2.3.1 Day-Ahead Market Processes

Bidding for the Day-Ahead Market (DAM) closes at 1000 hours on the day before the Trading Day and consists of a sequence of processes that determine the hourly Market Clearing Prices for Energy (including physical and Virtual Bids) and AS, as well as the incremental procurement in RUC while also mitigating Bids from to address non-competitive constraints determining RMR dispatch levels to meet local reliability requirements and mitigating 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 needs. The CAISO ensures that Virtual Bids (Supply and Demand) are not passed from the IFM to RUC or RTM.

RMR dispatches to meet local reliability requirements are determined manually prior to the start of the market and are incorporated as constraints into the market processes. In addition to that, RMR dispatch requirement for Condition 1 RMR resources can also be determined by the MPM process as described further in section 6.1.7.1. The extent Condition 2 RMR units are considered in the market, they are considered based on their cost-based RMR Proxy Bids.

TTC, OTC, etc. pertain to all interties, and to significant corridors such as Path 15 and Path 26. The OTC is updated for the DAM and RTM as needed. The details of OTC calculation and timeline are provided in Section 5.2. OTC reduction cutoff 0900 hours. However uprates are allowed up to 1000 hours.

The prices resulting from these processes are used for the Day-Ahead Market Settlement. The timeline for the Integrated Forward Market is shown in Exhibit 6. The following subsections present an overview of these processes for the Trading Day. Further details are presented in Section 6, Day-Ahead Market Processes.

2.3.1.1 Day-Ahead Market Power Mitigation & Reliability Requirements Determination (MPM-RRD)

MPM-RRD is the first market process in the Day-Ahead Market, which consists of two parts the “MPM” and the “RRD.” The MPM and RRD are combined processes that run simultaneously. The MPM function consists of a test to determine which Bids to mitigate Bids to address non-competitive constraints are subject to mitigation for local market power based on specified criteria. The details of the test are provided in Section 1.1.6.5.1. If the test fails, the MPM mitigates the affected Bids for the relevant Trading Hours of the Trading Day. The RRD function determines the minimal and most efficient schedule of Reliability Must-Run Generation to address local reliability in meeting the CAISO Forecast of CAISO Demand for the next Trading Day, and mitigates the submitted Energy Bids from RMR units if they are called to operate under a RMR contract. The MPM and RRD functions are performed simultaneously prior to the Integrated Forward Market process. Please refer to Section 6.5, Market Power Mitigation & Reliability Requirement Determination for a more detailed description of this process.
2.3.1.2 Integrated Forward Market

The IFM is a market for trading physical and virtual Energy and Ancillary Services for each Trading Hour of the next Trading Day. IFM uses Clean Bids from SIBR\textsuperscript{1} (i.e., that pass the SIBR validation rules) and the mitigated Energy Bids to the extent necessary after MPM-RRD in order to clear physical and Virtual Supply and physical and Virtual Demand Bids and to procure AS to meet one-hundred percent of CAISO’s AS requirements at least cost over the Trading Day. Refer to Section 6.6, Integrated Forward Market, for further details.

2.3.2 Real-Time Processes

Bidding for the Real-Time Market (RTM) and HASP closes 75 minutes before the beginning of each Trading Hour (which in turn begins at the top of each hour). A sequence of processes determines the Market Clearing Prices for each Trading Hour. The prices resulting from these processes are used for the HASP and Real-Time Market Settlement.

Virtual Bids and Awards are not considered in the RTM.

The following subsections present an overview of these processes for the Trading Hour. Further details are presented in Section 7, Real-Time Processes.

2.3.2.1 Market Power Mitigation \\ Reliability Requirements Determination

The MPM-RRD functions for the RTM and the HASP are analogous to the same functions that are-is performed for the DAM. For Real-Time, the MPM-RRD functions cover the Trading Hour and the resultant mitigated Bids are then used by the remaining Real-Time processes including HASP and the RTM. Refer to Section 7.4, MPM-RRD for Real-Time.

The Day-Ahead Market and the HASP and Real-Time Market require separate Bid submissions. MPM re-evaluates all Bids in HASP/RTM.

Mitigation in the DAM is a separate process from Real-Time mitigation. As a result, a Bid could be mitigated in the DAM but not be mitigated in the RTM, and vice versa.

2.3.2.2 Hour-Ahead Scheduling Process

The Hour-Ahead Scheduling Process (HASP) is a process for scheduling Energy and AS based on the Bids submitted into the HASP from Scheduling Points. Refer to Section 7.5, Hour-Ahead Scheduling Process.

\textsuperscript{1} This process is described in more detail in the *BPM for Market Instruments*, Section 8.
HASP is performed immediately after the Real-Time MPM-RRD. HASP produces: (1) HASP Advisory Schedules and advisory AS Awards for internal Generating Units and Dynamic System Resources; (2) final and financially binding HASP AS Awards for Non-Dynamic System Resources; and (3) final and financially binding HASP Intertie Schedules for SCs. All HASP Schedules for the Trading Hour are published approximately 45 minutes before the start of each Trading Hour.

