California Independent
System Operator Corporation

September 30, 2010

VIA ELECTRONIC FILING

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20246

Re: California Independent System Operator Corporation
Compliance Filing
Docket No. ER10-1706-000

Dear Secretary Bose:

The California Independent System Operator Corporation (ISO)[1] submits this filing in compliance with the Federal Energy Regulatory Commission's August 31, 2010 order on tariff revisions in the above-referenced proceeding.[2] In its *August 2010 Order*, the Commission accepted in part and rejected in part the ISO's proposed tariff revisions relating to interconnection requirements for asynchronous generating facilities.

I. Background

On July 2, 2010, the ISO submitted proposed tariff revisions relating to interconnection requirements for large asynchronous generating facilities. The ISO's proposed requirements included capabilities for low voltage ride through and frequency rise-through, power factor design and reactive power, voltage regulation and generator power management. The majority of the ISO's proposed tariff changes appeared in two new large generator interconnection agreements that would apply to interconnection customers in the serial study group (Appendix BB to the ISO tariff) and interconnection customers subject to a cluster study group (Appendix CC to the ISO tariff. The ISO requested an effective date of July 3, 2010 for these requirements, which would apply to interconnection customers that either had not executed or had

[1] The ISO is sometimes referred to CAISO. Capitalized terms not otherwise defined herein have the meanings set forth in the Master Definitions Supplement, Appendix A to the currently effective ISO tariff. The ISO is submitting this filing in compliance with Order No. 714, *Electronic Tariff Filings*, FERC Stats. & Regs. ¶ 31,276 (2009).

[2] *California Indep. Sys. Operator Corp*., 132 FERC ¶ 61,196 (2010) (*August 2010 Order*)

not been tendered a large generator interconnection agreement by this date. The ISO also requested that the Commission exempt interconnection customers from the new low voltage ride through requirements if those customers demonstrate, as of May 18, 2010, a binding commitment to purchase inverters for thirty percent or more of the facility's maximum generating capacity that are incapable of complying with the new low voltage ride through requirements.

In its *August 2010 Order*, the Commission accepted the ISO's proposed tariff revisions regarding frequency and low voltage ride through requirements applicable to all asynchronous generating facilities. But the Commission rejected the ISO's proposal to exempt interconnection customers who demonstrate as of May 18, 2010 a binding commitment to purchase inverters for thirty percent or more of the facility's maximum generating capacity that are incapable of complying with these requirements. [3] The *August 2010 Order* directs the ISO to change its proposed May 18, 2010 date to July 3, 2010. The Commission also accepted the ISO's proposed tariff revisions to exempt asynchronous generating facilities from the requirement to provide power system stabilizers and to specify that interconnection customers provide standard study models to the extent such models are available. The *August 2010 Order* granted a waiver prior notice requirements for the accepted tariff provisions and authorized an effective date for those provisions of July 3, 2010. The Commission rejected without prejudice a number of the ISO's proposed interconnection requirements, including requirements related to power factor design and operation, voltage regulation and reactive power control, and generator power management. [4]

II. Proposed Tariff Modifications on Compliance

Pursuant to the Commission's *August 2010 Order*, the ISO proposes the following changes to its proposed tariff revisions to Appendices BB and CC of its tariff:

- Delete Article 9.6.2.2 pertaining to voltage control and governor control for asynchronous generating facilities.

- Modify Appendix H, Section A.i to provides an exemption for asynchronous generating facility if it can demonstrate to the ISO a binding commitment as of July 3, 2010 to purchase inverters for thirty (30) percent or more of the Generating Facility's maximum Generating Facility Capacity that are incapable of complying with the requirements.

- Modify Appendix H, Section A.iii to delete proposed tariff language relating to power factor design and operating requirements and include existing tariff

[3] *August 2010 Order* at PP 66-72.

[4] *August 2010 Order* at PP 45-48, 54-55, 87-89.

language relating to power factor design criteria from the ISO's currently approved large generator interconnection requirements for wind generators.

- Delete Appendix H, Section A.iv relating to voltage regulation and reactive power control requirements.

- Delete Appendix H, Section A.v relating to generator plant power management requirements.

- Modify Appendix H, Section A.vi to delete proposed tariff language relating to supervisory control and data acquisition and automated dispatch system capability and include existing tariff language relating to supervisory control and data acquisition criteria from the ISO's currently approved large generator interconnection requirements for wind generators.

III. Materials Provided In This Compliance Filing

The following documents, in addition to this transmittal letter, support this filing:

Attachment A	Clean sheets of the currently effective tariff showing revisions described in this filing
Attachment B	Sheets showing, in black-line format, the changes to the currently effective tariff described in this filing

IV. Conclusion

The ISO respectfully requests that the Commission accept this filing as complying with the directives of the Commission's *August 2010 Order*.

Please do not hesitate to contact the undersigned if you have any questions.

Respectfully submitted,

By: *ss/Andrew Ulmer*
Nancy Saracino
General Counsel
Grant Rosenblum
Senior Counsel
Andrew Ulmer
Senior Counsel
California Independent System
Operator Corporation
151 Blue Ravine Road
Folsom, CA 95630
Tel: (916) 608-7182
Fax: (916) 608-7246
E-mail: amckenna@caiso.com

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 captioned 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 this 30th day of September 2010.

