concurrently submit Bids that enable the applicable CAISO Market to transition the Multi-Stage Generating Resource to other MSG Configurations.

5.1.5.2 Operating Information

The operating information submitted with a RTM Self-Schedule Bid component is the same as that required for a Real-Time Economic Bid.

5.2 CAISO Demand Bids

SCs representing Loads (including exports) submit Demand Bids indicating the hourly quantity of Energy in MWh that it intends to purchase in the IFM for each Trading Hour of the Trading Day. Convergence Bidding Entities that are registered must have at least one Scheduling Coordinator ID that is authorized to submit Virtual Demand Bids. Scheduling Coordinators submitting Demand Bid components submit both common information and information that is specific to the type of Demand Bid. The common information included in the Demand Bids is as follows:

- Scheduling Coordinator ID Code
- Location Code for the LAP, PNode or APNode, as applicable (also for Virtual Bids)

For Virtual Bids at a location the Resource Type must be “Virtual Demand”

The specific information associated with different types of Demand Bids is described in the following sections.

5.2.1 Day-Ahead Economic Bids for Demand

SCs may submit Day-Ahead Economic Bids for Demand of the following types:

- Participating Load Bids
- Non-Participating Load Bids

5.2.1.1 Participating Load Demand Bids

Participating Load Bids can be submitted only for those resources that are registered as Pumped-Storage Hydro Units or Pumping Load resources. In addition to the common information contained in all Bids, Participating Load Demand Bids contain the following information:

- Pumping Level, expressed in MWh

- Pumping Cost, expressed in \$/Hr. The value bid for Pumping Cost must not be lower than a minimum cost registered in the Master File. The bid value can be positive or zero, indicating that the resource will pay no more than the bid value for the power needed to run the pump, or negative, indicating that the resource will be paid no less than the bid value for the power needed to run the pump.
- Ramp Rate, expressed in MW/min, for Pumped-Storage Hydro Units
- Shut-Down Cost, expressed in \$

The Pumping Load (individual or aggregated) will be registered in the Master File as a Participating Load.

Participating Load Demand Bids will be validated by the CAISO upon submission to ensure that the Energy Bid Curve complies with bid validation rules. Participating Load Bids, as a type of resource-specific resource bid, are subject to the energy bid caps described further in Attachment P.

5.2.1.1.1 Aggregated Participating Load

An Aggregated Participating Load will be modeled and will participate in the CAISO's markets as both a Non-Participating Load (NPL) and a Generator. The Aggregated Participating Load will not be able to participate in the CAISO's markets directly as a Participating Load in Release 1.

The Scheduling Coordinator on behalf of the Aggregated Pumping Load may submit two Bids for the same Trading Day: (1) as a Non-Participating Load, a Day-Ahead Self-Schedule with an Energy Bid Curve with a maximum 10 segments; and (2) as a Generator representing the demand reduction capacity of the Aggregated Participating Load, a submission to Self-Provide Non-Spinning Reserve or a Bid to provide Non-Spinning Reserve. The CAISO will assign two Resource IDs: one for Non-Participating Load Bids and one for Generator Bids (either a Resource ID for a Generating Unit or a Physical Scheduling Plant). Both Resource IDs will be in the Master File on behalf of the Aggregated Participating Load. The Aggregated Participating Load will be treated as a Participating Load for settlement and compliance purposes except that Aggregated Participating Load will be scheduled and settled at Custom LAP rather than an individual PNode. Future software releases will allow Aggregated Participating Load resources to participate directly as Participating Load.

In the DAM when the SC submits the Non-Spinning Reserve Self-Provision or the Non-Spinning Reserve Bid, the SC must ensure that the total Non-Spinning Reserve (including Self-Provided or any Ancillary Services Awards in the market) is available in Real-Time for dispatch. For the

Aggregated Participating Load, this means the Demand must be there in real-time for reduction. For example, if the associated Non-Participating Load does not clear the DAM at a load level that is greater than the total Non-Spinning Awards, the market participant must ensure the pumps will be pumping in Real-Time in order to provide the Non-Spinning Reserve; otherwise the payment for Non-Spinning Reserve will be rescinded by No-Pay.

In the DAM when the SC submits the Non-Spinning Reserve Self-Provision and the Non-Spinning Reserve Bid, the SC must indicate that the Non-Spinning Reserve Self-Provision and Non-Spinning Reserve Bid are contingent; the SC must not submit an Energy Bid curve on behalf of the Aggregated Pumping Load as a Generator or the resource may be dispatched for Energy.

The following table provides guidance to Scheduling Coordinators submitting Bids on behalf of Aggregated Participating Load.

Generator Bid Components And Attributes	Corresponding Aggregated Participating Load Attributes
Start-Up Cost	Demand curtailment cost, e.g. Pump Shut Down Cost (\$/curtailment event)
Start-Up Time	Demand curtailment time
Minimum Load	Must be zero to prevent unit commitment in the DAM
Minimum Load Cost	Set to zero since Minimum Load is set to zero
Maximum Capacity	Certified Non-Spinning Reserve capacity
Best/Worst Operating Reserve Ramp Rate	Certified Non-Spinning Reserve Ramp Rate
Best/Worst Operational Ramp Rate	Best/worst Demand curtailment rate (Note: Since Generating Units do not have different Ramp Rates for Ramping up and down, the Demand pickup rate is ignored.)
Minimum Run Time	Minimum Demand curtailment time
Minimum Down Time	Must be zero (Note: Minimum Base Load time is not used because doing so would require the IFM/RTM to link the Generator resource with the Non-Participating Load resource.)
Maximum Daily Start-Ups	Maximum number of daily curtailments
Energy Bid Curve	Must not submit in the DAM or the resource may be dispatched for Energy in the IFM (Bid submitted in the RTM represents offer to curtail Demand associated with the Non-Spinning Reserve (\$/MWh).)

5.2.1.2 Non-Participating Load Demand Bids

Non-Participating Load Demand Bids contains the following:

Demand Bid Curve – A staircase curve with up to ten segments, monotonically decreasing, defined by 11 pairs of a MW quantity and price, expressed in \$/MWh.

Example of Demand Bid Curve Component for Non-Participating Load

Segment	Operating Level (MW)	Energy Price \$/MWh
1	70	75

Segment	Operating Level (MW)	Energy Price \$/MWh
2	150	65
3	200	60
4	250	55
5	300	50
6	340	45
7	375	40
8	400	35
9	450	30
10	475	25
	500	25

Demand up to the MW defined by the first segment (i.e., the starting point of the Demand Bid Curve) is treated as a Self-Schedule.

Separate Demand Bid curves can be submitted for each Trading Hour of the Trading Day.

Non-Participating Load Demand Bids will be validated by the CAISO upon submission to ensure that the Demand Bid Curve complies with bid validation rules. Non-Participating Load Demand Bids are subject to the energy bid caps described further in Attachment P.

5.2.2 Day-Ahead Economic Virtual Bids for Demand

Day-Ahead Economic Virtual Bids for Demand are limited to the Energy Curve defined in the bid. For Virtual Demand Bids this is required and the Resource Type selected must be "Virtual Demand". The construction of the Energy Bid Curve can be seen in the example below. Virtual Bids must start at 0 MW.

Example of Virtual Demand Bid Curve Component

Segment	Operating Level (MW)	Energy Price \$/MWh
1	0	75
2	150	65
3	200	60

Segment	Operating Level (MW)	Energy Price \$/MWh
4	250	55
5	300	50
6	340	45
7	375	40
8	400	35
9	450	30
10	475	25
	500	25

Virtual Demand Bids will be validated by the CAISO upon submission to ensure that the Energy Bid Curve complies with bid validation rules. Virtual Demand Bids are subject to the Hard Energy Bid Cap. Virtual Demand Bids are subject to the energy bid caps described further in Attachment P.

5.2.3 Day-Ahead Self-Schedule Bids for Demand

In addition to Economic Bids for Demand, SCs submit Self-Schedule Bids for Demand. With the exception of ETCs and TORs, SCs may only submit Self-Schedules for Demand in the DAM.

SCs can submit Export Self-Schedules in the RTM. (see section 5.2.4)

5.2.3.1 Transmission Ownership Right Self-Schedule Bid Component

In addition to the common Demand Bid information listed in Section 5.2, a Day-Ahead TOR Self-Schedule Demand Bid contains the following:

- TOR Contract Reference Number

TOR Self-Schedule Demand quantity – expressed in MW

TOR Self-Schedules must be submitted balanced between source and sink, and must be within the allotted ownership rights for that TOR, as specified in the TRTC provided in advance to the CAISO. Sources and sinks must use the same TOR Contract Reference Number. The Contract Reference Number must be registered in the Master File prior to the TOR Self-Schedule taking place. (CAISO Tariff Section 17.3.1, Validation of TOR Self-Schedules).

5.2.3.2 Existing Transmission Contract Self-Schedule Bid Component (also applies to CVRs)

In addition to the common Demand Bid information listed in Section 5.2, a Day-Ahead ETC Self-Schedule Demand Bid contains the following: *Note: Converted Rights (CVR) will be submitted into SIBR using the “Self Schedule ETC” Product Type (DAM only).

➤ ETC/CVR Contract Reference Number *Note: CVRs are also defined by the CRN.
ETC Self-Schedule Demand quantity – expressed in MW

ETC/CVR Self-Schedules must be submitted balanced between source and sink, and must not exceed the MW amount for the ETC/CVR referenced in the Bid, as specified in the TRTC provided in advance to the CAISO. Sources and sinks must use the same ETC/CVR Contract Reference Number. The Contract Reference Number must be registered in the Master File prior to the ETC Self-Schedule taking place. (CAISO Tariff Section 16.6.1, Validation of ETC Self-Schedules)

5.2.3.3 Price Taker Self-Schedule Bid Component

In addition to the common Demand Bid information listed in Section 5.2, a Day-Ahead PT Self-Schedule Demand Bid contains the following:

PT Self-Schedule Demand Quantity – expressed in MW

The Demand Bid component of a Price Taker Self-Schedule does not have to be balanced with a Supply Bid component.

For PT Self-Schedules from Export Resources in addition to the above information the PT Self-Schedule must also contain:

- Supporting Resource that will be a Generating Unit.

5.2.3.4 Process for Exports to obtain PT Status

For Export Resources that are not RA Resources to be treated as a PT, the SC must designate a Generating Unit that is non-RA/non-RUC as the supporting resource for the PT Self-Schedule for the Trading Hour. The identified Generating Unit may or may not be in the same SC’s portfolio of the Export Resource. Different Generating Units may support the PT Self-Schedules of an Export Resource in different Trading Hours and the same Generating Unit may be identified by several Export Resources to support their PT Self-Schedules in a Trading Hour.

The CAISO will validate according to the SIBR rules that the designated supporting resource for the PT Self-Schedule has available capacity that is greater than or equal to the sum of the relevant PT Export Self-Schedules that claim that same resource multiplied by a configurable Export Capacity factor (such as 100%). If the available capacity is less than the calculated value, SIBR shall convert the PT Export Self-Schedules to LPT Export Self-Schedules in their entirety according to the SIBR Business Rules.

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Export Resources that are identified as RA Resources in DAM and RTM may submit PT Self-Schedules up to the registered “RA Capacity” without designating a supporting resource.

SCs may submit Lower Price Taker (LPT) Self-Schedules for Export Resources that are not explicitly supported by a non-RA/non-RUC Generating Unit.

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5.2.3.5 Lower Price Taker Self-Schedule Bid Component

In addition to the common Demand Bid information listed in Section 5.2, a Day-Ahead LPT Self-Schedule Demand Bid contains the following:

LPT Self-Schedule Demand Quantity – expressed in MW

The Demand Bid component of a Lower Price Taker Self-Schedule does not have to be balanced with a Supply Bid component.

5.2.3.6 Aggregate Resource Load Bids

Load Distribution Factors (LDFs) for allowed customized aggregation come from the LDF library maintained by CAISO. The LDF Library contains the following:

Distribution Location – the Connectivity Node (CNode) associated with the Custom Load Aggregation Resource

Distribution Factor – Load Distribution Factor for the Custom Load Aggregation Resource located at the Distribution Location

5.2.4 Real-time Economic Bids for Demand

The following resources may submit Demand Bids in the RTM:

Participating Loads

Exports may submit Bid or Self-Schedules in the RTM. However, to the extent an Export is Self-Scheduled and seeks to have the same priority as CAISO Forecast of CAISO Demand, the Export must be supported by non-RA or non-RUC capacity.

The process for both will be submitted using the process described in section 5.2.1.1 and 5.2.3.4.

5.2.5 Real-Time Self-Schedule Demand Bids

SCs can submit Export Self-Schedules in the RTM.

In DAM, an Export Self-Schedule explicitly and adequately supported by the non-RA capacity in the Energy Bid of a Generator or Import resource, that is also not associated with Self-Provided upward A/S capacity, has the same Self-Schedule priority as CAISO Demand. Otherwise, an Export Self-Schedule has a lower Self-Schedule priority than CAISO Demand

In RTM, Export Self-Schedule already cleared in the IFM or explicitly and adequately supported by the energy bid capacity that is in excess of the RUC Schedule and not occupied by DA upward AS awards and RT upward AS self-provisions of a generator or import resource has the same Self-Schedule priority as CAISO demand forecast. Otherwise, Export Self-Schedule has lower Self-Schedule priority than CAISO demand

The process for Export Resources to obtain PT status is explained in section 5.2.2.4.

It is important to note that a TOR/ETC/Wheel that is submitted in the DAM result, if accepted, in a Day Ahead Schedule. In order to preserve an ETC/TOR/Wheel the ETC/TOR/Wheel must be resubmitted in the RTM.

5.2.5.1 Existing Transmission Contract Self-Schedule Bid Component

In addition to the common Demand Bid information listed in Section 5.2, an ETC Self-Schedule Demand Bid contains the following:

- ETC Contract Reference Number

- ETC Self-Schedule Demand quantity, expressed in MW

ETC Self-Schedules must be submitted balanced between source and sink, and must not exceed the MW amount for the ETC referenced in the Bid, as specified in the TRTC provided in advance to the CAISO. Sources and sinks must use the same ETC Contract Reference Number. The Contract Reference Number must be registered in the Master File prior to the ETC Self-Schedule taking place. (CAISO Tariff Section 16.6.1, Validation of ETC Self-Schedules)

5.2.5.2 Transmission Ownership Right Self-Schedule Bid Component

In addition to the common Demand Bid information listed in Section 5.2, a TOR Self-Schedule Demand Bid contains the following:

- TOR Contract Reference Number

TOR Self-Schedule Demand quantity, expressed in MW.

TOR Self-Schedules must be submitted balanced between source and sink, and must be within the allotted ownership rights for that TOR as specified in the TRTC provided in advance to the CAISO. Sources and sinks must use the same TOR Contract Reference Number. The Contract Reference Number must be registered in the Master File prior to the TOR Self-Schedule taking place. (CAISO Tariff Section 17.3.1, Validation of TOR Self-Schedules)

5.2.5.3 Price Taker Self-Schedule Bid Component

In addition to the common Demand Bid information listed in Section 5.2, a Real-Time PT Self-Schedule Demand Bid contains the following:

PT Self-Schedule Demand Quantity – expressed in MW

The Demand Bid component of a Price Taker Self-Schedule does not have to be balanced with a Supply Bid component.

5.2.5.4 Lower Price Taker Self-Schedule Bid Component

In reference to the Export Priority for lower self schedule in Section 5.2, a Real-Time LPT Self-Schedule Demand Bid contains the following:

LPT Self-Schedule Demand Quantity – expressed in MW

The Demand Bid component of a Lower Price Taker Self-Schedule does not have to be balanced with a Supply Bid component.

The same process for Export Priority applies in Real-Time as in the Day-Ahead. (see Section 5.2.2.4)

6. Ancillary Services Bids

7. ~~Residual Unit Commitment Availability~~ Reliability Capacity Bids

Welcome to the ~~Residual Unit Commitment Availability~~ Reliability Capacity Bids section of the CAISO BPM for Market Instruments. In this section you will find the following information:

The information required to submit a ~~RUC Availability~~ Reliability Capacity Bid

How CAISO validates the ~~RUC Availability~~ Reliability Capacity Bids

The ~~Residual Unit Commitment (RUC)~~RUC process occurs in the Day-Ahead Market after the DA IFM is completed. RUC is a reliability function for ~~committing resources and procuring RUC capacity~~ procuring Reliability Capacity Up (RCU) included in the Day Ahead Schedule resulting from the IFM (as Energy or AS capacity), in order to meet the difference between the CAISO Forecast of CAISO Demand and Reliability Capacity Down (RCD) to provide downward dispatch capability (including locational differences) and the Demand scheduled in the Day Ahead Schedule resulting from the IFM, for each Trading Hour of the Trading Day. The RUC is the process designed to ensure that sufficient on-line resources are available to meet Real-Time Demand. SCs can submit Bids to provide RUC Availability capacity. These Bids for these products are submitted into the DAM process only. For Multi-Stage Generating Resources the ~~RUC Availability~~ Reliability Capacity Bids shall be submitted at the MSG Configuration level.

This section is based on CAISO Tariff Sections 30.5.2.7, 31.5 and 40.5.2

7.1 Reliability Capacity ~~UC Availability~~ Bid

This section is based on CAISO Tariff Section 31.5, Residual Unit Commitment. Virtual Bids and NGRs, and Reliability Demand Response Resources are not eligible to participate in RUC.

The ~~RUC Availability~~ Reliability Capacity Bid component differs depending on whether the Generating Unit submitting the Bid is under a Resource Adequacy (RA) obligation or not.

- **Resources with an RA Obligation:** Resources providing RA Capacity must participate in the RUC process by submitting a bid for RCU up to their available RA capacity. Bidding for RCD is optional.
- **Resources without an RA Obligation:** A resource not under an RA obligation may voluntarily submit bids for RCU and/or RCD. This bid is interpreted as an incremental amount of capacity the resource is willing to provide in the RUC process.

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A Reliability Capacity Bid includes the following components:

- RCU or RCD Bid Quantity, express in MW.
- RCU or RCD Bid Price, expressed in \$/MW. The bid price for both RCU and RCD is capped at \$250/MW.

For LPT and economic exports that clear the IFM, the CAISO may insert proxy RCU bids in the RUC process. An awarded proxy RCU is not compensated but serves as an indication that the export is subject to potential curtailment in the Real-Time Market if the capacity is needed for system reliability.

A resource that receives a binding RCU or RCD award in the RUC process has a must-offer obligation for that capacity in the Real-Time Market. In the event a resource receives an award but does not submit a corresponding energy bid in the RTM, SIBR will create an energy bid based on the resource's Default Energy Bid (DEB).

