

5. Energy Bids

5.1.1 Day-Ahead Economic Bids for Supply

5.1.1.1.4 Energy Bid Curve

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

The Energy Bid Curve component contains:

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

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

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

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

Segment	Operating Level (MW)	Energy Price \$/MWh
	500	75

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

The Energy Bid Curve must be monotonically increasing. Separate Energy Bid Curves are submitted for each Trading Hour of the Trading Day.

5.1.1.2.1 Ramp Rate Component

SCs can submit three different types of Ramp Rate information.

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

Operational Ramp Rate (Required if submitting Economic Bid for Supply) – The Operational Ramp Rate of resources limits the Energy schedule changes from one time period to the next in the SCUC. The Operational Ramp Rate is used for scheduling and dispatch when the Generating Unit is not providing Regulation. The Ramp Rate function allows the SCs to declare the Ramp Rate at different operating levels. The Operational Ramp Rate component is a staircase curve of up to four segments (in addition to the Ramp Rate segments needed for modeling Forbidden Operating Regions, which are entered in the Master File¹) comprising the Ramp Rate, expressed in MW/minute and associated operating levels, expressed in MW. NGRs are limited to two segments, with one segment defining the charging range (negative side) and the other defining the discharging range (positive side).

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

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

¹ Ramp Rates and Forbidden Regions are merged to create a single Clean Bid.

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

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

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

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

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

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

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

MW	MW/Min
100	6
160	2
200	7
280	3
300	8
400	4

MW	MW/Min
410	9
490	5
500	9
600	9

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

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

Regulation Ramp Rate (Required if submitting Bid for Regulation Up or Regulation Down)² The Regulation Ramp Rate is a single value included in Ancillary Services Bids for Regulation Up and Regulation Down that represents the Ramp Rate of a resource used in the procurement and dispatch of Regulation Up or Regulation Down capacity. Further details of this Bid component are described in Section 6 (Ancillary Services Bids).

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

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

5.1.4 Real-Time Economic Bids for Supply

² The Regulation Ramp Rate cannot be greater than any segment of the Operational Ramp Rate that is in the Bid.

5.1.4.1.4 Energy Curve Bid Component

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

The Energy Curve Bid component contains:

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

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

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

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

The Energy Bid Curve must be monotonically increasing.

5.1.4.2.1 Ramp Rate Component

The Operational Ramp Rate of resources reflects the limitations of the resources' abilities to alter output from one time period to the next and is honored in the SCUC. The Operational Ramp Rate constraints are determined by the Operational Ramp Rate function, or the Regulation Ramp Rate (if the Generating Unit provides Regulation) multiplied by a time interval, (e.g., 60 minutes). The Operational Ramp Rate is used for scheduling and dispatch when the Generating Unit is not providing Regulation.

For NGRs, however, the Operational Ramp Rate will also be used for procurement and dispatch of Ancillary Services in addition to its regular purpose. SCs may only submit Operational Ramp Rates for NGRs.

The Ramp Rate function allows the SCs to declare the Ramp Rate at different operating levels. This Bid component contains:

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

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

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

Operating Reserve Ramp Rate (Required if SC is submitting Bid for Operating Reserve) – The Operating Reserve Ramp Rate is a single number included in Ancillary Services Bids for

Spinning Reserves and Non-Spinning Reserves that represents the Ramp Rate of a resource used in the procurement of Operating Reserve capacity. Further details of this Bid component are described in Section 6 (Ancillary Services Bids).

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

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

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

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

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

6. Ancillary Services Bids

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

How CAISO procures Ancillary Services

How SCs can self-provide Ancillary Services

A description of the Ancillary Services Bid components

6.1 Procurement of Ancillary Services

This section is based on CAISO Tariff Sections 8.4.7. 2, Bidding and Self-Provision of Ancillary Services and CAISO Tariff Section 30.5.2.6, Ancillary Services Bids (Not applicable for Virtual Bids).