SS: *Jane Ostapovich*
Jane Ostapovich

Attachment A – Clean

IRRP Compliance Filing

California Independent System Operator Corporation

Fifth Replacement FERC Electric Tariff

* * *

CAISO TARIFF APPENDIX BB

Standard Large Generator Interconnection Agreement

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ARTICLE 9. OPERATIONS

9.6 Reactive Power.

9.6.1 Power Factor Design Criteria. For all Generating Facilities other than Asynchronous Generating Facilities, the Interconnection Customer shall design the Large Generating Facility to maintain a composite power delivery at continuous rated power output at the terminals of the Electric Generating Unit at a power factor within the range of 0.95 leading to 0.90 lagging, unless the CAISO has established different requirements that apply to all generators in the Balancing Authority Area on a comparable basis. For Asynchronous Generating Facilities, the Interconnection Customer shall design the Large Generating Facility to maintain power factor criteria in accordance with Appendix H of this LGIA.

9.6.2 Voltage Schedules. Once the Interconnection Customer has synchronized an Electric Generating Unit with the CAISO Controlled Grid, the CAISO or Participating TO shall require the Interconnection Customer to maintain a voltage schedule by operating the Electric Generating Unit to produce or absorb reactive power within the design limitations of the Electric Generating Unit set forth in Article 9.6.1 (Power Factor Design Criteria). CAISO's voltage schedules shall treat all sources of reactive power in the Balancing Authority Area in an equitable and not unduly discriminatory manner. The Participating TO shall exercise Reasonable Efforts to provide the Interconnection Customer with such schedules at least one (1) day in advance, and the CAISO or Participating TO may make changes to such schedules as necessary to maintain the reliability of the CAISO Controlled Grid or the Participating TO's electric system. The Interconnection Customer shall operate the Electric Generating Unit to maintain the specified output voltage or power factor within the design limitations of the Electric Generating Unit set forth in Article 9.6.1 (Power Factor Design Criteria), and as may be required by the CAISO to operate the Electric Generating Unit at a specific voltage schedule within the design limitations set forth in Article 9.6.1. If the Interconnection Customer is unable to maintain the specified voltage or power factor, it shall promptly notify the CAISO and the Participating TO.

9.6.2.1 Governors and Regulators. Whenever an Electric Generating Unit is operated in parallel with the CAISO Controlled Grid and the speed governors (if installed on the Electric Generating Unit pursuant to Good Utility Practice) and voltage regulators are capable of operation, the Interconnection Customer shall operate the Electric Generating Unit with its speed governors and voltage regulators in automatic operation. If the Electric Generating Unit's speed governors and voltage regulators are not capable of such automatic operation, the Interconnection Customer shall immediately notify the CAISO and the Participating TO and ensure that the Electric Generating Unit operates as specified in Article 9.6.2 through manual operation and that such Electric Generating Unit's reactive power production or absorption (measured in MVARs) are within the design capability of the Electric Generating Unit(s) and steady

state stability limits. The Interconnection Customer shall restore the speed governors and voltage regulators to automatic operation as soon as possible and in accordance with the Reliability Management System Agreement in Appendix G. If the Large Generating Facility's speed governors and voltage regulators are improperly tuned or malfunctioning, the CAISO shall have the right to order the reduction in output or disconnection of the Large Generating Facility if the reliability of the CAISO Controlled Grid would be adversely affected. The Interconnection Customer shall not cause its Large Generating Facility to disconnect automatically or instantaneously from the CAISO Controlled Grid or trip any Electric Generating Unit comprising the Large Generating Facility for an under or over frequency condition unless the abnormal frequency condition persists for a time period beyond the limits set forth in ANSI/IEEE Standard C37.106, or such other standard as applied to other generators in the Balancing Authority Area on a comparable basis.

9.6.3 Payment for Reactive Power. CAISO is required to pay the Interconnection Customer for reactive power that Interconnection Customer provides or absorbs from an Electric Generating Unit when the CAISO requests the Interconnection Customer to operate its Electric Generating Unit outside the range specified in Article 9.6.1, provided that if the CAISO pays other generators for reactive power service within the specified range, it must also pay the Interconnection Customer. Payments shall be pursuant to Article 11.6 or such other agreement to which the CAISO and Interconnection Customer have otherwise agreed.

* * *

Appendix H
To LGIA

INTERCONNECTION REQUIREMENTS FOR AN ASYNCHRONOUS GENERATING FACILITY

Appendix H sets forth interconnection requirements specific to all Asynchronous Generating Facilities. Existing individual generating units of an Asynchronous Generating Facility that are, or have been, interconnected to the CAISO Controlled Grid at the same location are exempt from the requirements of this Appendix H for the remaining life of the existing generating unit. Generating units that are replaced, however, shall meet the requirements of this Appendix H.

A. Technical Requirements Applicable to Asynchronous Generating Facilities

i. Low Voltage Ride-Through (LVRT) Capability

An Asynchronous Generating Facility shall be able to remain online during voltage disturbances up to the time periods and associated voltage levels set forth in the requirements below.