2.4.5 Scheduling Coordinator Responsibilities

This section is based on CAISO Tariff Section 4.5.2.2, SC Representing Convergence Bidding Entities, Section 4.5.3, Responsibilities of a Scheduling Coordinator and Section 4.5.4, Operations of a Scheduling Coordinator

Each Scheduling Coordinator (SC) is responsible for the following. Additional information is presented in the BPM for Scheduling Coordinator Application & Responsibilities:

- Obligation to pay CAISO’s charges in accordance with the CAISO Tariff
- Depending on the Markets in which the SC wants to participate, submit Bids in the Day-Ahead Market and HASP for the HASP and the Real-Time Market in relation to Market Participants for which it serves as an SC; SCs provide CAISO with intertie schedules prepared in accordance with all NERC, WECC, and CAISO requirements, including providing e-Tags for all transactions
- Coordinating and allocating modifications in Demand and exports and Generation and imports at the direction of CAISO in accordance with the CAISO Tariff Section 4.5.3.
- Submitting any applicable Inter-SC Trades that the Market Participants intend to have settled through the CAISO Markets, pursuant to the CAISO Tariff
- Tracking and settling all intermediate trades, including bilateral transactions and Inter-SC Trades, among the entities for which it serves as SC
- Providing Ancillary Services in accordance with the CAISO Tariff
• Submitting to CAISO the forecasted weekly peak Demand on the CAISO Controlled Grid and the forecasted Generation capacity. The forecasts cover a period of 12 months on a rolling basis.

• Complying with all CAISO Business Practice Manuals and ensuring compliance by each of the Market Participants which it represents with all applicable provisions of the Business Practice Manuals.

• Identifying any Interruptible Imports included in its Bids or Inter-SC Trades.

• Submitting Schedules for Participating Intermittent Resources consistent with the CAISO Tariff.

• Submitting Bids so that any service provided in accordance with such Bids does not violate environmental constraints, operating permits or applicable law. All submitted Bids must reflect resource limitations and other constraints as such are required to be reported to the CAISO Control Center.

• Other than a Scheduling Coordinator that engages solely in financial activity (i.e. Virtual Bidding on behalf of Convergence Bidding Entities and Inter-SC Trades), each SC operates and maintains a 24-hour, seven days per week, scheduling center. Each SC designate a senior member of staff as its scheduling center manager who is responsible for operational communications with CAISO and who has sufficient authority to commit and bind the SC.

• Scheduling Coordinator is responsible for providing GDF’s for Aggregate Generating Resources. Default GDFs will be used in absence of this data. These default GDF’s are derived from the State Estimator and they are maintained in the GDF Library.

• The Scheduling Coordinator is responsible for registering and bidding resources as Multi-Stage Generating Resources pursuant to Section 27.8 of the CAISO Tariff. Information on registration of Multi-Stage Generating Resources is available at: http://www.caiso.com/27bd/27bdc1ce2f430.html

• SCs submit Bids for imports of Energy and Ancillary Services for which associated Energy is delivered from Dynamic System Resources located outside of the CAISO Balancing Authority Area, provided that:
  - Such dynamic scheduling is technically feasible and consistent with all applicable NERC and WECC criteria and policies.
All operating, technical, and business requirements for dynamic scheduling functionality, as posted in standards on the CAISO Website\(^2\), are satisfied.

The SC for the dynamically scheduled System Resource executes an agreement with CAISO for the operation of dynamic scheduling functionality.

All affected host and intermediary Balancing Authority Areas each execute with CAISO an Interconnected Balancing Authority Area Operating Agreement or special operating agreement related to the operation of dynamic scheduling functionality.

SCs need to register Proxy Demand Resources (PDR) resources with CAISO.

SCs must submit GDFs with the bids for PDRs with dynamic GDFs. For PDRs with static GDFs, SCs are expected to provide GDFs during registration.

SCs need to register with the CAISO to submit Virtual Bids on behalf of registered Convergence Bidding Entities.

SCs need to identify which Convergence Bidding Entities (CBEs) it will represent (including itself, if applicable). SC/CBE relationships will be modeled in the Master File for the basis of Position Limits.

The parent SC (i.e. corporate or governmental entity contracting with the CAISO to participate in the CAISO Markets) must ensure collateral is provided sufficient to cover simultaneous CRR and Virtual Bid credit exposure as well as all other market activity.

SCs need to submit information regarding affiliates that participate in the CAISO Markets and information concerning any Resource Control Agreements on forms and at times specified in the Business Practice Manual for Scheduling Coordinator Certification & Termination and Convergence Bidding Entity Registration & Termination. This information is needed for proper operation of the dynamic competitive path assessment.

\(^2\) The relevant information can be found at: [http://www.caiso.com/docs/09003a6080/2f/c8/09003a60802fc882ex.html](http://www.caiso.com/docs/09003a6080/2f/c8/09003a60802fc882ex.html)
6. **Day-Ahead Market Processes**

Welcome to the *Day-Ahead Market Processes* section of the CAISO *BPM for Market Operations*. In this section, you will find the following information:

- How CAISO determines and applies Market Power Mitigation and Reliability Requirement Determination processes
- How CAISO clears the Integrated Forward Market
- How CAISO performs the Residual Unit Commitment process

A timeline and data flow diagram is included for the Day-Ahead Market Processes, as shown in Exhibit 6-1, Day-Ahead Market Timeline.

