December 19, 2018

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

Re: California Independent System Operator Corporation
Compliance Filing
Docket No. ER18-1169-___

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO)[1] submits this filing in compliance with the Commission's "Order Accepting Compliance Filing Subject to Condition," issued in the above-referenced proceeding on November 19, 2018.[2]

On March 23, 2018, the CAISO filed proposed revisions to its tariff to implement its commitment cost enhancements phase 3 initiative (March 23 Tariff Amendment). Among other changes, the March 23 Tariff Amendment included revisions to implement a methodology to allow eligible use-limited resources to include opportunity cost adders in their commitment costs and energy bid costs based on eligible use limitations.[3]

In its June 21 Order, the Commission accepted the tariff revisions, effective November 1, 2018[4] as requested by the CAISO, but ordered the CAISO to submit a compliance filing within 30 days to add details concerning the opportunity cost calculations.[5] On July 23, 2018, the CAISO submitted its compliance filing in response to the June 21 Order. In Its November 19 Order, the Commission accepted the July 23 compliance filing but directed the CAISO to submit a further compliance filing to add references to the specific gas price

---

1 References in this compliance filing to numbered sections are references to sections of the CAISO tariff as revised by this filing, unless otherwise indicated.

2 *Cal. Indep. Sys. Operator Corp.*, 165 FERC ¶ 61,140 (2018) (November 19 Order).

3 The March 23 Tariff Amendment set forth these revisions primarily in new tariff section 30.4.1.1.6.

4 *Cal. Indep. Sys. Operator Corp.,* 163 FERC ¶ 61, 211 (2018) (June 21 Order). Additionally, on August 31, 2018, the CAISO filed a petition for limited tariff waiver to delay implementation until April 1, 2019. On October 23, 2018, the Commission issued an order accepting the CAISO's petition. *Cal. Indep. Sys. Operator Corp.*, 165 FERC ¶ 61,038 (2018).

5 *See* June 21 Order at PP 32-34.

indices used in calculating forecasted gas prices. The Commission directed the CAISO to submit a compliance filing within 30 days (*i.e.,* by December 19, 2018).[6]

To comply with the Commission's directives, the CAISO has is revising tariff section 30.4.1.1.6.2.2. Specifically, the CAISO is revising step (2) of the opportunity cost calculation methodology to add references to the gas price indices for the natural gas futures commodity price used to determine the forecasted gas prices. The CAISO is also adding a reference to the source for the wholesale future electric power price, which is also a component of the forecasted locational marginal prices. This component is referenced in both steps (2) and (3). The CAISO is proposing to substitute the term "trading hub" for the defined term "Trading Hub," because "Trading Hub" refers to specific aggregated pricing nodes in the CAISO market. The term trading hub in the instant tariff language, on the other hand, refers to the wholesale future electric power price published in the Intercontinental Exchange. All other references to gas prices and greenhouse gas prices are calculated pursuant to existing tariff provisions. The CAISO added the specific tariff references as appropriate.

In addition to this transmittal letter, this compliance filing includes attachments A and B. Attachment A contains clean CAISO tariff sheets reflecting the tariff revisions described above. Attachment B shows these revisions in red-line format.

If there are any questions regarding this filing, please contact the undersigned.

Respectfully submitted,

/s/ Sidney L. Mannheim

Roger E. Collanton
General Counsel
Sidney L. Mannheim
Assistant General Counsel
California Independent System
Operator Corporation
250 Outcropping Way
Folsom, CA 95630
Tel: (916) 608-7144
Fax: (916) 608-7222
E-mail: smannheim@caiso.com

Counsel for the California Independent System Operator Corporation

[6] *See* November 19 Order at P 11.

CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon all of the parties listed on the official service list for the above-referenced proceeding, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated at Folsom, California, on this 19th day of December, 2018.

