

Business Requirements Specification

Unwarranted Storage Bid-Cost Recovery

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Revision History

| Date | Version | Description |
|-------------|----------------|---------------------------|
| 3/4/2025 | 1.0 | Initial Document Release. |

Disclaimer and Understanding

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1 Introduction

1.1 Purpose

The purpose of this document is to capture and record a description of what the Users and Business Stakeholders of the project wish to obtain, by providing high level business requirements. This document establishes the basis for the agreement between the initiators and implementers of the project. The information in this document serves as input to determine the scope of projects and all Business Process Modeling and System Requirements Specifications efforts.


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

1.2 Conventions

- None

1.3 Background

- The CAISO proposes to modify the real-time bid cost recovery calculations for storage resources to consider other cost proxies in addition to the real-time energy bid cost in all real-time intervals, thus mitigating the risk of energy bids unduly inflating bid cost recovery payments. These cost proxies will ensure storage resources remain eligible for bid cost recovery but will reduce the potential for unwarranted bid cost recovery payment. These calculations will apply to all intervals.
 - For resources that are "dispatched up", the real-time energy bid cost component in the RT BCR calculation would be replaced by the minimum of the bid and the maximum of (RT DEB, RT LMP, and DA LMP).
 - For resources that are "dispatched down", the real-time energy bid cost component in the RT BCR calculation would be replaced by the maximum of the bid and the minimum of (RT DEB, RT LMP, and DA LMP).
 - In either case, the alternative of using the DA LMP is only applicable to storage resources with a DA Schedule.
- The phrase "dispatched up" or "dispatched down" is relative to the prior market.
 - A resource is dispatched up if the FMM dispatches a storage resource to increase its discharge or decrease its charge relative to its Day-Ahead Energy Schedule (DAES), or if the five-minute RTD market dispatches a storage resource to increase its discharge or decrease its charge relative to its FMM schedule.
 - A resource is dispatched down if the FMM dispatches the resource to decrease its discharge or increase its charge relative to the DAES, or if the five-minute RTD market

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dispatches a storage resource to decrease its discharge or increase its charge relative to its FMM schedule.

1.4 Scope

- Modify the formula used to calculate RT BCR for Limited energy storage resources (LESRs) to limit the opportunity for adverse financial outcomes and outsized operational costs in the FMM and RTD for intervals with and/or without a DA Schedule Energy (DASE) or Base Schedule Energy (BASE).

1.5 Acronym and Terms Definitions

Refer to **Appendix-A – Acronym Definition**


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2 Intellectual Property Ownership

Intellectual Property covers a broad array of information and materials, including written works, computer programs, software, business manuals, processes, symbols, logos and other work products. Determining ownership of Intellectual Property is very important in preserving the rights of the California ISO, and helps to avoid Intellectual Property infringement issues. In considering the business requirements or service requirements to be performed, the business owner of the project must determine Intellectual Property Ownership.

2.1 Checklist


All information in this document is the Intellectual Property (copyright, trademark, patent, and/or trade secret) of the California ISO.

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3 Details of Business Need/Problem

3.1 Description


| Business Opportunity/Problem Statement: | |
|--|---|
| What: | <ul style="list-style-type: none"> The CAISO proposes to modify the real-time bid cost recovery calculations for storage resources to consider other cost proxies in addition to the real-time energy bid cost in all real-time intervals, thus mitigating the risk of energy bids unduly inflating bid cost recovery payments. These cost proxies will ensure storage resources remain eligible for bid cost recovery but will reduce the potential for unwarranted bid cost recovery payment. These calculations will apply to all intervals. <ul style="list-style-type: none"> For resources that are "dispatched up", the real-time energy bid cost component in the RT BCR calculation would be replaced by the minimum of the bid and the maximum of (RT DEB, RT LMP, and DA LMP). For resources that are "dispatched down", the real-time energy bid cost component in the RT BCR calculation would be replaced by the maximum of the bid and the minimum of (RT DEB, RT LMP, and DA LMP). In either case, the alternative of using the DA LMP is only applicable to storage resources with a DA Schedule. |
| Why do we have this opportunity/problem: | As a result, this BCR is compensating assets for bidding in a manner that deviates from their DAES, thus making them unfeasible. |
| Who does this opportunity/problem impact: | <ul style="list-style-type: none"> Impacted Departments <ul style="list-style-type: none"> Market Participants Market Services Market Performance and Advanced Analytics Customer Readiness Policy Legal |

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4 Business Impacts


4.1 Business Practice Manual (BPM)

| BPM | Description of Impact(s) |
|-------------------|--|
| Market Operations | <ul style="list-style-type: none"> Update for MQS to revise the EEA for final bid prices for LESRs. |


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4.2 Other

| Impact | Description (optional) | | | | |
|-------------------------------|------------------------|--|-----------|--|------------------------|
| Market Simulation | Yes | | | | |
| Market Participant Impact | | | | | |
| | | External Participant Type | Impacted? | | Notes |
| | | Demand Response Entity | No | | |
| | | Financial Entity | Yes | | BCR Settlements Impact |
| | | Forecast Service Provider (FSP) | No | | |
| | | Government/Regulatory Agency | Yes | | Tariff Filing |
| | | Reliability Coordination (RC) Customer | No | | |
| | | Scheduling Coordinator (SC) | No | | |
| | | Transmission Owner (TO) | No | | |
| | | WEIM Entity | Yes | | BCR Settlements Impact |
| | | Adjacent BA | No | | |
| | | Other | No | | |
| | | External Bid Publication | No | | |
| User Acceptance Testing (UAT) | Yes | | | | |
| Operational Procedures | No | | | | |

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| Impact | Description (optional) |
|---|-------------------------------|
| Customer Readiness Impact | |
| 1. External Communication Needed | <i>Yes</i> |
| 2. External Onboarding and Maintenance | <i>No</i> |
| • External Training | <i>Yes</i> |
| • External Computer Based Training | <i>No</i> |
| Policy Initiative | <i>Yes</i> |

