

Attachment A – Clean Tariff

Compliance Filing – FERC Order No. 881

California Independent Systems Operator Corporation

July 12, 2022

Section 6

* * * * *

Section 6.5.17 Transmission Line Ratings

The CAISO will maintain on the password-protected section of its OASIS page or on another password-protected website a database of Transmission Line Ratings and Transmission Line Rating methodologies. The database will include a record of all Transmission Line Ratings used in real-time operations and in each future period for which they are calculated. Any postings of temporary alternate Transmission Line Ratings or exceptions will be part of this database. The database will include records of which Transmission Line Ratings and Transmission Line Rating methodologies were in effect at which times over the previous five years, including records of which temporary alternate Transmission Line Ratings or exceptions in effect during the previous five years. Each record in the database will reflect which transmission line to which the record applies and the date and time the record was entered into the database.

The database will document the nature of and basis for each exception, the date(s) and time(s) that the exception was initiated, and (if applicable) the date(s) and time(s) that each exception was withdrawn and the standard rating that became effective again. The database will also document the use of an alternate Transmission Line Rating, including the nature of and basis for the alternate rating, the date and time that the alternate rating was initiated, and, if applicable, the date and time that the alternate rating was withdrawn and the standard rating became effective again.

To the extent that the CAISO fails to make available any Transmission Line Rating used in real-time operations or in any future period for which they are calculated, the CAISO will endeavor to provide this information within the next 30 days, after which the information will not be provided.

Users that meet the requirements of Section 6.5.10.2 may obtain access to the database of Transmission Line Ratings and Transmission Line Rating methodologies. The CAISO will maintain the database so that users can view, download, and query data in a standard formats, using standard protocols. Upon request, the CAISO will provide other transmission providers with access to the database.

* * * * *

Appendix A

* * * * *

- Ambient Adjusted Rating

A Transmission Line Rating that: (1) applies to a time period of not greater than one hour; (2) reflects an up-to-date forecast of ambient air temperature across the time period to which the rating applies; (3) reflects the absence of solar heating during nighttime periods where the local sunrise/sunset times used to determine daytime and nighttime periods are updated at least monthly, if not more frequently; and (4) is calculated at least each hour, if not more frequently

- Dynamic Line Rating

A Transmission Line Rating that applies to a time period of not greater than one hour and reflects up-to-date forecasts of inputs such as (but not limited to) ambient air temperature, wind, solar heating, transmission line tension, or transmission line sag.

- Emergency Rating

A Transmission Line Rating that reflects operation for a specified, finite period, rather than reflecting continuous operation. An Emergency Rating may assume an acceptable loss of equipment life or other physical or safety limitations for the equipment involved.

- Seasonal Ratings

A Transmission Line Rating that (a) applies to a specified season where seasons to include not fewer than four seasons in each year, and to reasonably reflect portions of the year where expected high temperatures are relatively consistent; and (b) reflects an up-to-date forecast of ambient air temperature across the relevant season over which the rating applies. Seasonal Line Ratings are calculated annually, if not more frequently, for each season in the future for which transmission service can be requested.

- Transmission Line Rating

The maximum transfer capability of a transmission line, computed in accordance with a written Transmission Line Rating methodology and consistent with Good Utility Practice, considering the technical limitations on conductors and relevant transmission equipment (such as thermal flow limits), as well as technical limitations of the transmission system (such as system voltage and stability limits).

* * * * *

Appendix JJ

Transmission Line Ratings

Part 1: Transmission Line Rating Methodologies

The CAISO will coordinate with Participating Transmission Owners in their development of Transmission Line Rating methodologies to ensure these methodologies account for the following elements:

- Calculation of temperatures at which there is sufficient confidence that the actual temperature will not be greater than that temperature (i.e., expected temperature plus an appropriate forecast margin).
- For Ambient Adjusted Ratings, including separate daytime and nighttime ratings.
- For Ambient Adjusted Ratings, updating the sunrise and sunset times used to calculate at least monthly.
- Ensuring Ambient Adjusted Ratings are valid for at least the range of local historical temperatures plus or minus a margin of 10 degrees Fahrenheit.
- Establishing procedures to handle a situation where forecast temperatures fall outside of such a range of temperatures, to ensure the use of safe and reliable Transmission Line Ratings, and in the event that actual temperatures set new high or low records, revising their look-up tables/databases or formulas/programs, as necessary and within a timely manner, to maintain a 10 degree Fahrenheit margin.
- Updating Ambient Adjusted Ratings with every five degree Fahrenheit increment of temperature change.
- Addressing how Ambient Adjusted Ratings for Transmission Lines interact with system voltage and stability limits, Remedial Action Schemes and system operating limits.
- For Seasonal Line Ratings, including not fewer than four seasons in each year, and reflecting portions of the year where expected high temperatures are relatively consistent.
- For Seasonal Line Ratings, reflecting an up-to-date forecast of ambient air temperature across the relevant season over which the rating applies.
- Calculating Seasonal Line ratings at least annually, for each season in the future for which transmission service can be requested under the CAISO Tariff.
- Developing forecasts of ambient air temperature for Ambient Adjusted Ratings and Seasonal Line Ratings, consistent with Good Utility Practice and on a non-discriminatory basis.
- For Emergency Ratings, reflecting an acceptable loss of equipment life or other physical or safety limitations for the equipment involved.
- For Emergency Ratings, incorporating an adjustment for ambient air temperature and daytime and nighttime solar heating,
- For Emergency ratings, incorporating a set of electrical equipment ratings that collectively operate as a single electric system element (e.g., transformers, relay protective devices, terminal

equipment, and series and shunt compensation devices), and using the most limiting component from that set to determine the Transmission Line Rating

In undertaking this coordination, the CAISO will seek to promote implementation consistency to the greatest extent possible.

The CAISO will also coordinate with Participating Transmission Owners in their development of exceptions or alternate ratings identified by their Transmission Line Rating methodologies, consistent with the following:

- Where a Participating Transmission Owner determines, consistent with Good Utility Practice, that the Transmission Line Rating of a transmission line is not affected by ambient air temperature or solar heating.
- Where a Participating Transmission Owner reasonably determines, consistent with Good Utility Practice that the temporary use of an alternate Transmission Line Rating is necessary to ensure the safety and reliability of the Transmission System, then the Transmission Provider may use such an alternate rating.

Part 2 – CAISO Use of Transmission Line Ratings

Day-Ahead Market

Unless an exception applies, the CAISO will use Ambient Adjusted Ratings, Dynamic Line Ratings, or alternate ratings validated and submitted by Participating Transmission Owners no later than 9:00 a.m. Pacific Time on the day before a Trading Day as the relevant Transmission Line Ratings in its Base Market Model for the Day-Ahead Market. Ambient Adjusted Ratings should reflect hourly values for each Trading Hour of the Trading Day. Participating Transmission Owners may submit Ambient Adjusted Ratings using SCADA, ICCP or similar communication systems as described in the applicable Business Practice Manual or Operating Procedures. If, for any reason, communications between a Participating Transmission Owner and the CAISO are disrupted and prevent a Participating Transmission Owner from submitting or the CAISO receiving the applicable Transmission Line Rating, or a data input failure occurs, or a hardware or software failure occurs, the CAISO will use the Seasonal Rating for the relevant Transmission Line for the applicable Trading Hour. If the CAISO detects an apparent inaccurate transmission line rating, the CAISO will inform the Participating Transmission Owner and take appropriate actions to resolve any inaccuracy, including use of an alternate rating specified by the Participating Transmission Owner.

Real-Time Market

Unless an exception applies, the CAISO will use Ambient Adjusted Ratings, Dynamic Line Ratings, or alternate ratings validated and submitted by Participating Transmission Owners and EIM Entities no later than 5 (five) hours before a Trading Hour as the relevant Transmission Line Ratings in its Base Market Model for the Real-Time Market. Ambient Adjusted Ratings should reflect equal values across each fifteen-minute interval of a Trading Hour. Participating Transmission Owners may submit Ambient Adjusted Ratings using SCADA, ICCP or similar communication systems as described in the applicable Business Practice Manual or Operating Procedures. If, for any reason, communications with the CAISO are disrupted and prevent a Participating Transmission Owner or EIM Entity from submitting or the CAISO receiving the applicable Transmission Line Rating, or a data input failure occurs, or a hardware or software failure occurs, the CAISO will use the applicable Seasonal Rating for the relevant Transmission Line for the applicable Trading Hour. If the CAISO detects an apparent inaccurate transmission line rating, the CAISO will inform the Participating Transmission Owner or EIM Entity and take appropriate actions to resolve any inaccuracy, including use of an alternate rating specified by the Participating Transmission Owner or EIM Entity.

Longer-Term Transmission Service

The CAISO will use Seasonal Line Ratings in connection with evaluation of any transmission service authorized under the CAISO Tariff ending more than 10 days from the date of the request.

Emergency Ratings

Consistent with Appendix L of the CAISO Tariff, the CAISO will use uniquely determined Emergency Ratings for contingency analysis in the operations horizon and in post-contingency simulations of constraints.