6.2 **Day-Ahead Market Timeline**

The detailed Day-Ahead Market timeline is shown by Exhibit 6-1, showing the execution of the principal application functions, i.e., MPM, RRD, IFM, and RUC. Each of these applications is described in detail in later sections of this BPM.

Exhibit 6-1: Day-Ahead Market Timeline
6.3 Scheduling Coordinator Activities

The SCs are the entities that interact directly with the CAISO Markets. They are responsible for submitting Bids into the CAISO Markets and to respond to the Dispatch Instructions and Unit Commitment Instructions of CAISO, resulting from the CAISO Markets.

6.3.1 Submit Bids

SCs submit Bids (for Supply, Virtual Supply, Demand, and Virtual Demand) for each resource to be used in DAM. DAM includes the **MPM-RRD**, the IFM and RUC. SCs may submit Bids for DAM as early as seven days ahead of the targeted Trading Day and up to Market Close of DAM for the target Trading Day. CAISO validates all Bids submitted to DAM, pursuant to the procedures set forth in Section 30.7 of the CAISO Tariff. In the case of Virtual Bids (Supply and Demand), credit checks are performed against the Parent SC’s (which provides financial collateral for itself and subordinate SCs) available credit limit prior to passing the Virtual Bids to the Day-Ahead Market.

SCs must submit Bids for RA Capacity into the IFM and the RUC process as required in Section 40 of the CAISO Tariff. SC’s obligations to submit bids for RA Capacity are described in detail in the BPM for Reliability Requirements.

To the extent that the SC wants to participate in any of the following markets, the following information must be submitted by the SCs before Market Close in order to participate in DAM:

- Energy Bids (Supply and Demand)
Ancillary Services Bids
RUC Availability Bids
Self-Schedules
Ancillary Services self-provision
Virtual Energy Bids (Virtual Supply, and Virtual Demand)

Further details are given in the *BPM for Market Instruments*, Sections 5, 6 and 7

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6.4.5 Execute Day-Ahead Market Applications

The following Day-Ahead applications are executed by CAISO after the Market Closes:

- MPM-RRD
- IFM
- RUC

6.4.6 Publish Reports to Scheduling Coordinators

The following is a summary of the Day-Ahead reports available to SCs for online viewing after the DAM has completed its execution:\(^3\):

- **Day-Ahead Generation Market Results** – Schedules of all generating resources.
- **Day-Ahead Load Market Results** – Schedules of both Participating Loads and Non-Participating Loads from the DAM.
- **Convergence Bid Clearing Results** – Virtual Supply Awards and Virtual Demand Awards from the IFM.
- **Day-Ahead RUC Capacity** – Incremental capacity amount committed or scheduled in the RUC, above the Day-Ahead Schedule.
- **Day-Ahead Import/Export Schedules** – Import and export Schedules from the DAM.

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\(^3\) Note: the SC’s confidential information is available only to the SC.
Day-Ahead Start-Up & Shutdown Instructions – Commitment instructions of all resources from the DAM.

Day-Ahead Ancillary Services Awards from accepted Bids and qualified Self-Provision – Awards for AS MW quantity, by AS type and resource from the DAM.

Day-Ahead MPM Results – Information about the “Mitigated” Bid that is used if the original Bid is modified in the MPM process. In addition the following MPM results will be published for informational purposes: LMPs at all PNodes and Apnodes with market resources associated with physical bids; shadow prices for all binding constraints; competitive path determination for all binding constraints; and reference bus identification.

Non-Participant Price Curves – Information on the Default Energy Bids supplied by an independent entity used in MPM. Day-Ahead Inter-SC Trades – Inter-SC Trade schedules for both Inter-SC Trades at Aggregate Pricing Nodes and Physical Trades, for both Inter-SC Trades of IFM Load Uplift Obligation and Ancillary Services from the DAM.

6.5 **Local Market Power Mitigation & Reliability Requirement Determination**

The market power mitigation process is to identify under which scheduling coordinators can exercise local market power in circumstances where there are insufficient resources to rely on competition to mitigate constraints based on market bids. In the absence of sufficient resources to rely on competition, scheduling coordinators could potentially manipulate the energy price in its local area by economically withholding supply. Any scheduling coordinators that are identified through this process will be subject to bid mitigation.

The MPM process will consist of a single market optimization run in which all modeled transmission constraints are enforced. It will utilize the same market optimization engine as used in the CAISO’s IFM and RUC. The MPM-RRD process accomplishes the following objectives:

- Market Power Mitigation
The MPM-RRD process includes the following steps:

- **Step (1):** CAISO Operator pre-specifies certain RMR requirements such as for Voltage Support that may not be modeled in the IFM.

- **Step (2):** Competitive Constraint Run (CCR) — the Reliability and Market Power Mitigation with only competitive path constraints enforced.

- **Step (3):** All Constraint Run (ACR) — the Reliability and Market Power Mitigation with all constraints enforced.

- **Step (4):** Reliability Requirement Determination and Bid Mitigation.

- The MPM-RRD process, as described here, applies to both DAM and HASP/RTM. Specific information for HASP/RTM is given in Section 7.4, MPM-RRD for Real-Time. Some characteristics of DAM LMPM are summarized as follows:

  - The LMPM-RRD process occurs in DAM immediately after the DAM close of bidding at 1000 hours, after by when all Bids and Self-Schedules are submitted by the SCs and validated by CAISO.