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5 Business Requirements

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


5.1 Business Process: Manage Market Quality System

5.1.1 Business Requirements


| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|-----------------|--|------------------|-----------------------------------|
| USBCR-BRQ-01020 | <p>Save Backup Copy of EEA OE Original Final Bid Records for All LESRs</p> <p>For LESRs within CAISO BAA, EDAM BAAs, and WEIM-only BAAs, System shall copy records of EEA of “OE” Energy Type with “F” Energy Bid type (F = Final) to “O” Energy Bid Type (O = Original Final).</p> <p>Notes</p> <ul style="list-style-type: none"> This applies to going forward from Go-Live date and retroactive starting from configurable Tariff activation date of 12/1/2024. | Core | MQS |
| USBCR-BRQ-01040 | <p>Revise EEA OE Final Bid Price (non-Null) Records for LESRs in CAISO & EDAM BAAs – Incremental OE</p> <p>For LESRs within CAISO BAA, EDAM BAAs, System shall revise the Bid Price (non-Null) of EEA records of “OE” Energy Type and “F” Energy Bid type (F = Final Bid) for each of FMM and RTD Real-Time Market Types for incremental OE (OE > 0) for a FMM/RTD market interval (respectively) for an EEA record</p> <ul style="list-style-type: none"> If Day-Ahead Schedule Energy (DASE) $\neq 0$ for hour h encompassing the FMM/RTD market interval <ul style="list-style-type: none"> Revised Final Bid Price = Min { Original Final Bid Price , Max (RT-DEB , RTD/FMM-LMP , DA-LMP) } Else If (DASE = 0 for hour h encompassing the FMM/RTD market interval | Core | MQS |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|-----------------|--|-------------------------|---|
| | <ul style="list-style-type: none"> Revised Final Bid Price = Min { Original Final Bid Price , Max (RT-DEB , FMM/RTD-LMP) } <p>Notes</p> <ul style="list-style-type: none"> This applies to going forward from Go-Live date and retroactive starting from configurable Tariff activation date of 12/1/2024. Refer to Demonstrative Example in Appendix-B: Formulas, Calculation Details, and Examples | | |
| USBCR-BRQ-01060 | <p>Revise EEA OE Final Bid Price (non-Null) Records for LESRs in CAISO & EDAM BAAs – Decremental or Zero OE</p> <p>For LESRs within CAISO BAA, EDAM BAAs, System shall revise the Bid Price (non-Null) of EEA records of “OE” Energy Type and “F” Energy Bid type (F = Final Bid) for each of FMM and RTD Real-Time Market Types for decremental or zero OE ($OE \leq 0$) for a FMM/RTD market interval (respectively) for an EEA record</p> <ul style="list-style-type: none"> If $DASE \neq 0$ for hour h encompassing the FMM/RTD market interval <ul style="list-style-type: none"> Revised Final Bid Price = Max { Original Final Bid Price , Min (RT-DEB , FMM/RTD-LMP , DA-LMP) } Else If ($DASE = 0$ for hour h encompassing the FMM/RTD market interval <ul style="list-style-type: none"> Revised Final Bid Price = Max { Original Final Bid Price , Min (RT-DEB , FMM/RTD-LMP) } <p>Notes</p> <ul style="list-style-type: none"> This applies to going forward from Go-Live date and retroactive starting from configurable Tariff activation date of 12/1/2024. Refer to Demonstrative Example in Appendix-B: Formulas, Calculation Details, and Examples | Core | <ul style="list-style-type: none"> MQS |
| USBCR-BRQ-01080 | <p>Revise EEA OE Final Bid Price (non-Null) Record for LESRs in WEIM-Only BAAs – Incremental OE</p> | Core | <ul style="list-style-type: none"> MQS |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|-----------------|---|------------------|---|
| | <p>For LESRs within WEIM-Only BAAs, System shall revise the Bid Price (non-Null) of EEA records of “OE” Energy Type and “F” Energy Bid type (F = Final Bid) for each of FMM and RTD Real-Time Market Types for incremental OE (OE > 0) for a FMM/RTD market interval (respectively) for an EEA record (regardless of the value of BASE)</p> <ul style="list-style-type: none"> Revised Final Bid Price = Min { Original Final Bid Price , Max (RT-DEB , RTD/FMM-LMP) } <p>Notes</p> <ul style="list-style-type: none"> This applies to going forward from Go-Live date and retroactive starting from configurable Tariff activation date of 12/1/2024. The DA-LMP is not considered for WEIM-only LESRs in the Revised Final Bid Price formulation since WEIM-Only BAAs do not participate in DAM. Refer to Demonstrative Example in Appendix-B: Formulas, Calculation Details, and Examples | | |
| USBCR-BRQ-01100 | <p>Revise EEA OE Final Bid Price (non-Null) Records for LESRs in WEIM-Only BAAs – Decremental or Zero OE</p> <p>For LESRs within WEIM-Only BAAs, System shall revise the Bid Price (non-Null) of EEA records of “OE” Energy Type and “F” Energy Bid type (F = Final Bid) for each of FMM and RTD Real-Time Market Types for decremental or zero OE (OE ≤ 0) for a FMM/RTD market interval (respectively) for an EEA record (regardless of the value of BASE)</p> <ul style="list-style-type: none"> Revised Final Bid Price = Max { Original Final Bid Price, Min (RT-DEB , FMM/RTD-LMP) } <p>Notes</p> <ul style="list-style-type: none"> This applies to going forward from Go-Live date and retroactive starting from configurable Tariff activation date of 12/1/2024. The DA-LMP is not considered for WEIM-only LESRs in the Revised Final Bid Price formulation since WEIM-Only BAAs do not participate in DAM. | Core | <ul style="list-style-type: none"> MQS |

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| ID# | Business Feature | Requirement Type | Potential Application(s) Impacted |
|-----------------|--|-------------------------|---|
| | <ul style="list-style-type: none"> Refer to Demonstrative Example in Appendix-B: Formulas, Calculation Details, and Examples | | |
| USBCR-BRQ-01120 | <p>Do NOT Revise EEA OE Final Bid Price (Null) Records for LESRs in CAISO, EDAM and WEIM-Only BAAs</p> <p>For LESRs within CAISO BAA, EDAM BAAs or WEIM-Only BAAs, System shall NOT revise the Bid Price of EEA records (without Bid Price [i.e. Null]) of “OE” Energy Type and “F” Energy Bid type (F = Final Bid) for each of FMM and RTD Real-Time Market Types for a FMM/RTD market interval (respectively) for an EEA record. i.e.</p> <ul style="list-style-type: none"> Revised Final Bid Price = Original Final Bid Price = Null <p>Notes</p> <ul style="list-style-type: none"> This applies to going forward from Go-Live date and retroactive starting from configurable Tariff activation date of 12/1/2024. Settlements will replace the Null Bid Prices with FMM/RTD LMP for each FMM/RTD market interval (respectively) for these records, as it does currently in production. Refer to Demonstrative Example in Appendix-B: Formulas, Calculation Details, and Examples | Core | <ul style="list-style-type: none"> MQS |

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5.2 Business Process: <Market/Business Simulation>


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

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


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

5.2.1 Business Requirements

| ID# | Guidance on Market Participant Impacts | Source System | Sink System | Reason for Potential Scenario |
|------------------|---|--|---|--|
| USBCR-MSIM-05020 | ISO, EDAM and WEIM-Only SCs Submit DA and RT Energy Bids for LESRs <ul style="list-style-type: none"> Set up a scenario where SCs for resources within CAISO, EDAM and WEIM-Only BAAs submit DA and | <ul style="list-style-type: none"> SIBR | <ul style="list-style-type: none"> SIBR MRI-S | 1. Rule Impacts 4. New system process |

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| ID# | Guidance on Market Participant Impacts | Source System | Sink System | Reason for Potential Scenario |
|------------|---|----------------------|--|--------------------------------------|
| | <p>RT energy bids for LESRs that can trigger the new revision rules for RT BCR Settlements.</p> <ul style="list-style-type: none"> • Run DAM (IFM and RUC). • Run RTM (FMM and RTD). • Run MQS (T+1C) • Run Settlements (T+5B) • Follow the results in sink systems to verify revised final bid prices are used in Settlements and published in CMRI. <ul style="list-style-type: none"> ○ CMRI <ul style="list-style-type: none"> ▪ Expected Energy Allocation Details ○ Settlements <ul style="list-style-type: none"> ▪ RT BCR | | <ul style="list-style-type: none"> • CMRI | |

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6 Appendices

6.1 Appendix-A – Acronym Definition


| Acronym | Definition |
|---------|--|
| A2A | Application-to-Application |
| ABC | Available Balancing Capacity |
| ACL | Access Control List |
| ADS | Automatic Dispatch System |
| AGC | Automatic Generation Control |
| AIM | Access and Identity Management |
| ALFS | Automated Load Forecast System |
| Anode | Aggregate Node |
| API | Application Program Interface |
| Apnode | Aggregate Pricing Node |
| AS | Ancillary Services |
| AUX | Auxiliary |
| B2B | Business-to-Business |
| BA | Business Analyst |
| BAA | Balancing Authority Area |
| BAAOP | Balancing Authority Area Operations Portal |
| BCR | Bid Cost Recovery |
| BPM | Business Process Manual |