/s/ Grace Clark
Grace Clark

Attachment A – Clean Tariff

Commitment Cost Enhancements Phase 3 Compliance Filing

California Independent System Operator Corporation

30.4.1.1.6.2.2 Methodology for Opportunity Cost Calculator

For the Opportunity Cost calculator developed by the CAISO, each calculation of Opportunity Costs will equal the estimated profits foregone if the Use-Limited Resource had one fewer unit of starts, run-hours, or Energy output, whichever is applicable, in the future time period of the validated limitation. With regard to each validated limitation of the Use-Limited Resource, the calculation will take into account a margin set forth in the Business Practice Manual. The calculation will also take into account the effect of any validated limitation on a Use-Limited Resource's number of starts, number of run-hours, or Energy output in the monthly and annual and/or rolling twelve month periods. For MSG Transitions, the Opportunity Cost for each transition will be derivative of the number of Start-Ups required for the MSG Resource to achieve a specific MSG Configuration.

The CAISO will calculate the estimated profits for each validated limitation over the future time period of the limitation based on the following estimated inputs: (a) the forecasted hourly average of fifteen-minute LMPs for Energy at the Use-Limited Resource's PNode or Aggregated PNode multiplied by (b) the optimal hourly dispatch of the Use-Limited Resource, minus (c) the estimated monthly Start-Up Cost of the Use-Limited Resource, minus (d) the estimated monthly Minimum Load Cost of the Use-Limited Resource, minus (e) the estimated monthly variable Energy cost of the Use-Limited Resource multiplied by the difference between (f) the optimal hourly commitment and dispatch of the Use-Limited Resource and (g) the PMin of the Use-Limited Resource, minus (h) the estimated monthly Transition Cost of the Use-Limited Resource.

The CAISO will calculate input (a) listed above by executing the following steps in the order shown below:

(1) For each future hour, calculate an hourly implied heat rate at each applicable PNode or Aggregated PNode for a Use-Limited Resource based on the hourly average of the fifteen-minute Real-Time LMPs (reflecting the gas price index used in the Real-Time Market calculated pursuant to Section 39.7.1.1.1.3) from the same hour of the previous year, the Greenhouse Gas Allowance Price, calculated pursuant to Section 39.7.1.1.1.4, from the same day of the previous year, and the gas price index of the applicable fuel region from the same day of the previous year.

(2) For each future month, calculate a monthly future implied heat rate based on the

applicable wholesale future power price of the applicable power trading hub as published by Intercontinental Exchange, the most recent Greenhouse Gas Allowance Price calculated pursuant to Section 39.7.1.1.1.4, and the natural gas future commodity price of the applicable fuel region. The CAISO determines the natural gas futures commodity price by fuel region averaging available prices from the following vendors: Intercontinental Exchange, Natural Gas Intelligence, and SNL Energy/BTU's Daily Gas Wire.

(3) For each future month, calculate a monthly historical implied heat rate based on the wholesale historic power price of the applicable power trading hub as published by Intercontinental Exchange for the same month of the previous year, the average Greenhouse Gas Allowance Price calculated pursuant to Section 39.7.1.1.1.4 for the same month of the previous year, and the average natural gas commodity price, reflecting the gas price index used in the Real-Time Market calculated pursuant to Section 39.7.1.1.1.3, of the applicable fuel region for the same month of the previous year.

(4) For each future month, calculate a monthly power price conversion factor as the ratio of the future implied heat rate calculated under (2) above and the historical implied heat rate calculated under (3) above.

(5) For each future hour, scale the hourly implied heat rate calculated under (1) above by the power price conversion factor calculated under (4) above.

(6) For each future hour, calculate the LMPs by applying the gas price index of the future month and the most recent Greenhouse Gas Allowance Price calculated pursuant to Section 39.7.1.1.1.4 to the scaled implied heat rates calculated under (5) above.

For a Use-Limited Resource that has twelve (12) or fewer months of LMP data at its PNode or Aggregated PNode, the CAISO will calculate input (a) listed above using LMP data from a comparable PNode or Aggregated PNode.

Additional detail regarding the calculation of Opportunity Costs is provided in Appendix N to the Business Practice Manual for Market Instruments. Any dispute regarding the calculation of Opportunity Costs will

be subject to the CAISO ADR Procedures set forth in Section 13.

