### \* \* \* \* \*

**30.4.5.2 Non-Natural Gas-Fired Resources**

For each non-natural gas-fired resource, the CAISO shall calculate the Proxy Start-Up Cost and Proxy Minimum Load Cost values under the Proxy Cost methodology as specified below.

1. **Fuel Input.** The Scheduling Coordinator for the resource will provide the fuel or fuel-equivalent input costs, which the CAISO will maintain in the Master File, pursuant to Section 39.7.1.1.1.2.
2. **Proxy Start-Up Costs.** Proxy Start-Up Costs will also include, if applicable:
3. a Variable Start-Up Operations and Maintenance Adder as provided in Section 30.4.5.4;
4. greenhouse gas allowance costs for each resource located within the CAISO Balancing Authority Area or an EIM Entity Balancing Authority Area within California or Washington, and registered with the California Air Resources Board or Washington Department of Ecology as having a greenhouse gas compliance obligation, as provided to the CAISO by the Scheduling Coordinator;
5. the rates for the Market Services Charge and System Operations Charge multiplied by the shortest Start-Up Time listed for the resource in the Master File, multiplied by the PMin of the resource as registered in the Master File, multiplied by 0.5.
6. **Proxy Minimum Load Costs.** Proxy Minimum Load Costs will also include, if applicable:
7. A Variable Energy Operation and Maintenance Adder as provided in Section 30.4.5.4 multiplied by the PMin of the resource or MSG Configuration of the resource as registered in the Master File;
8. a Variable Minimum Load Operations and Maintenance Adder as provided in Section 30.4.5.4;
9. greenhouse gas allowance costs for each resource located within the CAISO Balancing Authority Area or an EIM Entity Balancing Authority Area within California or Washington, and registered with the California Air Resources Board or the Washington Department of Ecology as having a greenhouse gas compliance obligation, as provided to the CAISO by the Scheduling Coordinator;
10. the rates for the Market Services Charge and System Operations Charge multiplied by the PMin of the resource as registered in the Master File; and
11. the Bid Segment Fee.

(d) **Proxy Transition Costs.** For each Multi-Stage Generating Resource under the Proxy Cost methodology, the CAISO will calculate the Proxy Transition Costs utilized for each feasible transition from a given MSG Configuration to a higher MSG Configuration based on the difference between the Proxy Start-Up Costs for the higher MSG Configuration, and the Proxy Start-Up Costs for the lower MSG Configuration, as those costs are determined in accordance with the Proxy Start-Up Cost calculation methodology set forth in Section 30.4.5. If the result of this calculation is negative for any transition between two MSG Configurations, then the associated Proxy Transition Cost shall be zero.

### \* \* \* \* \*

**39.6.1.6.2 Projected Greenhouse Gas Allowance Price**

For resources that are registered with the California Air Resources Board or the Washington Department of Ecology as having a greenhouse gas compliance obligation, the CAISO will calculate a projected Greenhouse Gas Allowance Price component to be used in establishing maximum Default Start-Up Bids and Default Minimum Load Bids after the twenty-first (21st) day of each month and will post it on the CAISO Website by the end of that month. The projected Greenhouse Gas Allowance Price component will be applicable for Scheduling Coordinators on behalf of eligible Use-Limited Resources electing to use the Registered Cost methodology until a new projected Greenhouse Gas Allowance Price component is calculated and posted on the CAISO Website. The projected Greenhouse Gas Allowance Price component will be calculated by averaging the applicable daily Greenhouse Gas Allowance Prices calculated over the first twenty (20) days of the month using the methodology set forth in Section 39.7.1.1.1.4. The CAISO will calculate a projected Greenhouse Gas Allowance Price separately for each unlinked jurisdiction that regulates greenhouse gas compliance obligations.

**39.6.1.6.3 Variable Operations and Maintenance Adder Components**

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### 30.4.3 Scheduling Coordinator Reference Level Change Requests

The CAISO will verify Reference Level Change Requests for changes to Default Start-Up Bids and Default Minimum Load Bids as described in Section 30.11.