SCs may submit an Economic Bid or a Bid for Self-Provided Ancillary Services (AS) from resources located within the CAISO Balancing Authority Area, submit Bids for AS from resources located outside CAISO Balancing Authority Area, or specify Inter-SC Trades of AS (covered in more detail in Section 9.2). Ancillary Services in the DAM and the RTM are comprised of the following:

Regulation Up, which must be synchronized and able to receive AGC signals

Regulation Down, which must be synchronized and able to receive AGC signals

Spinning Reserve (which must be synchronized, be available in 10 minutes, and be maintainable for two hours)

Non-Spinning Reserve (which must be supplied within 10 minutes and be maintainable for two hours)

In HASP, only Operating Reserves (Spinning and Non-Spinning Reserves) are available.

Certified Participating Generators and Dynamic System Resources are eligible to provide all AS. Certified Non-Dynamic System Resources are eligible to provide Operating Reserves only. Certified Participating Loads and Proxy Demand Resources are eligible to provide Non-Spinning Reserve only.

The same resource capacity may be offered for more than one Ancillary Services into the same CAISO Market at the same time. SCs may submit Bids to provide Spinning Reserve or Non-Spinning Reserve from certified System Resources, including Dynamic System Resources. In the event that an AS Bid is invalid, the SC receives prompt notification of that invalidity.

[For resources that are subject to CAISO Tariff Appendix II, the responsible Scheduling Coordinator may only submit an Ancillary Service Bid that has a price of \\$0/MWh, or it can also submit a Submission for Self-Provision.](#)

CAISO operates a competitive DAM, the HASP, and RTM to procure AS. Bids for Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve in the DAM must be

received no sooner than seven days prior to the Trading Day up to Market Close of the DAM (1000 hours on the day prior to the Trading Day). The Bids contain information for each of the 24 hour Trading Hours of the Trading Day.

Bids for DAM AS in support of Ancillary Services (AS) with Must Offer Obligation (MOO) will be enforced by the SIBR Rules in the DAM. The CAISO will utilize the certified AS capability of those RA Resources that are subject to AS MOO. Use Limited Resources such as hydro generating units and participating load resources will not be subject to AS MOO. The AS MOO is not dependent on whether the RA Capacity is subject to the Standard Capacity Product availability provisions.

In SIBR, if there is no AS Component in a Generating Resource Bid and the Generating Resource or a resource modeled as a Generating Resource specified in that Bid is registered as an RA Resource subject to the AS MOO for the Trading Day, (if the resource is a Multi-Stage Generating Resource the AS capacity is at the MSG Configuration that is bid in and each MSG Configuration has a specific AS Capacity certified to provide AS), an AS Bid Component must be generated with a Capacity equal to the highest available capacity not to exceed the registered Capacity, for that Resource and Trading Day, and with a Price equal to the Default Ancillary Service Bid Price. The Contingency Dispatch Indicator in that Bid will be set to "Yes". It is possible that if an AS component does exist, it may be extended if needed to meet the requirements. (Tariff Sections 40.6.1, 40.46.4, 40.6.4.3.2, 40.6.8)

Bids for AS in the RTM are submitted incrementally from any DAM AS Awards. DAM AS Awards are binding commitments and cannot be reduced in RTM. CAISO requires SCs to honor their DA AS Awards when submitting AS Bids in the RTM.

Bids for all four AS in the RTM processes must be received at least 75 minutes prior to the commencement of the Trading Hour. The Bids include information for only the relevant Trading Hour. Failure to provide information within the stated timeframes results in the Bids being declared invalid by CAISO.

Scheduling Coordinators submitting Ancillary Services Bids for System Resources to be used in the HASP or Real-Time Market must also submit an Energy Bid for the associated Ancillary Services Bid under the same Resource ID in the Real-Time Market, otherwise the bid validation rules in Section 30.7.6.1 of the CAISO Tariff will apply to cover any portion of the Ancillary Services Bid not accompanied by an Energy Bid. As described in Section 33.7 of the CAISO Tariff, if the resource is a Non-Dynamic Hourly System Resource, the CAISO will only use the Ancillary Services Bid in the HASP optimization and will not use the associated Energy Bid for the same Resource ID to schedule Energy from the Non-Dynamic Hourly System Resource in the HASP.