  - The Time Horizon for LMPM in DAM is 24 hours (23 and 25 respectively on Daylight Saving transition days).

  - Each market interval for LMPM in DAM is one hour.

  - The time resolution of the CAISO Forecast of CAISO Demand in DAM is hourly.

  - Each market interval for MPM-RRD in DAM is one hour.

  - The Energy Bid mitigation in DAM is performed on an hourly basis.

  - Bids on behalf of Demand Response Resources (PDRs, RDRR’s) and Virtual Bids are not considered in the LMPM process as part of the power balance equation; however these bids are not subject to mitigation.
Multi-Stage Generating Resources will be subject to the market power mitigation procedures described in Section 31.2 of the CAISO Tariff at the MSG Configuration basis as opposed to the overall plant level.

The Full Network Model does not fully model network elements such as reactive power, stability limits and usage limitations. The CAISO Operator pre-specifies certain RMR requirements because certain RMR resources are needed for reasons that cannot be determined automatically by SCUC, such as Voltage Support, and certain RMR resources are saved for later use due to reasons that cannot be modeled accurately by the SCUC, such as usage limit. Reliability processes are further detailed in the BPM for Reliability Requirements.

For RMR resources located in the San Diego Air Quality Control Basin, the CAISO may either exclude RMR resources with air emissions limitations from a particular DAM run or may establish an operating limit constraint for the resource’s operating range to manage the usage limitations over the year consistent with Schedule P of the RMR Contract. The determination to activate such constraints is evaluated by the CAISO Grid Operator based on anticipated RMR requirements for the RMR Contract year. If a use-limited RMR resource is excluded from a DAM MPM-RRD solution, the CAISO Operator may pre-specify such an RMR resource prior to DAM in a similar way in which RMR dispatch from voltage and stability constraints may be pre-specified prior to the DAM MPM-RRD pre-IFM runs.

The CAISO Operator has the opportunity to review results from the MPM-RRD run and if necessary to make adjustments to the RMR dispatch of use-limited RMR resources. The adjustments may include not committing a recommended RMR resource and/or substituting the RMR commitment with another RMR resource.

The MPM-RRD runs optimally (using the same SCUC software as for IFM) then commits and dispatches resources as if procuring Energy and Ancillary Services to meet 100% of CAISO Forecast of CAISO Demand and AS requirements.

6.5.1 Decomposition method

The MPM method is referred as the locational marginal price decomposition method (or LMP decomposition method). It consists of a single market optimization run in which all modeled transmission constraints are enforced. Then, each LMP in the market will be decomposed into four components: (1) the energy component; (2) the loss component; (3) the competitive congestion component; and (4) the non-competitive congestion component. For location i:
Where:

EC stands for the energy component,
LC stands for the loss component,
CC stands for the competitive constraint congestion component (Competitive LMP), and;
NC stands for the non-competitive constraint congestion component.

Under the LMP decomposition method, a positive non-competitive congestion component indicates the potential of local market power. The non-competitive congestion component of each LMP will be calculated as the sum over all non-competitive constraints of the product of the constraint shadow price and the corresponding shift factor.

In order for the non-competitive congestion component to be an accurate indicator of local market power, the reference bus that these shift factors relate to should be at a location that is least susceptible to the exercise of local market power. The CAISO selects as the reference bus the Midway 500kV bus when flow on Path 26 is north to south and the Vincent 500kV bus when flow on Path 26 is south to north. The Midway and Vincent 500kV buses are excellent choices for LMPM purpose because they are located on the backbone of the CAISO’s transmission system near the center of the California transmission grid with sufficient generation and roughly half the system load on each side. Therefore, these buses are very competitive locations, and are least likely to be impacted by the exercise of local market power.

Every resource with the LMP non-competitive congestion component greater than the Mitigation Threshold Price (currently set at zero) is subject to mitigation. Bids from any such resources will be mitigated downward to the higher of the resource’s Default Energy Bid, or the “competitive LMP” at the resource’s location, which is the LMP established in the LMPM run minus the non-competitive congestion component thereof (competitive LMP = ).

Only competitive path constraints are enforced in the CCR, and all network constraints modeled in the FNM are enforced in the ACR. Comparing the dispatch levels between the CCR and ACR runs determines RMR requirements and identifies the resources subject to Local Market Power Mitigation.

If a resource is incremented between CCR and ACR, that resource is mitigated per the market power mitigation processes. The incremental portion of their Bid is mitigated to the resource’s default Bid, subject to monotonic rules. Resources that are mitigated greater than 80% of the time are considered Frequently Mitigated Units. This process is described in more detail in Section 6.5.5 below.

RMR requirements that are needed to resolve Congestion in the ACR are determined as part of the MPM-RRD run. Additional RMR requirements needed as a result of system stability or a
voltage constraint are determined using procedural methods based on the CAISO Forecast of CAISO Demand in a Local Reliability Area. These RMR requirements are manually entered as resource-specific constraints in MPM/IFM. The relevant RMR Units are dispatched manually through RMR Dispatch Notice.