1. An Asynchronous Generating Facility shall remain online for the voltage disturbance caused by any fault on the transmission grid, or within the Asynchronous Generating Facility between the Point of Interconnection and the high voltage terminals of the Asynchronous Generating Facility's step up transformer, having a duration equal to the lesser of the normal three-phase fault clearing time (4-9 cycles) or one-hundred fifty (150) milliseconds, plus any subsequent post-fault voltage recovery to the final steady-state post-fault voltage. Clearing time shall be based on the maximum normal clearing time associated with any three-phase fault location that reduces the voltage at the Asynchronous Generating Facility's Point of Interconnection to 0.2 per-unit of nominal voltage or less, independent of any fault current contribution from the Asynchronous Generating Facility.

2. An Asynchronous Generating Facility shall remain online for any voltage disturbance caused by a single-phase fault on the transmission grid, or within the Asynchronous Generating Facility between the Point of Interconnection and the high voltage terminals of the Asynchronous Generating Facility's step up transformer, with delayed clearing, plus any subsequent post-fault voltage recovery to the final steady-state post-fault voltage. Clearing time shall be based on the maximum backup clearing time associated with a single point of failure (protection or breaker failure) for any single-phase fault location that reduces any phase-to-ground or phase-to-phase voltage at the Asynchronous Generating Facility's Point of Interconnection to 0.2 per-unit of nominal voltage or less, independent of any fault current contribution from the Asynchronous Generating Facility.

3. Remaining on-line shall be defined as continuous connection between the Point of Interconnection and the Asynchronous Generating Facility's units, without any mechanical isolation. Asynchronous Generating Facilities may cease to inject current into the transmission grid during a fault.

4. The Asynchronous Generating Facility is not required to remain on line during multi-phased faults exceeding the duration described in Section A.i.1 of this Appendix H or single-phase faults exceeding the duration described in Section A.i.2 of this Appendix H.

5. The requirements of this Section A.i of this Appendix H do not apply to faults that occur between the Asynchronous Generating Facility's terminals and the high side of the step-up transformer to the high-voltage transmission system.

6. Asynchronous Generating Facilities may be tripped after the fault period if this action is intended as part of a special protection system.

7. Asynchronous Generating Facilities may meet the requirements of this Section A.i of this Appendix H through the performance of the generating units or by installing additional equipment within the Asynchronous Generating Facility, or by a combination of generating unit performance and additional equipment.

8. The provisions of this Section A.i of this Appendix H apply only if the voltage at the Point of Interconnection has remained within the range of 0.9 and 1.10 per-unit of nominal voltage for the preceding two seconds, excluding any sub-cycle transient deviations.

The requirements of this Section A.i in this Appendix H shall not apply to any Asynchronous Generating Facility that can demonstrate to the CAISO a binding commitment, as of July 3, 2010, to purchase inverters for thirty (30) percent or more of the Generating Facility's maximum Generating Facility Capacity that are incapable of complying with the requirements of this Section A.i in this Appendix H. The Interconnection Customer must include a statement from the inverter manufacturer confirming the inability to comply with this requirement in addition to any information requested by the CAISO to determine the applicability of this exemption.

ii. Frequency Disturbance Ride-Through Capability

An Asynchronous Generating Facility shall comply with the off nominal frequency requirements set forth in the WECC Under Frequency Load Shedding Relay Application Guide or successor requirements as they may be amended from time to time.

iii. Power Factor Design Criteria (Reactive Power)

An Asynchronous Generating Facility shall operate within a power factor within the range of 0.95 leading to 0.95 lagging, measured at the Point of Interconnection as defined in this LGIA in order to maintain a specified voltage schedule, if the Phase II Interconnection Study shows that such a requirement is necessary to ensure safety or reliability. The power factor range standard can be met by using, for

example, power electronics designed to supply this level of reactive capability (taking into account any limitations due to voltage level, real power output, etc.) or fixed and switched capacitors, or a combination of the two, if agreed to by the Participating TO and CAISO. The Interconnection Customer shall not disable power factor equipment while the Asynchronous Generating Facility is in operation. Asynchronous Generating Facilities shall also be able to provide sufficient dynamic voltage support in lieu of the power system stabilizer and automatic voltage regulation at the generator excitation system if the Phase II Interconnection Study shows this to be required for system safety or reliability.

iv. Supervisory Control and Data Acquisition (SCADA) Capability

An Asynchronous Generating Facility shall provide SCADA capability to transmit data and receive instructions from the Participating TO and CAISO to protect system reliability. The Participating TO and CAISO and the Asynchronous Generating Facility Interconnection Customer shall determine what SCADA information is essential for the proposed Asynchronous Generating Facility, taking into account the size of the plant and its characteristics, location, and importance in maintaining generation resource adequacy and transmission system reliability.

vv. Power System Stabilizers (PSS)

Power system stabilizers are not required for Asynchronous Generating Facilities.

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CAISO TARIFF APPENDIX CC

Large Generator Interconnection Agreement

for Interconnection Requests in a Queue Cluster Window

that are tendered a Large Generator Interconnection Agreement on or after July 3, 2010

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ARTICLE 9. OPERATIONS

9.6 Reactive Power.

9.6.1 Power Factor Design Criteria. For all Generating Facilities other than Asynchronous Generating Facilities, the Interconnection Customer shall design the Large Generating Facility to maintain a composite power delivery at continuous rated power output at the terminals of the Electric Generating Unit at a power factor within the range of 0.95 leading to 0.90 lagging, unless the CAISO has established different requirements that apply to all generators in the Balancing Authority Area on a comparable basis. For Asynchronous Generating Facilities, the Interconnection Customer shall design the Large Generating Facility to maintain power factor criteria in accordance with Appendix H of this LGIA.