Scheduling Coordinators must also comply with the bidding rules associated with the must offer requirements for Ancillary Services specified in Section 40.6 of the CAISO Tariff. For Multi-Stage Generating Resources the AS Bids shall be submitted at the MSG Configuration level.

7. Residual Unit Commitment Availability Bids

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

The information required to submit a RUC Availability Bid

How CAISO validates the RUC Availability Bids

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

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

7.1 RUC Availability Bid

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

The RUC Availability Bid component differs depending on whether the Generating Unit submitting the Bid is under a Resource Adequacy (RA) obligation or not. If a resource is not under a RA obligation, the RUC Availability Bid that the resource submits is interpreted as an incremental amount of capacity that the resource is willing to provide in the Day-Ahead Market for RUC in addition to its Day-Ahead Market Bids and Self-Schedules. In this case the resource would submit a RUC Availability Bid that includes:

- RUC Availability Bid quantity, expressed in MW
- RUC Availability Bid price, expressed in \$/MW

These two components must exist together for a valid RUC Availability Bid.

The RUC Availability Cost component can vary hourly throughout the Trading Day.

If a resource is under RA obligation, a certain amount of capacity of this resource is registered with CAISO as RA Capacity. Resources providing RA Capacity must participate in the RUC process consistent with RA requirements as described in the BPM for Reliability Requirements, by submitting an Energy bid (could be Self-Schedule) up to the registered RA Capacity.

The SC may submit a non-zero RUC Availability Bid only for that portion of its capacity that is not RA Capacity, assuming the capacity is eligible to participate in RUC unless the resource is subject to CAISO Tariff Appendix II, in which case the RUC Availability Bids must be \$0/MWh for any capacity bid in. See section 6.7.2.6 of the BPM for Market Operations.

If a resource has a RA obligation, the amount of RA Capacity is registered with CAISO as RA Capacity. RA Capacity that is not a hydroelectric Generating Unit, Pumping Load or exempt Non-Dispatchable Use-Limited Resource pursuant to CAISO Tariff section 40.6.4.3.2, must participate in RUC. The CAISO will automatically optimize all RUC obligated capacity from Generating Units, Imports or System Resources at \$0/MW per hour for the full amount of RA Capacity for a given resource.

For Resources that are registered as an RA Resource and are also registered as a Must Offer Obligation (MOO) unit in DAM, SIBR will allow Market Participants to specify a Capacity Limit Indicator to specify whether they want IFM to limit the total capacities committed in IFM to the RA capacity.

If there is no Capacity Limit Indicator specified in a RUC Bid Component for a Trading Hour in a Generating Resource Bid, SIBR will check to see if the RA Flag for the Generating Resource specified in that Bid and for that Trading Hour is "Yes", if there is then a Capacity Limit Indicator will be generated by SIBR in that RUC Bid Component with a value of "No".

If there is a Capacity Limit Indicator of “Yes” specified in a RUC Bid Component for a Trading Hour in a Generating Resource Bid, a Capacity Limit must be generated in that RUC Bid Component equal to the RA Capacity.

Real Time bids can be affected by RUC if there is a RUC Award; in the event that there is a RUC Award but no RT bid then an Energy Bid will be created by SIBR. Participants observing RUC Awards that are equal to Pmin should submit an energy bid from Pmin to Pmin+.01 if the RUC capacity is equal to Pmin for the resource.

7.2 RUC Availability Bid Component Validation

The RUC Bid validation follows the Bid validation process described in Section 8 (Bid Submission and Validation). The Bid validation rules related specifically to the RUC Bid components are referenced in Appendix A.