Similar to all other Generating Units and Dynamic Resource-Specific System Resources in the CAISO markets, Multi-Stage Generating Resources will be subject to the market power mitigation procedures described in Section 31.2 of the CAISO Tariff at the MSG Configuration basis as opposed to the overall plant level. The general MPM-RRD methodology applies to Multi-Stage Generating Resources with the following additional rules:

1. Regardless of which MSG Configuration MWs the ACR or CCR clears, if the ACR MWs are greater than the CCR MWs, the Multi-Stage Generating Resource, i.e., the entire plant, is subject to mitigation;
2. Each MSG Configuration for the resource is mitigated by comparing the configuration’s Default Energy Bid curve and clean bid curve for the bid segments above the CCR MW level for non-RMR resource, except that the CCR MWs can be from a different MSG Configuration regardless of whether the CCR MW is within the MSG Configuration’s bid spectrum or not;
3. When comparing the Default Energy Bid curve and clean bid curve, the rule of not mitigating below the CCR bid price still applies, except that the CCR bid price level can be from a different MSG Configuration;
4. All MSG Configuration-based bids, mitigated or not, pass to subsequent market runs.

Example:

The CCR cleared configuration A at 50 MW and $30. The ACR cleared configuration D at 150 MW. Configuration D bid is from 100 to 200 MW at $40 and the Default Energy Bid curve is $25 over the same range. Configuration D would get mitigated to $30, because 1) ACR MW level is compared to CCR MW level even though the CCR is from a different configuration; and 2) the $30 bid from configuration A is the effective lower limit for which a bid on any configuration can be mitigated.

To support this methodology, Default Energy Bids for Multi-Stage Generating Resources are calculated by the CAISO at the individual MSG Configuration level. The MSG resource still has the full options to elect for its Default Energy Bid calculation as described in section 6.5.4. However, for the first 90 days after a Non-Multi-Stage Generating Resource is converted to a Multi-Stage Generating Resource, only the Variable Cost Option or Negotiated Rate Option is allowed.
6.5.2 **Day-Ahead Treatment Of RMR Resources In MPM**

RMR dispatches are determined in accordance with the RMR Contract, the MPM-RRD process addressed in Sections 31 and 33 of the CAISO Tariff and through manual RMR Dispatch Notices to meet **Applicable Reliability Criteria** and local reliability requirements. To manage RMR resources within RMR Contract requirements and limitations, the CAISO may rely on manual RMR dispatches exclusively. Except as discussed in Section 6.5.1 above for RMR Units located in the San Diego Air Quality Control Basis with binding emissions constraints, RMR units operating under Condition 1 that will be manually dispatched by the CAISO for RMR services will be able to participate in the market like non-RMR Units.

CAISO notifies SCs for RMR Units of the amount and time of the Energy requirements from specific RMR Units in the Trading Day either prior to or at the same time as the Day-Ahead Schedules, AS and RUC Awards are published. This notification occurs via an RMR Dispatch Notice or a flagged RMR Dispatch in the IFM Day-Ahead Schedule.

CAISO may also issue RMR Dispatch Notices after Market Close of the DAM and through Dispatch Instructions flagged as RMR Dispatches in the Real-Time Market. The Energy to be delivered for each Trading Hour pursuant to the RMR Dispatch Notice an RMR Dispatch in the IFM or Real-Time is referred to as the “RMR Energy.” SCs may submit Bids in the DAM or the HASP for RMR Units operating under Condition 1 of the RMR Contract, in accordance with the bidding rules applicable to non-RMR Units.

A Bid submitted in the DAM ISO markets on behalf of a Condition 1 RMR Unit is deemed to be a notice of intent to substitute a Market Transaction for the amount of MWh specified in each Bid for each Trading Hour pursuant to Section 5.2 of the RMR Contract. In the event CAISO issues an RMR Dispatch Notice or an RMR Dispatch in the IFM or Real-Time Market for any Trading Hour, any MWh quantities cleared through Competitive Constraint Run of the MPM-RRD—not subject to mitigation as a result of the MPM process—are settled as a market transaction under the RMR Contract.

- **Condition 1 RMR Units** are treated similar to other Generating Units in the MPM-RRD processes. If the RMR Unit is not incremented in the ACR above the CCR schedule, then the submitted Bid curve, is used as is in the IFM run and any MWh scheduled in IFM are considered a market dispatch, not an RMR dispatch. If the Condition 1 RMR Unit is incremented in the ACR compared to the CCR schedule, then the portion of the submitted Bid curve above the CCR schedule and up to the higher of the RMR contract capacity or the upper limit of submitted Bid curve is replaced with the lower of the RMR Proxy Bid or the submitted Bid price, subject to monotonicity rules. MPM passes the final Bid curve to the IFM.
If the Condition 1 RMR Unit is not scheduled in the IFM to the ACR level determined in the pre-IFM AC run, then the ACR schedule is enforced in RUC at a high scheduling priority.

RMR Units operating under Condition 2 may not submit Bids until and unless CAISO issues an RMR Dispatch Notice or unless the resource is flagged as an RMR Dispatch in the DAM, in which case the RMR Contracts requires consideration of RMR Proxy Bids on behalf of the remaining capacity of the resource in the subsequent markets, that the RMR Owner submit a Bid in the RTM for the Trading Hours specified in the RMR Dispatch Notice or Day-Ahead Schedule, as described in CAISO-Tariff Section 41.5.1.

Condition 2 RMR Units are considered in the ACR with their RMR Proxy Bid, which is based on Schedule M of the relevant RMR Contract.