### 30.4.4 Default Commitment Cost Bids

**30.4.4.1 Using Proxy Cost Methodology**

For resources under the Proxy Cost methodology, the CAISO will calculate a resource’s Default Commitment Cost Bids as the applicable Proxy Cost multiplied by the Commitment Cost Multiplier.

**30.4.4.2 Use-Limited Resources**

For Use-Limited Resources using the Proxy Cost methodology, the CAISO will calculate a resource’s Default Commitment Cost Bids as the applicable Proxy Cost multiplied by Commitment Cost Multiplier plus the Start-Up Opportunity Cost, Transition Opportunity Cost, or Minimum Load Opportunity Cost as applicable.

**30.4.4.3 Registered Costs**

For Use-Limited Resources using the Registered Cost methodology, the CAISO will use the Registered Costs as registered in the Master File as the Default Commitment Cost Bids.

**30.4.4.4 Insufficient Information**

In the event that the Scheduling Coordinator for a resource (other than a Multi-Stage Generating Resource or a Multi-Stage Generating Resource in its lowest configuration in which it can be started) does not provide sufficient data for the CAISO to determine the resource’s Default Commitment Cost Bids or one or more components of the resource’s Default Commitment Cost Bids, the CAISO will assume that the resource’s Default Commitment Cost Bids, or the indeterminable component(s) of the resource’s Default Commitment Cost Bids, are zero. In the event that the Scheduling Coordinator for a Multi-Stage Generating Resource does not provide such data for an MSG Configuration beyond its lowest configuration in which it can be started, Section 30.4.5.3 applies.

**30.4.4.5 Resources with Greenhouse Gas Compliance Obligations**

For each resource registered with a state agency as having a greenhouse gas compliance obligation, the information provided to the CAISO by the Scheduling Coordinator must be consistent with the information submitted to the governing state agency.

**30.4.4.6 Maximum Default Minimum Load Bid**

In no case shall a Default Minimum Load Bid exceed the Minimum Load Cost Hard Cap.

### 30.4.5 Proxy Cost Methodology

The CAISO will calculate Proxy Costs as described in this Section 30.4.5.

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### 39.7.1 Calculation of Default Energy Bids

Default Energy Bids shall be calculated by the CAISO, for the on-peak hours and off-peak hours for both the DAM and RTMs, pursuant to one of the methodologies described in this Section. The Scheduling Coordinator for each Generating Unit owner or Participating Load must rank order the following options of calculating the Default Energy Bid starting with its preferred method. The Scheduling Coordinator 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 Scheduling Coordinator must have a negotiated rate established with the CAISO. If no rank order is specified for a Generating Unit or Participating Load, then the default rank order of (1) Variable Cost Option, (2) Negotiated Rate Option, (3) LMP Option will be applied. For the first ninety (90) days after changes to resource status and MSG Configurations as specified in Section 27.8.3, including the first ninety (90) days after the effective date of Section 27.8.3, the Default Energy Bid option for the resource is limited to the Negotiated Rate Option or the Variable Cost Option. Default Energy Bids used for purposes other than for calculating Reasonableness Thresholds will be subject to the Soft Energy Bid Cap, unless the CAISO has approved a Reference Level Change Request pursuant to Section 30.11 in support of an Energy Bid above the Soft Energy Bid Cap. Scheduling Coordinators for storage resources participating as Non-Generator Resources also may rank the storage resource option among their options. If no rank is specified for a storage resource participating as a Non-Generator Resource, then the default rank will be (1) Variable Cost Option and (2) LMP Option. Scheduling Coordinators for storage resources participating as Non-Generator Resources must provide the data necessary for determining the storage resource option if that option is the first in rank order.

**39.7.1.1 Variable Cost Option**

For natural gas-fueled units, the Variable Cost Option will calculate the Default Energy Bid by adding incremental cost (comprised of incremental fuel cost plus a volumetric Grid Management Charge adder plus a greenhouse gas cost adder if applicable) with the Variable Energy Operation and Maintenance Adder, by multiplying the sum by the Default Energy Bid Multiplier, adding a Bid Adder if applicable for a Frequently Mitigated Unit, and adding Variable Energy Opportunity Costs, if any. For non-natural gas-fueled units, the Variable Cost Option will calculate the Default Energy Bid by summing incremental fuel or fuel-equivalent cost plus a volumetric Grid Management Charge plus a greenhouse gas cost adder if applicable, multiplying the sum by the Default Energy Bid Multiplier, adding a Bid Adder if applicable for a Frequently Mitigated Unit, and adding Variable Energy Opportunity Costs, if any. For any Default Energy Bids calculated under the Variable Cost Option that exceed $1,000 per MWh because of an approved Reference Level Change Request, any ten percent (10%) adder or Frequently Mitigated Unit adder shall not exceed $100 per MWh.