Attachment B – Marked Tariff

Compliance Filing – FERC Order No. 881

California Independent Systems Operator Corporation

July 12, 2022

Section 6

* * * * *

Section 6.5.17 Transmission Line Ratings

The CAISO will maintain on the password-protected section of its OASIS page or on another password-protected website a database of Transmission Line Ratings and Transmission Line Rating methodologies. The database will include a record of all Transmission Line Ratings used in real-time operations and in each future period for which they are calculated. Any postings of temporary alternate Transmission Line Ratings or exceptions will be part of this database. The database will include records of which Transmission Line Ratings and Transmission Line Rating methodologies were in effect at which times over the previous five years, including records of which temporary alternate Transmission Line Ratings or exceptions in effect during the previous five years. Each record in the database will reflect which transmission line to which the record applies and the date and time the record was entered into the database.

The database will document the nature of and basis for each exception, the date(s) and time(s) that the exception was initiated, and (if applicable) the date(s) and time(s) that each exception was withdrawn and the standard rating that became effective again. The database will also document the use of an alternate Transmission Line Rating, including the nature of and basis for the alternate rating, the date and time that the alternate rating was initiated, and, if applicable, the date and time that the alternate rating was withdrawn and the standard rating became effective again.

To the extent that the CAISO fails to make available any Transmission Line Rating used in real-time operations or in any future period for which they are calculated, the CAISO will endeavor to provide this information within the next 30 days, after which the information will not be provided.

Users that meet the requirements of Section 6.5.10.2 may obtain access to the database of Transmission Line Ratings and Transmission Line Rating methodologies. The CAISO will maintain the database so that users can view, download, and query data in a standard formats, using standard protocols. Upon request, the CAISO will provide other transmission providers with access to the database.

* * * * *

Appendix A

* * * * *

- Ambient Adjusted Rating

A Transmission Line Rating that: (1) applies to a time period of not greater than one hour; (2) reflects an up-to-date forecast of ambient air temperature across the time period to which the rating applies; (3) reflects the absence of solar heating during nighttime periods where the local sunrise/sunset times used to determine daytime and nighttime periods are updated at least monthly, if not more frequently; and (4) is calculated at least each hour, if not more frequently

- Dynamic Line Rating

A Transmission Line Rating that applies to a time period of not greater than one hour and reflects up-to-date forecasts of inputs such as (but not limited to) ambient air temperature, wind, solar heating, transmission line tension, or transmission line sag.

- Emergency Rating

A Transmission Line Rating that reflects operation for a specified, finite period, rather than reflecting continuous operation. An Emergency Rating may assume an acceptable loss of equipment life or other physical or safety limitations for the equipment involved.

- Seasonal Ratings

A Transmission Line Rating that (a) applies to a specified season where seasons to include not fewer than four seasons in each year, and to reasonably reflect portions of the year where expected high temperatures are relatively consistent; and (b) reflects an up-to-date forecast of ambient air temperature across the relevant season over which the rating applies. Seasonal Line Ratings are calculated annually, if not more frequently, for each season in the future for which transmission service can be requested.

- Transmission Line Rating

The maximum transfer capability of a transmission line, computed in accordance with a written Transmission Line Rating methodology and consistent with Good Utility Practice, considering the technical limitations on conductors and relevant transmission equipment (such as thermal flow limits), as well as technical limitations of the transmission system (such as system voltage and stability limits).

* * * * *

Appendix JJ

Transmission Line Ratings

Part 1: Transmission Line Rating Methodologies

The CAISO will coordinate with Participating Transmission Owners in their development of Transmission Line Rating methodologies to ensure these methodologies account for the following elements:

- Calculation of temperatures at which there is sufficient confidence that the actual temperature will not be greater than that temperature (i.e., expected temperature plus an appropriate forecast margin).
- For Ambient Adjusted Ratings, including separate daytime and nighttime ratings.
- For Ambient Adjusted Ratings, updating the sunrise and sunset times used to calculate at least monthly.
- Ensuring Ambient Adjusted Ratings are valid for at least the range of local historical temperatures plus or minus a margin of 10 degrees Fahrenheit.
- Establishing procedures to handle a situation where forecast temperatures fall outside of such a range of temperatures, to ensure the use of safe and reliable Transmission Line Ratings, and in the event that actual temperatures set new high or low records, revising their look-up tables/databases or formulas/programs, as necessary and within a timely manner, to maintain a 10 degree Fahrenheit margin.
- Updating Ambient Adjusted Ratings with every five degree Fahrenheit increment of temperature change.
- Addressing how Ambient Adjusted Ratings for Transmission Lines interact with system voltage and stability limits, Remedial Action Schemes and system operating limits.
- For Seasonal Line Ratings, including not fewer than four seasons in each year, and reflecting portions of the year where expected high temperatures are relatively consistent.
- For Seasonal Line Ratings, reflecting an up-to-date forecast of ambient air temperature across the relevant season over which the rating applies.
- Calculating Seasonal Line ratings at least annually, for each season in the future for which transmission service can be requested under the CAISO Tariff.
- Developing forecasts of ambient air temperature for Ambient Adjusted Ratings and Seasonal Line Ratings, consistent with Good Utility Practice and on a non-discriminatory basis.
- For Emergency Ratings, reflecting an acceptable loss of equipment life or other physical or safety limitations for the equipment involved.
- For Emergency Ratings, incorporating an adjustment for ambient air temperature and daytime and nighttime solar heating.
- For Emergency ratings, incorporating a set of electrical equipment ratings that collectively operate as a single electric system element (e.g., transformers, relay protective devices, terminal

equipment, and series and shunt compensation devices), and using the most limiting component from that set to determine the Transmission Line Rating

In undertaking this coordination, the CAISO will seek to promote implementation consistency to the greatest extent possible.

The CAISO will also coordinate with Participating Transmission Owners in their development of exceptions or alternate ratings identified by their Transmission Line Rating methodologies, consistent with the following:

- Where a Participating Transmission Owner determines, consistent with Good Utility Practice, that the Transmission Line Rating of a transmission line is not affected by ambient air temperature or solar heating.
- Where a Participating Transmission Owner reasonably determines, consistent with Good Utility Practice that the temporary use of an alternate Transmission Line Rating is necessary to ensure the safety and reliability of the Transmission System, then the Transmission Provider may use such an alternate rating.

Part 2 – CAISO Use of Transmission Line Ratings

Day-Ahead Market

Unless an exception applies, the CAISO will use Ambient Adjusted Ratings, Dynamic Line Ratings, or alternate ratings validated and submitted by Participating Transmission Owners no later than 9:00 a.m. Pacific Time on the day before a Trading Day as the relevant Transmission Line Ratings in its Base Market Model for the Day-Ahead Market. Ambient Adjusted Ratings should reflect hourly values for each Trading Hour of the Trading Day. Participating Transmission Owners may submit Ambient Adjusted Ratings using SCADA, ICCP or similar communication systems as described in the applicable Business Practice Manual or Operating Procedures. If, for any reason, communications between a Participating Transmission Owner and the CAISO are disrupted and prevent a Participating Transmission Owner from submitting or the CAISO receiving the applicable Transmission Line Rating, or a data input failure occurs, or a hardware or software failure occurs, the CAISO will use the Seasonal Rating for the relevant Transmission Line for the applicable Trading Hour. If the CAISO detects an apparent inaccurate transmission line rating, the CAISO will inform the Participating Transmission Owner and take appropriate actions to resolve any inaccuracy, including use of an alternate rating specified by the Participating Transmission Owner.

Real-Time Market

Unless an exception applies, the CAISO will use Ambient Adjusted Ratings, Dynamic Line Ratings, or alternate ratings validated and submitted by Participating Transmission Owners and EIM Entities no later than 5 (five) hours before a Trading Hour as the relevant Transmission Line Ratings in its Base Market Model for the Real-Time Market. Ambient Adjusted Ratings should reflect equal values across each fifteen-minute interval of a Trading Hour. Participating Transmission Owners may submit Ambient Adjusted Ratings using SCADA, ICCP or similar communication systems as described in the applicable Business Practice Manual or Operating Procedures. If, for any reason, communications with the CAISO are disrupted and prevent a Participating Transmission Owner or EIM Entity from submitting or the CAISO receiving the applicable Transmission Line Rating, or a data input failure occurs, or a hardware or software failure occurs, the CAISO will use the applicable Seasonal Rating for the relevant Transmission Line for the applicable Trading Hour. If the CAISO detects an apparent inaccurate transmission line rating, the CAISO will inform the Participating Transmission Owner or EIM Entity and take appropriate actions to resolve any inaccuracy, including use of an alternate rating specified by the Participating Transmission Owner or EIM Entity.

Longer-Term Transmission Service

The CAISO will use Seasonal Line Ratings in connection with evaluation of any transmission service authorized under the CAISO Tariff ending more than 10 days from the date of the request.

Emergency Ratings

Consistent with Appendix L of the CAISO Tariff, the CAISO will use uniquely determined Emergency Ratings for contingency analysis in the operations horizon and in post-contingency simulations of constraints.