6.5.3 Competitive Path Criteria

This is based on CAISO Tariff Section 39.7.2.2.

6.5.3.1 Competitive Path Criteria for the Day Ahead Market

As part of each Day-Ahead Market MPM run, an in-line dynamic competitive/non-competitive designation calculation determines whether a constraint is non-competitive. A Transmission Constraint will be competitive by default unless the Transmission Constraint is determined to be non-competitive as part of this calculation. This will occur when the maximum available supply of counter-flow to the Transmission Constraint from all portfolios of suppliers that are not identified as potentially pivotal, plus the cleared supply of virtual counter-flow from potentially pivotal suppliers, is less than the demand for counter-flow.

6.5.3.2 Competitive Path Criteria for the HASP and Real-Time Market

A transmission Constraint is deemed competitive if no three unaffiliated suppliers are jointly pivotal in relieving Congestion on that constraint. The determination of whether or not the pivotal supplier criteria for an individual constraint are violated is assessed using the Feasibility Index described below.

Assessment of competitiveness is performed assuming various system conditions potentially including, but not limited to, season, Load, planned transmission and resource Outages. If an individual constraint fails the pivotal supplier criteria under any of these system conditions, the constraint is deemed uncompetitive for the entire year under all system conditions until a subsequent assessment deems the constraint competitive.

In general, a constraint may be an individual transmission line or a collection of lines that create distinct transmission Constraints. For purposes of the competitive assessment, the set of
Constraints that are consistent with those included in the network model, are modeled along with transmission limits enforced in the FNM.

Competitive path assessment is conducted on an annual basis. However, if there is a significant change in the transmission or Generation infrastructure, the assessment may be carried out (and the results implemented) sooner.

For process description for the competitive path assessment criteria, Refer to Attachment CB.

6.5.4 Default Energy Bids

This section is based on CAISO Tariff Section 39.7.1, Calculation of Default Energy Bids.

Default Energy Bids are calculated for on-peak hours and off-peak hours, pursuant to one of the methodologies described in this Section. The SCs for each Generating Unit owner or Participating Load must rank the following options of calculating the Default Energy Bid starting with their preferred method. The SC must provide the data necessary for determining the Variable Costs unless the Negotiated Rate Option precedes the Variable Cost Option in the rank order, in which case the SC must have a Negotiated Rate established with the Independent Entity charged with calculating the Default Energy Bid. If no rank order is specified for a Generating Unit or Participating Load, then the following default rank order is applied:

1. Variable Cost Option (see CAISO Tariff Section 39.7.1.1)
2. Negotiated Rate Option (see CAISO Tariff Section 39.7.1.3)
3. LMP Option (see CAISO Tariff Section 39.7.1.2)
4. Variable Cost Option plus Bid Adder (see CAISO Tariff Section 39.7.1.4)

The details of this calculation are described in more detail in the BPM for Market Instruments, Attachment D.

6.5.5 Bid Adder for Frequently Mitigated Units

This section is based on CAISO Tariff Section 39.8.1, Bid Adder Eligibility Criteria.

To receive a Bid Adder for Frequently Mitigated Units, a Generating Unit:

- Must have a Mitigation Frequency that is greater than 80% in the previous 12 months
- Must have run for more than 200 hours in the previous 12 months
Must not have an contract to be a Resource Adequacy Resource for its entire Maximum Net Dependable Capacity or be subject to an obligation to make capacity available under the CAISO Tariff

Additionally, the SC for the Generating Unit must agree to be subject to the Frequently Mitigated Unit Option for a Default Energy Bid. Run hours are those hours during which a Generating Unit has positive metered output. During the first 12 months after the effective date of MRTU CAISO Tariff Section 39.8.1, the Mitigation Frequency is based on a rolling 12-month combination of RMR dispatches and incremental Bids dispatched out of economic merit order to manage local Congestion from the period prior to the effective date of MRTU CAISO Tariff Section 39.8.1, which serves as a proxy for being subject to Local Market Power Mitigation, and a Generating Resource's Market Power Mitigation frequency after the effective date of MRTU CAISO Tariff Section 39.8.1.

Generating Units that received RMR dispatches and/or incremental Bids dispatched out of economic merit order to manage local Congestion in an hour prior to the effective date of MRTU have that hour counted as a mitigated hour in their Mitigation Frequency. After the first 12 months from the effective date of MRTU, the Mitigation Frequency is based entirely on a Generating Unit mitigated under the MPM-RRD process described in Sections 31 and 33 of the MRTU CAISO Tariff.

6.6 Integrated Forward Market

This section is based on CAISO Tariff Section 31.3, Integrated Forward Market.

After the MPM-RRD and prior to RUC, CAISO performs the IFM. The IFM performs Unit Commitment and Congestion Management, clears Virtual Bids submitted by SCs and clears the Energy Bids as modified in the MPM-RRD, taking into account transmission limits, inter-temporal and other operating constraints, and ensures that adequate Ancillary Services are procured in the CAISO Balancing Authority Area based on 100% of the CAISO Forecast of CAISO Demand.