8.2 Energy Bid Validation Rules

This section is based on the following CAISO Tariff sections:

- CAISO Tariff Section 30.7, Bid Validation
- CAISO Tariff Section 30.10, Format and Validation of Operational Ramp Rates
- CAISO Tariff Section 30.11, Format and Validation of Startup and Shutdown Times
- CAISO Tariff Section 30.12, Format and Validation of Startup and Shutdown Costs
- CAISO Tariff Section 30.12, Format and Validation of Minimum Load Costs
- CAISO Tariff Section 30.7.3.6.2 Credit Requirement

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

Step 1: CAISO validates all Bids after submission of the Bid for content, which determines that the Bid adheres to the structural rules required of the Bid (as described in more detail in Section 8.2.3). If the Bid fails any of the content level rules, CAISO assigns the Bid a status of “Rejected Bid” and the SC has the opportunity to correct and re-submit the Bid.

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

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

- “Conditionally Modified” or “Valid”

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

Virtual Bid position limits exist at each location and are associated to a Convergence Bidding Entity which may have multiple Scheduling Coordinators authorized to submit Virtual Bids at each location. Bidding validation rules are triggered each time a Virtual Bid is submitted, if the sum of all bids at that location by the Scheduling Coordinators associated to a single Convergence Bidding Entity exceeds the Position Limit, all bids at that location for that Convergence Bidding Entity will become Invalid.

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

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

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

Warnings are issued in the following cases:

- Wheeling Through transactions that are not matched (Balance Indicator is “N”, meaning that there is no matching Wheeling Reference for either the Import or Export bid in the Wheeling Bid Component). Such Bids will be erased if the wheeling reference does not match.
- Inter-SC Trades counterparties are not matched. Inter-SC Trades without matching counterparties are deemed invalid at market close time.

- Circular dependency found in a chain of Inter-SC Trades. Trades with circular dependencies are deemed invalid at market close time.
- ETC or TOR Self-Scheduled sources and sinks that are not balanced. ETC or TOR Self-Schedules that are not balanced by market close time will not have physical scheduling priority.
- ETC Self-Schedules that are over the Entitlement amount. ETCs that are over their Entitlement amount at market close time will not have physical scheduling priority. TOR Self-Schedules that are over the transmission right amount. TORs that are over their transmission right amount will not have physical scheduling priority at market close time.

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

Detailed steps that CAISO validation processes are outlined in Sections 8.2.1 to 8.2.3

8.2.1.3 SIBR Generated Bid (Physical Bids only)

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

[Resources that are subject to CAISO Tariff Appendix II must select the Proxy Cost Option for Start-Up and Minimum Load costs.](#)

D. Calculation of Default Energy Bids

The overall intent of the Default Energy Bid mitigation system is to mirror competitive outcomes in those situations where participants might have market power. CAISO believes that under competitive outcomes generators would be paid at least their variable costs.

Consequently the Default Energy Bid (DEB) is designed to approximate that cost.

Additionally, pursuant to CAISO Tariff 39.7.1.6 the method for calculating RMR Unit Default

Energy Bids is also discussed. The RMR DEBs are calculated similarly to non-RMR Units but utilize costs specified to their RMR Contracts.

An SC may modify the ranking of the three options for calculating the DEB up to two times during any 365-day period. If an SC would like to modify the ranking of options for calculating the DEB more than two times during any 365-day period, additional changes must be approved by the CAISO or Independent Entity responsible for determining DEBs under the Negotiated Option.

This appendix is concerned solely with the calculation of the Default Energy Bid (DEB) which forms part of the broader Market Power Mitigation (MPM). The DEB is only used for Market Power Mitigation in the incremental direction. There is no decremental mitigation as infeasible schedules will not be accepted in the Day-Ahead Market. In all four variations of the Default Energy Bid (DEB) will be calculated, namely Day-Ahead and Real-Time DEBs for both peak and off-peak separately. There is no hourly variation except in the transition hours between Off-Peak and Peak and vice versa.