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| Acronym | Definition |
|----------------|--|
| BRS | Business Requirement Specifications |
| BS | Base Schedule |
| BASE | BAse Schedule Energy |
| BSAP | Base Schedule Aggregation Portal |
| BSC | Base Schedule Coordinator |
| BSSD | (WEIM) Base Schedule Submission Deadline |
| CAISO | California Independent System Operator |
| CB | Convergence Bidding |
| CC | Commitment Cost |
| CCDEBE | Commitment Costs and Default Energy Bid Enhancements |
| CDN | Conformed Dispatch Notice |
| CIM | Common Information Model |
| CIP | Critical Infrastructure Protection |
| CIRA | Customer Interface for Resource Adequacy |
| CISO | California Independent System Operator |
| CLAP | Custom Load Aggregation Point |
| CMRI | Customer Market Results Interface |
| Cnode | Connectivity Node |
| COG | Constrained-Output Generator |
| CPM | Capacity Procurement Mechanism |
| CRN | Contract Reference Number |

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| Acronym | Definition |
|----------------|---|
| CRR | Congestion Revenue Rights |
| CRRS | Congestion Revenue Rights Settlements (aka CRR Clawback system) |
| CSS | Critical Systems Support |
| DA | Day-Ahead |
| DACA | Day-Ahead Contingency Analysis |
| DAES | Day-Ahead Energy Schedule |
| DAM | Day-Ahead Market |
| DART | Day-Ahead Reliability Tool |
| DASE | Day-Ahead Schedule Energy |
| DCPA | Dynamic Competitive Path Assessment |
| DEB | Default Energy Bid |
| DER | Distributed Energy Resource |
| DCC | Default Commitment Cost |
| DGAP | Default Generation Aggregation Point |
| DMLC | Default Minimum Load Cost |
| DMM | Department of Market Monitoring |
| DOP | Dispatch Operating Point |
| DOT | Dispatch Operating Target |
| DR | Demand Response |
| DRP | Demand Response Program |
| DSA | Dynamic Stability Analysis |

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| Acronym | Definition |
|----------------|---|
| DSTC | Default State Transition Cost |
| DSUC | Default Start Up Cost |
| EBC | Energy Bid Cost |
| ECIC | Energy Costs and Index Calculator |
| ED | Exceptional Dispatch |
| EDAM | Extended Day-Ahead Market |
| EDR | Enterprise Data Repository |
| EDRP | Enterprise Data Repository Production |
| EE | Expected Energy |
| EEA | Expected Energy Allocation |
| EESC | Energy Imbalance Market Entity Scheduling Coordinator |
| EFC | Effective Flexible Capacity |
| EMM | Enterprise Model Management |
| EMMS | Enterprise Model Management System |
| EMNA | Energy Management Network Application |
| EMS | Energy Management System |
| EOL | End Of Life |
| EPI | Electricity Price Index |
| ESP | Electronic Security Perimeter |
| ESR | Energy Storage Resource |
| ETC | Existing Transmission Contract |

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| Acronym | Definition |
|----------------|---|
| ETSR | Energy Transfer System Resources |
| FDR | Forecast Data Repository |
| FERC | Federal Energy Regulatory Commission |
| FMCA | Fifteen-Minute Contingency Analysis |
| FMM | Fifteen-Minute Market |
| FMU | Frequently Mitigated Unit |
| FNM | Full Network Model |
| FODD | FERC Outgoing Data Depository |
| FRCT | Forbidden Region Crossing Time |
| FRD | Flexible Ramp Down |
| FRU | Flexible Ramp Up |
| GDF | Generation Distribution Factor |
| GHG | Green House Gas |
| GIP | Generator Interconnection Procedure |
| GMC | Grid Management Charge |
| GPI | Gas Price Index |
| GRDT | Generator Resource Data Template |
| GUI | Graphical User Interface |
| HASP | Hour-Ahead Scheduling Process |
| HAVGC | Heat Average Cost (for non-gas resources) |
| HR | Heat Rate |

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| Acronym | Definition |
|----------------|--|
| ICE | InterContinental Exchange |
| ICM | Infrastructure Contracts and Management |
| ID | Identifier |
| IFM | Integrated Forward Market |
| ISL | Intertie Scheduling Limit |
| ISO | California Independent System Operator |
| IOOC | Integrated Optimal Outage Coordination |
| IT | Information Technology |
| ITC | Inter-Tie Constraint |
| ITPD | Information Technology Product Development |
| ITS | Interchange Transaction Scheduler |
| ITSM | Information Technology Service Management |
| JOU | Joint Owned Unit |
| LACA | Look-Ahead Contingency Analysis |
| LAP | Load Aggregation Point |
| LDF | Load Distribution Factor |
| LEL | Lower Economic Limit |
| LESR | Limited Energy Storage Resource |
| LFR | Lower Forbidden Region |
| LF | Load Forecast |
| LMP | Locational Marginal Price |

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| Acronym | Definition |
|----------------|--|
| LMPM | Locational Market Power Mitigation |
| LOL | Lower Operating Limit |
| LRA | <i>Local Regulatory Authority</i> |
| LRL | Lower Regulation Limit |
| LSE | Load Serving Entity |
| LTCA | Long-Term Contingency Analysis |
| MA | Market Analysis |
| MAPP | Management Application for Post Processes |
| MCI | Model and Contract Implementation |
| MD | Manual Dispatch |
| MDT | Minimum Down Time |
| MDS | Maximum Daily Startups |
| MF | Master File |
| MLAC | Minimum Load Average Cost |
| MLC | Minimum Load Cost |
| MLHAVGC | Minimum Load Heat Average Cost (for non-gas resources) |
| MLHR | Minimum Load Heat Rate |
| MMA | Major Maintenance Adder |
| MMAMLC | Major Maintenance Adder for Minimum Load Cost |
| MMASUC | Major Maintenance Adder for Start Up Cost |
| MMASTC | Major Maintenance Adder for MSG State Transition Cost |

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| Acronym | Definition |
|----------------|---|
| MMG | Manage Markets & Grid |
| MMR | Manage Market & Reliability |
| MOS | Manage Operations Support & Settlements |
| MPM | market Power Mitigation |
| MQS | Market Quality System |
| MQSHISP | Market Quality System Historical Production |
| MRID | Master Resource IDentifier |
| MRI-S | Market Results Interface – Settlements |
| MRTU | Market Redesign Technology Upgrade |
| MSD | Market Settlement Dispute |
| MSSA | Metered Sub System Agreement |
| MSG | Multi-Stage Generator |
| MUT | Minimum Up Time |
| MV&A | Market Validation & Analysis |
| MVT | Market Validation Tool |
| N/A | Not Applicable |
| NA | Network Application |
| NDEB | Negotiated Default Energy Bid |
| NGR | Non-Generating Resource |
| NM | Network Model |
| NQC | Net Qualifying Capacity |

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| Acronym | Definition |
|----------------|--|
| NGR | Non-Generating Resource |
| OASIS | Open Access Same-time information System |
| OATI | Open Access Technology International |
| OC | Opportunity Cost |
| OCC | Opportunity Cost Calculator |
| ODCP | On Demand Capacity Procurement |
| OE | Optimal Energy |
| OES | Operations Engineering Services |
| OMS | Outage Management System |
| OOM | Out Of Market |
| OTS | Operations Training Simulator |
| PAM | Program and Application Management |
| PBC | Power Balance Constraint |
| PC | Pre-Calculation |
| PCA | Price Correction Admin |
| PCT | Price Correction Tools |
| PDR | Proxy Demand Resource |
| PI | Plant Information |
| PIWS | Plant Information Web Services |
| PL | Participating Load |
| Pmax | Maximum Generation Capacity |

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| Acronym | Definition |
|----------------|---|
| Pmin | Minimum Generation Capacity |
| PMO | Program Management Office |
| PNM | Public New Mexico |
| Pnode | Pricing Node |
| POC | Point Of Contact |
| PRSC | Participating Resource Scheduling Coordinator |
| PSH | Pump Storage Hydro |
| PSTD | Power Systems Technology Development |
| PSTO | Power Systems Technology Operations |
| PTO | Participating Transmission Owner |
| QRB | Quality Review Board |
| RA | Resource Adequacy |
| RC | Reliability Coordinator |
| RC-BSAP | Reliability Coordinator - Base Schedule Aggregation Portal |
| RCD | Reliability Capacity Down |
| RCSA | Reliability Coordinator Service Agreement |
| RCU | Reliability Capacity Up |
| RDOT | Ramping Dispatch Operating Target (a continuous piecewise linear curve connecting consecutive <i>DOTs</i> using their mid-interval points, from RTD, RTCD, or RTDD runs, as applicable) |
| RDRR | Reliability Demand Response Resource |
| RDT | Resource Data Template |