**39.7.1.1.1 Incremental Cost Calculation Under the Variable Cost Option**

**39.7.1.1.1.1 Natural Gas-Fired Resources**

(a) Calculation of incremental fuel cost - For natural gas-fueled units, incremental fuel cost is calculated based on an incremental heat rate curve multiplied by the natural gas price calculated as described below.

Resource owners shall submit to the CAISO average heat rates (Btu/kWh) measured for at least two (2) and up to eleven (11) generating operating points (MW), where the first and last operating points refer to the minimum and maximum operating levels (i.e., PMin and PMax), respectively. The average heat rate curve formed by the (Btu/kWh, MW) pairs is a piece-wise linear curve between operating points, and two (2) average heat rate pairs yield one (1) incremental heat rate segment that spans two (2) consecutive operating points. The incremental heat rates (Btu/kWh) in the incremental heat rate curve are calculated by converting the average heat rates submitted by resource owners to the CAISO to requirements of heat input (Btu/h) for each of the operating points and dividing the changes in requirements of heat input from one (1) operating point to the next by the changes in MW between two (2) consecutive operating points as specified in the Business Practice Manual. For each segment representing operating levels below eighty (80) percent of the unit’s PMax, the incremental heat rate is limited to the maximum of the average heat rates for the two (2) operating points used to calculate the incremental heat rate segment.

The unit’s final incremental fuel cost curve is calculated by multiplying this incremental heat rate curve by the applicable natural gas price, and then, if necessary, applying a left-to-right adjustment to ensure that the final incremental cost curve is monotonically non-decreasing. Heat rate and cost curves shall be stored, updated, and validated in the Master File.

 (b) Calculation of greenhouse gas cost adder - For each natural gas-fired resource registered with the California Air Resources Board or the Washington Department of Ecology as having a greenhouse gas compliance obligation, the CAISO will calculate a greenhouse gas cost adder as the product of the resource’s incremental heat rate, the greenhouse gas emissions rate authorized by the California Air Resources Board or the Washington Department of Ecology, and the applicable Greenhouse Gas Allowance Price.

 (c) Calculation of volumetric Grid Management Charge adder - For each natural gas-fired resource, the CAISO will include a volumetric Grid Management Charge adder that consists of: (i) the Market Services Charge; (ii) the System Operations Charge; and (iii) the Bid Segment Fee divided by the MW in the Bid segment.

**39.7.1.1.1.2 Non-Natural Gas-Fired Resources**

For non-natural gas-fueled units, incremental fuel cost is calculated based on an average cost curve as described below.

Resource owners for non-natural gas-fueled units shall submit to the CAISO average fuel or fuel equivalent costs ($/MW) measured for at least two (2) and up to eleven (11) generating operating points (MW), where the first and last operating points refer to the minimum and maximum operating levels (i.e., PMin and PMax), respectively. The average cost curve formed by the ($/MWh, MW) pairs is a piece-wise linear curve between operating points, and two (2) average cost pairs yield one (1) incremental cost segment that spans two (2) consecutive operating points. For each segment representing operating levels below eighty percent (80%) of the unit’s PMax, the incremental cost rate is limited to the maximum of the average cost rates for the two (2) operating points used to calculate the incremental cost segment. The unit’s final incremental fuel cost curve is then adjusted, if necessary, applying a left-to-right adjustment to ensure that the final incremental cost curve is monotonically non-decreasing. The CAISO will include, if applicable: (i) greenhouse gas allowance costs for each non-natural gas-fired resource registered with the California Air Resources Board or the Washington Department of Ecology as having a greenhouse gas compliance obligation, as provided to the CAISO by the Scheduling Coordinator for the resource; (ii) variable operation and maintenance cost; and (iii) a volumetric Grid Management Charge adder that consists of: (a) the Market Services Charge; (b) the System Operations Charge; and (c) the Bid Segment Fee divided by the MW in the Bid segment. Cost curves shall be stored, updated, and validated in the Master File.