D.1 Day-Ahead

The Market Power Mitigation (MPM) process determines when to use Default Energy Bids (DEB) and RMR Proxy Bids to in place of market bids in the CAISO markets. The MPM process analyzes the potential to exercise local market power and determines bid mitigation based on a single processing run that decomposes each resource's locational market price (LMP) into components relating to energy, losses, and competitive and non-competitive congestion components. Under this method, which is known as the LMP decomposition method, mitigation will be based on the non-competitive congestion component of each resource's LMP. If the non-competitive constraint congestion component is greater than zero its bid will be mitigated to the higher of the DEB, or RMR Proxy Bid, as applicable, and its competitive LMP if it is lower than the unmitigated bid. The purpose of the DEB is to mimic the variable cost of the generating units, so that in the IFM generators are dispatched based on their variable costs rather than their submitted Bids. Hence, the purpose of the DEB is to allow incremental dispatch based on variable cost. Once the MPM is complete, DAM LMPs are set for the dispatched capacity when the DAM runs.

D.2 Real-Time

In real-time generators enter the simplified Real Time Market Process (RTM) with their DAM schedules subject to a bidding rule that they may not submit an Energy Bid component at a lower Bid price than their highest accepted DA Energy Bid. Again mitigation only occurs in the incremental direction. Decremental dispatches are based on submitted bids that conform to the bidding rule. CAISO carries out the same process as in the DAM. Mitigation of bids remains at the hourly level although LMPs are dispatched at the 5 minute level, settlement at the 10 minute level, and unit commitment and Ancillary Service procurement at the 15 minute level.

D.3 Characteristics of the Default Energy Bid (DEB)

A Default Energy Bid is a monotonically increasing staircase function consisting of a maximum of 10 economic bid segments, or 10 (\$/MW, MW) pairs and an End MW value. Each Default Energy Bid is identified by the DEB ID; it is also identifiable by the Resource ID, the Market in which it is applicable, the period of the day in terms of On Peak and Off Peak when it is applicable, and the time it is updated.

In addition to the DEB_ID there is also a Segment Number that indicates the sequence of segments. A segment of a Default Energy Bid is represented by the Start MW and the Price in terms of \$/MWh. Each segment of the Default Energy Bid is associated with a field that indicates which methodology has been used to determine the segment. A DEB may be calculated using more than one methodology as explained below.

Separate DEBs are calculated for the DAM and the RTM, as well as for peak and off-peak hours. The Default Energy Bid is eligible to set the LMP at its location. LMPs set by mitigated bids will not be revisited and reset due to the presence of an updated gas index.

There are three methodology options for calculating DEBs:

- LMP Option: A weighted average LMP based on the lowest quartile of validated and/or corrected LMPs set at the Generating Unit location during Trading Hours in the last 90 days when the Unit was dispatched. Generating Units must pass a competitiveness screen to qualify for this option in which 50% of their MWh dispatches over the prior 90-days must have been dispatched competitively.
- Negotiated Rate Option: An amount negotiated with the Independent Entity. . If a Resource has ranked the Negotiated Rate Option as the first choice, the complete curve of the latest Negotiated Rate Option will be selected.
- Variable Cost Option: This option is based on the variable cost of the unit and includes a 10% adder for non-RMR capacity. Furthermore this option is supplemented by the Frequently Mitigated Unit (FMR) adder whereby certain units that are often mitigated qualify for a contribution towards their going-forward fixed costs. If a Resource has ranked the Variable Cost Option as the first choice, the complete curve (i.e., including all segments) of the Variable Cost Option will be calculated and selected.

Each Resource (through their SC) will rank the three alternatives for Default Energy Bid calculation according to their order of preference for each resource. There will be a single ranking for all hours of all days. Resources that are subject to CAISO Tariff Appendix II must choose the Variable Cost Option, otherwise a \$0/MWh bid will be used as the Default Energy Bid.

The details of the three alternatives are described below.