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| Acronym | Definition |
|----------------|--|
| RIG | Remote Intelligent Gateway |
| RIMS | Resource Interconnection Management System |
| RMR | Reliability Must Run |
| ROPR | Operating Reserve Ramp Rate |
| RR | Ramp Rate |
| RREG | Regulation Ramp Rate |
| RSE | Resource Sufficiency Evaluation |
| RSEE | Resource Sufficiency Evaluation Enhancements |
| RT | Real-Time |
| RTBS | Real-Time Base Scheduler |
| RTCA | Real-Time Contingency Analysis |
| RTCD | Real-Time Contingency Dispatch |
| RTD | Real-Time Dispatch |
| RTDD | Real-Time Disturbance Dispatch |
| RTPD | Real-Time Pre-Dispatch |
| RTM | Real-Time Market |
| RTUC | Real-Time Unit Commitment |
| RUC | Residual Unit Commitment |
| SADS | System And Design Specifications |
| SC | Scheduling Coordinator |
| SCME | Scheduling Coordinator Meter Entity |

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

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| Acronym | Definition |
|----------------|--|
| TG | Tie Generator |
| TNA | Transmission Network Application |
| TOP | Transmission Operator Provider |
| TOR | Transmission Ownership Contract |
| TEE | Total Expected Energy |
| TTEE | Total Target Expected Energy (based on RDOT) |
| UAT | User Acceptance Testing |
| UEL | Upper Economic Limit |
| UFR | Upper Forbidden Region |
| UI | User Interface |
| UIE | Uninstructed Energy Imbalance |
| UL | User Limited |
| UOL | Upper Operating Limit |
| URL | Upper Regulation Limit |
| VER | Variable Energy Resource |
| VOM | Variable Operations & Maintenance |
| VOMC | Variable Operations & Maintenance Cost |
| WebOMS | Web-based Outage Management System |
| WEIM | Western Energy Imbalance Market |
| XML | Extensible Markup Language |
| XSD | XML Schema Definition |


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| Acronym | Definition |
|---------|---------------------|
| ZIL | Zero Impedance Line |


6.2 Appendix-B: Formulas, Calculation Details, and Examples

6.2.1 Demonstrative Example


| Trade Date | Time Interval | Resource ID | Market Type | Energy Bid Type | Energy Type Code | MWH | Bid Price (Original) | DA LMP | FMM/RTD LMP | RT-DEB Price | Bid Price (Revised) | Energy Bid Cost (Original) | Energy Bid Cost (Revised) | Energy Market Revenue | Net Amount (Original) | Net Amount (Revised) |
|------------|---------------|-------------|-------------|-----------------|------------------|--------|----------------------|---------|-------------|--------------|---------------------|----------------------------|---------------------------|-----------------------|-----------------------|----------------------|
| 2/1/2025 | 16:00 | 123456 | RTD | F | OE | 2.2705 | 369.09 | \$39.30 | \$21.29 | \$101.73 | \$101.73 | \$838.02 | \$230.97 | \$48.34 | \$789.68 | \$182.62 |
| 2/1/2025 | 16:00 | 123456 | RTD | F | OE | 0.1667 | 368.89 | \$39.30 | \$21.29 | \$101.73 | \$101.73 | \$61.48 | \$16.95 | \$3.55 | \$57.93 | \$13.41 |
| 2/1/2025 | 16:00 | 123456 | RTD | F | OE | 0.0833 | 368.99 | \$39.30 | \$21.29 | \$101.73 | \$101.73 | \$30.75 | \$8.48 | \$1.77 | \$28.97 | \$6.70 |
| 2/1/2025 | 16:05 | 123456 | RTD | F | OE | 8.0750 | 369.09 | \$39.30 | \$20.15 | \$101.73 | \$101.73 | \$2,980.40 | \$821.43 | \$162.75 | \$2,817.66 | \$658.69 |
| 2/1/2025 | 16:05 | 123456 | RTD | F | OE | 2.5540 | 384.39 | \$39.30 | \$20.15 | \$101.73 | \$101.73 | \$981.73 | \$259.81 | \$51.47 | \$930.26 | \$208.33 |
| 2/1/2025 | 16:05 | 123456 | RTD | F | OE | 1.8408 | 384.49 | \$39.30 | \$20.15 | \$101.73 | \$101.73 | \$707.78 | \$187.26 | \$37.10 | \$670.68 | \$150.16 |
| 2/1/2025 | 16:05 | 123456 | RTD | F | OE | 0.6422 | 384.69 | \$39.30 | \$20.15 | \$101.73 | \$101.73 | \$247.06 | \$65.33 | \$12.94 | \$234.12 | \$52.39 |
| 2/1/2025 | 16:05 | 123456 | RTD | F | OE | 0.1667 | 368.89 | \$39.30 | \$20.15 | \$101.73 | \$101.73 | \$61.48 | \$16.95 | \$3.36 | \$58.12 | \$13.60 |
| 2/1/2025 | 16:05 | 123456 | RTD | F | OE | 0.0833 | 368.99 | \$39.30 | \$20.15 | \$101.73 | \$101.73 | \$30.75 | \$8.48 | \$1.68 | \$29.07 | \$6.80 |
| 2/1/2025 | 16:05 | 123456 | RTD | F | OE | 0.0083 | 369.19 | \$39.30 | \$20.15 | \$101.73 | \$101.73 | \$3.08 | \$0.85 | \$0.17 | \$2.91 | \$0.68 |
| 2/1/2025 | 16:05 | 123456 | RTD | F | OE | 0.0083 | 376.79 | \$39.30 | \$20.15 | \$101.73 | \$101.73 | \$3.14 | \$0.85 | \$0.17 | \$2.97 | \$0.68 |
| 2/1/2025 | 16:10 | 123456 | RTD | F | OE | 7.7166 | 369.09 | \$39.30 | \$21.70 | \$101.73 | \$101.73 | \$2,848.10 | \$784.97 | \$167.48 | \$2,680.62 | \$617.49 |
| 2/1/2025 | 16:10 | 123456 | RTD | F | OE | 0.9269 | 384.39 | \$39.30 | \$21.70 | \$101.73 | \$101.73 | \$356.30 | \$94.29 | \$20.12 | \$336.18 | \$74.17 |
| 2/1/2025 | 16:10 | 123456 | RTD | F | OE | 0.1667 | 368.89 | \$39.30 | \$21.70 | \$101.73 | \$101.73 | \$61.48 | \$16.95 | \$3.62 | \$57.86 | \$13.34 |
| 2/1/2025 | 16:10 | 123456 | RTD | F | OE | 0.0833 | 368.99 | \$39.30 | \$21.70 | \$101.73 | \$101.73 | \$30.75 | \$8.48 | \$1.81 | \$28.94 | \$6.67 |
| 2/1/2025 | 16:10 | 123456 | RTD | F | OE | 0.0119 | 384.49 | \$39.30 | \$21.70 | \$101.73 | \$101.73 | \$4.56 | \$1.21 | \$0.26 | \$4.31 | \$0.95 |
| 2/1/2025 | 16:10 | 123456 | RTD | F | OE | 0.0052 | 369.19 | \$39.30 | \$21.70 | \$101.73 | \$101.73 | \$1.90 | \$0.52 | \$0.11 | \$1.79 | \$0.41 |
| 2/1/2025 | 16:10 | 123456 | RTD | F | OE | 0.0051 | 376.79 | \$39.30 | \$21.70 | \$101.73 | \$101.73 | \$1.94 | \$0.52 | \$0.11 | \$1.82 | \$0.41 |
| 2/1/2025 | 16:15 | 123456 | FMM | F | OE | 8.0750 | 369.09 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$2,980.40 | \$821.43 | \$214.65 | \$2,765.75 | \$606.78 |
| 2/1/2025 | 16:15 | 123456 | FMM | F | OE | 2.8325 | 384.69 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$1,089.63 | \$288.14 | \$75.29 | \$1,014.34 | \$212.84 |