If a resource is not under a RA obligation, the RUC Availability Bid that the resource submits is interpreted as an incremental amount of capacity that the resource is willing to provide in the Day Ahead Market for RUC in addition to its Day Ahead Market Bids and Self Schedules. In this case the resource would submit a RUC Availability Bid that includes: —, RUC Availability Bid quantity, expressed in MW —, RUC Availability Bid price, expressed in \$/MW. These two components must exist together for a valid RUC Availability Bid. The RUC Availability Cost component can vary hourly throughout the Trading Day. Version 91 Last Revised: March 26, 2025 Page 104 If a resource is under RA obligation, a certain amount of capacity of this resource is registered with CAISO as RA Capacity. Resources providing RA Capacity must participate in the RUC process consistent with RA requirements as described in the BPM for Reliability Requirements, by submitting an Energy bid (could be Self-Schedule) up to the registered RA Capacity. The SC may submit a non-zero RUC Availability Bid only for that portion of its capacity that is not RA Capacity, assuming the capacity is eligible to participate in RUC unless the resource is subject to CAISO Tariff Appendix II, in which case the RUC Availability Bids must be \$0/MWh for any capacity bid in. See section 6.7.2.6 of the BPM for Market Operations. If a resource has a RA obligation, the amount of RA Capacity is registered with CAISO as RA Capacity. RA Capacity that is not a hydroelectric Generating Unit, Pumping Load or exempt Non-Dispatchable Use Limited Resource pursuant to CAISO Tariff section 40.6.4.3.2, must participate in RUC. The CAISO will automatically optimize all RUC obligated capacity from Generating Units, Imports or System Resources at \$0/MW per hour for the full amount of RA Capacity for a given resource. For Resources that are registered as an RA Resource and are also registered as a Must Offer Obligation (MOO) unit in DAM, SIBR will allow Market Participants to specify a Capacity Limit Indicator to specify whether they want IFM.

to limit the total capacities committed in IFM to the RA capacity. If there is no Capacity Limit Indicator specified in a RUC Bid Component for a Trading Hour in a Generating Resource Bid, SIBR will check to see if the RA Flag for the Generating Resource specified in that Bid and for that Trading Hour is "Yes", if there is then a Capacity Limit Indicator will be generated by SIBR in that RUC Bid Component with a value of "No". If there is a Capacity Limit Indicator of "Yes" specified in a RUC Bid Component for a Trading Hour in a Generating Resource Bid, a Capacity Limit must be generated in that RUC Bid Component equal to the RA Capacity. Real Time bids can be affected by RUC if there is a RUC Award; in the event that there is a RUC Award but no RT bid then an Energy Bid will be created by SIBR. Participants observing RUC Awards that are equal to Pmin should submit an energy bid from Pmin to Pmin+.01 if the RUC capacity is equal to Pmin for the resource.

7.2 RUC Availability Reliability Capacity Bid Component Validation

The RUC Reliability Capacity Bid validation follows the Bid validation process described in Section 90 V (Bid Submission and Validation). The Bid validation rules related specifically to the RUC Bid components are referenced in Appendix A.

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8. Imbalance Reserve Bids

Welcome to the *Imbalance Reserve Bids* section of the CAISO BPM for Market Instruments. In this section you will find the following information:

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- How the CAISO procures Imbalance Reserves
- A description of the Imbalance Reserve Bid components

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8.1 Procurement of Imbalance Reserves

This section is based on CAISO Tariff Section 30.5.2.9, Imbalance Reserve Bids.

The CAISO procures Imbalance Reserves in the Day-Ahead Market's Integrated Forward Market (IFM). Imbalance Reserves are co-optimized with Energy and Ancillary Services to reserve flexible ramping capability to manage uncertainty between the day-ahead and real-time markets.

SCs may submit Economic Bids for Imbalance Reserves from eligible resources. There is no self-provision for Imbalance Reserves. An Imbalance Reserve award creates a must-offer obligation in the Real-Time Market (RTM).

Only resources that are dispatchable in the fifteen-minute market are eligible to provide Imbalance Reserves. The same resource capacity may be offered for Energy, Ancillary Services, and Imbalance Reserves in the same IFM run. The market optimization will award the resource to the product or combination of products that provides the most economic value.

8.2 Procurement of Imbalance Reserves

The Bids for Imbalance Reserves contain components that are specific to each product direction. The same Bid components are included for each Trading Hour of the Day-Ahead Market.

The following sections describe the specific Bid components for each type of Imbalance Reserve.

An Imbalance Reserve Up Bid is an offer to provide upward ramping capability. A resource submitting an IRU bid must also submit an economic energy bid for the overlapping capacity range. The specific IRU Bid components are the following:

- IRU Capacity, expressed in MW. This is a single quantity for the hour.
- IRU Price, expressed as \$/MW. This is a single price for the hour. The bid price is capped at \$55/MWh.

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An Imbalance Reserve Down Bid is an offer to provide downward ramping capability. A resource submitting an IRD bid must also submit an economic energy bid for the overlapping capacity range. The specific IRD Bid components are the following:

- IRD Capacity, expressed in MW. This is a single quantity for the hour.
- IRD Price, expressed as \$/MW. This is a single price for the hour. The bid price is capped at \$55/MWh.

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8.3 Imbalance Reserve Bid Component Validation

The Imbalance Reserve Bid validation follows the Bid validation process described in Section 9. The Bid validation rules related specifically to the IRU and IRD Bid components are referenced in Appendix A.

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8.9. Bid Submission & Validation

Welcome to the *Bid Submission & Validation* section of the CAISO BPM for Market Instruments. In this section you will find the following information:

How CAISO accepts Bids and Inter-SC Trades for Energy, Ancillary Services and other commodities from SCs that are certified to transact through CAISO

How CAISO ensures that those Bids and Inter-SC Trades are valid and modifies the Bids for correctness when necessary

How CAISO enters the Bids and Inter-SC Trades from SCs into a database for processing by other components of CAISO's business systems

How CAISO provides feedback to SCs concerning Bids and Inter-SC Trades that are submitted

Detailed Bid validation rules are referenced in Attachment A of this BPM.

8.9.1 Timeline

This section presents the timelines for the DAM, and RTM as they relate to Bid submission and validation. DAM is for both physical Bids and Virtual Bids.

Exhibit 8-1 Time-Line for Bid Submission and validation.

Stages	Day-Ahead Timeline	Application	Activities
1	Submit bids up to seven days prior to the Trading Day SC may begin submitting Bids	Beginning at approximately 1:00 pm the day prior to the Trading Hour SCs may begin submitting RTM bids for all 24 hours of the RTM for the following trading day	SCs continuously submit bids before Market Close time to CAISO. CAISO validates bids upon receipt and provides messages back to SCs as to the validity of their bids referencing specific validation rules that have fired on their bids.
2	01:30 am	Master File Update	Newest static data for resources received and applied for next trading day.
3	01:40 am	DAM Commitment Costs	Newest Gas Price and Commitment Cost data for resources received and applied for next trading day.
4	02:20 am	DAM Resource Adequacy (CIRA)	Newest Resource Adequacy (RA) data for resources received and applied for next trading day and + 6.
5	03:10 am	DAM Bid Revalidation	Daily work flow to revalidate bids with newest data from MF/CIRA/ECIC..
6	08:20 am	DAM Resource Adequacy (CIRA)	Newest Resource Adequacy (RA) data for resources received and applied for next trading day and + 6
7	08:40 am	DAM Commitment Costs	Newest Gas Price and Commitment Cost data for resources received and applied for next trading day.
8	09:10 am	DAM Bid Revalidation	Daily work flow to revalidate bids with newest data from MF/CIRA/ECIC.
9	10:00 am	HASP T- 75	The DAM and RTM are closed for bid submission CAISO performs any necessary bid generation

Stages	Day-Ahead Timeline	Application	Activities
			All market accepted bids with a status of Modified or Valid are considered Clean Bids and sent to IFM/RTM to continue processing the markets.
10	9:40 pm	RTM Commitment Costs (ECIC)	Newest Gas Price and Commitment Cost data for resources received and applied for next trading day.
11	10:10 pm	RTM Bid Revalidation	Daily work flow to revalidate bids with newest data from CIRA/ECIC for next day.

8.1.19.1.1 Day-Ahead Market

Day-Ahead Market Bids may be submitted up to seven days prior to the Trading Day for each of the seven days when the DAM opens and must be submitted prior to Market Close for each Trading Hour in the Trading Day, at 1000 hours of the day prior to the Trading Day.

In the DAM, SC submits a Day-Ahead Bid for a resource for a 24-hour market period. The Day-Ahead Bid comprises two types of components:

Daily Components – These are physical Bid parameters that are associated with the resource for the Trading Day, not with an individual market or hourly intervals of the physical Bid and are not applicable to Virtual Bids. Daily components include:

- Start-Up information (Cost curve, time curve)
- Minimum Load information
- Transition Information (Multi-Stage Generating Resources only)
- Ramp Rate information
- Minimum and Maximum Energy Limit information
- Initial State of Charge (SOC)

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Hourly Components – These are physical Bid parameters that may vary from one Trading Hour to the next through the Trading Day. Hourly components are not applicable for Virtual Bids except as noted below:

- ~~RUC Availability~~Reliability Capacity Bid price
- ~~RUC Availability Bid~~Reliability Capacity quantities (RCU, RCD)~~y~~
- Capacity Limit Indicator
- Ancillary Services quantities
- Ancillary Services Bid prices
- Imbalance Reserve quantities (IRU, IRD)
- Imbalance Reserve Bid prices
- Contingency Dispatch information
- Self-Provision quantities
- Energy Bid Curve (Virtual Bids consist of only the Energy Bid Curve)
- Demand Bid curve
- Pump Shut-Down and Pumping Cost information
- Pumping Level
- Distribution Location and Factors (for a Generating Unit that consists of multiple individual Generating Units)

8-29.2 Energy Bid Validation Rules

This section is based on the following CAISO Tariff sections:

- CAISO Tariff Section 30.7, Bid Validation
- CAISO Tariff Section 30.10, Format and Validation of Operational Ramp Rates
- CAISO Tariff Section 30.11, Format and Validation of Startup and Shutdown Times
- CAISO Tariff Section 30.12, Format and Validation of Startup and Shutdown Costs
- CAISO Tariff Section 30.12, Format and Validation of Minimum Load Costs
- CAISO Tariff Section 30.5.2.8, Reliability Capacity Bids

- [CAISO Tariff Section 30.5.2.9, Imbalance Reserve Bids](#)
- CAISO Tariff Section 30.7.3.6.2 Credit Requirement

CAISO validates all Energy Bids submitted by SCs prior to carrying out any of the market processes. Bids are validated for content and for consistency with the Registered Data contained in the Master File. In addition Virtual Bids are validated for available credit with the Credit Tracking System. For physical Bids, the rules can also generate Bids for any missing or invalid data. The same basic approach to Bid validation takes place for the DAM and the RTM, with one additional step in the DAM to validate Bids against updated Master File content. CAISO carries out Bid validation in four steps:

Step 1: CAISO validates all Bids after submission of the Bid for content, which determines that the Bid adheres to the structural rules required of the Bid (as described in more detail in Section [Error! Reference source not found.8-2-3](#)). If the Bid fails any of the content level rules, CAISO assigns the Bid a status of “Rejected Bid” and the SC has the opportunity to correct and re-submit the Bid.

Step 2: After the Bids are successfully validated for content, but prior to the Market Close of the DAM, CAISO carries out the second level validation rules to verify that the Bid adheres to the applicable CAISO Market rules and if applicable, limits based on the content of the Master File. If the Bid fails any level two validation rules, CAISO assigns the Bid a status of “Invalid” and the SC has the opportunity to correct or resubmit the Bid.

Step 3: Physical Bids Only - If the Bid successfully passes validation in Step 2, it continues through the third level of processing where CAISO analyzes the Bid based on its content, to identify any missing Bid components that must be present for the Bid to be valid consistent with the market rules. At this stage, the Bid is either automatically modified for correctness and assigned a status of:

- “Conditionally Modified” or “Valid”

Step 4: Virtual Bids Only - If the Virtual Bid successfully passes validation in Step 2, it is passed on to the Credit Tracking System where it will be validated against available credit, if Approved the assigned Bid status will remain as “Conditionally Valid” or “Valid”, if Disapproved, the assigned Bid status will be set to “Invalid”.

Physical Bids that trigger bidding validation rules that result in warnings do not result in an invalid or rejected Bid status but simply notify the user of an issue with the Bid that they have submitted. SCs will need to take action on warnings to ensure their Bids or Trades will be accepted for a particular market.

Bids submitted in advance of the DAM are revalidated after the daily Master File update and when the newest commitment cost data is received. After the update, all conditional Bids must be re-validated prior to the trading period when the Bid takes effect. After Market Close for the DAM ~~or RTM~~, to the extent that SCs fail to enter a Bid for certain resources that are required offer RA capacity, CAISO creates Energy, Ancillary Service, and Imbalance Reserve Bids for these resources, called a Generated Bid. After the RUC market power mitigation pass is complete, the CAISO also creates required Reliability Capacity Bids for certain resources as well. Market Close for the DAM the CAISO also creates required \$0 RUC Availability Bids for certain resources as well as the AS bids for those resources. For resources that are subject to CAISO Tariff Appendix II, CAISO will replace submitted Energy Bids (which must be at \$0/MWh) with a Generated Bid. Except for bids created by the CAISO, an SC can cancel a Bid any time prior to Market Close by selecting the “Cancel” button on the Bid summary page of the SIBR application or by submitting the Web Action message through web services.

NOTE: In order to allow for sufficient time to resolve any possible validation/balancing issues before closing of a Market, Bids, including Self-Schedules, should be submitted within 30 minutes of Market Close.

Warnings or rejections are issued in the following cases:

- Wheeling Through transactions that are not matched (Balance Indicator is “N”, meaning that there is no matching Wheeling Reference for either the Import or Export bid in the Wheeling Bid Component). Such Bids will be erased if the wheeling reference does not match.
- Inter-SC Trades without matching counterparties are deemed invalid at market close time.
- Trades with circular dependencies are deemed invalid at market close time.
- ETC or TOR Self-Schedules that are not balanced upon submission into SIBR, for DAM only, will lose its scheduling priority for the entire ETC or TOR Self-Schedules. The CAISO will apply the ETC or TOR Settlement treatment pursuant to Tariff section 11.2.1.5 to the valid balanced portions only, for DAM and RTM.
- ETCs or TOR Self-Schedules that exceeds the resource capacity limits in the relevant Existing Contract based on TRTC instructions will be rejected upon submission into SIBR, and the responsible SC will be notified.
- ETCs or TOR that are submitted when their Entitlement is not positive will be rejected upon submission into SIBR, and the responsible SC will be notified.
- ETC or TOR Self-Schedules that do not reference the correct Contract Reference will be rejected upon submission into SIBR, and the responsible SC will be notified.

NOTE: Individual ETCs and TORs may be part of a chain (a combination of individual TORs or ETCs used in sequence). Each submission of an ETC or TOR Self-Schedule that is part of a chain will trigger notification to ALL Scheduling Coordinators associated with the registered chain.

Detailed steps that CAISO validation processes are outlined in Sections [9.2.18.2.4](#) to 8.2.3

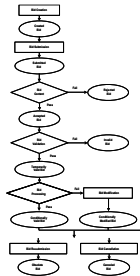
8.2.19.2.1 Day-Ahead Market Validation

CAISO's DAM validation includes validation steps prior to the close of the market, including the update to Master File and receiving any new data for commitment costs or Resource Adequacy (RA) data.

8.2.19.2.1.1 Physical Bid Validation Prior to Market Close & Master File Update

Exhibit 8-2 below outlines the steps CAISO takes to validate Physical Bids prior to Market Close and Master File update.

Exhibit 8-2: Bid Validation Prior to Market Close



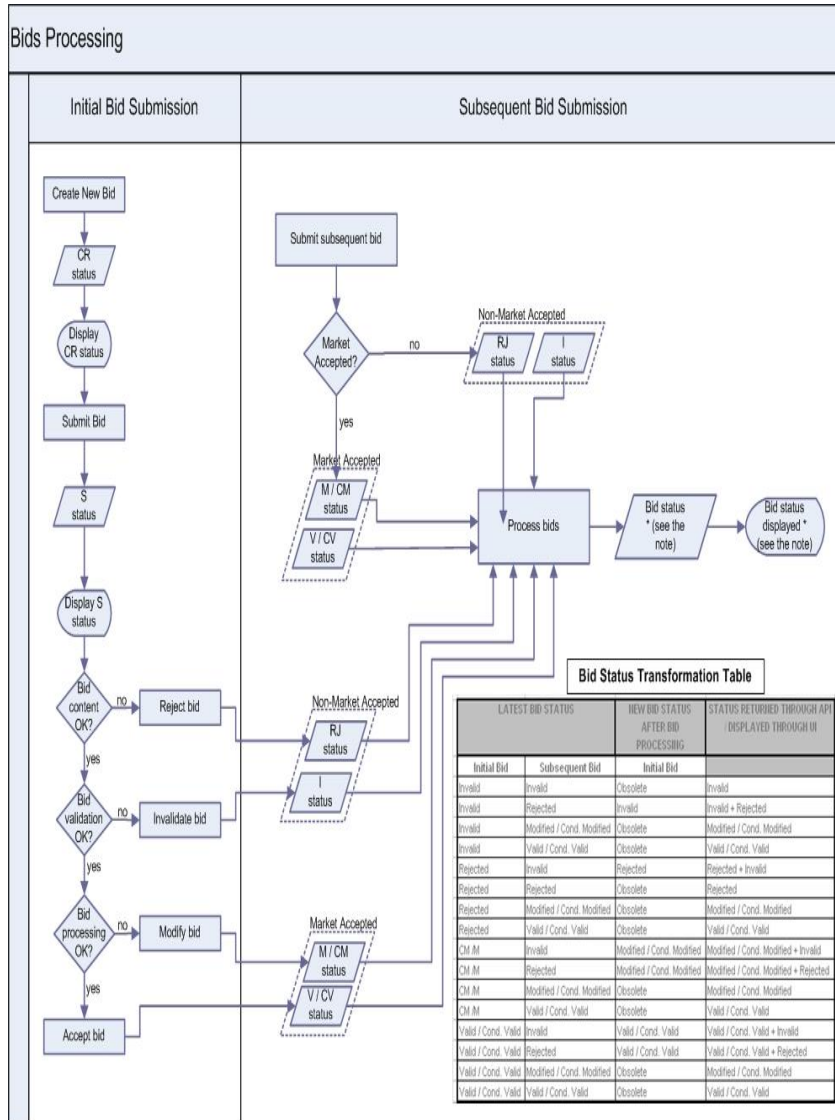
- 1) **Bid Creation** – SCs create Bids, entering all required data.
- 2) **Bid Submission** – SCs submit Bids into the SIBR platform.
- 3) **Level 1: Bid Content Validation** – After the SC submits a Bid, CAISO rules engine performs a Bid content validation, to verify that the Bid is structurally complete and correct. In this step, CAISO evaluates whether the Bid adheres to all the “structural rules” required of Bids. This includes such things as validating that all required components are present and the resources or services contained in the Bid actually exist. References to the Bidding rule details are in Attachment A of this BPM.
- 4) **Bid Acceptance** – If the Bid passes the Bid content validation in Step 1, CAISO categorizes the Bid as an “Accepted Bid”. If the Bid fails any of the content validation rules, CAISO assigns the Bid a “Rejected Bid” status. The SC must correct and re-submit the Bid.
- 5) **Level 2: Bid Validation** – All Accepted Bids undergo Bid validation for the entire Trading Day immediately after Bid submission to ensure all Bid contents are present and valid. Accepted Bids that fail Bid validation become Invalid Bids and Accepted Bids that pass Bid validation become Temporarily Valid Bids. This Bid is then eligible to be used in the Markets. CAISO remembers any errors and informs the SC that validation is complete, and provides the error analysis to the SC. If the validation fails, the Bid becomes an “Invalid Bid” and the SC must correct and re-submit the Bid. CAISO validates that the components of the Bid meet the applicable market rules. e.g., the Bids are a) consistent with the contents of the Master File; and b) for RTM Bids, consistent with the Schedule and Award from the Day-Ahead Market. If the Bid passes CAISO validation, CAISO characterizes the Bid as a “Temporarily Valid Bid”.

Note for Multi-Stage Generating Resource bids: If any configuration within a bid does not pass Bid Content or Bid Validation all configurations submitted as part of the bid will also become Rejected or Invalid. Warning messages will indicate which configuration caused the bid to become Rejected or Invalid.