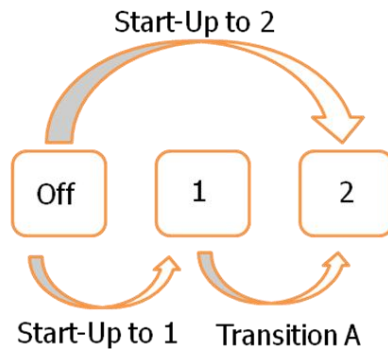
H Transition Costs for Multi-Stage Generator Resources

- Multi-Stage Generating (MSG) units are capable of operating in multiple output ranges due to their generating technology. A resource that has been registered as an MSG unit will also have a Transition Matrix, which contains operating constraints associated with the feasible transitions between configurations.
- Among the operating parameters defined in the Transition Matrix is the “Transition Cost Multiplier”, which SIBR will use to calculate a daily transition cost. Transition costs figure into the optimization’s decisions to move a multi-stage generator (MSG) resource from one configuration to another.

The following two rules define the allowable upper and lower boundaries that transition costs must lie within. [Multi-Stage Generating Resources that that are subject to CAISO Tariff Appendix II must register a transition cost of \\$0/MWh for all transitions in their transition matrix.](#)

- The first rule (Rule 1) constrains the transition costs along each feasible path from offline to each configuration such that their sum is between 100% and 125% of the cost (plus 10%) associated with starting up directly to that configuration.

Example:



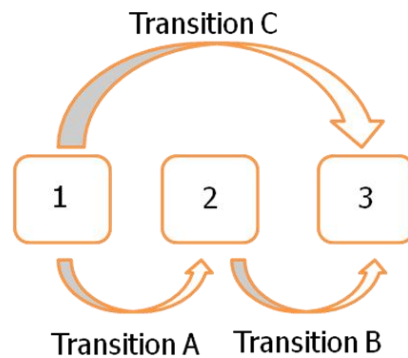
$$100\% \text{ Start-Up to 2} \leq \begin{matrix} \text{Start-Up to 1} \\ + \\ \text{Transition A} \end{matrix} \leq 125\% \text{ Start-Up to 2}$$

In order to validate Rule 1, Scheduling Coordinators will need to provide the start-up fuel value for every configuration (i.e., the fuel needed to get to a configuration’s minimum operating level), whether it is start-able or non-start-able. A proxy start-up cost will be calculated by multiplying the start-up fuel by the current posted monthly gas price, plus 10%. For resources that are subject to a greenhouse gas compliance obligation (as indicated by a ‘Y’ in the ‘GHG_COMPLIANCE_OBLIG’ field in Master File), a proxy start-up cost will be the product of the start-up fuel, the posted monthly gas price, and the monthly projected Greenhouse Gas Allowance Price.

- Start-up fuel and start-up cost values for non-start-able configurations will be used for validation of Rule 1 only. Start-up fuel values provided for start-able configurations must be consistent with the start-up fuel values provided in the Resource Data Template (RDT).

- The second rule (Rule 2) limits transition costs between configurations such that the sum of nested transition costs is between 100% and 125% of the direct transition.

Example:



$$100\% \text{ Transition C} \leq \begin{array}{c} \text{Transition A} \\ + \\ \text{Transition B} \end{array} \leq 125\% \text{ Transition C}$$

- Scheduling Coordinators will submit the transition costs associated with upward transitions (lower MW output configuration to higher MW output configuration), the valid monthly gas price (posted on the CAISO website on the day costs are submitted), the monthly projected Greenhouse Gas Allowance Price if applicable, and the “transition cost multiplier”, which is calculated by dividing the transition costs by the monthly gas price. The “transition cost multiplier” values will be stored in Master File as a measure of MMBtu (“Transition Fuel” in the RDT) and utilized by SIBR to calculate a daily transition cost value.
- Costs associated with downward transitions are not subject to Rule 1 and Rule 2. Heat input values (fuel quantity) associated with downward transitions may be submitted in the Transition Fuel field of the RDT’s ‘TRANSITION’ tab.

Transition costs provided for upward transitions and startup fuel values provided for non-startable configurations will be used only for the purpose of validating Rules 1 and 2.