9.6.2 Voltage Schedules. Once the Interconnection Customer has synchronized an Electric Generating Unit with the CAISO Controlled Grid, the CAISO or Participating TO shall require the Interconnection Customer to maintain a voltage schedule by operating the Electric Generating Unit to produce or absorb reactive power within the design limitations of the Electric Generating Unit set forth in Article 9.6.1 (Power Factor Design Criteria). CAISO's voltage schedules shall treat all sources of reactive power in the Balancing Authority Area in an equitable and not unduly discriminatory manner. The Participating TO shall exercise Reasonable Efforts to provide the Interconnection Customer with such schedules at least one (1) day in advance, and the CAISO or Participating TO may make changes to such schedules as necessary to maintain the reliability of the CAISO Controlled Grid or the Participating TO's electric system. The Interconnection Customer shall operate the Electric Generating Unit to maintain the specified output voltage or power factor within the design limitations of the Electric Generating Unit set forth in Article 9.6.1 (Power Factor Design Criteria), and as may be required by the CAISO to operate the Electric Generating Unit at a specific voltage schedule within the design limitations set forth in Article 9.6.1. If the Interconnection Customer is unable to maintain the specified voltage or power factor, it shall promptly notify the CAISO and the Participating TO.

9.6.2.1 Governors and Regulators. Whenever an Electric Generating Unit is operated in parallel with the CAISO Controlled Grid and the speed governors (if installed on the Electric Generating Unit pursuant to Good Utility Practice) and voltage regulators are capable of operation, the Interconnection Customer shall operate the Electric Generating Unit with its speed governors and voltage regulators in automatic operation. If the Electric Generating Unit's speed governors and voltage regulators are not capable of such automatic operation, the Interconnection Customer shall immediately notify the CAISO and the Participating TO and ensure that the Electric Generating Unit operates as specified in Article 9.6.2 through manual operation and that such Electric Generating Unit's reactive power production or absorption (measured in MVARs) are within the design capability of the Electric Generating Unit(s) and steady state stability limits. The Interconnection Customer shall restore the speed

governors and voltage regulators to automatic operation as soon as possible. If the Large Generating Facility's speed governors and voltage regulators are improperly tuned or malfunctioning, the CAISO shall have the right to order the reduction in output or disconnection of the Large Generating Facility if the reliability of the CAISO Controlled Grid would be adversely affected. The Interconnection Customer shall not cause its Large Generating Facility to disconnect automatically or instantaneously from the CAISO Controlled Grid or trip any Electric Generating Unit comprising the Large Generating Facility for an under or over frequency condition unless the abnormal frequency condition persists for a time period beyond the limits set forth in ANSI/IEEE Standard C37.106, or such other standard as applied to other generators in the Balancing Authority Area on a comparable basis.

9.6.3 Payment for Reactive Power. CAISO is required to pay the Interconnection Customer for reactive power that Interconnection Customer provides or absorbs from an Electric Generating Unit when the CAISO requests the Interconnection Customer to operate its Electric Generating Unit outside the range specified in Article 9.6.1, provided that if the CAISO pays other generators for reactive power service within the specified range, it must also pay the Interconnection Customer. Payments shall be pursuant to Article 11.6 or such other agreement to which the CAISO and Interconnection Customer have otherwise agreed.

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Appendix H
To LGIA

INTERCONNECTION REQUIREMENTS FOR AN ASYNCHRONOUS GENERATING FACILITY

Appendix H sets forth interconnection requirements specific to all Asynchronous Generating Facilities. Existing individual generating units of an Asynchronous Generating Facility that are, or have been, interconnected to the CAISO Controlled Grid at the same location are exempt from the requirements of this Appendix H for the remaining life of the existing generating unit. Generating units that are replaced, however, shall meet the requirements of this Appendix H.

A. Technical Requirements Applicable to Asynchronous Generating Facilities

i. Low Voltage Ride-Through (LVRT) Capability

An Asynchronous Generating Facility shall be able to remain online during voltage disturbances up to the time periods and associated voltage levels set forth in the requirements below.

1. An Asynchronous Generating Facility shall remain online for the voltage disturbance caused by any fault on the transmission grid, or within the Asynchronous Generating Facility between the Point of Interconnection and the high voltage terminals of the Asynchronous Generating Facility's step up transformer, having a duration equal to the lesser of the normal three-phase fault clearing time (4-9 cycles) or one-hundred fifty (150) milliseconds, plus any subsequent post-fault voltage recovery to the final steady-state post-fault voltage. Clearing time shall be based on the maximum normal clearing time associated with any three-phase fault location that reduces the voltage at the Asynchronous Generating Facility's Point of Interconnection to 0.2 per-unit of nominal voltage or less, independent of any fault current contribution from the Asynchronous Generating Facility.