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| Trade Date | Time Interval | Resource ID | Market Type | Energy Bid Type | Energy Type Code | MWH | Bid Price (Original) | DA LMP | FMM/RTD LMP | RT-DEB Price | Bid Price (Revised) | Energy Bid Cost (Original) | Energy Bid Cost (Revised) | Energy Market Revenue | Net Amount (Original) | Net Amount (Revised) |
|------------|---------------|-------------|-------------|-----------------|------------------|---------|----------------------|---------|-------------|--------------|---------------------|----------------------------|---------------------------|-----------------------|-----------------------|----------------------|
| 2/1/2025 | 16:15 | 123456 | FMM | F | OE | 2.7500 | 384.49 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$1,057.35 | \$279.74 | \$73.10 | \$984.25 | \$206.64 |
| 2/1/2025 | 16:15 | 123456 | FMM | F | OE | 2.7417 | 384.39 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$1,053.87 | \$278.90 | \$72.88 | \$980.99 | \$206.02 |
| 2/1/2025 | 16:15 | 123456 | FMM | F | OE | 0.1667 | 368.89 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$61.48 | \$16.95 | \$4.43 | \$57.05 | \$12.52 |
| 2/1/2025 | 16:15 | 123456 | FMM | F | OE | 0.0833 | 368.99 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$30.75 | \$8.48 | \$2.22 | \$28.53 | \$6.26 |
| 2/1/2025 | 16:15 | 123456 | FMM | F | OE | 0.0083 | 376.79 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$3.14 | \$0.85 | \$0.22 | \$2.92 | \$0.63 |
| 2/1/2025 | 16:15 | 123456 | FMM | F | OE | 0.0083 | 369.19 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$3.08 | \$0.85 | \$0.22 | \$2.86 | \$0.63 |
| 2/1/2025 | 16:15 | 123456 | RTD | F | OE | -0.7693 | 384.49 | \$39.30 | \$24.13 | \$101.73 | \$384.49 | (\$295.80) | (\$295.80) | (\$18.57) | (\$277.23) | (\$277.23) |
| 2/1/2025 | 16:15 | 123456 | RTD | F | OE | -2.3554 | 384.69 | \$39.30 | \$24.13 | \$101.73 | \$384.69 | (\$906.11) | (\$906.11) | (\$56.84) | (\$849.27) | (\$849.27) |
| 2/1/2025 | 16:20 | 123456 | FMM | F | OE | 8.0750 | 369.09 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$2,980.40 | \$821.43 | \$214.65 | \$2,765.75 | \$606.78 |
| 2/1/2025 | 16:20 | 123456 | FMM | F | OE | 2.8325 | 384.69 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$1,089.63 | \$288.14 | \$75.29 | \$1,014.34 | \$212.84 |
| 2/1/2025 | 16:20 | 123456 | FMM | F | OE | 2.7500 | 384.49 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$1,057.35 | \$279.74 | \$73.10 | \$984.25 | \$206.64 |
| 2/1/2025 | 16:20 | 123456 | FMM | F | OE | 2.7417 | 384.39 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$1,053.87 | \$278.90 | \$72.88 | \$980.99 | \$206.02 |
| 2/1/2025 | 16:20 | 123456 | FMM | F | OE | 0.1667 | 368.89 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$61.48 | \$16.95 | \$4.43 | \$57.05 | \$12.52 |
| 2/1/2025 | 16:20 | 123456 | FMM | F | OE | 0.0833 | 368.99 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$30.75 | \$8.48 | \$2.22 | \$28.53 | \$6.26 |
| 2/1/2025 | 16:20 | 123456 | FMM | F | OE | 0.0083 | 369.19 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$3.08 | \$0.85 | \$0.22 | \$2.86 | \$0.63 |
| 2/1/2025 | 16:20 | 123456 | FMM | F | OE | 0.0083 | 376.79 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$3.14 | \$0.85 | \$0.22 | \$2.92 | \$0.63 |
| 2/1/2025 | 16:20 | 123456 | RTD | F | OE | -0.5694 | 369.09 | \$39.30 | \$26.04 | \$101.73 | \$369.09 | (\$210.16) | (\$210.16) | (\$14.83) | (\$195.33) | (\$195.33) |
| 2/1/2025 | 16:20 | 123456 | RTD | F | OE | -2.0091 | 384.39 | \$39.30 | \$26.04 | \$101.73 | \$384.39 | (\$772.28) | (\$772.28) | (\$52.33) | (\$719.95) | (\$719.95) |
| 2/1/2025 | 16:20 | 123456 | RTD | F | OE | -2.7483 | 384.49 | \$39.30 | \$26.04 | \$101.73 | \$384.49 | (\$1,056.68) | (\$1,056.68) | (\$71.58) | (\$985.10) | (\$985.10) |
| 2/1/2025 | 16:20 | 123456 | RTD | F | OE | -2.8325 | 384.69 | \$39.30 | \$26.04 | \$101.73 | \$384.69 | (\$1,089.63) | (\$1,089.63) | (\$73.77) | (\$1,015.86) | (\$1,015.86) |
| 2/1/2025 | 16:25 | 123456 | FMM | F | OE | 8.0750 | 369.09 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$2,980.40 | \$821.43 | \$214.65 | \$2,765.75 | \$606.78 |