6) **Level 3: Bid Processing** – The Bid is only processed (or modified for correctness) if it at least passes through all content and validation rules, which means that the Bid submitted is structurally correct and conforms to all Master File parameters. Once a Bid passes through the content and validation rules, it may be modified if it violates any of the processing rules. CAISO analyzes the “Temporarily Valid Bid” to identify any missing Bid components that must be present for the Bid to be valid. CAISO either modifies the Bid for correctness and assigns it a status of “Conditionally Valid Bid” or modifies the Bid and assigns it a status of “Conditionally Modified Bid”. The detailed Bid processing rules are referenced in Attachment A of this BPM. At this point the SC may leave the bid unchanged or initiate a change as follows:

- a) Cancel the Bid, in which case CAISO retains the Bid in the system as a “Cancelled Bid”. CAISO does not process Cancelled Bids.
- b) Modify and re-submit the Bid, in which case CAISO retains the original Bid in the system as an “Obsolete Bid”. CAISO does not process Obsolete Bids. The re-submitted Bid is processed as a new Bid, starting with Level 1, content validation. If the new Bid is Invalid or Rejected, the current Valid or Modified Bid remains active in the designated market.
- c) If the SC does not want to make any changes to their existing Bid, they may leave the Conditionally Modified Bid or Conditionally Valid Bid as is to be processed in the appropriate CAISO Market.

7) **Bid Status** – Summary of how Bid Status changes.



8.2.4-29.2.1.2 Virtual Bid Validation Prior to Market Close and Master File Update

- 1) **Bid Creation** – SCs create Virtual Supply and Demand Bids, entering all required data.
- 2) **Bid Submission** – SCs submit Bids into the SIBR platform.
- 3) **Level 1: Virtual Bid Content** – After the SC submits a Bid, CAISO rules engine performs a Bid content validation, to verify that the Bid is structurally complete and correct. In this step, CAISO evaluates whether the Bid adheres to all the “structural rules” required of Bids. This includes such things as validating that all required components are present and the resources or services contained in the Bid actually exist. Please refer to the Bidding rule details that are in Attachment A of this BPM.
 - **Virtual Bid Acceptance** – If the Bid passes the Bid content check the CAISO categorizes the Bid as a temporarily valid and passed to through to the next set of rules for step 2. If the Bid fails any of the content rules, CAISO assigns the Bid a “Rejected” status. The SC must correct and re-submit the Bid.
- 4) **Level 2: Virtual Bid Validation** – All Bids that pass the content check in Step 1 undergo Bid validation for the entire Trading Day, Bids that fail validation become an “Invalid Bid” and the SC must correct and re-submit the Bid. If the Bids are consistent with the contents of the Master File the Bid passes CAISO validation, CAISO characterizes the Bid as a “Conditionally Valid” or “Valid”.
- 5) **Level 3: Virtual Bid Credit Approval Processing** – Only a “Conditionally Valid” or “Valid” Bid will be sent to the Credit Tracking System for credit approval. Depending on the available credit for the Convergence Bidding Entity a credit status for the Bid will be returned as “Approved” or “Disapproved”, A credit status returned as “Approved” will retain the Bid status of either “Conditionally Valid” or “Valid”. If the credit status is returned as “Disapproved” then the Bid status will be set to “Invalid”. The detailed Bid processing rules are referenced in Attachment A of this BPM. At this point the Scheduling Coordinator may leave the bid unchanged or initiate a change as follows:
 - a) Cancel the Bid, in which case CAISO retains the Bid in the system as a “Cancelled Bid”. A cancelled bid will be sent to the Credit Tracking System for a release of the credit.

- b) Modify and re-submit the Bid, in which case CAISO retains the original Bid in the system as an "Obsolete Bid". Obsolete bids will be sent to the Credit Tracking System for credit release prior to the modified bid being sent to the Credit Tracking System. If the new Bid is Invalid or Rejected, the current Valid or Conditionally Valid Bid remains active in the designated market.

If the SC does not want to make any changes to their existing Bid, they may leave the "Conditionally Valid" or "Valid" Bid as is to be processed in the appropriate CAISO Market

Exhibit 8-3 below outlines the steps CAISO takes to validate Virtual Bids prior to Market Close and Master File update.

8.2.4.39.2.1.3 SIBR Generated Bid (Physical Bids only)

In the event that SIBR must generate a Bid or Bid component to comply with Tariff requirements, SIBR will generate a Bid or Bid component for the resource. There is a series of processing rules that are executed to establish the Start-Up and Minimum Load Cost in SIBR to generate the Bid with the proper Start-Up and Minimum Load costs based on the resource's election of either the Proxy Cost Option or the Registered Cost Option, and if it is a Natural Gas resource or Non-Natural Gas resource. Registered Cost resources use the values provided for the resource that are in the Master File.

The SIBR Rules (Appendix A) sections 411xx (Generating Resource Start-Up Bid Component Processing) and 412xx (Generating Resource Minimum Load Cost Bid Component Processing) detail the generation of these costs.

Start-Up Bid Component

If the Registered Cost Option is selected, which is only available to resources that meet the definition of "Use-Limited" and have fewer than 12 months of LMP data, a Registered Start-Up Cost will be generated. See Attachment G for details.

If the Proxy Cost Option is selected, the following two curves will be generated for a Start-Up Bid component if the Scheduling Coordinator has not submitted a Start-Up Bid component, or if the submitted Start-Up Bid component is higher than the Default Start-Up Bid:

1. The Start-Up Time Bid Curve - this is the registered value retrieved from Master File for the resource and most current Trading Day.
2. The Start-Up Cost Curve - this is calculated using the following information:
 - a. Start-Up Energy Cost Curve (registered Start-Up Energy * Energy Price Index).
 - b. Start-Up Fuel Cost Curve (registered Start-Up Fuel * Fuel Region Price).
 - c. Greenhouse Gas Start-Up Cost Allowance Curve (if applicable – see Attachment K).
 - d. Variable Start-Up Operations and Maintenance Cost Adder (if applicable – see Attachment L for details).
 - e. Grid Management Charge (GMC) Start-Up Cost Adder (Minimum Load * GMC Adder * (shortest Start-Up Time/60) * .5). The GMC Adder is made up of the Market Services Charge and System Operations Charge components.
 - f. Startup Opportunity Cost, if applicable, for Use-Limited Resources with a start limitation. See Attachment N of the Market Instruments BPM for details.

Generated Start-Up Bid Curve = Proxy Start-Up Cost (Start-Up Energy Cost Curve + Start-Up Fuel Cost Curve + Greenhouse Gas Start-Up Cost Allowance Curve + Variable Start-Up Operations and Maintenance Adder + GMC Start-Up Cost Adder + Startup Opportunity Cost (if applicable, see Attachment N for details).

For examples of a Start-Up Bid component calculation, see Attachment G.

Minimum Load Bid Component

If the Registered Cost Option is applicable, a Registered Minimum Load Cost will be generated. See Attachment G for details.

If the Proxy Cost Option is selected, the Minimum Load Cost is generated using the following information if the Scheduling Coordinator has not submitted a Minimum Load Cost bid, or if the submitted Minimum Load Cost bid is higher than the Default Minimum Load Bid:

- 1) Minimum Load Fuel Cost – the product of the Minimum Load Heat Rate, the Minimum Load, and the daily fuel region price.
- 2) Variable Energy Operations and Maintenance Cost - the product of the registered Variable Energy Operation and Maintenance Adder in \$/MWh and the registered Minimum Load in MW (if applicable – see Attachment L for details).
- 3) Greenhouse Gas Allowance Minimum Load Cost - the product of the Greenhouse Gas Minimum Load Cost Allowance and the registered Minimum Load (if applicable – see Attachment K).
- 4) Variable Minimum Load Operations and Maintenance Adder (if applicable – see Attachment L for details).
- 5) Grid Management Charge (GMC) Minimum Load Cost Adder - product of the GMC Minimum Load Cost Adder and the registered Minimum Load. The GMC Minimum Load Cost Adder is made up of the Market Services Charge and System Operations Charge components and a third value representing the Bid Segment Fee component divided by the resource Pmin.
- 6) Minimum Load Opportunity Cost, if applicable, for Use-Limited Resources with a run-hour limitation. See Attachment N of the Market Instruments BPM for details.

Generated Minimum Load Bid = Proxy Minimum Load Cost (Minimum Load Fuel Cost + Variable Energy Operations and Maintenance Cost + Greenhouse Gas Allowance Minimum Load Cost + Variable Minimum Load Operations and Maintenance Adder + GMC Minimum Load Cost Adder + Minimum Load Opportunity Cost (if applicable, see attachment N for details).

For examples of a Minimum Load Bid calculation, see Attachment G. The Minimum Load Bid will not exceed the Minimum Load Cost Hard Cap.

Energy Bid Component

An Energy Bid will be generated based on either the Default Energy Bid methodology or the Generated Bid methodology, depending on the resource types. Generated bids are used for non-Resource Specific System Resources providing Resource Adequacy capacity. The methodology for generated bids is detailed in Attachment I. All other resources use the Default Energy Bid methodologies, explained in Attachment D.

Transition Bid: See Attachment H of this BPM for details.

8.2.1.49.2.1.4 Master File Data Update

Since DAM Bids may be submitted up to seven days in advance they must be revalidated daily based on the daily update of Master File information. The Master File used in SIBR is consistent with the updated Master File for that Trade Day. The Master File can be refreshed daily and can be used for bids submitted up to t +7. However when the Master File refreshes the bids that were initially valid may become invalid or rejected based on new Master File data. If a resources changes ownership, the new owner will not be able to input bids or schedules on the resource until the Master File has refreshed for that day. Similar to new Master File data, new Resource Adequacy data can also impact bids that may be revalidated after the newest data is received before the bid re-validation.

Bids are assigned a “Conditional” status during the initial Bid validation since the Bid status could change with the update of the Master File information. These Bids are assigned a status of “Conditionally Modified” Bid or “Conditionally Valid” Bid until the final Master File update occurs for the Trading Day designated in the Bid.

The diagram in Section [9.2.1.58-2.1.5](#) below shows the validation process a Bid goes through when it is in a “Conditional” state. Changes to the Master File for each SC that were submitted at least seven business days in advance are introduced into the system once per day.

8.2.1.59.2.1.5 Physical Bid Validation Prior to Market Close & After Final Master File Update for Trading Day

Exhibit 8-4 shows the steps CAISO uses to validate Physical Bids after Master File update and prior to Market Close.

8.2.1.69.2.1.6 Virtual Bid Validation Prior to Market Close & After Final Master File Update for Trading Day

After the Master File is updated by CAISO, CAISO re-validates all “Conditional” Bids using the following process:

- 1) CAISO validates the “Conditionally Valid Bids” to establish that the Bids meet the applicable market rules. If the Bid passes the content check, the Bid becomes a “Temporarily Valid Bid”. If the Bid does not pass the validation process, the Bid becomes a “Rejected” Bid.
- 2) CAISO passes the temporarily valid through to the Level 2 validation where the bid passes CAISO validation, CAISO characterizes the Bid as a “Conditionally Valid” or “Valid” or if the Bid fails validation it will become an “Invalid Bid” and the SC must correct and re-submit the Bid.
- 3) The SC reviews the “Valid Bid”, at this time the SC may re-submit the Bid (all validation and Bid processing steps are repeated for the new Bid), or cancel the Bid or allow the Bid to stand.
- 4) The SC may also review the “Limit Viewer” tab on the UI at any time to see if any changes may have affected any position limits associated to a location associated to an Inter-Tie scheduling point specified in a bid.
- 5) Virtual Bidding may be suspended or limited by the CAISO either by SC, Location, or Convergence Bidding Entity at a Location to adjust Position Limits. These actions are supported by Tariff section 39.11.2.

Exhibit 8-5 shows the steps CAISO uses to validate Virtual Bids after Master File update and prior to Market Close.

At the time of Market Close, the “Valid Bid” becomes a “Clean Bid”.

8.2.1.79.2.1.7 Validation after Market Close (Not applicable to Virtual Bids)

If an SC fails to submit a Bid for the full amount of available RA Capacity from a Generating Unit or Dynamic System Resource (Resource Specific System Resource) other than Use-Limited and Hydro Resources, CAISO creates an Energy Bids for these resources, called Generated Bids. CAISO creates Generated Bids after Market Close for the DAM using data in the Master File or through data provided by the applicable SC. CAISO notifies the SC of the use of a Generated Bid for each Generating Unit prior to Market Clearing of the IFM.

The Generated Bid is provided to the SC. The SC may view the Generated Bid but may not modify the Generated Bid.

8.2.2 Open / Isolated Intertie Validation

The ISO market systems will validate all System Resources Bids, including Self-Schedules, for each Trading Hour with regard to open or isolated Intertie conditions on associated Intertie constraints (ITC) and market scheduling limits (MSL). This validation is based on the directional total transfer capability (TTC) and the isolated Intertie status reported by the Existing Transmission Contract Calculator (ETCC) on the ITCs / MSLs.

Section 30.8 prohibits Scheduling Coordinators from submitting Bids, including Self-Schedules, on transmission paths that are out-of-service, i.e., the transmission TTC is rated at zero. These open Intertie conditions occur when the TTC is zero in both directions of the Intertie or path. If Scheduling Coordinators submit Bids at such locations, the Section 30.8 requires that the ISO reject such Bids or Self-Schedules. An isolated Intertie condition is one where the TTC is non-zero in one direction, but that TTC is reserved for resources registered as stranded load in the master file.

Under open Intertie conditions, all associated resource Bids are marked as inadmissible during the hours where the condition exists. Under an isolated Intertie condition, all associated resource Bids are marked as inadmissible, during the hours where the condition exists, except resources registered as stranded load in the direction of the non-zero TTC. In either case, inadmissible Bids are ignored in the market applications (DAM/RTN), thereby rejected by the applicable market run. While the ISO markets ignore inadmissible Bids and in effect rejecting these Bids, these Bids are not rejected or modified as are bids that fail other validation rules. Rather, an hourly indicator in the Bid indicates that the Bid is inadmissible due to open/isolated Intertie conditions. This hourly indicator is displayed on the graphical user interface for each hourly Bid component. Additionally, the Bid processing rules that determine this indicator are displayed in the defined error messages and returned in an API per rule error message.

Bids for System Resources which have registered an alternate tie path in the Master File will be considered in the IFM to be bid at the alternate path if the primary tie path is open or isolated. For these resources, if both the primary and alternate path is open / isolated, only then will the bid be considered inadmissible for the ISO market processes.

8.2.29.2.2 RTM Validation

CAISO uses the same process to validate Bids for the RTM, with the exception that CAISO does not validate the Bid before and again after the Master File update. CAISO only validates the RTM Bids based on the current Master File Data on the relevant Trading Day.

9-10. Inter-SC Trades

40.11. Reporting Information

Welcome to the *Reporting Information* section of *CAISO BPM for Market Instruments*. In this section you will find the following information:

- A description of the reports that are available to SCs

Technical interface documentation and report content details can be found in the Interface Specification for Market Results Services and Market Results Report Overview documentation at: <http://www.caiso.com/2359/2359b9866b2c0.html>

40.11.1 Scope of CMRI Reports available to SCs

Exhibit 10-1.1 summarizes the reports that are available to SCs through the Customer Market Results Interface (CMRI). Details of the report contents are provided in subsequent sections.

Exhibit 10-1.1: Summary of CMRI Reports

Title	Contents
Day Ahead Reports The following Day Ahead reports are available through the Customer Market Results Interface (CMRI).	
Day-Ahead Generation Market Results	Day-Ahead Energy Schedules, Ancillary Services Awards, Load Following and RUC Capacity for Generating Units
Day-Ahead Demand Market Results	Day-Ahead Energy Schedules and Ancillary Services Awards of Participating Loads and Day-Ahead Energy Schedules for Non-Participating Loads
Day-Ahead Residual Unit Commitment (RUC) Capacity	RUC Capacity and RUC Awards from the Residual Unit Commitment process. Posted hourly, the following values: <ul style="list-style-type: none"> • Capacity (total RUC capacity) - this is the positive difference between the RUC Schedule and the greater of the Day-Ahead Schedule and the Minimum Load level of a resource. • Award (RUC Award portion) – this is the portion of the RUC capacity from resources eligible to receive RUC Availability Payments. • For Interties the total RUC Schedule is displayed as the RUC Award product.
Two Day-Ahead Residual Unit Commitment (RUC) Advisory Schedules	This report is based on the Two Day-Ahead process run. For the second trading day, the resource level advisory RUC Schedule is the Schedule in MW which gets cleared from the RUC process. While it is advisory, it serves as a forecast of the resource's upcoming energy schedule on a two-day ahead base. RUC data presented

Title	Contents
	in this report is for informational purposes only. This advisory data will be available for a rolling window of seven trading-date period on CMRI as soon as the Two Day-Ahead process run is completed (14:00 and 18:00 PST).
Day-Ahead Import/Export Schedules	Day-Ahead Energy Schedules and Ancillary Services Awards at Intertie Scheduling Points. Addition of a new column called " <i>Effective Intertie</i> ", an element that only applies to intertie resources. In cases of an open-tie situation per market run results, this element will indicate the Secondary Tie identifier; whereas if there is no open-tie situation, this element will indicate the Primary Tie identifier.
Day-Ahead Instructions	Start-Up instructions resulting from the RUC process
Day-Ahead Ancillary Service Market Results	Resource-specific Ancillary Service Awards resulting from the Integrated Forward Market run
Day-Ahead Market Power Mitigation (MPM) Results	Segments of the "new" or mitigated Bid as a result of the Day-Ahead Market Power Mitigation Process (MPM)
Day-Ahead Generation Commodity Prices	Day-Ahead resource-specific prices (for Energy Schedules, Ancillary Services Awards, RUC Awards) of Generating Units
Day-Ahead Demand Commodity Prices	Day-Ahead resource-specific prices for Energy Schedules and Ancillary Services Awards of Participating Loads; and resource-specific prices for Energy Schedules of Non-Participating Loads
Day Ahead Finally Qualified Load Following Capacity	Day-Ahead Finally Qualified Load Following Up and Down Capacity for Metered Subsystems (MSS) resources
Day-Ahead Unit Commitments	Resources that are self-committed or CAISO committed by the IFM or RUC process in the Day-Ahead Market
Day-Ahead Import-Export Commodity Prices	Day-Ahead resource-specific prices (for Energy Schedules, Ancillary Services Awards, RUC Awards) of System Resources
Extremely Long Start Resource Instructions	Startup instructions resulting from the Extremely Long Start Commitment (ELC) process.
Day-Ahead Reliability Must Run (RMR) Dispatches	RMR units that either have an Energy Schedule (from the IFM run) that is flagged as an RMR Dispatch and/or a Manual RMR Dispatch
Day-Ahead Base Schedules	Reports the generation and interchange base schedules submitted for the day-ahead and/or real-time markets to the CAISO. These represent the forward energy schedules, with hourly granularity, that is the baseline to measure deviations for settlement through the EIM.
Two Day-Ahead Residual Unit Commitment (RUC) Advisory Schedules	RUC Capacity and RUC advisory awards from the Residual Unit Commitment process run two days ahead. Posted hourly, the following values: <ul style="list-style-type: none"> Capacity (total RUC capacity) - this is the positive difference between the RUC Schedule and the greater of the Day-Ahead Schedule and the Minimum Load level