2. An Asynchronous Generating Facility shall remain online for any voltage disturbance caused by a single-phase fault on the transmission grid, or within the Asynchronous Generating Facility between the Point of Interconnection and the high voltage terminals of the Asynchronous

Generating Facility's step up transformer, with delayed clearing, plus any subsequent post-fault voltage recovery to the final steady-state post-fault voltage. Clearing time shall be based on the maximum backup clearing time associated with a single point of failure (protection or breaker failure) for any single-phase fault location that reduces any phase-to-ground or phase-to-phase voltage at the Asynchronous Generating Facility's Point of Interconnection to 0.2 per-unit of nominal voltage or less, independent of any fault current contribution from the Asynchronous Generating Facility.

3. Remaining on-line shall be defined as continuous connection between the Point of Interconnection and the Asynchronous Generating Facility's units, without any mechanical isolation. Asynchronous Generating Facilities may cease to inject current into the transmission grid during a fault.

4. The Asynchronous Generating Facility is not required to remain on line during multi-phased faults exceeding the duration described in Section A.i.1 of this Appendix H or single-phase faults exceeding the duration described in Section A.i.2 of this Appendix H.

5. The requirements of this Section A.i. of this Appendix H do not apply to faults that occur between the Asynchronous Generating Facility's terminals and the high side of the step-up transformer to the high-voltage transmission system.

6. Asynchronous Generating Facilities may be tripped after the fault period if this action is intended as part of a special protection system.

7. Asynchronous Generating Facilities may meet the requirements of this Section A.i of this Appendix H through the performance of the generating units or by installing additional equipment within the Asynchronous Generating Facility, or by a combination of generating unit performance and additional equipment.

8. The provisions of this Section A.i of this Appendix H apply only if the voltage at the Point of Interconnection has remained within the range of 0.9 and 1.10 per-unit of nominal voltage for the preceding two seconds, excluding any sub-cycle transient deviations.

The requirements of this Section A.i in this Appendix H shall not apply to any Asynchronous Generating Facility that can demonstrate to the CAISO a binding commitment, as of July 3, 2010, to purchase inverters for thirty (30) percent or more of the Generating Facility's maximum Generating Facility Capacity that are incapable of complying with the requirements of this Section A.i in this Appendix H. The Interconnection Customer must include a statement from the inverter manufacturer confirming the inability to comply with this requirement in addition to any information requested by the CAISO to determine the applicability of this exemption.

ii. Frequency Disturbance Ride-Through Capability

An Asynchronous Generating Facility shall comply with the off nominal frequency requirements set forth in the WECC Under Frequency Load Shedding Relay Application Guide or successor requirements as they may be amended from time to time.

iii. Power Factor Design Criteria (Reactive Power)

An Asynchronous Generating Facility shall operate within a power factor within the range of 0.95 leading to 0.95 lagging, measured at the Point of Interconnection as defined in this LGIA in order to maintain a specified voltage schedule, if the Phase II Interconnection Study shows that such a requirement is necessary to ensure safety or reliability. The power factor range standard can be met by using, for example, power electronics designed to supply this level of reactive capability (taking into account any limitations due to voltage level, real power output, etc.) or fixed and switched capacitors, or a combination of the two, if agreed to by the Participating TO and CAISO. The Interconnection Customer shall not

disable power factor equipment while the Asynchronous Generating Facility is in operation. Asynchronous Generating Facilities shall also be able to provide sufficient dynamic voltage support in lieu of the power system stabilizer and automatic voltage regulation at the generator excitation system if the Phase II Interconnection Study shows this to be required for system safety or reliability.
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iv. Supervisory Control and Data Acquisition (SCADA) Capability

An Asynchronous Generating Facility shall provide SCADA capability to transmit data and receive instructions from the Participating TO and CAISO to protect system reliability. The Participating TO and CAISO and the Asynchronous Generating Facility Interconnection Customer shall determine what SCADA information is essential for the proposed Asynchronous Generating Facility, taking into account the size of the plant and its characteristics, location, and importance in maintaining generation resource adequacy and transmission system reliability.

v. Power System Stabilizers (PSS)

Power system stabilizers are not required for Asynchronous Generating Facilities.

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Attachment B – Marked Tariff

IRRP Compliance Filing

California Independent System Operator Corporation

Fifth Replacement FERC Electric Tariff

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CAISO TARIFF APPENDIX BB

Standard Large Generator Interconnection Agreement

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ARTICLE 9. OPERATIONS

9.6 Reactive Power.

9.6.1 Power Factor Design Criteria. For all Generating Facilities other than Asynchronous Generating Facilities, the Interconnection Customer shall design the Large Generating Facility to maintain a composite power delivery at continuous rated power output at the terminals of the Electric Generating Unit at a power factor within the range of 0.95 leading to 0.90 lagging, unless the CAISO has established different requirements that apply to all generators in the Balancing Authority Area on a comparable basis. For Asynchronous Generating Facilities, the Interconnection Customer shall design the Large Generating Facility to maintain power factor criteria in accordance with Appendix H of this LGIA.