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| Trade Date | Time Interval | Resource ID | Market Type | Energy Bid Type | Energy Type Code | MWH | Bid Price (Original) | DA LMP | FMM/RTD LMP | RT-DEB Price | Bid Price (Revised) | Energy Bid Cost (Original) | Energy Bid Cost (Revised) | Energy Market Revenue | Net Amount (Original) | Net Amount (Revised) |
|------------|---------------|-------------|-------------|-----------------|------------------|---------|----------------------|---------|-------------|--------------|---------------------|----------------------------|---------------------------|-----------------------|-----------------------|----------------------|
| 2/1/2025 | 16:25 | 123456 | FMM | F | OE | 2.8325 | 384.69 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$1,089.63 | \$288.14 | \$75.29 | \$1,014.34 | \$212.84 |
| 2/1/2025 | 16:25 | 123456 | FMM | F | OE | 2.7500 | 384.49 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$1,057.35 | \$279.74 | \$73.10 | \$984.25 | \$206.64 |
| 2/1/2025 | 16:25 | 123456 | FMM | F | OE | 2.7417 | 384.39 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$1,053.87 | \$278.90 | \$72.88 | \$980.99 | \$206.02 |
| 2/1/2025 | 16:25 | 123456 | FMM | F | OE | 0.1667 | 368.89 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$61.48 | \$16.95 | \$4.43 | \$57.05 | \$12.52 |
| 2/1/2025 | 16:25 | 123456 | FMM | F | OE | 0.0833 | 368.99 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$30.75 | \$8.48 | \$2.22 | \$28.53 | \$6.26 |
| 2/1/2025 | 16:25 | 123456 | FMM | F | OE | 0.0083 | 376.79 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$3.14 | \$0.85 | \$0.22 | \$2.92 | \$0.63 |
| 2/1/2025 | 16:25 | 123456 | FMM | F | OE | 0.0083 | 369.19 | \$39.30 | \$26.58 | \$101.73 | \$101.73 | \$3.08 | \$0.85 | \$0.22 | \$2.86 | \$0.63 |
| 2/1/2025 | 16:25 | 123456 | RTD | F | OE | -0.2099 | 384.39 | \$39.30 | \$25.60 | \$101.73 | \$384.39 | (\$80.67) | (\$80.67) | (\$5.37) | (\$75.30) | (\$75.30) |
| 2/1/2025 | 16:25 | 123456 | RTD | F | OE | -0.9732 | 384.49 | \$39.30 | \$25.60 | \$101.73 | \$384.49 | (\$374.17) | (\$374.17) | (\$24.91) | (\$349.26) | (\$349.26) |
| 2/1/2025 | 16:25 | 123456 | RTD | F | OE | -2.2156 | 384.69 | \$39.30 | \$25.60 | \$101.73 | \$384.69 | (\$852.33) | (\$852.33) | (\$56.71) | (\$795.62) | (\$795.62) |
| 2/1/2025 | 16:30 | 123456 | FMM | F | OE | 8.0750 | 369.09 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$2,980.40 | \$821.43 | \$186.74 | \$2,793.66 | \$634.70 |
| 2/1/2025 | 16:30 | 123456 | FMM | F | OE | 2.7500 | 384.49 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$1,057.35 | \$279.74 | \$63.59 | \$993.75 | \$216.15 |
| 2/1/2025 | 16:30 | 123456 | FMM | F | OE | 2.7417 | 384.39 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$1,053.87 | \$278.90 | \$63.40 | \$990.47 | \$215.50 |
| 2/1/2025 | 16:30 | 123456 | FMM | F | OE | 1.1667 | 384.69 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$448.81 | \$118.68 | \$26.98 | \$421.83 | \$91.70 |
| 2/1/2025 | 16:30 | 123456 | FMM | F | OE | 0.1667 | 368.89 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$61.48 | \$16.95 | \$3.85 | \$57.63 | \$13.10 |
| 2/1/2025 | 16:30 | 123456 | FMM | F | OE | 0.0833 | 368.99 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$30.75 | \$8.48 | \$1.93 | \$28.82 | \$6.55 |
| 2/1/2025 | 16:30 | 123456 | FMM | F | OE | 0.0083 | 376.79 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$3.14 | \$0.85 | \$0.19 | \$2.95 | \$0.66 |
| 2/1/2025 | 16:30 | 123456 | FMM | F | OE | 0.0083 | 369.19 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$3.08 | \$0.85 | \$0.19 | \$2.88 | \$0.66 |
| 2/1/2025 | 16:30 | 123456 | RTD | F | OE | -0.0083 | 369.19 | \$39.30 | \$27.18 | \$101.73 | \$369.19 | (\$3.05) | (\$3.05) | (\$0.22) | (\$2.83) | (\$2.83) |
| 2/1/2025 | 16:30 | 123456 | RTD | F | OE | -0.0083 | 376.79 | \$39.30 | \$27.18 | \$101.73 | \$376.79 | (\$3.12) | (\$3.12) | (\$0.22) | (\$2.89) | (\$2.89) |
| 2/1/2025 | 16:30 | 123456 | RTD | F | OE | -0.0278 | 368.99 | \$39.30 | \$27.18 | \$101.73 | \$368.99 | (\$10.25) | (\$10.25) | (\$0.75) | (\$9.49) | (\$9.49) |

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|  California ISO | Technology | Template Version: | 7.2 |
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| Unwarranted Storage Bid-Cost Recovery Business Requirements Specification - Planning | | Date Created: | 3/4/2025 |


| Trade Date | Time Interval | Resource ID | Market Type | Energy Bid Type | Energy Type Code | MWH | Bid Price (Original) | DA LMP | FMM/RTD LMP | RT-DEB Price | Bid Price (Revised) | Energy Bid Cost (Original) | Energy Bid Cost (Revised) | Energy Market Revenue | Net Amount (Original) | Net Amount (Revised) |
|------------|---------------|-------------|-------------|-----------------|------------------|---------|----------------------|---------|-------------|--------------|---------------------|----------------------------|---------------------------|-----------------------|-----------------------|----------------------|
| 2/1/2025 | 16:30 | 123456 | RTD | F | OE | -1.1667 | 384.69 | \$39.30 | \$27.18 | \$101.73 | \$384.69 | (\$448.81) | (\$448.81) | (\$31.71) | (\$417.10) | (\$417.10) |
| 2/1/2025 | 16:30 | 123456 | RTD | F | OE | -2.7413 | 384.39 | \$39.30 | \$27.18 | \$101.73 | \$384.39 | (\$1,053.71) | (\$1,053.71) | (\$74.50) | (\$979.21) | (\$979.21) |
| 2/1/2025 | 16:30 | 123456 | RTD | F | OE | -2.7500 | 384.49 | \$39.30 | \$27.18 | \$101.73 | \$384.49 | (\$1,057.35) | (\$1,057.35) | (\$74.74) | (\$982.61) | (\$982.61) |
| 2/1/2025 | 16:30 | 123456 | RTD | F | OE | -6.0235 | 369.09 | \$39.30 | \$27.18 | \$101.73 | \$369.09 | (\$2,223.20) | (\$2,223.20) | (\$163.70) | (\$2,059.50) | (\$2,059.50) |
| 2/1/2025 | 16:35 | 123456 | FMM | F | OE | 8.0750 | 369.09 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$2,980.40 | \$821.43 | \$186.74 | \$2,793.66 | \$634.70 |
| 2/1/2025 | 16:35 | 123456 | FMM | F | OE | 2.7500 | 384.49 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$1,057.35 | \$279.74 | \$63.59 | \$993.75 | \$216.15 |
| 2/1/2025 | 16:35 | 123456 | FMM | F | OE | 2.7417 | 384.39 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$1,053.87 | \$278.90 | \$63.40 | \$990.47 | \$215.50 |
| 2/1/2025 | 16:35 | 123456 | FMM | F | OE | 1.1667 | 384.69 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$448.81 | \$118.68 | \$26.98 | \$421.83 | \$91.70 |
| 2/1/2025 | 16:35 | 123456 | FMM | F | OE | 0.1667 | 368.89 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$61.48 | \$16.95 | \$3.85 | \$57.63 | \$13.10 |
| 2/1/2025 | 16:35 | 123456 | FMM | F | OE | 0.0833 | 368.99 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$30.75 | \$8.48 | \$1.93 | \$28.82 | \$6.55 |
| 2/1/2025 | 16:35 | 123456 | FMM | F | OE | 0.0083 | 369.19 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$3.08 | \$0.85 | \$0.19 | \$2.88 | \$0.66 |
| 2/1/2025 | 16:35 | 123456 | FMM | F | OE | 0.0083 | 376.79 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$3.14 | \$0.85 | \$0.19 | \$2.95 | \$0.66 |
| 2/1/2025 | 16:35 | 123456 | RTD | F | OE | -0.0083 | 369.19 | \$39.30 | \$26.52 | \$101.73 | \$369.19 | (\$3.08) | (\$3.08) | (\$0.22) | (\$2.86) | (\$2.86) |
| 2/1/2025 | 16:35 | 123456 | RTD | F | OE | -0.0083 | 376.79 | \$39.30 | \$26.52 | \$101.73 | \$376.79 | (\$3.14) | (\$3.14) | (\$0.22) | (\$2.92) | (\$2.92) |
| 2/1/2025 | 16:35 | 123456 | RTD | F | OE | -0.0427 | 368.99 | \$39.30 | \$26.52 | \$101.73 | \$368.99 | (\$15.76) | (\$15.76) | (\$1.13) | (\$14.63) | (\$14.63) |
| 2/1/2025 | 16:35 | 123456 | RTD | F | OE | -0.0529 | 368.89 | \$39.30 | \$26.52 | \$101.73 | \$368.89 | (\$19.52) | (\$19.52) | (\$1.40) | (\$18.12) | (\$18.12) |
| 2/1/2025 | 16:35 | 123456 | RTD | F | OE | -1.1667 | 384.69 | \$39.30 | \$26.52 | \$101.73 | \$384.69 | (\$448.81) | (\$448.81) | (\$30.94) | (\$417.87) | (\$417.87) |
| 2/1/2025 | 16:35 | 123456 | RTD | F | OE | -2.7417 | 384.39 | \$39.30 | \$26.52 | \$101.73 | \$384.39 | (\$1,053.87) | (\$1,053.87) | (\$72.70) | (\$981.17) | (\$981.17) |
| 2/1/2025 | 16:35 | 123456 | RTD | F | OE | -2.7500 | 384.49 | \$39.30 | \$26.52 | \$101.73 | \$384.49 | (\$1,057.35) | (\$1,057.35) | (\$72.92) | (\$984.43) | (\$984.43) |
| 2/1/2025 | 16:35 | 123456 | RTD | F | OE | -6.1148 | 369.09 | \$39.30 | \$26.52 | \$101.73 | \$369.09 | (\$2,256.91) | (\$2,256.91) | (\$162.14) | (\$2,094.77) | (\$2,094.77) |
| 2/1/2025 | 16:40 | 123456 | FMM | F | OE | 8.0750 | 369.09 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$2,980.40 | \$821.43 | \$186.74 | \$2,793.66 | \$634.70 |