6.6.5 Adjustment of Non-Priced Quantities in IFM

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

All Self-Schedules are respected by SCUC to the maximum extent possible and are protected from curtailment in the Congestion Management process to the extent that there are Economic Bids that can relieve Congestion. If all Effective Economic Bids in the IFM are exhausted,
resource Self-Schedules between the resource’s Minimum Load and the first Energy level of the first Energy Bid point is subject to adjustments based on the scheduling priorities listed in Section 6.6.5.3.

Through this process, imports and exports may be reduced to zero, Demand Schedules may be reduced to zero, and Price Taker Demand (LAP Load) may be reduced. However, prior to reducing Load the following process is used to ensure that LAP Load is not reduced unnecessarily.

**Market Parameter Values**

This section provides the specific value settings for a set of ISO market parameters that are used for adjusting non-priced quantities in the market optimizations.

The parameter values are organized into three sections by market process: the Integrated Forward Market (IFM), the Residual Unit Commitment (RUC), and the Real Time Market (RTM). The parameters in these tables are also known in the jargon of mathematical optimization as “penalty factors,” which are associated with constraints on the optimization and which govern the conditions under which constraints may be relaxed and the setting of market prices when any constraints are relaxed. Importantly, the magnitude of the penalty factor values in the tables for each market reflect the hierarchical priority order in which the associated constraint may be relaxed in that market by the market software.

**Integrated Forward Market (IFM) Parameter Values**

<table>
<thead>
<tr>
<th>Penalty Price Description</th>
<th>Scheduling Run Value</th>
<th>Pricing Run Value</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market energy balance</td>
<td>6500</td>
<td>1000</td>
<td>Market energy balance is the requirement that total supply equal the sum of total demand plus losses for the entire system. In the IFM energy balance reflects the clearing of bid-in supply and demand; in the MPM component of the DAM it reflects the scheduling of bid-in supply against the ISO demand forecast.</td>
</tr>
</tbody>
</table>

**6.7.2.6 Day-Ahead Schedules for Supply**

Prior to determining the quantity of additional capacity that needs to be available, CAISO introduces and honors the resource commitments and associated Supply Schedules that have

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4 Penalty values are negatively valued for supply reduction and positively valued for demand reduction.
cleared the IFM. However, after potential RUC zone specific procurement target adjustments are factored into CFCD, the resulting distribution of Demand on individual CNodes for RUC may be different from that used in the IFM. Because of this, RUC Capacity may be procured from resources in a RUC zone where the CFCD had been increased relative to the IFM scheduled Demand, even when the total system wide Day-Ahead Schedules are equal to or greater than the total system wide RUC CFCD. As a result of this, IFM resource Schedules entered into the RUC optimization as high priority Self-Schedules (essentially fixed resources) may need to be reduced. For some resources, this may result in a RUC Schedule that is lower than the Day-Ahead Schedule in order to satisfy the SCUC power balance constraint, which effectively means that the Day-Ahead Schedule of the resource was reduced to accommodate procurement of RUC Capacity from another resource. Note that this reduction of the Day-Ahead Schedule in RUC has no bearing on the settlement of the original Day-Ahead Schedule.

RMR Generation Schedules that have been determined in the pre-IFM, MPM-RRD process are also honored in the RUC process. Therefore, if an RMR resource dispatched to 200 MW in the pre-IFM, MPM-RRD process, but only clears the IFM at 100 MW, the RMR resource is scheduled at 200 MW as input to RUC.

### 6.7.2.8.1 Capacity Constraints

The capacity constraints ensure that sufficient RUC Capacity is procured to meet the CFCD. This is accomplished by enforcing the Power balance between the total Supply (which includes IFM Energy Schedules, RMR Generation Schedules that result from MPM-RRD and RUC Capacity) and the total Demand (which includes IFM export Schedules and Demand Forecast.) The CFCD can be adjusted to increase the RUC target if there is AS Bid insufficiency in IFM, as described in Section Error! Reference source not found.6.7.2.3 above.

### 7.2.1 Submit Bids

This section is based on CAISO Tariff Section 33.1, Submission of Bids for the HASP and RTM.

SCs may submit Bids that are used for the HASP and the RTM processes starting from the time Day-Ahead Schedules are posted until 75 minutes prior to each applicable Trading Hour in the
Trading Day. The rules for submitted Bids specified in Section 30 of the CAISO Tariff apply to Bids submitted to the HASP and RTM.

After the bidding closes for the HASP and the RTM for a Trading Hour, CAISO performs a validation process consistent with the provisions set forth in Section 30.7 of the CAISO Tariff, and described in more detail in the *BPM for Market Instruments, Section 8.*

Bids submitted to the HASP and the RTM to supply Energy and Ancillary Services are considered in the various HASP and RTM processes, including the MPM-RRD process, the HASP, the STUC, the RTUC, the RTED, the RTCD, and the RTMD.

CAISO allows HASP Self-Scheduled firm exports to the extent the firm export is being physically sourced from a resource that is not obligated to serve CAISO Demand (i.e., capacity being committed to Resource Adequacy, RUC Award, or RMR). Validation and accommodation for such Self-Scheduled firm exports requires a manual process.

### 7.3.3 Execute Real-Time Applications

The following Real-Time applications are executed by CAISO after bidding for the market closes:

- **MPM-RRD (hourly)**
- **HASP(hourly) – incorporates RTUC #1**
- **STUC (hourly) – incorporates RTUC #2**
- **RTUC (every 15-min) – #3 & #4**
- **RTED (every 5 minutes)**
- **RTCD (on demand)**
- **RTMD (on demand)**

The table shown by Exhibit 7-2 summarizes the execution of these applications.