Title	Contents
	<p>of a resource.</p> <ul style="list-style-type: none"> Advisory Award (RUC Award portion) – this is the portion of the RUC capacity from resources that can potentially receive RUC Availability Payments if awarded during the Day Ahead Market process. <p>For Interties the total RUC Schedule is displayed as the RUC Award product</p>
Day-Ahead Market Priority	Day-Ahead Energy Schedules and Ancillary Services Awards at Intertie Scheduling Points including a Market Priority Type column of types including ETC/TOR, DAPT or DALPT.
<p>Real Time Reports</p> <p>The following Real Time reports are available through the Customer Market Results Interface (CMR).</p>	
Hour-Ahead Scheduling Process (HASP) Market Power Mitigation (MPM) Results	Segments of the “new” or mitigated Bid as a result of the HASP Market Power Mitigation Process (MPM)
Fifteen-Minute Market (FMM) Market Power Mitigation (MPM) Results	Segments of the “new” or mitigated Bid as a result of the FMM Market Power Mitigation Process (MPM)
Hour-Ahead Scheduling Process (HASP) Schedules	Displays Hour-Ahead Scheduling Process results for the next Trading Hour. Posts the HASP Binding results relevant to hourly HASP Block Intertie Schedules. Posts HASP Advisory results relevant to all other Pre-Dispatch Resources.
Hour-Ahead Scheduling Process (HASP) Schedule Prices	Displays Hour-Ahead Scheduling Process advisory resource-specific prices for the next Trading Hour.
Fifteen-Minute Market (FMM) Schedules	<p>Displays FMM results for the next 15-minute interval. FMM schedules cover real-time Energy and Ancillary Services Awards.</p> <p>Addition of a new column called “<i>Effective Intertie</i>”, an element that only applies to intertie resources. In cases of an open-tie situation per market run results, this element will indicate the Secondary Tie identifier; whereas if there is no open-tie situation, this element will indicate the Primary Tie identifier.</p> <p>Addition of a new product commodity – code “<i>IEEA</i>”; with a display value of “<i>CA Export Allocation</i>”. This is the Imbalance Energy Export Allocation applicable for WEIM resources.</p> <p>“Ramp Up” and “Ramp Down” in product types, and “Cleared” and “Market” schedule type attributes related to flexible ramping product. Both Cleared and Market will result to equal values as the flexible ramping product can’t be self-scheduled.</p>
Fifteen-Minute Market (FMM) Schedule Prices	<p>Displays FMM resource-specific prices for the next 15-minute interval. Covers prices for Energy and Ancillary Services Awards.</p> <p>Addition of a new Locational Marginal Price LMP component called “<i>GHG</i>” Greenhouse Gas only applicable for WEIM resources. It is the additional LMP component due to the net</p>

Title	Contents
Fifteen-Minute Market (FMM) Flexible Ramping Constraint Capacity	energy export allocation constraint. Reports the amount of upward ramping MW quantity of Flexible Ramping Constraint capacity awarded for each resource.
Real-Time Unit Commitment (RTUC) Advisory Schedules	Reports the 15-minute interval based resource level advisory energy schedules from the real-time 15-minute market horizon. "Ramp Up" and "Ramp Down" in product types, and "Cleared" and "Market" schedule type attributes related to flexible ramping product. Both Cleared and Market will result to equal values as the flexible ramping product can't be self-scheduled. For VER Resources using the CAISO forecast, the advisory energy schedule is the persistent forecast plus any advisory market dispatch. For PDR Resources using the hourly block option, this will display the Binding schedule (even though the report is labeled as Advisory). **Note: Data retention for this report will be a rolling period of five (5) trading days plus the current date.
Resource-Specific VER Forecast Usage	Posts the actual 5-minute and 15-minute load forecast used by RTM. Depending on option chosen by the SC and forecast availability, forecast may come from either the values submitted by the SC or from the forecast generated by CAISO systems. Posts for all intervals (binding and advisory) in the FMM and RTD run time horizon. This report should be used to see the forecast generated by CAISO systems in relation to the VER Persistence Market Model.
Real-Time Dispatch (RTD) Schedules	Reports the 5-minute interval based resource level binding energy schedules from the real-time 5-minute market runs. "Ramp Up" and "Ramp Down" in product types, and "Cleared" and "Market" schedule type attributes related to flexible ramping product. Both Cleared and Market will result to equal values as the flexible ramping product can't be self-scheduled. For VER resources using the CAISO forecast, the binding energy schedule is the persistent forecast plus any market dispatch.
Real-Time Dispatch (RTD) Advisory Schedules	Reports the 5-minute interval based resource level advisory energy schedules from the real-time 5-minute market horizon. "Ramp Up" and "Ramp Down" in product types, and "Cleared" and "Market" schedule type attributes related to flexible ramping product. Both Cleared and Market will result to equal values as the flexible ramping product can't be self-scheduled. For VER Resources using the CAISO forecast, the advisory energy schedule is the persistent forecast plus any advisory market dispatch. **Note: Data retention for this report will be a rolling period of five (5) trading days plus the current date.
Real-Time Dispatch (RTD) Schedule Prices	Reports the 5-minute interval based resource level binding prices from the real-time 5-minute market runs.

Title	Contents
Real-Time Base Schedules	Reports the generation and interchange base schedules submitted for the day-ahead and/or real-time markets to the CAISO. These represent the forward energy schedules, with hourly granularity, that is the baseline to measure deviations for settlement through the EIM.
Fifteen Minute Market(FMM) Movement Points	Provide resource-level Movement Start and End Points (mw), based on the binding and first advisory intervals, resulting from the FMM/15-minute market run.
Real Time Dispatch(RTD) Movement Points	Provide resource-level Movement Start and End Points (mw), based on the binding and first advisory intervals, resulting from the RTD/5-minute market run.
Fifteen Minute Market(FMM) Flexible Ramp Price Breakdown	Provide the flexible ramping total price (FRMP) and its BAA level price breakdown, resulting from the FMM/15-minute market outputs.
Real Time Dispatch(RTD) Flexible Ramp Price Breakdown	Provide the flexible ramping total price (FRMP) and its BAA level price breakdown, resulting from the RTD/5-minute market outputs.
Flexibile Ramp Requirement Sufficiency Test Results	This report has been moved to OASIS under the Flexible Ramp Requirements Inputs and Output.
Bid Range Capacity Test Results	This report has been moved to OASIS under the WEIM RSE Capacity Test.
Resource Operating Limits	Publish the operation range for Overlapping Resource Aggregation (ORA) resources. Overlapping resource aggregation are multiple aggregate market resources that are registered out of the same set of physical units in a Balancing Authority Area (BAA).
Available Balance Capacity	Displays WEIM Available Balancing Capacity (ABC) Upward and Downward Dispatch for the FMM and the Real-Time Dispatch for the WEIM BAA. There will be no information published in the report for those market intervals with no WEIM Available Balancing Capacity identified in the WEIM Base Schedules. If WEIM Available Balancing Capacity does not exist, this field will show null.
Infeasibility	Infeasibility report information will be based on the FMM and the Real-Time Dispatch runs for the WEIM BAA. Infeasibility MW values can be negative or positive. Negative values indicate a decremental direction, while positive values indicate an incremental direction. The infeasibility MW actual values will be displayed. If infeasibility MW actual value does not exist, this field will show null.
Load Conforming	Load conformance report is for both the FMM and the Real-Time Dispatch runs for the WEIM BAA. The WEIM Entity load conforming information will be published for binding intervals. Load conformance MW values can be positive or negative. Positive values indicate an incremental direction, and negative values indicate a decremental direction.

Title	Contents
Advisory Load Conforming	Load conformance report is for both, the FMM, and the Real-Time Dispatch runs for the WEIM BAA. The WEIM Entity load conforming information will be published for advisory intervals. Load conformance MW values can be positive or negative. Positive values indicate an incremental direction, and negative values indicate a decremental direction.
Flexible Ramping Resource Awards	FRP Resource Awards from RTM
Real-Time Market Priority	Real-Time Energy Schedules and Ancillary Services Awards at Intertie Scheduling Points including a Market Priority Type column of types including ETC/TOR, DAPT, DALPT, RTPPT, RTLPT, RTECON
Market Active Resource Constraints	Reports the 15-minute and 5-minute flag for resources that have been uneconomically dispatched to support the State of Charge needed for a current or future interval with Ancillary Services where the Constraint Name is labeled "ASSOC."
Real-Time Advisory Shutdown Instructions	Reports if RTPD shutdown instructions are Binding or Advisory (where Binding Instruction equals Y=Binding or N=Advisory) for a given trade date at the SC ID and Resource Name levels. Also provides the interval in which the instruction was received and the Shutdown Instruction Start time.
<p>Post-Market Reports</p> <p>The following Post-Market reports are available through the Customer Market Results Interface (CMRI).</p>	
Expected Energy Allocation Details	<p>Displays the post-market Expected Energy results from the energy accounting process. Expected Energy is the sum total of all DA and RT (including FMM and RTD) market awards, Exceptional Dispatches and any other Dispatch Instructions, taking into account physical limitations (outage management system), disaggregated into their Settlement components.</p> <p>For residual energy, report includes the price at which the residual energy will be settled.</p> <p>User may choose to display allocation either by Default Energy Bid, or the final input bid used by the market systems (SIBR clean bid as adjusted by market pre-processors).</p> <p>Addition of two new expected energy type codes applicable for WEIM resources:</p> <ul style="list-style-type: none"> • BASE - real-time expected energy based on the base schedules • MDE - manual dispatch energy signals
Expected Energy	Post-market or after-the-fact energy accounting results for Settlement calculations. This report will contain the Total Expected Energy for Day Ahead, Fifteen-Minute, and Real Time Dispatch, and include Instructed and Total energy.
ISO Commitment Cost	Includes Commitment and transition Flags, time periods and

Title	Contents
Details	Costs to validate the Bid Cost Recovery charge in Settlements
Conformed Dispatch Notice (CDN)	Summary of the Day-Ahead and Real-Time Energy Schedules, Ancillary Service Awards, RMR Dispatches, Competitive Constraint Run results of RMR resources
CRN	Reports the MW breakdown and CRN number market results for ETC/TOR Self-Schedules in the DAM and the RTM. These MWs breakdown are inputs used in the ETC/TOR balancing rights, and are not the final ETC/TOR balancing rights. RTM CRN reporting includes ETC/TOR schedule changes after the close of the RTM. Note: This report has limited functionality, and is only available in the GUI. The same results are posted to the CAISO SFTP site for downloading. Access to the CRN data through the SFTP site is managed through the AARF (Application Account Request Form) process.
Non-Dispatchable Time Ranges	Specifies the start and end time of non-dispatchable periods including resource commitments, transitions, operations within a forbidden region and DOP corrections. Used to validate the Bid Cost Recovery charge in Settlements.
Regulation Pay for Performance	Provides the 15-minute performance accuracy values for regulation mileage up (RMU) and regulation mileage down (RMD). In addition, instructed and adjusted regulation mileage data will also be available in this report. Zero values for all these three data elements indicate that either the resource was not awarded regulation or the resource's actual mileage for the interval was zero.
Resource Level Movement	Provide 15-minute and 5-minute resource-level Forecasted Movement (FM) and Uncertainty Movement (UM) for generator and intertie resources, published at TD+1.
CRR Revenue Adjustments Details	This report provides CRR Holder specific adjustments related to CRR settlements that were adjusted due to DAM flows on binding constraints being lower than the CRR flows on the same constraint as awarded through the CRR allocation and auction process. Transmission Constraint ID: Constraint Name from the market. Constraint Case: This field contains either Base Case, or the name of the contingency case. CRR ID: '0' if the CRR is an obligation type CRR, if an option type CRR then the CRR ID when the CRR was awarded Hedge Type: Obligation or Option CRR Type: AGG – If an obligation CRR, otherwise MT-Merchant Transmission or MT_TOR-Merchant Transmission TOR Notional Revenue: Full CRR value for a CRR Holder without reduction on the constraint Offset Revenue: Offset adjustment by hour, by constraint. Positive is a surplus, negative is a deficit CRR Clawback Revenue: Clawback amount for a CRR Holder by constraint Circular Scheduling: Circular scheduling adjustment amount for a CRR Holder by constraint

Title	Contents
	<p>Derate Factor: derate factor = OTC/TTC from the matching tie constraint. . If a CRR was not derated, the derate factor is 1.</p> <p>CRR Award MW: This value is the netted MW based on source/sink locations as described in section 17 of the BPM for CRRs</p>
Exceptional Dispatch Hold State of Charge	<p>Exceptional Dispatch (ED) data pertaining to Hold State-of-Charge EDs including:</p> <ul style="list-style-type: none"> • ED Start Time • ED End Time • Resource ID • SOC Hold Instruction • Counterfactual Dispatch MW with Hold SOC • Counterfactual Dispatch MW without Hold SOC
<p>Default Bids Reports</p> <p>The following Default Bids reports are available through the Customer Market Results Interface (CMRI).</p>	
Default Energy Bid Curves	<p>Default Energy Bid Curve data that may be used in the Market Power Mitigation process. Default Energy Bids are calculated using various methodologies described in Attachment D. Generated Bids are also based on Default Energy Bids.</p>
Default RMR Minimum Load & Startup Cost Bid Curves	<p>Displays the default minimum load and startup cost bid curves that will be used for the Market Power Mitigation (MPM) Process. This information originates from an independent entity and applies to RMR units only.</p>
Greenhouse Gas Bid Cap	<p>Provides the daily greenhouse gas maximum cost value (\$/mwh) of WEIM participating resources to serve demand in California. This report is available to the scheduling coordinator of the resource.</p>
Daily Electricity Price Index (EPI)	<p>Provides resource level daily EPI, based on Wholesale or Retail Electric Region type, which is calculated on daily basis. The EPI is used as an input in the day-ahead and real-time markets to calculate the auxiliary power portion of start-up costs.</p>
Actual Limitation Values	<p>Provides actuals (scheduled) starts (including MSG transitions), run-hours and energy output for use-limited each resource.</p>
Resource Opportunity Costs	<p>Provides modeled opportunity costs results for each resource on monthly and daily basis depending on OC Used Flag (Y/N)</p>
Default Commitment Costs	<p>This daily report includes the default commitment bids: Default Minimum Load Bids, Default Start-Up Bids, and Default Transition Bids. This report is published three times daily approximately at 2:30 AM, 9:00 AM, 10:00 PM, and at various times to reflect approved Reference Level Change Requests. DAM and RTM will use the latest default commitment costs that are available at the time when these markets start to run. For commitment costs that have not been adjusted via a Reference Level Change Request, the values presented in this report will typically show 125% of the proxy commitment costs. The exception to this is if the SC has submitted a Reference Level</p>

Title	Contents
	<p>Change Request.</p> <p>If an SC has submitted an <i>automated</i> Reference Level Change request for a resource and the request resulted in the resource's Reference Levels being adjusted, this report will show the Revised Reference Level for the resource instead of the resource's default commitment bids.</p> <p>If an SC has submitted a <i>manual</i> Reference Level Change Request for a resource and the request resulted in the resource's Reference Levels being adjusted, this report will show the Revised default commitment bids (i.e. not including a commitment cost multiplier but including an opportunity cost, if applicable). See Attachment O for more about Reference Levels and Reference Level Change Requests.</p>
<p>Convergence Bidding Reports</p> <p>The following four Convergence Bidding reports are available through the Customer Market Results Interface (CMRI). Reports 4.2, 4.3 and 4.4 are associated with the CRR Adjustment Settlement Rule. For additional details on the CRR Adjustment Settlement Rule, please see the BPM for Market Operations, Appendix F.</p>	
Day Ahead Convergence Bidding Awards	Displays the market Virtual Bidding supply and demand awards that were cleared in the day-ahead market for energy Addition of a new column called " <i>Intertie</i> ", which defines the "Primary Tie" if the virtual bid Pnode or Anode is external to CAISO
Hourly Prices due to Convergence Bidding for CRR Adjustment	Displays the hourly prices that CAISO uses to calculate Congestion Revenue Rights (CRR) adjustments due to Virtual Bidding
Binding Transmission Constraints due to Convergence Bidding for CRR Adjustment Report	Displays supporting data for settlement charges imposed on scheduling coordinators, as a result of the application of the CRR settlement rule - specifically CRR flow impact on award locations for each scheduling coordinator.
Flow Impact due to Convergence Bidding for CRR Adjustment	Displays supporting data for settlement charges imposed on scheduling coordinators, as a result of the application of the CRR settlement rule – specifically CRR flow impact aggregated by Entity, where the Entity is a Convergence Bidding Entity name that coincides with a CRR Holder.
<p>Forecast Reports</p> <p>The following Forecast reports are available through the Customer Market Results Interface (CMRI).</p>	
Variable Energy Resource Forecast	Provide the day-ahead, rolling, and locked or final hour-ahead forecast for variable energy resources. This report will be available to the scheduling coordinator of the standalone or co-located variable energy resource and for each variable component of a hybrid resource.