Attachment B – Marked Tariff

Commitment Cost Enhancements Phase 3 Compliance Filing

California Independent System Operator Corporation

30.4.1.1.6.2.2 Methodology for Opportunity Cost Calculator

For the Opportunity Cost calculator developed by the CAISO, each calculation of Opportunity Costs will equal the estimated profits foregone if the Use-Limited Resource had one fewer unit of starts, run-hours, or Energy output, whichever is applicable, in the future time period of the validated limitation. With regard to each validated limitation of the Use-Limited Resource, the calculation will take into account a margin set forth in the Business Practice Manual. The calculation will also take into account the effect of any validated limitation on a Use-Limited Resource's number of starts, number of run-hours, or Energy output in the monthly and annual and/or rolling twelve month periods. For MSG Transitions, the Opportunity Cost for each transition will be derivative of the number of Start-Ups required for the MSG Resource to achieve a specific MSG Configuration.

The CAISO will calculate the estimated profits for each validated limitation over the future time period of the limitation based on the following estimated inputs: (a) the forecasted hourly average of fifteen-minute LMPs for Energy at the Use-Limited Resource's PNode or Aggregated PNode multiplied by (b) the optimal hourly dispatch of the Use-Limited Resource, minus (c) the estimated monthly Start-Up Cost of the Use-Limited Resource, minus (d) the estimated monthly Minimum Load Cost of the Use-Limited Resource, minus (e) the estimated monthly variable Energy cost of the Use-Limited Resource multiplied by the difference between (f) the optimal hourly commitment and dispatch of the Use-Limited Resource and (g) the PMin of the Use-Limited Resource, minus (h) the estimated monthly Transition Cost of the Use-Limited Resource.

The CAISO will calculate input (a) listed above by executing the following steps in the order shown below:

(1) For each future hour, calculate an hourly implied heat rate at each applicable PNode or Aggregated PNode for a Use-Limited Resource based on the hourly average of the fifteen-minute Real-Time LMPs (reflecting the gas price index used in the Real-Time Market calculated pursuant to Section 39.7.1.1.1.3) from the same hour of the previous year, the Greenhouse Gas Allowance Price, calculated pursuant to Section 39.7.1.1.1.4, from the same day of the previous year, and the gas price index of the applicable fuel region from the same day of the previous year.

(2) For each future month, calculate a monthly future implied heat rate based on the

applicable wholesale future power price of the applicable power ~~T~~trading ~~H~~hub as published by Intercontinental Exchange, the most recent Greenhouse Gas Allowance Price calculated pursuant to Section 39.7.1.1.1.4, and the natural gas future commodity price of the applicable fuel region. The CAISO determines the natural gas futures commodity price by fuel region averaging available prices from the following vendors: Intercontinental Exchange, Natural Gas Intelligence, and SNL Energy/BTU's Daily Gas Wire.

(3) For each future month, calculate a monthly historical implied heat rate based on the wholesale historic power price of the applicable power ~~T~~trading ~~H~~hub as published by Intercontinental Exchange for the same month of the previous year, the average Greenhouse Gas Allowance Price calculated pursuant to Section 39.7.1.1.1.4 for the same month of the previous year, and the average natural gas commodity price, reflecting the gas price index used in the Real-Time Market calculated pursuant to Section 39.7.1.1.1.3, of the applicable fuel region for the same month of the previous year.

(4) For each future month, calculate a monthly power price conversion factor as the ratio of the future implied heat rate calculated under (2) above and the historical implied heat rate calculated under (3) above.

(5) For each future hour, scale the hourly implied heat rate calculated under (1) above by the power price conversion factor calculated under (4) above.

(6) For each future hour, calculate the LMPs by applying the gas price index of the future month and the most recent ~~g~~Greenhouse ~~g~~Gas Allowance Price~~costs~~ calculated pursuant to Section 39.7.1.1.1.4 to the scaled implied heat rates calculated under (5) above.

For a Use-Limited Resource that has twelve (12) or fewer months of LMP data at its PNode or Aggregated PNode, the CAISO will calculate input (a) listed above using LMP data from a comparable PNode or Aggregated PNode.

Additional detail regarding the calculation of Opportunity Costs is provided in Appendix N to the Business Practice Manual for Market Instruments. Any dispute regarding the calculation of Opportunity Costs will

be subject to the CAISO ADR Procedures set forth in Section 13.