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| | | Document Version: | 1 |
| Unwarranted Storage Bid-Cost Recovery Business Requirements Specification - Planning | | Date Created: | 3/4/2025 |

| Trade Date | Time Interval | Resource ID | Market Type | Energy Bid Type | Energy Type Code | MWH | Bid Price (Original) | DA LMP | FMM/RTD LMP | RT-DEB Price | Bid Price (Revised) | Energy Bid Cost (Original) | Energy Bid Cost (Revised) | Energy Market Revenue | Net Amount (Original) | Net Amount (Revised) |
|------------|---------------|-------------|-------------|-----------------|------------------|---------|----------------------|---------|-------------|--------------|---------------------|----------------------------|---------------------------|-----------------------|-----------------------|----------------------|
| 2/1/2025 | 16:40 | 123456 | FMM | F | OE | 2.7500 | 384.49 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$1,057.35 | \$279.74 | \$63.59 | \$993.75 | \$216.15 |
| 2/1/2025 | 16:40 | 123456 | FMM | F | OE | 2.7417 | 384.39 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$1,053.87 | \$278.90 | \$63.40 | \$990.47 | \$215.50 |
| 2/1/2025 | 16:40 | 123456 | FMM | F | OE | 1.1667 | 384.69 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$448.81 | \$118.68 | \$26.98 | \$421.83 | \$91.70 |
| 2/1/2025 | 16:40 | 123456 | FMM | F | OE | 0.1667 | 368.89 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$61.48 | \$16.95 | \$3.85 | \$57.63 | \$13.10 |
| 2/1/2025 | 16:40 | 123456 | FMM | F | OE | 0.0833 | 368.99 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$30.75 | \$8.48 | \$1.93 | \$28.82 | \$6.55 |
| 2/1/2025 | 16:40 | 123456 | FMM | F | OE | 0.0083 | 376.79 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$3.14 | \$0.85 | \$0.19 | \$2.95 | \$0.66 |
| 2/1/2025 | 16:40 | 123456 | FMM | F | OE | 0.0083 | 369.19 | \$39.30 | \$23.13 | \$101.73 | \$101.73 | \$3.08 | \$0.85 | \$0.19 | \$2.88 | \$0.66 |
| 2/1/2025 | 16:40 | 123456 | RTD | F | OE | -0.4537 | 384.39 | \$39.30 | \$26.42 | \$101.73 | \$384.39 | (\$174.42) | (\$174.42) | (\$11.99) | (\$162.43) | (\$162.43) |
| 2/1/2025 | 16:40 | 123456 | RTD | F | OE | -0.6850 | 384.69 | \$39.30 | \$26.42 | \$101.73 | \$384.69 | (\$263.51) | (\$263.51) | (\$18.10) | (\$245.41) | (\$245.41) |
| 2/1/2025 | 16:40 | 123456 | RTD | F | OE | -1.3613 | 384.49 | \$39.30 | \$26.42 | \$101.73 | \$384.49 | (\$523.39) | (\$523.39) | (\$35.97) | (\$487.42) | (\$487.42) |
| 2/1/2025 | 16:45 | 123456 | FMM | F | OE | 8.0750 | 369.09 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$2,980.40 | \$821.43 | \$112.11 | \$2,868.29 | \$709.32 |
| 2/1/2025 | 16:45 | 123456 | FMM | F | OE | 2.8325 | 384.69 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$1,089.63 | \$288.14 | \$39.33 | \$1,050.31 | \$248.81 |
| 2/1/2025 | 16:45 | 123456 | FMM | F | OE | 2.7500 | 384.49 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$1,057.35 | \$279.74 | \$38.18 | \$1,019.17 | \$241.57 |
| 2/1/2025 | 16:45 | 123456 | FMM | F | OE | 2.7417 | 384.39 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$1,053.87 | \$278.90 | \$38.06 | \$1,015.81 | \$240.83 |
| 2/1/2025 | 16:45 | 123456 | FMM | F | OE | 0.1667 | 368.89 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$61.48 | \$16.95 | \$2.31 | \$59.17 | \$14.64 |
| 2/1/2025 | 16:45 | 123456 | FMM | F | OE | 0.0833 | 368.99 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$30.75 | \$8.48 | \$1.16 | \$29.59 | \$7.32 |
| 2/1/2025 | 16:45 | 123456 | FMM | F | OE | 0.0083 | 369.19 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$3.08 | \$0.85 | \$0.12 | \$2.96 | \$0.73 |
| 2/1/2025 | 16:45 | 123456 | FMM | F | OE | 0.0083 | 376.79 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$3.14 | \$0.85 | \$0.12 | \$3.02 | \$0.73 |
| 2/1/2025 | 16:45 | 123456 | RTD | F | OE | -0.0083 | 369.19 | \$39.30 | \$26.49 | \$101.73 | \$369.19 | (\$3.08) | (\$3.08) | (\$0.22) | (\$2.85) | (\$2.85) |
| 2/1/2025 | 16:45 | 123456 | RTD | F | OE | -0.0083 | 376.79 | \$39.30 | \$26.49 | \$101.73 | \$376.79 | (\$3.14) | (\$3.14) | (\$0.22) | (\$2.92) | (\$2.92) |
| 2/1/2025 | 16:45 | 123456 | RTD | F | OE | -0.0427 | 368.99 | \$39.30 | \$26.49 | \$101.73 | \$368.99 | (\$15.76) | (\$15.76) | (\$1.13) | (\$14.63) | (\$14.63) |

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|  California ISO | Technology | Template Version: | 7.2 |
| | | Document Version: | 1 |
| Unwarranted Storage Bid-Cost Recovery Business Requirements Specification - Planning | | Date Created: | 3/4/2025 |