Title	Contents
Interval Variable Energy Resource Forecast	Provide the 5-minute rolling forecast for variable energy resources. This report will be available to the scheduling coordinator of the standalone or co-located variable energy resource and for each variable component of a hybrid resource.
Reference Reports The following Reference reports are available through the Customer Market Results Interface (CMRI).	
Intertie Resource Transaction ID	Reports all of the unique alphanumeric identifiers, that were dynamically generated by the bidding system (SiBR) referred to as the " <i>Transaction ID</i> "; and its corresponding attributes: <ul style="list-style-type: none"> • RegisteredInterTie identifier • SchedulingCoordinator identifier • PrimaryFlowgate identifier • SecondaryFlowgate identifier • AggregatedPnode identifier • IndividualPnode identifier Direction (Import, Export) • Energy Product Type (Firm Energy, Non Firm Energy, Dynamic Interchange, Wheeling, Unit Contingency) • Purchase Service Entity (PSE) • Wheeling Resource identifier • Wheeling Resource registeredFlag
Energy Imbalance Market Reports The following Western Energy Imbalance Market reports are available through the Customer Market Results Interface (CMRI).	
Base Schedules	Reports the generation and interchange WEIM Base Schedules submitted for the day-ahead and/or real-time markets to the CAISO. These represent the forward energy schedules, with hourly granularity, that is the baseline to measure deviations for settlement through the EIM.
EIM Transfer	Reports the Western Energy Imbalance Market transfer (mw) breakdown for each WEIM Entity Balancing Authority Area and WEIM Entity Balancing Authority Area group under the real-time market runs (RTPD and RTD).
Balancing Test Results	Report that provide the results for the series of tests conducted to ensure that each WEIM Entity Balancing Authority Area has sufficient resources to serve its load while still realizing the benefits of increased resource diversity. Please refer to the Western Energy Imbalance Market <i>Business Practice Manual</i> document for more information.
Load Base Schedules	Reports the base schedules for load resources under the real-time markets
Transmission Violation Test Results	Report that provide the results for the series of tests conducted to ensure that each WEIM Entity Balancing Authority Area has sufficient resources to serve its load while still realizing the

Title	Contents
	benefits of increased resource diversity. Please refer to the Western Energy Imbalance Market <i>Business Practice Manual</i> document for more information.
Flexible Ramp Requirement Sufficiency Test Results	Report that provide the results for the series of tests conducted to ensure that each WEIM Entity Balancing Authority Area has sufficient resources to serve its load while still realizing the benefits of increased resource diversity. Please refer to the Western Energy Imbalance Market <i>Business Practice Manual</i> document for more information.
Bid Range Capacity Test Results	Report that provide the results for the series of tests conducted to ensure that each WEIM Entity Balancing Authority Area has sufficient resources to serve its load while still realizing the benefits of increased resource diversity. Please refer to the Western Energy Imbalance Market <i>Business Practice Manual</i> document for more information.
EIM After-the-fact Interchange Schedules	Provide the after-the-fact values of the interchange base schedules submitted by the WEIM entities. The values are reported in 5 or 15 minute intervals and can be submitted up to T-8 calendar days. After-the-Fact interchange schedules describes the MWh value displayed on the e-Tag after the timeframe is in the past. This report is available to the WEIM entity.
EIM Bid Capacity	This report publishes the hourly high and low percentile of interchange schedule deviation for the BAA WEIM Entity.
EIM Bid Capacity	<p>Reports hourly interchange schedule deviation.</p> <p>System will report on the new calculated bid capacity percentage for the next month.</p> <p>System will report high and low percentile of import histogram for each WEIM BAA and ISO for each hour (24 hours) for the applicable month.</p> <p>The WEIM entity who get the base schedule test results shall see the percentage. Ex: PAC, NVE</p>
Resource Operating Limits	Publish the operation range for Overlapping Resource Aggregation (ORA) resources. Overlapping resource aggregation are multiple aggregate market resources that are registered out of the same set of physical units in the Western Energy Imbalance Market (EIM) Balancing Authority Area (BAA).
<p>Phase Shifter Reports</p> <p>The CAISO controlled grid includes phase shifter transformers that enable the CAISO as the balancing authority area to monitor and adjust the power flow on the CAISO controlled grid. Phase-shifting transformers are designed to ensure the reliable and secure operation of the grid is maintained. Phase-shifting transformers help control the power flow through transmission lines by changing the phase angle between the input voltage and the output voltage of the transmission lines. The CAISO market systems model the phase-shifting transformers in its</p>	

Title	Contents
	congestion management and produces a least cost security constrained dispatch phase-shifting transformer tap control and manages the power flow directly. The CAISO market systems can optimize phase-shifting transformer tap control by including the tap position movement impact on the transmission flow on a particular constraint.
Tap Position	This report present the PST devices optimized PST tap position for IFM, RTUC, RTD for binding intervals for the each market time horizon, in the same manner as resource.
Advisory Tap Position	This report present the PST devices optimized PST tap position for RTUC, RTD for advisory intervals for the each market time horizon, in the same manner as resource.
Contingency Dispatch Tap Position	This report present the PST devices optimized PST tap position for RTCD/RTDD for binding intervals for the each market time horizon, in the same manner as resource.
<p>Gas Burn Reports</p> <p>The following Gas Burn reports are available to gas companies through the Customer Market Results Interface (CMRI). These reports calculate and present gas burn estimates to gas companies serving electric generation located within the CAISO BAA. This functionality provides timely information to the gas companies for their use to manage their respective system operations. Gas burn estimate data are calculated using IFM and RUC results for Day Ahead and Two Day Ahead (Daily) reports and using RTUC results for Real Time reports. The reports are published immediately following completion of the applicable market and burn values are displayed in MMcf. The Daily reports show hourly values for each electric market day and the Real Time reports show fifteen minute values for available RTPD intervals.</p>	
Gas Burn Detail	CMRI shall consume and publish Gas burn data in MMcf for Resources that belong to Gas Companies on; <ul style="list-style-type: none"> • hourly basis for the entire next day for IFM and RUC pass • hourly basis for the entire day after tomorrow (D+2) for IFM and RUC pass • 15 minute basis for the RTPD binding and STUC advisory intervals
Gas Burn Summary	CMRI shall consume and publish Gas burn summary data in MMcf for various levels like Gas Company, Service Area, Forecast Zone, Transmission Zone, Gas Meter on; <ul style="list-style-type: none"> • hourly basis for the entire next day for IFM and RUC pass • hourly basis for the entire day after tomorrow (D+2) for IFM and RUC pass • 15 minute basis for the RTPD binding and STUC advisory intervals

10.1.1 Dispatches for Hourly and 15-Minute PDRs

Scheduling Coordinators for Proxy Demand Resources using the hourly block and 15-minute interval option can obtain binding schedules and awards via CMRI. Refer to the following reports on the Real-Time tab.

- Fifteen-Minute Market (FMM) Schedules (15-minute interval option)
- Real-Time Unit Commitment (RTUC) Advisory Schedules (hourly block option)



Fifteen-Minute Market (FMM) Schedules

Scheduling Coordinators for Proxy Demand Resources and Proxy Demand Resource-Load Shift Resources using the 15-minute interval option can see their binding schedules via this report. The report is usually published no later than 22.5 minutes prior to the start of the binding interval. The following screen shot shows binding schedules for 4/30/2019, HE 21.

Day-Ahead Real-Time Post-Market Default Bids Convergence Bidding Forecast Transmission Constraints Reference LSE Energy Imbalance Market Phase Shifter Gas Burn Reliability Cc

Trade Date: 04/30/2019 Entity: [ALL] Resource: 1 Mem(s) Binding: [ALL] Hour: [ALL] Apply Reset

Product: [ALL] Schedule Type: [ALL]

Fifteen-Minute Market (FMM) Schedules

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Trade Date	SC ID	Resource	Configuration	Effective Interlie	Product	Schedule Type	Binding	Hour Ending	Interval IE:15 [MW]	Interval IE:30 [MW]	Interval IE:45 [MW]	Interval IE:00 [MW]	
04/30/2019					Energy	Cleared	Yes		21	0.01	0.01	0.01	0.01
04/30/2019					Energy	Market	Yes		21	0.00	0.00	0.00	0.00
04/30/2019					Energy	Self	Yes		21	0.01	0.01	0.01	0.01
04/30/2019					Ramp Down	Cleared	Yes		21	0.00	0.00	0.00	0.00
04/30/2019					Ramp Down	Market	Yes		21	0.00	0.00	0.00	0.00
04/30/2019					Ramp Up	Cleared	Yes		21	0.00	0.00	0.00	0.00
04/30/2019					Ramp Up	Market	Yes		21	0.00	0.00	0.00	0.00
04/30/2019					Energy	Cleared	Yes		22	0.01	0.01	0.01	0.01
04/30/2019					Energy	Market	Yes		22	0.00	0.00	0.00	0.00
04/30/2019					Energy	Self	Yes		22	0.01	0.01	0.01	0.01
04/30/2019					Ramp Down	Cleared	Yes		22	0.00	0.00	0.00	0.00
04/30/2019					Ramp Down	Market	Yes		22	0.00	0.00	0.00	0.00
04/30/2019					Ramp Up	Cleared	Yes		22	0.00	0.00	0.00	0.00
04/30/2019					Ramp Up	Market	Yes		22	0.00	0.00	0.00	0.00
04/30/2019					Energy	Cleared	Yes		23	0.01	0.01	0.01	0.01
04/30/2019					Energy	Market	Yes		23	0.00	0.00	0.00	0.00
04/30/2019					Energy	Self	Yes		23	0.01	0.01	0.01	0.01
04/30/2019					Ramp Down	Cleared	Yes		23	0.00	0.00	0.00	0.00
04/30/2019					Ramp Down	Market	Yes		23	0.00	0.00	0.00	0.00
04/30/2019					Ramp Up	Cleared	Yes		23	0.00	0.00	0.00	0.00

Report Generated: 05/01/2019 12:01:00

Real-Time Unit Commitment (RTUC) Advisory Schedules

Scheduling Coordinators for Proxy Demand Resources using the hourly block option can see their binding schedules via this report (even though the report is labeled as advisory.) The report is usually published no later than 52.5 minutes prior to the start of the binding hour. Notes:

- The column labeled Interval Start Date Time shows the time interval corresponding to the beginning of the hour.
- To view the HASP result, the column labeled Market Start Date Time must be 45 minutes prior to the Interval Start Date Time.

The following screen shot shows binding schedules for 4/30/2019, HE 21.

Trade Date: 04/30/2019 Entity: [REDACTED] Resource: 1 Item(s) Hour: [ALL] Apply Reset
 Product: [ALL] Schedule Type: [ALL]

Real-Time Unit Commitment (RTUC) Advisory Schedules

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Market Start Date Time	Interval Start Date Time	SC ID	Resource	Configuration	Effective Intertie Product	Schedule Type	Binding Schedule	[MW]
04/30/2019 19:15	04/30/2019 20:00	[REDACTED]	[REDACTED]		Energy	Cleared	N	0.01
04/30/2019 19:15	04/30/2019 20:00	[REDACTED]	[REDACTED]		Energy	Market	N	0.00
04/30/2019 19:15	04/30/2019 20:00	[REDACTED]	[REDACTED]		Energy	Self	N	0.01
04/30/2019 19:15	04/30/2019 20:15	[REDACTED]	[REDACTED]		Energy	Cleared	N	0.01
04/30/2019 19:15	04/30/2019 20:15	[REDACTED]	[REDACTED]		Energy	Market	N	0.00
04/30/2019 19:15	04/30/2019 20:15	[REDACTED]	[REDACTED]		Energy	Self	N	0.01
04/30/2019 19:15	04/30/2019 20:30	[REDACTED]	[REDACTED]		Energy	Cleared	N	0.01
04/30/2019 19:15	04/30/2019 20:30	[REDACTED]	[REDACTED]		Energy	Market	N	0.00
04/30/2019 19:15	04/30/2019 20:30	[REDACTED]	[REDACTED]		Energy	Self	N	0.01
04/30/2019 19:15	04/30/2019 20:45	[REDACTED]	[REDACTED]		Energy	Cleared	N	0.01
04/30/2019 19:15	04/30/2019 20:45	[REDACTED]	[REDACTED]		Energy	Market	N	0.00
04/30/2019 19:15	04/30/2019 20:45	[REDACTED]	[REDACTED]		Energy	Self	N	0.01
04/30/2019 19:30	04/30/2019 20:30	[REDACTED]	[REDACTED]		Energy	Cleared	N	0.01

41.12. Dispatch Information/ADS

42.13. Public Market Information

Welcome to the *Public Market Information* section of CAISO *BPM for Market Instruments*. These reports are based on the requirements detailed in the CAISO Tariff Section 6.5, CAISO Communications.

In this section you will find the following information:

List of Report Tabs provided on the CAISO OASIS site. (<http://oasis.caiso.com>)

Content of the reports included under those Report Tabs

Interface Specifications regarding the downloading of the OASIS data through an API can be found at:

<http://caiso.com/235f/235fcbd556310.html>

CAISO provides the following reports groups through OASIS listed by the Tab name as they appear on the CAISO OASIS web site:

- Prices
- Transmission
- System Demand
- Energy
- Ancillary Services
- CRR
- Public Bids
- Atlas

42.13.1 Prices

CAISO provides information on prices to the public through the OASIS web page. The Price reports contain the following information:

Locational Marginal Prices (LMP) – Posts Hourly Locational Marginal Prices for all PNodes, APNodes and Scheduling Points in \$/MWh, for the DAM IFM and RUC market processes. Data fields are as follows:

Energy LMP

- LMP Marginal Cost of Energy (MCE)
- LMP Marginal Cost of Congestion (MCC)
- LMP Marginal Cost of Losses (MCL)
- LMP Marginal Cost of Green House Gas (MGHG)

• Imbalance Reserve Up LMP (IRUMP):

- IRU Marginal Cost of Capacity
- IRU Marginal Cost of Congestion

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• Imbalance Reserve Down LMP (IRDMP):

- IRD Marginal Cost of Capacity
- IRD Marginal Cost of Congestion

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• Reliability Capacity Up LMP (RCUMP):

- RCU Marginal Cost of Capacity
- RCU Marginal Cost of Congestion
- RCU Marginal Cost of Losses

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• Reliability Capacity Down LMP (RCDMP):

- RCD Marginal Cost of Capacity
- RCD Marginal Cost of Congestion
- RCD Marginal Cost of Losses

← Formatted

~~Note: For the RUC RCU/RCD prices, only the RUC RCUMP and RCDMP prices are posted. The three component LMP breakdown is not applicable for RUC RCU/RCD pricing.~~

HASP Locational Marginal Prices (LMP) – Posts hourly, the 4 15-minute advisory Locational Marginal Prices in \$/MWh, for the HASP hour. Posts the LMP, plus the Congestion, Loss and Energy Components that make up the LMP.

- Note: In the event of HASP failure, HASP Pnode prices may not be available in OASIS. In this case, CAISO will not backfill these advisory prices.

Data fields are as follows:

LMP

- LMP Marginal Cost of Energy (MCE)
- LMP Marginal Cost of Congestion (MCC)
- LMP Marginal Cost of Losses (MCL)

FMM Locational Marginal Prices (LMP) – Posts on a 15-minute basis, the 15-minute financially binding Locational Marginal Prices in \$/MWh, for the FMM market process. Posts the LMP, plus the Congestion, Loss and Energy Components that make up the LMP.

Interval Locational Marginal Prices (LMP) – Posts the five-minute Locational Marginal Prices for PNodes and APNodes in \$/MWh, for each five-minute interval Real-Time Economic Dispatch (RTED). Data fields are as follows:

LMP

- LMP Marginal Cost of Energy (MCE)
- LMP Marginal Cost of Congestion (MCC)
- LMP Marginal Cost of Losses (MCL)

- Greenhouse Gas (GHG)⁹

Contingency Dispatch Locational Marginal Prices (LMP) – Similar to the Interval Locational Marginal Prices (LMP) report, but for Real Time Contingency Dispatch (RTCD) runs.

Posts the ten-minute Locational Marginal Prices for PNodes and APNodes in \$/MWh, for each ten-minute interval RTCD. Data fields are as follows:

LMP

- LMP Marginal Cost of Energy (MCE)
- LMP Marginal Cost of Congestion (MCC)
- LMP Marginal Cost of Losses (MCL)

EIM Green House Gas Shadow Prices (GHG) - Provides the Greenhouse Gas Shadow Price of the net imbalance energy export from all WEIM Entity BAAs imported into the ISO BAA resulting from the Real-Time Market runs (RTPD and RTD).

AS Clearing Prices – Posts the Ancillary Services Marginal Price (ASMP) for all Ancillary Service types for all binding AS Regions. Posted hourly in \$/MW for the DAM.

DAM - Hourly ASMP (\$/MW)

Interval AS Clearing Prices - Ancillary Services Marginal Price (ASMP) for all Ancillary Service types for all binding AS Regions. Posts 15-Minute price relevant to the next 15 minute binding interval for RTM on a fifteen minute basis.

RTM - 15Min Binding ASMP (\$/MW)

Imbalance Reserve Requirement Demand Curves – Posts the hourly demand curves used to procure Imbalance Reserves Up and Down for each Balancing Authority Area

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⁹ Greenhouse Gas component is only applicable to the Western Energy Imbalance Market (EIM)

(BAA). The report, published daily before the DAM, includes the price and MW quantity for each segment of the demand curve.

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Intertie Constraint Shadow Prices – Posts the hourly constraint pricing at each Intertie-based Transmission Interface And Intertie Constraint, for each Market Process (DAM, HASP) in \$/MWh, and the 15-Minute Shadow Price in \$/MWh for the FMM. Report will also include an indication of whether the Constraints were binding because of the base operating conditions or contingencies, and if caused by a Contingency, the identity of the specific Contingency.

Nomogram/Branch Shadow Prices – Posts the hourly constraint pricing at each binding Nomogram and Branch, for each Market Process (DAM, HASP) in \$/MWh, and the 15-Minute Shadow Price in \$/MWh for the FMM. Report will also include an indication of whether the Constraints were binding because of the base operating conditions or contingencies, and if caused by a Contingency, the identity of the specific Contingency.

Fuel Prices – For each Gas Flow Day, lists the gas price in \$/MMBTU by fuel region. This report shows the fuel region prices applicable for the real-time market. The fuel region prices applicable for the day-ahead market are not published.

Current Locational Marginal Price – This report is available for download only. Five minute Locational Marginal Prices for all PNodes and APNodes for the current interval. (Returns the most recently posted interval only) This download is provided to allow Oasis users to quickly receive the most current LMP without any prior intervals included in the payload.

Interval Intertie Constraint Shadow Prices – Posts the 5-Minute constraint pricing at Transmission Interfaces and Intertie Constraints in \$/MWh, for the RTD run in the RTM. Report will also include an indication of whether the Constraints were binding because of the base operating conditions or contingencies, and if caused by a Contingency, the identity of the specific Contingency.

Contingency Dispatch Intertie Constraint Shadow Prices – Similar to the Interval Intertie Constraint Shadow Prices report, but for Real Time Contingency Dispatch (RTCD) runs. Posts the 10-Minute constraint pricing at Transmission Interfaces and Intertie Constraints in \$/MWh, for the RTCD run in the RTM. Report will also include an indication of whether the Constraints were binding because of the base operating conditions or contingencies, and if caused by a Contingency, the identity of the specific Contingency.

Interval Nomogram/Branch Shadow Prices - Posts the 5-Minute constraint pricing at each Nomogram and Branch in \$/MWh, for the RTD run in the RTM. Report will also include an

indication of whether the Constraints were binding because of the base operating conditions or contingencies, and if caused by a Contingency, the identity of the specific Contingency.

Contingency Dispatch Nomogram/Branch Shadow Prices - Similar to the Interval Nomogram/Branch Shadow Prices report, but for Real Time Contingency Dispatch (RTCD) runs. Posts the 10-Minute constraint pricing at each Nomogram and Branch in \$/MWh, for the RTCD run in the RTM. Report will also include an indication of whether the Constraints were binding because of the base operating conditions or contingencies, and if caused by a Contingency, the identity of the specific Contingency.

Deployment Scenario Constraint Shadow Prices - Posts the hourly constraint shadow prices for binding constraints within the IRU and IRD deployment scenarios in the IFM. This report allows market participants to see the congestion costs associated with ensuring the deliverability of Imbalance Reserves.

Reference Prices – Posts Quarterly Reference prices associated with each Virtual Bidding PNode and APNode for supply and demand.

Nodal Group Constraints Shadow Prices - This report displays the upper and lower MW limits, cleared MW value and associated hourly shadow prices for any binding Nodal Group Constraint. This report is triggered with the publication of the Day-Ahead results.

Flexible Ramping Constraint Results – Posts the following values for RTUC and RTD market runs, for intervals when the Flexible Ramping Constraint is enforced.

- Ramp Up Capacity (MW) - The required amount of total un-loaded capacity below maximum operating limits (that can be dispatched up) of the ramp-limited resources that is retained through the market optimization. The Flexible Ramping Constraint is enforced on a system level per market run and market interval.
- Ramp Up Shadow Price (\$/MW) - Shadow price of the ramping up constraint when binding in the relevant market run and in the binding market interval. Binding interval shadow price is the Ramp Up Shadow Price.

Payment to resources providing the flexi-ramp capacity will be paid based on the following price: For each applicable fifteen-minute FMM interval, the Flexible Ramping Constraint derived price will be equal to the lesser of: 1) \$800/MWh; or 2) the greater of: (a) 0; (b) the Real-time Ancillary Services Marginal Price for Spinning Reserves for the applicable fifteen-minute FMM interval; or (c) the Flexible Ramping Constraint Shadow Price minus seventy-five percent of the maximum of (i) zero (0); or (ii) the Real-Time System Marginal Energy

Cost, calculated as the simple average of the three five-minute Dispatch Interval System Marginal Energy Costs in the applicable fifteen-minute FMM interval.

The flexi-ramp cost for each binding FMM interval can be estimated by the amount of procured RAMP Up Capacity multiplied by the price described above in that binding interval. If the flexi-ramping constraint is binding and feasible, the procured Ramp Up Capacity is equal to the flexi-ramping capacity requirement (Ramp Up Capacity or RAMP_UP_CAP_REQ). However, if the flexi-ramping constraint is infeasible, meaning that the FMM market run is unable to procure the full required flexi-ramping capacity, the procured Ramp Up Capacity would be less than the flexi-ramping capacity requirement. On OASIS, the flexi-ramping capacity requirement not the procured amount is posted.