9.6.2 Voltage Schedules. Once the Interconnection Customer has synchronized an Electric Generating Unit with the CAISO Controlled Grid, the CAISO or Participating TO shall require the Interconnection Customer to maintain a voltage schedule by operating the Electric Generating Unit to produce or absorb reactive power within the design limitations of the Electric Generating Unit set forth in Article 9.6.1 (Power Factor Design Criteria). CAISO's voltage schedules shall treat all sources of reactive power in the Balancing Authority Area in an equitable and not unduly discriminatory manner. The Participating TO shall exercise Reasonable Efforts to provide the Interconnection Customer with such schedules at least one (1) day in advance, and the CAISO or Participating TO may make changes to such schedules as necessary to maintain the reliability of the CAISO Controlled Grid or the Participating TO's electric system. The Interconnection Customer shall operate the Electric Generating Unit to maintain the specified output voltage or power factor within the design limitations of the Electric Generating Unit set forth in Article 9.6.1 (Power Factor Design Criteria), and as may be required by the CAISO to operate the Electric Generating Unit at a specific voltage schedule within the design limitations set forth in Article 9.6.1. If the Interconnection Customer is unable to maintain the specified voltage or power factor, it shall promptly notify the CAISO and the Participating TO.

9.6.2.1 Governors and Regulators. Whenever an Electric Generating Unit is operated in parallel with the CAISO Controlled Grid and the speed governors (if installed on the Electric Generating Unit pursuant to Good Utility Practice) and voltage regulators are capable of operation, the Interconnection Customer shall operate the Electric Generating Unit with its speed governors and voltage regulators in automatic operation. If the Electric Generating Unit's speed governors and voltage regulators are not capable of such automatic operation, the Interconnection Customer shall immediately notify the CAISO and the Participating TO and ensure that the Electric Generating Unit operates as specified in Article 9.6.2 through manual operation and that such Electric Generating Unit's reactive power production or absorption (measured in MVARs) are within the design capability of the Electric Generating Unit(s) and steady

state stability limits. The Interconnection Customer shall restore the speed governors and voltage regulators to automatic operation as soon as possible and in accordance with the Reliability Management System Agreement in Appendix G. If the Large Generating Facility's speed governors and voltage regulators are improperly tuned or malfunctioning, the CAISO shall have the right to order the reduction in output or disconnection of the Large Generating Facility if the reliability of the CAISO Controlled Grid would be adversely affected. The Interconnection Customer shall not cause its Large Generating Facility to disconnect automatically or instantaneously from the CAISO Controlled Grid or trip any Electric Generating Unit comprising the Large Generating Facility for an under or over frequency condition unless the abnormal frequency condition persists for a time period beyond the limits set forth in ANSI/IEEE Standard C37.106, or such other standard as applied to other generators in the Balancing Authority Area on a comparable basis.

~~**9.6.2.2 Loss of Voltage Control and Governor Control for Asynchronous Generating Facilities.** For Asynchronous Generating Facilities, Appendix H to this LGIA sets forth the requirements for Large Generating Facilities relating to: (i) the loss of voltage control capability, (ii) governor response to frequency conditions, and (iii) ability not to disconnect automatically or instantaneously from the CAISO Controlled Grid or trip any Electric Generating Unit comprising the Large Generating Facility for an under- or over-frequency condition. Asynchronous Generating Facilities are not required to provide governor response to under-frequency conditions.~~

9.6.3 Payment for Reactive Power. CAISO is required to pay the Interconnection Customer for reactive power that Interconnection Customer provides or absorbs from an Electric Generating Unit when the CAISO requests the Interconnection Customer to operate its Electric Generating Unit outside the range specified in Article 9.6.1, provided that if the CAISO pays other generators for reactive power service within the specified range, it must also pay the Interconnection Customer. Payments shall be pursuant to Article 11.6 or such other agreement to which the CAISO and Interconnection Customer have otherwise agreed.

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Appendix H
To LGIA

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Appendix H sets forth interconnection requirements specific to all Asynchronous Generating Facilities. Existing individual generating units of an Asynchronous Generating Facility that are, or have been, interconnected to the CAISO Controlled Grid at the same location are exempt from the requirements of this Appendix H for the remaining life of the existing generating unit. Generating units that are replaced, however, shall meet the requirements of this Appendix H.

A. Technical Requirements Applicable to Asynchronous Generating Facilities

i. Low Voltage Ride-Through (LVRT) Capability

An Asynchronous Generating Facility shall be able to remain online during voltage disturbances up to the time periods and associated voltage levels set forth in the requirements below.

~~1.~~ 1. An Asynchronous Generating Facility shall remain online for the voltage disturbance caused by any fault on the transmission grid, or within the Asynchronous Generating Facility between the Point of Interconnection and the high voltage terminals of the Asynchronous Generating Facility's step up transformer, having a duration equal to the lesser of the normal three-phase fault clearing time (4-9 cycles) or one-hundred fifty (150) milliseconds, plus any subsequent post-fault voltage recovery to the final steady-state post-fault voltage. Clearing time shall be based on the maximum normal clearing time associated with any three-phase fault location that reduces the voltage at the Asynchronous Generating Facility's Point of Interconnection to 0.2 per-unit of nominal voltage or less, independent of any fault current contribution from the Asynchronous Generating Facility.