| Trade Date | Time Interval | Resource ID | Market Type | Energy Bid Type | Energy Type Code | MWH | Bid Price (Original) | DA LMP | FMM/RTD LMP | RT-DEB Price | Bid Price (Revised) | Energy Bid Cost (Original) | Energy Bid Cost (Revised) | Energy Market Revenue | Net Amount (Original) | Net Amount (Revised) |
|------------|---------------|-------------|-------------|-----------------|------------------|---------|----------------------|---------|-------------|--------------|---------------------|----------------------------|---------------------------|-----------------------|-----------------------|----------------------|
| 2/1/2025 | 16:45 | 123456 | RTD | F | OE | -0.0529 | 368.89 | \$39.30 | \$26.49 | \$101.73 | \$368.89 | (\$19.52) | (\$19.52) | (\$1.40) | (\$18.12) | (\$18.12) |
| 2/1/2025 | 16:45 | 123456 | RTD | F | OE | -2.7417 | 384.39 | \$39.30 | \$26.49 | \$101.73 | \$384.39 | (\$1,053.87) | (\$1,053.87) | (\$72.63) | (\$981.24) | (\$981.24) |
| 2/1/2025 | 16:45 | 123456 | RTD | F | OE | -2.7500 | 384.49 | \$39.30 | \$26.49 | \$101.73 | \$384.49 | (\$1,057.35) | (\$1,057.35) | (\$72.85) | (\$984.50) | (\$984.50) |
| 2/1/2025 | 16:45 | 123456 | RTD | F | OE | -2.8325 | 384.69 | \$39.30 | \$26.49 | \$101.73 | \$384.69 | (\$1,089.63) | (\$1,089.63) | (\$75.04) | (\$1,014.60) | (\$1,014.60) |
| 2/1/2025 | 16:45 | 123456 | RTD | F | OE | -6.1148 | 369.09 | \$39.30 | \$26.49 | \$101.73 | \$369.09 | (\$2,256.91) | (\$2,256.91) | (\$161.99) | (\$2,094.92) | (\$2,094.92) |
| 2/1/2025 | 16:50 | 123456 | FMM | F | OE | 8.0750 | 369.09 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$2,980.40 | \$821.43 | \$112.11 | \$2,868.29 | \$709.32 |
| 2/1/2025 | 16:50 | 123456 | FMM | F | OE | 2.8325 | 384.69 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$1,089.63 | \$288.14 | \$39.33 | \$1,050.31 | \$248.81 |
| 2/1/2025 | 16:50 | 123456 | FMM | F | OE | 2.7500 | 384.49 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$1,057.35 | \$279.74 | \$38.18 | \$1,019.17 | \$241.57 |
| 2/1/2025 | 16:50 | 123456 | FMM | F | OE | 2.7417 | 384.39 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$1,053.87 | \$278.90 | \$38.06 | \$1,015.81 | \$240.83 |
| 2/1/2025 | 16:50 | 123456 | FMM | F | OE | 0.1667 | 368.89 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$61.48 | \$16.95 | \$2.31 | \$59.17 | \$14.64 |
| 2/1/2025 | 16:50 | 123456 | FMM | F | OE | 0.0833 | 368.99 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$30.75 | \$8.48 | \$1.16 | \$29.59 | \$7.32 |
| 2/1/2025 | 16:50 | 123456 | FMM | F | OE | 0.0083 | 369.19 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$3.08 | \$0.85 | \$0.12 | \$2.96 | \$0.73 |
| 2/1/2025 | 16:50 | 123456 | FMM | F | OE | 0.0083 | 376.79 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$3.14 | \$0.85 | \$0.12 | \$3.02 | \$0.73 |
| 2/1/2025 | 16:50 | 123456 | RTD | F | OE | -0.0083 | 369.19 | \$39.30 | \$25.59 | \$101.73 | \$369.19 | (\$3.05) | (\$3.05) | (\$0.21) | (\$2.84) | (\$2.84) |
| 2/1/2025 | 16:50 | 123456 | RTD | F | OE | -0.0083 | 376.79 | \$39.30 | \$25.59 | \$101.73 | \$376.79 | (\$3.12) | (\$3.12) | (\$0.21) | (\$2.91) | (\$2.91) |
| 2/1/2025 | 16:50 | 123456 | RTD | F | OE | -0.0278 | 368.99 | \$39.30 | \$25.59 | \$101.73 | \$368.99 | (\$10.25) | (\$10.25) | (\$0.71) | (\$9.54) | (\$9.54) |
| 2/1/2025 | 16:50 | 123456 | RTD | F | OE | -2.7413 | 384.39 | \$39.30 | \$25.59 | \$101.73 | \$384.39 | (\$1,053.71) | (\$1,053.71) | (\$70.16) | (\$983.55) | (\$983.55) |
| 2/1/2025 | 16:50 | 123456 | RTD | F | OE | -2.7500 | 384.49 | \$39.30 | \$25.59 | \$101.73 | \$384.49 | (\$1,057.35) | (\$1,057.35) | (\$70.38) | (\$986.97) | (\$986.97) |
| 2/1/2025 | 16:50 | 123456 | RTD | F | OE | -2.8325 | 384.69 | \$39.30 | \$25.59 | \$101.73 | \$384.69 | (\$1,089.63) | (\$1,089.63) | (\$72.49) | (\$1,017.14) | (\$1,017.14) |
| 2/1/2025 | 16:50 | 123456 | RTD | F | OE | -6.0235 | 369.09 | \$39.30 | \$25.59 | \$101.73 | \$369.09 | (\$2,223.20) | (\$2,223.20) | (\$154.15) | (\$2,069.04) | (\$2,069.04) |
| 2/1/2025 | 16:55 | 123456 | FMM | F | OE | 8.0750 | 369.09 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$2,980.40 | \$821.43 | \$112.11 | \$2,868.29 | \$709.32 |

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| | | Document Version: | 1 |
| Unwarranted Storage Bid-Cost Recovery Business Requirements Specification - Planning | | Date Created: | 3/4/2025 |

| Trade Date | Time Interval | Resource ID | Market Type | Energy Bid Type | Energy Type Code | MWH | Bid Price (Original) | DA LMP | FMM/RTD LMP | RT-DEB Price | Bid Price (Revised) | Energy Bid Cost (Original) | Energy Bid Cost (Revised) | Energy Market Revenue | Net Amount (Original) | Net Amount (Revised) |
|------------|---------------|-------------|-------------|-----------------|------------------|---------|----------------------|---------|-------------|--------------|---------------------|----------------------------|---------------------------|-----------------------|-----------------------|----------------------|
| 2/1/2025 | 16:55 | 123456 | FMM | F | OE | 2.8325 | 384.69 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$1,089.63 | \$288.14 | \$39.33 | \$1,050.31 | \$248.81 |
| 2/1/2025 | 16:55 | 123456 | FMM | F | OE | 2.7500 | 384.49 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$1,057.35 | \$279.74 | \$38.18 | \$1,019.17 | \$241.57 |
| 2/1/2025 | 16:55 | 123456 | FMM | F | OE | 2.7417 | 384.39 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$1,053.87 | \$278.90 | \$38.06 | \$1,015.81 | \$240.83 |
| 2/1/2025 | 16:55 | 123456 | FMM | F | OE | 0.1667 | 368.89 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$61.48 | \$16.95 | \$2.31 | \$59.17 | \$14.64 |
| 2/1/2025 | 16:55 | 123456 | FMM | F | OE | 0.0833 | 368.99 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$30.75 | \$8.48 | \$1.16 | \$29.59 | \$7.32 |
| 2/1/2025 | 16:55 | 123456 | FMM | F | OE | 0.0083 | 376.79 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$3.14 | \$0.85 | \$0.12 | \$3.02 | \$0.73 |
| 2/1/2025 | 16:55 | 123456 | FMM | F | OE | 0.0083 | 369.19 | \$39.30 | \$13.88 | \$101.73 | \$101.73 | \$3.08 | \$0.85 | \$0.12 | \$2.96 | \$0.73 |
| 2/1/2025 | 16:55 | 123456 | RTD | F | OE | -0.4367 | 384.39 | \$39.30 | \$23.71 | \$101.73 | \$384.39 | (\$167.88) | (\$167.88) | (\$10.35) | (\$157.52) | (\$157.52) |
| 2/1/2025 | 16:55 | 123456 | RTD | F | OE | -1.3507 | 384.49 | \$39.30 | \$23.71 | \$101.73 | \$384.49 | (\$519.32) | (\$519.32) | (\$32.02) | (\$487.30) | (\$487.30) |
| 2/1/2025 | 16:55 | 123456 | RTD | F | OE | -2.3472 | 384.69 | \$39.30 | \$23.71 | \$101.73 | \$384.69 | (\$902.93) | (\$902.93) | (\$55.65) | (\$847.28) | (\$847.28) |