MPM DA Locational Marginal Prices (LMP) and Imbalance Reserve Up Prices (IRUMP)

– Hourly Locational Marginal Prices for Energy (LMP) and Imbalance Reserve Up (IRUMP) from the Day-Ahead MPM run for all PNodes and APNodes associated with market resources.

- For energy: with physical bids in \$/MWh. Posts the LMP, including the competitive congestion component, non-competitive congestion component, loss and energy components that make up the LMP.
- For Imbalance Reserve Up: Posts the IRUMP, including the competitive congestion and capacity components that make up the IRUMP.

MPM RUC Locational Marginal Prices (RCUMP) – Hourly Locational Marginal Prices for Reliability Capacity Up (RCUMP) from the RUC Market Mitigation run for all PNodes and APNodes associated with market resources with physical bids in \$/MW. Posts the RCUMP, including the competitive congestion component, non-competitive congestion component, loss, and capacity components that make up the RCUMP.

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MPM RTM Locational Marginal Prices (LMP) – 15-minute Locational Marginal Prices from the HASP and FMM MPM runs for all PNodes and APNodes associated with market resources with physical bids in \$/MWh. Posts hourly for the 4 intervals of the HASP hour and every 15 minutes for FMM. Posts the LMP, plus the competitive congestion component, non-competitive congestion component, loss and energy components that make up the LMP.

MPM Nomogram/Branch Group Shadow Prices – Posts the constraint pricing at each binding nomogram and branch group, for each market process of the MPM run (DAM, HASP, FMM) in \$/MWh. Posts hourly data for DAM and 15 minute data for HASP and

FMM. Report will also include an indication of whether the Constraints were binding because of the base operating conditions or contingencies, and if caused by a Contingency, the identity of the specific Contingency.

MPM Nomogram/Branch Group Competitive Paths – Posts the results of the dynamic competitive path determination, for binding nomogram and branch constraints for each market process of the MPM run (DAM, HASP, FMM, RTD). Posts hourly data for DAM and 15 minute data for HASP and FMM and 5 minute for RTD. Posts a flag indicating whether each binding constraint was competitive or not.

MPM Intertie Constraint Shadow Prices – Posts the constraint pricing at Transmission Interfaces and Intertie Constraints, for each market process of the MPM run (DAM, HASP, FMM) in \$/MWh. Posts hourly data for DAM and 15 minute data for HASP and FMM. Report will also include an indication of whether the Constraints were binding because of the base operating conditions or contingencies, and if caused by a Contingency, the identity of the specific Contingency.

MPM Intertie Constraint Competitive Paths – Posts the results of the dynamic competitiveness constraint, for binding interchange, market scheduling limit, and branch group constraints for each market process of the MPM run (DAM, HASP, FMM, RTD). Posts hourly data for DAM and 15 minute data for HASP and FMM, and 5 minute for RTD. Posts a flag indicating whether each binding constraint was competitive or not.

MPM Reference Bus – Posts the reference bus used in the MPM run for each market process of the MPM run (DAM, HASP, FMM). Contains hourly data for the Day-Ahead market and 15-minute data for HASP and FMM. Note, the IFM, RUC, and regular HASP and FMM runs use a distributed reference bus.

MPM Interval Reference Bus - Posts the reference interval bus used in the MPM run for RTD. Contains 12 intervals data.

Greenhouse Gas Allowance Prices – Posts the California and Washington index price for greenhouse gas allowances in \$/metric ton.

Historical ACE Data – Pursuant to FERC Order 784; 18 C.F.R § 385 37.6(k), the CAISO will post on OASIS historical one-minute and ten-minute area control error data for the most recent calendar year, and update this posting once per year. The CAISO will post this annual data by the end of January for the previous year.

Scheduling Constraint Shadow Prices - This report will provide the shadow prices created by scheduling constraints, examples of these are: BAA POWER BALANCE, BAA

TRANSFER DISTRIBUTION, BAA TRANSFER LOWER LIMIT, BAA TRANSFER UPPER LIMIT, ETSR LOWER LIMIT, ETSR TRANSMISSION COST, ETSR UPPER LIMIT, etc.

Hourly RTM LAP Prices - Posts daily for T-1, the LAP prices with hourly granularity from Real Time Market Run.

Flexible Ramp Requirements Inputs - Flexible Ramp Requirements Inputs - This report contains balancing authority area-level 15-minute interval data published at T-75', T-55' and T-40' for both "UP" and "DOWN" Ramp Types for the following:

- Requirement Amount
- Credit
- Net Import Capability
- Net Import Capability
- Diversity Benefit

Competitive Solicitation Process Offer - The Reliability Service Initiative (RSI) is a multi-year effort to address the ISO's rules and processes surrounding resource adequacy (RA) resources.

OASIS shall publish a new report for finalized bids into the competitive solicitation process for annual, monthly and intra-monthly offer period.

- This data will be posted on a rolling five-quarter delay that starts on the period offer start date. (end of 15 months after last day of the month).
- Supplier offers shall be described by generation technology type, MW quantity, price, RA capability (system, flexible, local), and competitive solicitation process offered.
- Offers shall be aggregated in the event less than three resources are in a single generation technology type.

The Offer Data is only downloadable to XML and CSV.

Hourly Energy Price Shaping Factor – Posts the calculated Hourly Energy Price Shaping Factor at an hourly granularity for both the Day-Ahead and Real-Time markets. The Hourly Energy Price Shaping Factor is used in the calculation of the Maximum Import Bid Price. See Appendix P for more details on this calculation.

12.213.2 Transmission

~~12.3~~13.3 System Demand

~~12.4~~13.4 Energy

The Energy reports contain the following information:

Schedule

System Load and Resource Schedules

DAM Load, Generation, Import and Export Schedules per TAC Area and CAISO total for each Operating Hour, in MW.

~~RUC Capacity~~Reliability Capacity (RCU and RCD) from Generation and Imports for each TAC Area, plus CAISO total for each Operating Hour, in MW.

Hourly Real-Time Market (HASP) Generation, Import and Export per TAC Area and CAISO total, in MW.

5 minute RTM Generation, Import and Export per TAC Area and CAISO total, in MW.

(Note: Dynamic imports is counted as IMPORTs, instead of GENERATION schedules)**Contingency Dispatch Resource Schedules** – Similar to the System Load and Resource Schedules report, but for Real Time Contingency Dispatch (RTCD) runs.

RTM Generation, Import and Export per TAC Area and CAISO total, in MW for all 10-minute RTCD runs.

Expected Energy – Lists after-the-fact Energy accounting, per Energy type. Posted daily at T+1, in MWh for ISO total.

Addition of two new expected energy type codes applicable for WEIM resources:

- **BASE** - real-time expected energy based on the base schedules
- **MDE** - manual dispatch energy signals

Please refer to the table in the BPM for Market Operations, Appendix C.4 for the complete list of valid Expected Energy Types.

RMR – Lists manually and MPM determined RMR summed across resources, for each Market, including DAM RMR Capacity available, DAM manual dispatched RMR Capacity, HASP RMR Capacity available, and HASP manual dispatched RMR Capacity.

Wind and Solar Summary - Provides the hourly aggregated day-ahead market schedules, hourly day-ahead aggregated forecasts, and hourly average real-time market schedules for all the variable energy resources (VER); plus hourly net virtual (total virtual supply minus total virtual demand awards).

Schedule Reductions – This report will provide the aggregated schedule reduction in RUC and HASP of imports, exports, wheel-through and load (reduction). The aggregation is also by tie-point and market product type (i.e., TOR, DAPT, DALPT, RTPT, RTLPT or those in DA or RT with only an economic bid).

RUC Under Supply Infeasibility and Enforced Constraints Report – As outlined in the Market Operations BPM, the Minimum State of Charge (MSOC) was developed as a temporary tool for storage management to ensure that in the real-time market, RA storage resources are charged to a level that will allow them to deliver their day-ahead discharge schedules.

The *RUC Under Supply Infeasibility and Enforced Constraints Report* displays the critical hours when the MSOC was enforced. When the report displays the RUC “Critical Hour=Y,” this indicates that for the given trade date and hour(s) the CAISO enabled the MSOC constraint. Critical hours are determined by Operations prior to the execution of RUC to assure battery charging is sufficient prior to stressed conditions, such as between HE18 and HE21 on a high load day. When engaged, the MSOC requirements are imposed on hours directly prior to discharge schedules, and not in hours earlier in the day, and the real time market will optimally schedule storage resources to charge or hold state of charge to meet these requirements.

The MSOC function engages only when the RUC process results in an under-generation infeasibility at any trading hour. As the determination of the Critical Hours is a different process than the RUC execution, the Critical Hours may not align exactly with RUC under supply infeasibility hours (shown as “Under-Gen Infeasibility” in the report). The “Min SOC Deactivation Time Stamp” field displays the exact timestamp if the real time operator cancels the binding requirements for all resources for the given trade date.

System

Market Power Mitigation Status - Mitigation indicator showing whether any Bids were replaced by reference levels in the applicable market power mitigation (MPM) process. This includes:

- DAM IFM-MPM: Mitigation of Energy and Imbalance Reserve Up bids.
- DAM RUC-MPM: Mitigation of Reliability Capacity Up bids.
- RTM Mitigation: Mitigation for HASP, FMM, and RTD processes.

~~— Reference Curves, for the following: DAM Hourly Market Mitigation (Yes/No), HASP and FMM 15Min Market Mitigation (Yes/No), and RTD (Yes/No).~~

~~Addition of a new element “Balancing Authority Area” (BAA) identifier in which the day-ahead/real-time mitigation results are defined.~~

Exceptional Dispatch— Summary of Exceptional Dispatch Energy for each Operating Hour, expressed in MWh, and Exceptional Dispatch weighted price, in \$/MWh. Posted daily at T+1. Values are summed by Exceptional Dispatch Type, by TAC Area.

Please refer to the BPM for Market Operations, Appendix C.4 for the complete list of valid Exceptional Dispatch Types.

Marginal Losses – Lists the total system Marginal Loss costs (\$) and total system losses (MWh) for the DAM and HASP Runoff RTM.

Day Ahead Market Summary Report - Posts the summary of the Day Ahead Market results. ~~showing~~The report shows physical and virtual breakdowns of ~~energy~~Energy, Ancillary Services, Imbalance Reserves, and Reliability Capacity, including quantities and values submitted and cleared. submitted, dollars submitted, energy cleared and dollars cleared as well as the totals.The report is grouped by product, supply, demand, exports and imports categories. This report will post after the completion of the Day Ahead Market publication.

Aggregated Generation Outages - Generator de-rates and outages which are considered in the Day-Ahead Market. Report is generated from the list of de-rates and outages that are known at the time of publication, typically 5:00 AM PPT the day prior to the operating day. Aggregated into a total MW capacity reduction amount by trading hub (NP15, ZP26, and SP15) and fuel category (thermal, hydro, renewable). The thermal fuel category includes gas, oil, nuclear, biomass, and waste fuel types. For ZP26 the resources are aggregated into a single category, due to low counts of hydro and renewable resources.

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Operator-Initiated Commitment – This report contains monthly information reflecting operator commitments that includes the following information

- Commitment size (MW),
- Transmission zone,
- Commitment reason. Please refer to Market Operations Appendices BPM section K.1 Table 2 for the reason code mapping.
- Commitment start time of each operator-initiated commitment.

For RUC commitments, the reason will be as “system wide capacity” and clarified reason would be “Optimization” since the commitment for RUC is coming from the market optimization. The ISO will publish report 25 days at the end of each trade month.

Transmission Loss - The purpose of this report is to display the WEIM and CAISO BAA’s transmission loss clearing results for each 5-minute interval (RTD). This is useful for Market Participants to shadow settle unaccounted for energy (UFE). Results will be shown for each BAA including market type, date, and interval.

Excess Behind the Meter Production - The Excess Behind the Meter Production (EBTMP) report provides market participants with hourly aggregate performance, by associated TAC Area, of the excess energy production measured at the meter wherein energy was injected onto the grid. EBTMP measurements values, in MWh, will be published and identified as "Final" and represent the snapshot of EBTMP measurement type meter data received by the ISO meter data submission deadline. Missing or subsequently corrected meter data will not be recorded in this report (will be reflected in the Settlement Re-Calc).

Each TAC Area shall have all 5-min, 15-min, and 60-min meter energy values aggregated/summed into a single hourly value for the EBTMP each measurement type.

Where the aggregate hourly meter value in MWh;

$$EBTMP\ MWh_{TAC1, Hr\ 2} = \sum EBTMP\ MWh_{TAC1, 5-min, Hr\ 2} + \sum EBTMP\ MWh_{TAC1, 15-min, Hr\ 2} + \sum EBTMP\ MWh_{TAC1, 60-min, Hr\ 2}$$

$$EBTMP\ MWh_{TAC2, Hr\ 2} = \sum EBTMP\ MWh_{TAC2, 5-min, Hr\ 2} + \sum EBTMP\ MWh_{TAC2, 15-min, Hr\ 2} + \sum EBTMP\ MWh_{TAC2, 60-min, Hr\ 2}$$

$$EBTMP\ MWh_{TACn, Hr\ 2} = \sum EBTMP\ MWh_{TACn, 5-min, Hr\ 2} + \sum EBTMP\ MWh_{TACn, 15-min, Hr\ 2} + \sum EBTMP\ MWh_{TACn, 60-min, Hr\ 2}$$

Convergence Bidding

Convergence Bidding Aggregate Awards - Posts Day Ahead CAISO aggregate Virtual Bidding Awards for Energy for Supply and Demand. Publishes with the Day Ahead Market results.

Net Cleared Convergence Bidding Awards - Posts Net Cleared MW for Virtual Bids for every Virtual Bidding Node per Trade Hour within a Trading Day including Trading Hubs and default LAPs. This report will post after all Real Time markets have closed for the associated Trading Day.

Posts Convergence Bidding Supply Awards, Less Convergence Bidding Demand Awards per node. Under this convention, positive net cleared virtual quantities will indicate net Virtual Supply, whereas negative net cleared virtual quantities will indicate net Virtual Demand at a given node.

A value of null Net Cleared Virtual quantities at a given node will indicate no virtual bids submitted at that node while a value of zero will indicate virtual supply and demand Awards netted to zero.

Convergence Bidding Nodal MW Limits- Posts the MW limits used by the ISO in formulating nodal MW constraints used as needed to help ensure an AC solution. An upper and lower limit is defined for each Eligible Pnode other than an Eligible Pnode. Intertie nodes are published in this report but are not Eligible Pnodes for Convergence Bidding. This report is triggered with the publication of the Day-Ahead results.

Imbalance Energy Market

EIM BAA Hourly Base NSI- This report will provide the hourly base net scheduled interchange (NSI) for each of the balancing authority areas at the T-40, T-55, and T-75 timeframes.

EIM BAA Hourly Base Loss- This report will provide the hourly base loss for each of the balancing authority areas at the T-40, T-55, and T-75 timeframes.

EIM Transfer Limits - Provides the WEIM Transfer low and high limits per WEIM Balancing Authority Area group, resulting from the real-time market runs (RTPD and RTD).

- Low limit indicates the minimum limit that can be transferred from a group
- High limit indicates the maximum limit that can be transferred from a group

Starting with the fall 2015 WEIM year 1 activation, this report will no longer be populated with the high and low limits per BAA group. WEIM transfer limits information will be available on the Tie level, via the new report "*EIM Transfer Limits by Tie*".

EIM Transfer - Provides the Western Energy Imbalance Market (EIM) Transfer mw per WEIM Balancing Authority Area Group, resulting from the real-time market runs (RTPD and RTD).

EIM BAA Dynamic NSI - Provides the Net Scheduled Interchange (NSI) results based on real-time market runs (RTPD and RTD) per Balancing Authority Area.

EIM BAA Base NSI - Provides the Net Scheduled Interchange (NSI) results for the real-time binding intervals, based on the last T-40 snapshot base schedules per Balancing Authority Area.

EIM Transfer Limits By Tie - Provides the Western Energy Imbalance Market (EIM) effective energy transfer limit mw of the energy transfer across the tie, resulting from the real-time market runs (FMM/RTPD and RTD).

EIM Transfer By Tie - Provides the Western Energy Imbalance Market (EIM) transfer mw across the tie, resulting from the real-time market runs (FMM/RTPD and RTD).

Flexible Ramping

Flexible Ramp Requirements Input and Outputs – This report contains balancing authority area level 15-minute interval data. Additional information about this report –

- Test Status

- Credit - Credits in the upward sufficiency test are net exports, while credits in the downward sufficiency test are net imports.
- Net Import Capability – Balancing area's net import capability
- Net Export Capability - Balancing area's net export capability
- Diversity Benefit - Diversity benefit reflects that system-level flexible ramping needs are typically smaller than the sum of the individual area needs.
- Requirement Amount - Flexible ramping sufficiency test requirement.
- Change in load forecast - Change in load forecast from the last binding 15-minute interval prior to the hour to each interval in the hour.
- Net Load Uncertainty - Uncertainty component from historical net load error. The 97.5th and 2.5th percentile of the mosaic quantile regression for net load error are used for the upward and downward uncertainty, respectively.
- Ramp Capacity - Ramping capacity from schedules in the last binding 15-minute interval prior to the hour. Includes both economic energy bids (constrained by unit limitations such as ramp rates) as well as fixed changes in schedules or renewable forecasts.
- Insufficiency amount – This is a calculated amount which is computed as the difference of Requirement Amount and Ramping Capacity.

EIM RSE Capacity Test Data - This report contains balancing authority area level 15-minute interval data. Additional information about this report –

- Test Status – information on capacity test status (pass or fail) for up and down direction
- Generation Base Schedule – generation base schedules
- Import Base Schedule – import base schedules
- Export Base Schedule – export base schedules
- Net Scheduled Interchange
- Net Base Schedule – difference between import and export base schedules

- Net-Load Uncertainty – This feature has been suspended using net load uncertainty adder from the capacity test.
- BAA Load Forecast -
- Bid Range capacity – information on bid range capacity test imbalance requirement.
- Insufficiency amount – This is a calculated amount which is computed as = (Bid Range Capacity + Generation Base Schedule + Import Base Schedule – Export Base Schedule – BAA load forecast)*-1
- Capacity Test Requirement (Required Amount)

Flexible Ramp Test Result Groups – This report publishes the RTD/RTPD flexible ramp sufficiency test results for each EIM entity, allowing participants to determine which EIM entities are part of the EIM area requirement.

Flexible Ramping Forecasts – This report includes the total RTD Binding and RTPD 1st interval advisory forecasts for resources grouped by EIM Entity and by technology type (solar, wind, demand)

Flexible Ramp Requirement Thresholds: The report contains the uncertainty threshold based on histograms and mosaic for both high and low requirement for flexible ramp requirements by EIM Entity for both 5 min and 15 minute.

Flexible Ramp Requirement Input Polynomials: The report contains the polynomial coefficients for both low and high for wind, solar and demand and mosaic by EIM entity for calculating the flexible ramp requirements.

Flexible Ramp Requirements Input Uncertainty Histograms: The report contains the uncertainty histogram values for both high and low percentile for wind, solar, demand and net demand used to calculate flexible ramp requirements.

Flexible Ramp Surplus Demand Curves- This report includes the Flex ramp up and Flex down surplus price curves by BAA broken up by FRP surplus zones from the RTD and RTPD 1st advisory interval.

Flexible Ramp Aggregated Awards- This report will provide the flexible ramping up/down aggregated award totals (MW) for each balancing authority areas (BAA) and the WEIM Area, resulting from RTPD/15minute and RTD/5-minute market runs.