**39.7.1.1.1.3 Calculation of Natural Gas Price**

(a) The CAISO will use different gas price indices for the Day-Ahead Market and the Real-Time Market. If a gas price index is unavailable for any reason, the CAISO will use the most recent available gas price index as set forth in Section 39.7.1.1.1.3(c).

(b) For all Trading Days of the Day-Ahead Market, except for Mondays when the Monday-only gas price index is available and meets the liquidity criteria described below, the CAISO will calculate a gas price index based on natural gas commodity prices reported by the Intercontinental Exchange one (1) day prior to the applicable Trading Day between 8:00 a.m. and 9:00 a.m. Pacific Time for natural gas deliveries on the Trading Day. The natural gas commodity prices reported by the Intercontinental Exchange are volume-weighted average gas prices reported during its next-day trading window. For Monday Trading Days, the CAISO will use the Monday-only gas price index when it is reported by the Intercontinental Exchange three (3) days prior to the Monday Trading Day, provided:

(i) The historical average volume of the Monday-only gas price index at a given location, using no more than ninety (90) days of trading, is at least 25,000 MMBTUs based on the CAISO’s test of whether the volume at a given location is above 25,000 MMBTUs at least once every six (6) months; and

(ii) On any given day the Monday-only gas price index published at the locations that meet the requirement in subsection (b)(i) above represents at least five (5) transitions.

(c) For all Trading Days of the Real-Time Market, except for Mondays when the Monday-only gas price index is available and meets the liquidity criteria described below, the CAISO will calculate a gas price index using at least one (1) price from the following publications: Natural Gas Intelligence, SNL Energy/BTU’s Daily Gas Wire, or Platt’s Gas Daily. The CAISO will update the gas price indices for the Real-Time Market between 7:00 p.m. and 10:00 p.m. Pacific Time using the natural gas prices published one (1) day prior to the applicable Trading Day for natural gas deliveries on the Trading Day, unless gas prices are not published on that day, in which case the CAISO will use the most recently published gas prices that are available. For Monday Trading Days, the CAISO will use the Monday-only gas price index when it is reported by the Intercontinental Exchange three (3) days prior to the Monday Trading Day, provided:

(i) The historical average volume of the Monday-only gas price index at a given location, using no more than ninety (90) days of trading, is at least 25,000 MMBTUs based on the CAISO’s test of whether the volume at a given location is above 25,000 MMBTUs at least once every six (6) months; and

(ii) On any given day the Monday-only index gas price published at the locations that meet the requirement in subsection(c)(i) above represents at least five (5) transactions.

**39.7.1.1.1.4 Calculation of Greenhouse Gas Allowance Price**

The CAISO will calculate the Greenhouse Gas Allowance Price separately for each unlinked jurisdiction that regulates greenhouse gas compliance obligations. To calculate the Greenhouse Gas Allowance Price for each unlinked jurisdiction, the CAISO will average applicable prices from two vendors specified in the BPM. If a greenhouse gas price from a vendor is unavailable for any reason, the CAISO will use the most recent available greenhouse gas price from that vendor. If greenhouse gas prices from two vendors have not yet been calculated for a jurisdiction, the CAISO will utilize the best available proxy, as follows: for Washington State, the CAISO will utilize $41/MT CO2e until an allowance auction is held in Washington, at which point the CAISO will use, as soon as is practicable, the allowance auction clearing price. If for any reason the CAISO cannot calculate a Greenhouse Gas Allowance Price, it will use the most recently calculated value.

The CAISO will update the Greenhouse Gas Allowance Price by approximately 22:00 Pacific Time each day (T). The daily Greenhouse Gas Allowance Price will be used in the next day’s Real-Time Market (T+1) and in the Day-Ahead Market for the following Trading Day (T+2). The CAISO will calculate each Greenhouse Gas Allowance Price during a year using prices for greenhouse gas allowances from that same year.