~~1.~~ 2. An Asynchronous Generating Facility shall remain online for any voltage disturbance caused by a single-phase fault on the transmission grid, or within the Asynchronous Generating Facility between the Point of Interconnection and the high voltage terminals of the Asynchronous Generating Facility's step up transformer, with delayed clearing, plus any subsequent post-fault voltage recovery to the final steady-state post-fault voltage. Clearing time shall be based on the maximum backup clearing time associated with a single point of failure (protection or breaker failure) for any single-phase fault location that reduces any phase-to-ground or phase-to-phase voltage at the Asynchronous Generating Facility's Point of Interconnection to 0.2 per-unit of nominal voltage or less, independent of any fault current contribution from the Asynchronous Generating Facility.

~~1.~~ 3. Remaining on-line shall be defined as continuous connection between the Point of Interconnection and the Asynchronous Generating Facility's units, without any mechanical isolation. Asynchronous Generating Facilities may cease to inject current into the transmission grid during a fault.

~~1.~~ 4. The Asynchronous Generating Facility is not required to remain on line during multi-phased faults exceeding the duration described in Section A.i.1 of this Appendix H or single-phase faults exceeding the duration described in Section A.i.2 of this Appendix H.

~~1.~~ 5. The requirements of this Section A.i of this Appendix H do not apply to faults that occur between the Asynchronous Generating Facility's terminals and the high side of the step-up transformer to the ~~the~~ high-voltage transmission system.

~~1.~~ 6. Asynchronous Generating Facilities may be tripped after the fault period if this action is intended as part of a special protection system.

~~1.~~ 7. Asynchronous Generating Facilities may meet the requirements of this Section A.i of this Appendix H through the performance of the generating units or by installing additional equipment within the Asynchronous Generating Facility, or by a combination of generating unit performance and additional equipment.

~~1.~~ 8. The provisions of this Section A.i of this Appendix H apply only if the voltage at the Point of Interconnection has remained within the range of 0.9 and 1.10 per-unit of nominal voltage for the preceding two seconds, excluding any sub-cycle transient deviations.

The requirements of this Section A.i in this Appendix H shall not apply to any Asynchronous Generating Facility that can demonstrate to the CAISO a binding commitment, as of July 3~~May 18~~, 2010, to purchase inverters for thirty (30) percent or more of the Generating Facility's maximum Generating Facility Capacity that are incapable of complying with the requirements of this Section A.i in this Appendix H. The Interconnection Customer must include a statement from the inverter manufacturer confirming the inability to comply with this requirement in addition to any information requested by the CAISO to determine the applicability of this exemption.

ii. Frequency Disturbance Ride-Through Capability

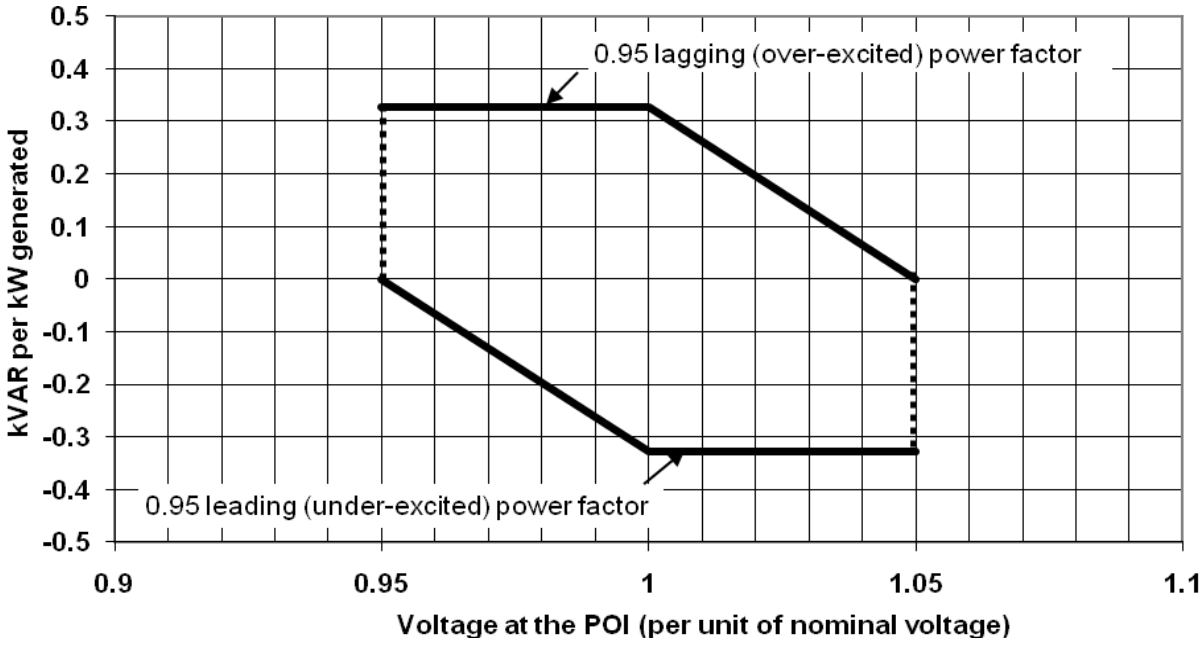
An Asynchronous Generating Facility shall comply with the off nominal frequency requirements set forth in the WECC Under Frequency Load Shedding Relay Application Guide or successor requirements as they may be amended from time to time.

iii. Power Factor Design ~~and Operating Requirements~~ Criteria (Reactive Power)

An Asynchronous Generating Facility shall operate within a power factor within the range of 0.95 leading to 0.95 lagging, measured at the Point of Interconnection as defined in this LGIA in order to maintain a specified voltage schedule, if the Phase II Interconnection Study shows that such a requirement is necessary to ensure safety or reliability. The power factor range standard can be met by using, for example, power electronics designed to supply this level of reactive capability (taking into account any limitations due to voltage level, real power output, etc.) or fixed and switched capacitors, or a combination of the two, if agreed to by the Participating TO and CAISO. The Interconnection Customer shall not disable power factor equipment while the Asynchronous Generating Facility is in operation. Asynchronous Generating Facilities shall also be able to provide sufficient dynamic voltage support in lieu of the power system stabilizer and automatic voltage regulation at the generator excitation system if the Phase II Interconnection Study shows this to be required for system safety or reliability.