Uncertainty Movement by Category- This report will provide the RTD/5min Uncertainty Movement (mw) for each resource category (Supply, Intertie, and Load) by BAA and WEIM Area (each defined as a BAA Group)

Flexible Ramp Requirements- This report contains balancing authority area-level 15-minute interval data starting on trade date 12/23/2015. Additional information about this report:

Flexible Ramp Constraint Requirement is the minimum 15-minute capacity required to meet the flexible ramp constraint for a particular balancing authority area.

Flexible Ramp Sufficiency Test Requirement is an unadjusted amount comprised of two components: uncertainty and net demand movement. The total flexible ramp sufficiency test requirement for a given 15-minute interval is equal to the cumulative sum of the net demand movement for the subject hour up to the corresponding 15-minute interval plus the uncertainty component for the given 15-minute interval. The sum requirement is before diversity benefits, export credits, and net import capability are considered.

- Net Demand Movement Component is the movement of the forecasted load minus the movement of the forecasted solar and wind power generated minus the change in the net scheduled interchange.
- Uncertainty Component is equal to the unadjusted Flexible Ramp Constraint Requirement. It represents the 95th percentile range of upward movement in the 5-minute market compared to the 15-minute market.

Flexible Ramping Product initiative will be active on 11/1/2016, the following report columns will be null:

- Flexible Ramp Constraint Requirement (mw)
- Flexible Ramp Sufficiency Test Requirement's Net Demand Movement Component

The Flexible Ramp Product Uncertainty Component value will continue to be published, for both "UP" and "DOWN" Ramp Types based on the Histogram for RTD & FMM.

Uplift

Zonal uplift – This report contains monthly uplift payments to resources. The report identifies uplift payments by transmission zone, day, and uplift category, i.e. charge code. For purposes this report, a transmission zone within the CAISO shall reflect the Transmission Access Charge Area of each Participating Transmission Owner. The ISO will

publish this report 18 days after the end of each calendar month, and again 120 days after the end of each calendar month. Please refer to the Configuration Guides posted on the BPM Settlements and Billing page to obtain the charge code descriptions included on this report.

Resource-Specific Uplift – This report contains the uplift paid to each resource by uplift category and aggregated across a trade month. The ISO will publish this report 80 days after the end of each calendar month, and again 120 days after the end of each calendar month. Please refer to the Configuration Guides posted on the BPM Settlements and Billing page to obtain the charge code descriptions included on this report.

WEIM

12.513.5 Ancillary Services

12.613.6 CRR

12.713.7 Public Bids

12.8 Resource Adequacy

Resource Adequacy Minimum Load – Posts at T +1, for both total CAISO committed, and total CAISO RA committed. Posts for the DAM, RUC and RTM plus the Totals across all markets, the following values. This includes commitments resulting from Energy, Ancillary Service, Imbalance Reserve, and Reliability Capacity awards. :

Capacity committed

Number of units committed

Minimum Load Cost (\$)

Start-Up Cost (\$)

Minimum Load (MW) (CAISO committed total only).

Available Import Capability – Posts the total import allocation per intertie for LSEs per month and how much of that allocation LSE's are willing to trade.

RA Period Start Date: the first of the month for the target RA month

Year : the year which the target RA month falls in

Month : the target RA month

SCID : the Scheduling Coordinator ID

Intertie: the intertie name

LSE ID: the Load Serving Entity ID

LSE Name: the Load Serving Entity name

Total Import Allocation (MW): the total import allocation held by the LSE on the intertie on the target RA month

Reserved Capability (MW): the amount of import capability the LSE is withholding to use for the RA showings

Tradable Capability (MW) : the amount of import capability the LSE is willing to trade with other entities

Contact Information: the contact information of the SC responsible for this import capability

Import Capability Used in RA Plan – Posts the total annual and monthly RA capacity shown on each intertie aggregated by LRA jurisdiction.

Submittal Type: monthly or yearly

RA Period Start Date: the first of the month for the target RA month

Year: the year which the target RA month falls in

Month: the target RA month

Intertie: the intertie name

Jurisdiction: CPUC, non-CPUC, or Other

Total Import Allocation: the total import allocation for the intertie
RA Showing MW: the total RA shown on the intertie

12.9 Atlas

Attachment A

BID VALIDATION RULES

B Master File Update Procedures

B.2 Generator Resource Data Template

The GRDT is an Excel spreadsheet containing multiple worksheet tabs, which contain static resource characteristics stored in the CAISO database. The worksheet tabs listed in the table below are described in the following sections:

Spreadsheet Tab	Contents
Instruction	Contains report details
Definition-GRDT	Link to blank template on CAISO website
Code	Blank
RESOURCE	Resource data
RAMPRATE	Resource ramp rate
HEATRATE	Resource heat rate
STARTUP	Resource start-up data
FORBIDDEN OPR REGION	Resource forbidden operating region
REGULATION	Resource regulation range
REG RAMP	Resource regulation ramp rate
OP RES RAMP	Resource operating reserve ramp rate
MSG_CONFIG	MSG Configuration detail
TRANSITION	Details of transitions between configurations
CONFIG_RAMP	Configuration ramp rate
CONFIG_HEAT	Configuration heat rate
CONFIG_STRT	Configuration start-up detail
CONFIG_REG	Configuration regulation range
CONFIG_RREG	Configuration regulation ramp rate
CONFIG_ROPR	Configuration operating reserve ramp rate
GEN_RES_AGGR	Child Resources of Aggregate Resource

B.2.2 RESOURCE tab – Reference-only Data

This table contains Generator resource data that is provided in the GRDT for reference only. These values are reflective of a regulatory agreement with the ISO, or are established through a testing, certification, or registration process, or are based on the Full Network Model. Updates cannot be made through the RDT change process, but may be initiated through another business process. The fields are listed in the order they appear in the GRDT.

RDT Column Name	Unit	Definition	
PGA_NAME (Participating Generator Agreement Name)		The name of an agreement between the CAISO and a Participating Generator; a pro forma version of which is set forth in Appendix B.2 of the CAISO Tariff	A revision to this name must match the name on the agreement.
SC_ID (Scheduling Coordinator ID)		An entity certified by the CAISO for the purposes of undertaking the functions specified in Section 4.5.3 of the CAISO Tariff.	
RES_ID (Resource ID)		The ISO resource identifier used for tracking each resource for market scheduling and outage coordination purposes.	
RES_NAME (Resource Name)		Descriptive Name for the Resource from the PGA or NSPGA Schedule 1, MSS Schedule 14, DR Registration, etc.	A revision to this name must match the facility name on the agreement schedule.
RES_TYPE (Resource Type)		Descriptive identifier denoting the type of resource: Generating Unit (GEN), Tie Generator (TG), Load.	
AGGREGATE_YN (Aggregate?)	Y/N	A generator resource that consists of more than one individual "child" resources as modeled in the CAISO system	
DR_TYPE	PDR/ RDRR/ null	Descriptive identifier denoting the type of Demand Response resource: PDR – Proxy Demand Resource RDRR – Reliability Demand Resource PDR_LSR – Proxy Demand Resource-Load Shift Resource Null – All others	
ENERGY_TYPE (Energy Type)		Energy Type If RES_TYPE = TG: <ul style="list-style-type: none"> • DYN – resource is on a Dynamic Scheduling Agreement • FIRM – import resource for scheduling of AS self-provision on ETC/TOR contracts If RES_TYPE = GEN, this field is Null	

RDT Column Name	Unit	Definition	
FUEL_TYPE (Primary Fuel Type)		Description of Primary Fuel Type of the Generator; such as, Natural Gas, Oil, Nuclear, etc. GAS – Natural Gas COAL – Coal/Coke DDR – Dispatchable Demand Response DIST – Distillate HYBD – Hybrid Resource OIL – Oil NUCL – Nuclear WAST – Waste to Energy BIOM – Biomass GEOT – Geothermal LESR – Limited Energy Storage Resource SOLR – Solar WATR – Water BGAS – Bio Gas (Landfill Sewage Digester etc.) HRCV – Heat Recovery WIND – Wind OTHR – Other	A revision to fuel type must match the agreement schedule. PDR_LSR Curtailment Resources FUEL_TYPE <> 'DDR', and PDR_LSR Consumption Resources FUEL_TYPE = 'DDR'
GEN_TECH_TYPE (Prime Mover Technology)		Description of the Prime Mover Technology associated with Generators ; such as, Hydro Turbine, Gas Turbine, Combined Cycle, etc HYDR – Hydro Turbine PTUR – Hydro Pump-Turbine GTUR – Gas Turbine STUR – Steam Turbine CCYC – Combined Cycle RECP – Reciprocating Engine PHOT – Photovoltaic WIND – Wind Turbine PUMP – Pump	A revision to technology type must match the agreement schedule.
GEN_TYPE (Generator Type)		H = Hydro resources T = Other resources	
FUEL_REGN_TYPE (Fuel Region)		Represents the fuel region price used in the calculation of Start-up and Minimum Load costs, as well as the variable based option for Default Energy Bid for a resource. For a full list of the available fuel regions, see here: http://www.caiso.com/market/Pages/NetworkandResourceModeling/Default.aspx See Attachment C for how to request a change to fuel region.	

RDT Column Name	Unit	Definition	
ELECTRIC_REGN (Electric Region)		<p>The electric region associates the corresponding electricity price for the resource's startup auxiliary power. For a full list of the available electric regions, see here: [http://www.aiso.com/market/Pages/NetworkandResourceModeling/Default.aspx]</p> <p>Each fuel region has a corresponding wholesale electric region. See Attachment M for how to request a retail electric region.</p>	
POWER_PRICE_HUB (Power Price Hub)		<p>Power trading hub assignment to associate the wholesale power price appropriate to a resource or Multi-Stage Generator based on the power price hub location documented in Open Access Transmission Tariffs for the Balancing Authority Area where the resource is located or if unavailable then the closest trading hub to the resource location.</p> <p>PHMIDC - Mid-Columbia PHPALO - Palo Verde PHNP15 – North of Path 15 PHSP15 – South of Path 15 PHMEAD – Mead</p>	
Default Electric Pricing Hub		<p>The local firm physical electricity trading location used in the calculation of the Hydro DEB Option. The Default Electric Pricing Hub is assigned based on resource Balancing Authority Area.</p> <p>PHMIDC - Mid-Columbia PHPALO - Palo Verde PHNP15 – North of Path 15 PHSP15 – South of Path 15 PHMEAD – Mead</p>	

RDT Column Name	Unit	Definition	
AQM_DIST_TYPE (Air Quality Management District)		The Air Quality Management District or Air Pollution Control District in which the resource is located. AMAD – Amador ANTV - Antelope Valley BUTT – Butte CALA – Calaveras COLU – Colusa ELDO - El Dorado FRVR - Feather River GBUN - Great Basin Unified GLEN – Glenn IMPE – Imperial KERN – Kern LAKE – Lake LASS – Lassen MARI – Mariposa MBUN - Monterey Bay Unified MEND – Mendocino MODO – Modoc MOJD - Mojave Desert NCUN - North Coast Unified NSER - Northern Sierra NSON - Northern Sonoma OTHR - Other Region PLAC – Placer SACM - Sacramento Metro SBRB - Santa Barbara SCOA - South Coast SDIE - San Diego SFBA - San Francisco Bay Area SHAS – Shasta SISK – Siskiyou SJVU - San Joaquin Valley Unified SLUO - San Luis Obispo TEHA – Tehama TUOL – Tuolumne VENT – Ventura YOSO - Yolo/Solano	
CERT_PIRP (Certified PIRP)	Q, Y, P, I, N, or null	Q = Wind or solar resource in the process of having forecast information evaluated Y = Wind or solar resources that are flagged as Variable Energy Resources P = PIRP protective measures (without Inter-SC trade) I = PIRP protective measures (with Inter-SC trade) N or Blank = not applicable	

RDT Column Name	Unit	Definition	
MOO_QUALIFIED (Must Offer Obligation Qualified)	R or N,	N: Resource is exempt from CAISO inserting a Generated Bid R: CAISO will insert generated bids if a resource has a must offer requirement and is not exempt from bid generation and has not submitted a bid. .	
STARTUP_CD_TYP E (Startup Code Type)		Code used to determine the startup characteristics. FAST: Generating Units that have a Start Up Time less than ten minutes and are certified to provide non-spin. Blank: All other resources.	
PGA_PART (Participating Generator Agreement Flag)	Y/N	An identifier of PGA Resources.	
COM_MW (Commercial Operation for Market MW)	MW	The portion of a new Generating Unit that has synchronized to the CAISO controlled grid and has completed on-site test operations and commissioning that is allowed to Bid into the CAISO markets in advance of achieving COD for the entire Electric Generating Unit. NOTE, once the resource declares COD, this field will become null.	
COG (Constrained Output Generator Flag)	Y/N	The output of the generation resources is not variable, ie PMax = PMin. Y: output is constrained.	
CERT_BLKSTRT (Certified for Black Start)	Y/N	An identifier of a resource that holds a Black Start agreement and has been certified for Black Start capability	
CERT_DAM (Certified for Day Ahead Market)	Y/N	An identifier of a resource eligible to participate in the Day Ahead market.	<ul style="list-style-type: none"> • Y for Generators and TG resources • N for Discrete Dispatch RDRR and WEIM resources (participating and non-participating)
CERT_RTM (Certified for Real Time Market)	Y/N	An identifier of a resource eligible to participate in the Real Time market	<ul style="list-style-type: none"> • Y for Generators, TG resources, and participating WEIM resources • N for DA-only PDR resources and non-participating WEIM resources

RDT Column Name	Unit	Definition	
CERT_RUC (Certified for RUC)	Y/N	A setting of 'Y' allows a resource to participate in RUC market.	<ul style="list-style-type: none"> Y for Generators, TG resources, and PDR_LSR (Curtailment) N for NGR, RDR, WEIM resources (participating and non-participating), and PDR_LSR (Consumption).
LMPM (Market Power Mitigation Participation Flag)	Y/N	An identifier of a resource that is subject to the market power mitigation process. Defined per tariff.	<ul style="list-style-type: none"> Y for Generators, TG resources, and participating WEIM resources N for non-participating WEIM resources, , and DR_TYPE = 'PDR_LSR'.
MSS_LD_FLNG_D WN (MSS Load Following Down)	Y/N	Identifier if a resource is load following down – applies to Metered Subsystem only	
MSS_LD_FLNG_UP (MSS Load Following Up)	Y/N	Identifier if a resource is load following up – applies to Metered Subsystem only	
QF (FERC Qualifying Facility Flag)	Y/N	Identifier if a resource is a qualifying cogeneration facility or small qualifying power production facility, as defined in the Code of Federal Regulations, Title 18, Part 292	
USE_LIMIT (Use Limit)	Y/N	Identifier of a resource that is energy use limited, such as limitation of energy or emission control, etc.	
CAR (Conditionally Available Resource)	Y / null	Identifier of a resource that has successfully registered as a Conditionally Available Resource	
ENERGY_OM_ADD ER (Variable Energy Operations and Maintenance Adder)	\$/MWh	Variable energy operations and maintenance (O&M) costs that are incurred in terms of MWh. See Attachment L for default values of variable energy O&M cost adders. For resources that have a negotiated variable energy O&M adder, that value will display in this field.	Submit a CIDI ticket with Case Record Type "Negotiated Rate Application" and Application Type "O&M" to establish a negotiated variable O&M adder.
ENERGY_OM_ADD ER_TYPE (Variable Energy Operations and Maintenance Adder Type)	D/N	This flag identifies whether the variable energy operations and maintenance adder is the default value (D) or a negotiated (N) value.	

RDT Column Name	Unit	Definition	
ML_ADDER (Variable Minimum Load Operations and Maintenance Adder)	\$/run-hour/MW or \$/run-hour*	Variable minimum load operations and maintenance (O&M) costs that are incurred in terms of hours of operation. See Attachment L for default values of variable minimum load O&M cost adders. For resources that have a negotiated variable minimum load O&M adder, that value will be displayed in this field. * - Note: the units of measurement differ depending on whether the adder type (see below) is Negotiated ("N") or Default ("D"). If it is N, the units are \$/run-hour. If it is D, the units are \$/run-hour per MW of Pmax.	Submit a CID1 ticket with Case Record Type "Negotiated Rate Application" and Application Type "O&M" to establish a negotiated variable O&M adder.
SU_ADDER (Variable Start-up Operations and Maintenance Adder)	\$/start/MW or \$/start*	Variable start-up operations and maintenance (O&M) costs that are incurred in terms of starts. See Attachment L for default values of variable start-up O&M cost adders. For resources that have a negotiated variable start-up O&M adder, that value will be displayed in this field. * - Note: the units of measurement differ depending on whether the adder type (see below) is Negotiated ("N") or Default ("D"). If it is N, the units are \$/start. If it is D, the units are \$/start per MW of Pmax.	Submit a CID1 ticket with Case Record Type "Negotiated Rate Application" and Application Type "O&M" to establish a negotiated variable O&M adder.
ML & SU O&M Adder Type	D/N	This flag identifies whether the variable minimum load and start-up operations and maintenance adder are the default value (D) or a negotiated (N) value.	If an SC requests to negotiate either the ML_ADDER or SU_ADDER, both adders must be negotiated. E.g. SCs cannot use the default value for the ML_ADDER and have a negotiated SU_ADDER.
STORAGE_VARIABLE_COST (Variable storage operations cost)	\$/MWh	Variable costs associated with operation of the storage resource, including cycling and cell degradation costs. Used in the Storage DEB calculation.	Submit a CID1 ticket with subject "Variable Storage Operations Cost Registration" to establish a non-zero variable storage operations cost. If no non-zero value is requested, the default value is \$0/MWh.
PRIOR_TYPE (Priority Type)		Designator of Regulatory Must-Run, Reliability Must Run, and Must Take resources	
DISP (Dispatchable)	Y/N	Designates a dispatchable resource	

RDT Column Name	Unit	Definition	
DISCRETE_DISP (Discrete Dispatch)	Y/null	Indicator of a resource that is dispatchable for a specified megawatt quantity. Applies to Reliability Demand Response only.	An RDRR resource above 100MW wishing to elect Discrete Dispatch must submit a CIDI ticket with Subject Line "Demand Response Attestation" requesting approval. See Demand Response BPM for attestation details. CAISO retains the ability to re-evaluate previously approved attestations at its discretion.
HDERA_YN (Distributed Resource Type)	Y/N/null	Designates the type of a Distributed Energy Resource Aggregate (DERA) Y = DERAs with underlying Distributed Curtailment Resources (DCR) N = DERAs without underlying Distributed Curtailment Resources (DCR) Null = the resource is not a DERA	
BASELINE_METHOD (Baseline Methodology - HDERA)		Designates the baseline method of a Distributed Energy Resource Aggregate (DERA) Valid baseline methods: - PDRLSR: PDR-LSR - PDRLSRDM5: PDR-LSR+Day Matching 5/10 - PDRLSRDM10: PDR-LSR+Day Matching 10/10 - PDRLSRWM: PDR-LSR+Weather Matching - PDRLSRDMC: PDR-LSR+Day Matching Combined - MGODM5: MGO+Day Matching 5/10 - MGODM10: MGO+Day Matching 10/10 - MGODMC: MGO+Day Matching Combined - MGOWM: MGO+Weather Matching - WM: Weather Matching - MGO: Meter Generation Output - DMC: Day Matching Combined - DM10: Day Matching 10/10 - DM5R: Day Matching 5/10 (Residential Only) - CG: Control Group	
RMR (Reliability Must Run)		Designates a resource that has a Reliability Must Run contract	