### Exhibit 6-2: Real-Time Applications

<table>
<thead>
<tr>
<th>Application</th>
<th>Periodicity</th>
<th>Interval</th>
<th>Time Horizon</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPM-RRD</td>
<td>Hourly Beginning at T-67.5’</td>
<td>15-min</td>
<td>105 min</td>
<td>Market Power Mitigation and Reliability Requirement Determination for RTM Bids submitted at T-75’ for the Trading Hour from T to T+60’. MPM-RRD for the Time Horizon from T minutes to T+60’</td>
</tr>
<tr>
<td>Application</td>
<td>Periodicity</td>
<td>Interval</td>
<td>Time Horizon</td>
<td>Task</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
<td>----------</td>
<td>--------------</td>
<td>------</td>
</tr>
<tr>
<td>HASP See Note 1</td>
<td>Hourly Beginning after MPM-RRD</td>
<td>15-min</td>
<td>105 min</td>
<td>Hourly pre-dispatch for Non-Dynamic System Resources for the Trading Hour from T to T+60’. Advisory 15-min dispatch for internal resources for the Trading Hour from T to T+60’. Advisory 15-min AS Awards for internal resources for the Trading Hour from T to T+60’. Binding hourly AS Awards for Non-Dynamic System Resources for the Trading Hour from T to T+60’.</td>
</tr>
</tbody>
</table>

### 7.4 MPM-RRD for Real-Time

This section is based on CAISO Tariff Section 33.4, MPM-RRD for the HASP and the RTM.

After the Market Close of HASP and RTM, after CAISO validates the Bids pursuant to Section 30.7 (of the CAISO Tariff), and prior to running the HASP optimization, CAISO conducts the MPM-RRD process, the results of which are utilized in the HASP optimization and all RTM processes for the Trading Hour.

The features of the RTM MPM-RRD are as follows:

- The MPM-RRD in RTM occurs immediately after the RTM close of bidding at 75’ before the Trading Hour.
- The Time Horizon for MPM-RRD in RTM is 60 minutes (i.e., from T to T+60’).
- The CAISO Forecast of CAISO Demand time resolution in RTM is 15 minutes.
- Each market interval for MPM-RRD in RTM is 15 minutes.
- The Energy Bid mitigation in the RTM is first performed on a 15-minute basis; and then the four 15-minute mitigated Bids for each resource are synthesized to produce the hourly mitigated Bid as follows:

  A single mitigated Bid for the entire Trading Hour is calculated using the minimum Bid price of the four mitigated Bid curves at each Bid quantity level. The Bids are mitigated only for the Bid quantities that are above the minimum quantity cleared in the Competitive Constraint Run (CCR) across all four 15-minute intervals.
For both Condition 1 and Condition 2 RMR Units, when mitigation is triggered, a single RMR Proxy Bid for the entire Trading Hour is calculated using the same methodology described as for non-RMR Units.

- Virtual Bids and Bids on behalf of Demand Response Resource PDR resources are not considered in MPM process as part of the power balance equation; however the bids are not subject to mitigation.

If a Condition 2 RMR Unit is issued a Manual RMR Dispatch by the CAISO, then RMR Proxy Bids for all of the unit’s Maximum Net Dependable Capacity will be considered in the MPM process.

For a Condition 1 RMR Unit that has submitted Bids and has not been issued a Manual RMR Dispatch, to the extent that the non-competitive Congestion component of an LMP calculated in the MPM process is greater than zero, and that MPM process dispatches a Condition 1 RMR Unit at a level such that some portion of its market Bid exceeds the Competitive LMP at the RMR Unit’s Location, the resource will be flagged as an RMR dispatch if it is dispatched at a level higher than the dispatch level determined by the Competitive LMP.

For a Condition 1 RMR Unit, if the dispatch level in the All Constraints Run (ACR) is greater than the dispatch level in the CCR, and for a Condition 2 RMR Unit that is dispatched in the ACR, the resource is flagged as an RMR Dispatch in the RTM and constitutes a Dispatch notice pursuant to the RMR Contract.

Refer to section 6.5 for details on the MPM process.

7.9 Real-Time Contingency Dispatch

This section is based on CAISO Tariff Section 34.3.2, Real-Time Contingency Dispatch.

The Real-Time Contingency Dispatch (RTCD) mode of operation is run in response to a significant Contingency event, such that waiting until the next normal RTED run is not adequate and/or Operating Reserve identified as Contingency Only need to be activated in response to the event. The CAISO Operator may activate the Operating Reserve identified as Contingency Only either on a resource specific basis or for all such resources.
When activating Contingency Only reserves in RTCD, the original Energy Bids associated with the resources providing Operating Reserve are used for the RTCD. (Section 34.3.2 of the CAISO Tariff) In this case, Dispatch and pricing will be based on original submitted Energy Bids as mitigated by MPM-RRD. If no Contingency event has occurred but CAISO has run out of Economic Bids, the CAISO may dispatch Contingency Only resources in RTED. The RTED will dispatch such resources using Energy Bid cap as provided in Section 39.6.1.1 and will set prices accordingly.