RDT Column Name	Unit	Definition	
MAX_RR (Maximum Ramp Rate)		This is a derived field that represents the maximum ramp rate in the operational ramp rate curve.	
PRC_SET_DAM (Price Setter – DAM)		Can set Market Clearing price in Day Ahead market	
PRC_SET_RTM (Price Setter – RTM)		Can set Market Clearing price in Real Time market	
MSG_YN (Multi-Stage Generator Flag)	Y/null	Indicator of a resource that is modeled with multiple configurations under the Multi-Stage Generator (MSG) model.	
STARTUP_RAMP_TIME (Startup Ramp Time)		Represents the time it takes to physically ramp unit from zero to pmin after the closing of the breaker.	
SUPPLY_CONFIG_YN (Supplied Configuration Flag)		This is a placeholder for future functionality.	
HR_PRE_DISP (Hourly Pre-Dispatch)	Y/N/null	This flag indicates a resource that if dispatched, shall be dispatched in the next Trading Hour to operate at a constant level over the entire Trading hour Y - Hourly only N - 15-minute market or hourly Blank - 5-minute market (all Generators)	
NGR (Non Generator Resource Flag)	Y/N/null	Indicator of a non-generator resource Y = NGR N or null = not NGR	
APPLY_WHLSLE_CHARGE	Y/N/null	N - Indicator of an NGR resource that is exempt from CAISO wholesale charges for negative energy where it already pays retail charges. Y - CAISO will apply the wholesale charge to negative energy for the NGR resource. Blank - non-NGR resources.	This flag only applies to NGR resources.
CHP (Combined Heat and Power Resource Flag)	Y/N/null	Indicator of a combined heat and power resource Y = CHP N or null = not CHP	

RMTG_MAX_ON_P EAK (RMT Max On Peak)	MW	For CHP resources, the portion of capacity that is eligible for Reliability Must-Take scheduling priority during on-peak hours. Must be reestablished annually. For exempt QF resources, this value is set equal to the unit's pmax.	Establish this value or update it by submitting RMT Max value letter to CAISO.
RMTG_ON_PEAK_ EXPIR_DT (RMT Max On Peak)	DD/MM/YY	Expiration date of the stated RMTG-eligible capacity For exempt QF resources, no expiration date applies.	
RMTG_MAX_OFF_ PEAK (RMT Max On Peak)	MW	For CHP resources, the portion of capacity that is eligible for Reliability Must-Take scheduling priority during off-peak hours. Must be reestablished annually. For exempt QF resources, this value is set equal to the unit's pmax.	Establish this value or update it by submitting RMT Max value letter to CAISO.
RMTG_OFF_PEAK_ EXPIR_DT (RMT Off Peak Expiration Date)	DD/MM/YY	Expiration date of the stated RMTG-eligible capacity For exempt QF resources, no expiration date applies.	
VER_YN (Variable Energy Resource Flag)	Y/null	Indicator of a Variable Energy Resource, defined as "A device for the production of electricity that is characterized by an Energy source that: (1) is renewable; (2) cannot be stored by the facility owner or operator; and (3) has variability that is beyond the control of the facility owner or operator."	
CO_LOCATED (Co-located resource)	Y/null	Only co-located resources that have elected to utilize the Aggregate Capability Constraint will have this flag set to Y. A co-located resource is a Generating Unit with a unique Resource ID that is part of a Generating Facility with other Generating Units. An WEIM Participating Resource with a unique Resource ID that is part of a single resource with other WEIM Participating Resources.	
VER_NGR	Y/null	Indicator of a hybrid NGR resource with a VER component	
Energy Imbalance Market Participating Flag EIM_PARTICIPATING	Y/N/null	Y = WEIM resource that is participating N = WEIM resource that is non-participating Blank for non-EIM resources	

<u>CERT_IRU</u> (Certified for Imbalance Reserve Up)	<u>Y/N</u>	<u>An identifier of a resource that is certified to provide Imbalance Reserve Up.</u>	
<u>CERT_IRD</u> (Certified for Imbalance Reserve Down)	<u>Y/N</u>	<u>An identifier of a resource that is certified to provide Imbalance Reserve Down.</u>	
<u>CERT_RCU</u> (Certified for Reliability Capacity Up)	<u>Y/N</u>	<u>An identifier of a resource that is certified to provide Reliability Capacity Up.</u>	
<u>CERT_RCD</u> (Certified for Reliability Capacity Down)	<u>Y/N</u>	<u>An identifier of a resource that is certified to provide Reliability Capacity Down.</u>	
<u>CERT_CAP_IRU</u>	<u>MW</u>	<u>The maximum capacity that a resource is certified to provide for Imbalance Reserve Up. This value is calculated by the CAISO based on the resource's 30-minute ramp capability.</u>	
<u>CERT_CAP_IRD</u>	<u>MW</u>	<u>The maximum capacity that a resource is certified to provide for Imbalance Reserve Down. This value is calculated by the CAISO based on the resource's 30-minute ramp capability.</u>	
<u>CERT_CAP_RCU</u>	<u>MW</u>	<u>The maximum capacity that a resource is certified to provide for Reliability Capacity Up. This value is calculated by the CAISO based on the resource's 30-minute ramp capability.</u>	
<u>CERT_CAP_RCD</u>	<u>MW</u>	<u>The maximum capacity that a resource is certified to provide for Reliability Capacity Down. This value is calculated by the CAISO based on the resource's 30-minute ramp capability.</u>	
<u>DAB_RANK_IRU</u>	<u>1, 2, or null</u>	<u>The SC's ranking preference for using either the Calculated (1) or Negotiated Rate (2) option for the Imbalance Reserve Up Default Availability Bid (DAB).</u>	
<u>DAB_RANK_RCU</u>	<u>1, 2, or null</u>	<u>The SC's ranking preference for using either the Calculated (1) or Negotiated Rate (2) option for the Reliability Capacity Up Default Availability Bid (DAB).</u>	

B.3 Intertie Resource Data Template

B.3.2 Intertie Resource Reference Only

This table contains Intertie resource data that is provided in the IRDT for reference only. The fields are listed in the order they appear in the IRDT.

RDT Column Name	Definition	Business Rule
RES_ID (Resource ID)	The ISO resource identifier used for tracking each resource for market scheduling.	Once created, the resource ID cannot be changed. The resource must end-dated and a new resource ID created.
ENERGY_TYPE	An identifier of the type of Energy from an Intertie resource as it pertains to Ancillary Service Requirements, Dynamic Interchange or Wheeling.	FIRM – Firm Import/Export NFRM – Non-Firm Import/Export WHL – Wheeling UCTG – Unit Contingent
CERT_RUC (Certified for RUC)	Identifier of a resource that is eligible to participate in RUC.	This flag is set to Y if a resource has Resource Adequacy capacity for a given trade date.
<u>CERT_IR</u>	<u>An identifier of an intertie resource that is certified as eligible to provide Imbalance Reserve (IRU and/or IRD).</u>	<u>Eligibility requires the resource to be registered as 15-minute or dynamically scheduled.</u>
<u>CERT_RC</u>	<u>An identifier of an intertie resource that is certified as eligible to provide Reliability Capacity (RCU and/or RCD).</u>	<u>Eligibility requires the resource to be registered as hourly, 15-minute, or dynamically scheduled.</u>
MOO_QUALIFIED (Must Offer Obligation Qualified)	N - Resource is not Must Offer R - Resource is eligible for Must Offer based on RA Capacity or RCST designation in any given trading hour	<ul style="list-style-type: none"> N for all export resources R for all import resources.
WHEEL_REFERENCE_NUMBER (Wheel Reference ID)	Represents the wheeling counter resource that can be used in the Wheeling Bid Component of an Intertie resource bid. This ID is created in Master File and corresponds to the import wheel resource ID	
STRANDED_LOAD	Identifies whether or not the resource is available for stranded load.	
MLCA (Marginal Loss Cost Adjustment)	Identifier of a resource eligible to receive the marginal loss cost adjustment of LMPs.	

H Transition Costs for Multi-Stage Generator Resources

Transition Costs are a type of Start-Up Cost specific to Multi-Stage Generators (MSGs). Transition Costs can be thought of as the costs to “start” a configuration (or conversely the cost savings to “shut down” a configuration). The CAISO uses different terminology to differentiate between changes in configuration when the resource is already “On” versus a plant-level Start-Up, which turns the resource “On” from the “Off” state per the CAISO tariff definitions.

Multi-Stage Generating Resources that are subject to CAISO Tariff Appendix II – Market-Based Rate Authority Suspension must register a Transition Cost of \$0/MWh for all transitions in their transition matrix.

Transition and Start-Up Costs will be calculated and treated as follows:

- A Start-Up Cost is incurred when a resource is turned “On.” If a resource is already On but incrementing between configurations, it may incur a Transition Cost in the upward direction. For the purposes of this discussion, the “lower” configuration is a configuration with a smaller minimum operating level than the “higher” configuration.
- Transition Costs will be calculated as the difference between the “To” and “From” configurations when the resource is increasing from a lower configuration to a higher configuration. Transition Costs will only be calculated for possible transition paths. The CAISO does not recognize a downward Transition Cost. Therefore, if a Multi-Stage Generator receives a Reliability Capacity Down (RCD) award in the RUC process, this represents a binding schedule to transition to a lower configuration, but there is no associated Transition Cost. The resource is compensated based on the standard market settlements for operating at the resulting lower configuration.
- Transition Costs must be either a zero or positive number and will default to zero if negative.

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O Reference Level Change Requests

This attachment discusses Reference Levels and how market participants can request adjustments to these values. Reference Levels refer to a resource’s Default Startup Bid, Default Minimum Load Bid, Default Transition Bid and Default Energy Bid. Commitment cost Reference

Levels use either the Proxy Cost or Registered Cost methodology outlined in Attachment G of the BPM for Market Instruments. Default Energy Bids (DEBs) are calculated under various options outlined in Attachment D of the BPM for Market Instruments. Commitment cost Reference Levels are used to cap the commitment cost components of market participants' bids. DEBs are used by the market when the resource energy bid is mitigated under the Market Power Mitigation (MPM) process. The CAISO also uses DEBs when it must generate energy bids for resources.

The CAISO calculates Reference Levels using resource parameters registered in the Master File and fuel or fuel-equivalent cost inputs. In certain circumstances, market participants may find that their Reference Levels do not adequately reflect their actual or expected fuel costs. For example, the fuel cost input for gas-fired resources is based on published next-day trading indices, whereas the actual cost of gas encountered by a resource may be the same-day gas price. In such a case, a market participant may be able to submit a Reference Level Change Request. Because much of this attachment discusses how fuel prices (primarily, natural gas prices) are used in the CAISO markets, the CAISO recommends that the reader be familiar with the contents of Attachment C prior to reviewing the information below.

This Attachment O of the BPM for Market Instruments contains:

1. the process for Reference Level Change Requests. T
2. the CAISO audit process to ensure supplier's Reference Level Change Request is based on verifiable increases in fuel or fuel-equivalent costs. T
3. the after-market cost recovery process for resources that made Reference Level Change Requests that were not approved before the applicable market run. T

O.3 After-Market Cost Recovery Process

Resources that have submitted a Reference Level Change Request may be eligible for after-market cost recovery based on the criteria described in this section. The after-market cost recovery process is intended to provide the opportunity for uplift payments to cover costs that, prior to the execution of the market, the SC requested to be included in their reference levels but could not be included due to one of two types of limitations built into the CAISO's reference level change request process. The first limitation is if a resource SC submitted an automated Reference Level Change Request that was capped at the Reasonableness Threshold value. The second limitation is if, under certain conditions described further below, the manual Reference level Change Request process did not include the requested costs. The submission

for after-market cost recovery must be within 30 business days after the operating day on which the resource incurred the unrecovered costs. The after-market cost recovery process is not intended to be a process through which SCs can recover *any* costs that they did not recover in CAISO markets. Instead, the process is intended only for costs that could not have been recovered through the CAISO market processes. The after-market cost recovery process is meant to work in conjunction with the Reference Level Change Request process.

O.3.1 After-Market Cost Recovery Eligibility

The following conditions must be met to be eligible for after-market cost recovery:

1. The SC must have made an automated or manual Reference Level Change Request that was not approved. Failure to make a Reference Level Change Request disqualifies a SC from requesting after-market cost recovery.
 - a. For automated requests, this means specifically that the Revised Default Commitment Cost Bid and/or Revised DEB was capped at the Reasonableness Threshold.
 - b. For manual requests, the request first must meet the conditions described in section O.1.3 in order to be considered a valid Manual Reference Level Change Request (e.g. request must be submitted on a timely basis, the request must include supporting documentation available for CAISO review by 8AM). If those conditions are met, the request may be eligible for after-market cost recovery if the manual request was not approved prior to the closing of the relevant market's bidding window.
2. The unrecovered costs must be based on *actual* fuel costs, and *not* expected costs. When the SC is submitting their calculation of Minimum Load Costs, Start-Up Costs, Transition Costs and DEBs using the actual fuel or fuel-equivalent cost that is supported by documentation, the SC should not include the Commitment Cost Multiplier, DEB Multiplier, or the fuel price scalar in the cost calculation. In addition, the fuel cost used for after-market cost recovery must not include gas imbalance penalties related to Operational or Emergency Flow Orders. Additionally, if the initial request was based on expected costs and the resource's actual costs exceed these expected costs, these additional costs are not eligible for cost recovery. The rationale for this is that the additional costs were not a part of the original request and the CAISO limits after-market cost recovery to amounts not approved in the original request.

3. The SC must provide the CAISO with documentation supporting these actual fuel or fuel-equivalent costs. The documentation must support several specific conditions in order for the resource to be eligible for after-market cost recovery.
 - a. The submitted documentation must show that procured daily fuel or fuel-equivalent costs for a given trade date exceeds the fuel costs or fuel-equivalent costs the CAISO used to calculate the resource's Reference Levels.
 - b. These costs must be reasonable and reflect prudent procurement practices.
4. The submission for after-market cost recovery is within 30 business days after the operating day on which the resource incurred the unrecovered costs. Failure to meet this 30-day deadline disqualifies a SC from requesting after-market cost recovery.

If the SC's request meets the above-noted conditions, the CAISO will then assess eligibility for each trading hour and reference level separately using the criteria below. For example, the CAISO will assess eligibility for after-market cost recovery of the minimum load costs for RTM HE18 separately from the minimum load costs for RTM HE19. Similarly, the CAISO will assess DAM HE18 separately from RTM HE18. These criteria are:

1. The SC must have submitted a Reference Level Change Request for the trading period in question. Trading periods can be either daily or hourly; *i.e.* a Reference Level Change Request can either be submitted for an entire trading day's market or just an individual trading hour for the relevant market. The length of time covered by a trading period differs between DAM vs RTM; between reference levels; and between automated vs manual reference level change requests, as follows:

DAM:

Type of request	DEB	MLC	SUC/TC
Manual	Daily	Daily	Daily
Automated	Hourly	Daily	Daily

RTM:

Type of request	DEB	MLC	SUC/TC
Manual	Daily*	Daily*	Daily*
Automated	Hourly	Hourly (note: differs from DAM)	Daily

* - Note: RTM manual requests are typically processed at 8AM on the trading day in question. If the initial request is approved, the Revised Reference Levels will become active from around midday (typically HE12 onwards). Because of this inherent limitation (i.e. that the earlier hours of the RTM could not be revised prior to the market running), a SC may request after-market cost recovery related to these earlier hours.

2. The SC must have received a binding commitment award, or schedule for the relevant market and trading hour.

a. ~~DAM Day-Ahead Market: Binding commitments are determined by either the IFM, or the RUC process for resources that are not short start. Binding DAM commitments~~ These awards carry forward into the RTM as self-schedules. The RUC process awards binding Reliability Capacity (RCU/RCD) that create a real-time must-offer obligation but does not issue a final energy schedule or start-up instruction.

b. Real-Time Market: Final, binding start-up instructions and energy schedules are issued from the real-time market processes (e.g., RTUC, STUC, FMM, RTD).

2. If a resource receives a binding commitment or award in the DAM for the trading hour in question, but has only submitted a Reference Level Change Request for the RTM, the RTM trading hour is not eligible for after-market cost recovery.

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3. The SC's bids must have been limited by the CAISO's processes (e.g. the SC did not bid as high as it was allowed to, the energy bid wasn't limited to its DEB). This differs by the type of bid in question:

a. MLC/SUC/TC bids: commitment cost bids associated with Reference Level Change Requests can be limited by the CAISO in two ways.

i. If a commitment cost bid is capped to its Revised Default Commitment Cost Bids, the costs above the cap are eligible for after-market cost recovery (provided the other conditions discussed above are met). The Reference Level Change Request process for commitment costs is intended to allow for additional bidding headroom for commitment cost bids prior to the market running, provided that these costs can be verified. If an SC's request for a higher bid cap is approved, but this higher bid cap is not utilized by the SC in its bid submission, this is the SC's responsibility and any uncapped commitment cost bids are not eligible for after-market cost recovery.

- ii. If a minimum load cost bid above the Minimum Load Cost Hard Cap (\$2,000/MWh based on Pmin of resource) associated with a Reference Level Change Request is limited to the Minimum Load Cost Hard Cap, the unrecovered minimum load costs above the Minimum Load Cost Hard Cap \$2,000/MWh are eligible for after-market cost recovery (provided the other conditions discussed above are met). Note that the Reference Level Change Request submitted above the Minimum Load Cost Hard Cap will be limited to the Minimum Load Cost Hard Cap, but will serve as the record of the resource's minimum load bid costs. Also note that both the reference level change request and the minimum load cost bid typically occur as part of the same bid submission in SIBR.
- b. Energy bids: incremental energy bids associated with Reference Level Change Requests can also be limited by the CAISO in two ways:
- i. If an incremental energy bid submitted by the SC is mitigated to its Revised DEB during local market power mitigation, the unrecovered incremental energy costs are eligible for after-market cost recovery (provided the other conditions discussed above are met).
 - ii. Incremental energy bids above the Hard Energy Bid Cap (\$2,000/MWh) are automatically rejected by SIBR, therefore, the SC needs to follow some specific steps in order to be eligible for after-market cost recovery:
 - 1. Submit an automated reference level change request equal to the resource's incremental energy bid costs (e.g. \$2,200/MWh). That automated reference level change request will be limited to the Hard Energy Bid Cap, but will serve as the record of the resource's incremental energy bid costs.
 - 2. Submit an incremental energy bid at or near the Hard Energy Bid Cap (e.g. \$1,999/MWh). This will be the incremental energy bid that will make its way to the market and will serve as a record that the SC attempted to submit its incremental energy bid as high as possible. Note: steps 1 and 2 typically occur as part of the same bid submission in SIBR.
 - 3. Meet the other eligibility conditions described earlier in this section.

Under certain very limited circumstances, exceptions to some of these conditions may exist. These limited circumstances are when the CAISO is unable to process Reference Level

Change Requests due to software or process and timing limitations. In other words, these are exceptions to condition 1 above: *“the Scheduling Coordinator SC must have made a manual or an automated or manual Reference Level Change Request that was not approved.”* If an SC has made a good faith attempt to submit a Reference Level Change Request in a timely manner but the CAISO is unable to process that request due to limitations on the CAISO’s side, the CAISO will consider whether the resource is eligible for after-market cost recovery on a case-by-case basis. These circumstances include:

- Software issues: The CAISO may experience software issues that limit its ability to accept manual requests or the ability of SCs to submit automated requests.
- Process and timing: The CAISO may experience high volumes of manual requests on days with high levels of fuel volatility. This may limit the CAISO’s ability to process all manual requests on time prior to the execution of the market.