~~1. Asynchronous Generating Facilities shall meet the following design requirements:~~

~~a. An Asynchronous Generating Facility shall be designed to have sufficient reactive power sourcing capability to achieve a net power factor of 0.95 lagging or less at the Point of Interconnection, at the Generating Facility's maximum Generating Facility Capacity. An Asynchronous Generating Facility shall be designed to have net reactive power sourcing and absorption capability sufficient to achieve or exceed the net reactive power range in Figure 1 as a function of the Point of Interconnection voltage, without exceeding the ratings of any equipment in the Asynchronous Generating Facility. The Point of Interconnection voltage is specified in per-unit of the nominal voltage.~~



~~Figure 1~~

~~a. Net power factor shall be measured at the Point of Interconnection as defined in this LGIA.~~

~~a. Asynchronous Generating Facilities may meet the power factor range requirement by using power electronics designed to supply the required level of reactive capability (taking into account any limitations due to voltage level and real power output) or fixed and switched capacitors, or a combination of the two.~~

~~a. Asynchronous Generating Facilities shall also provide dynamic voltage support if the Interconnection Study requires dynamic voltage support for system safety or reliability.~~

~~a. Asynchronous Generating Facilities shall vary the reactive power output between the full sourcing and full absorption capabilities such that any step change in the reactive power output does not cause a step change in voltage at the Point of Interconnection greater than 0.02 per unit of the nominal voltage.~~

~~a. The maximum voltage change requirement shall apply when the CAISO Controlled Grid is fully intact (no line or transformer outages), or during outage conditions which do not decrease the three-phase short circuit capacity at the Point of Interconnection to less than ninety (90) percent of the three-phase short-circuit capacity that would be present without the transmission network outage.~~

~~1. Asynchronous Generating Facilities shall meet the following operational requirements:~~

~~a. When plant output power is greater than twenty (20) percent of the Asynchronous Generating Facility's maximum Generating Facility Capacity, the Asynchronous Generating Facility shall have a net reactive power range at least as great as specified in Figure 1 at the Point of Interconnection, based on the actual real power output level delivered to the Point of Interconnection.~~

a. Power output may be curtailed at the direction of CAISO to a value where the net power factor range is met, if the reactive power capability of an Asynchronous Generating Facility is partially or totally unavailable, and if continued operation causes deviation of the voltage at the Point of Interconnection outside +/- 0.02 per unit of scheduled voltage level.

a. When the output power of the Asynchronous Generating Facility is less than twenty (20) percent of the Generating Facility's maximum Generating Facility Capacity, the net reactive power shall remain within the range between –6.6% and +6.6% of the Asynchronous Generating Facility's real power rating.

a. If the Point of Interconnection voltage exceeds 1.05 per unit, the Asynchronous Generating Facility shall provide reactive power absorption to the extent possible without violating the ratings of any of the Asynchronous Generating Facility's equipment.

a. If the Point of Interconnection voltage is less than 0.95 per unit, the Asynchronous Generating Facility shall provide reactive power injection to the extent possible without violating the ratings of any of the Asynchronous Generating Facility's equipment.

iv. Voltage Regulation and Reactive Power Control Requirements

1. The Asynchronous Generation Facility's reactive power capability shall be controlled by an automatic system having both voltage regulation and a net power factor regulation operating modes. The default mode of operation will be voltage regulation.

1. The voltage regulation function mode shall automatically control the net reactive power of the Asynchronous Generating Facility to regulate the Point of Interconnection positive sequence component of voltage to within a tolerance of +/- 0.02 per unit of the nominal voltage schedule assigned by the Participating TO or CAISO, within the constraints of the reactive power capacity of the Asynchronous Generation Facility. Deviations outside of this voltage band, except as caused by insufficient reactive capacity to maintain the voltage schedule tolerances, shall not exceed five (5) minutes duration per incident.

1. The power factor mode will regulate the net power factor measured at the Point of Interconnection. If the Asynchronous Generating Facility uses discrete reactive banks to provide reactive capability, the tolerances of the power factor regulation shall be consistent with the reactive banks' sizes meeting the voltage regulation tolerances specified in the preceding paragraph.

1. The net reactive power flow into or out of the Asynchronous Generating Facility, in any mode of operation, shall not cause the positive sequence component of voltage at the Point of Interconnection to exceed 1.05 per unit, or fall below 0.95 per unit.

1. The CAISO, in coordination with the Participating TO, may permit the Interconnection Customer to regulate the voltage at a point on the Asynchronous Generating Facility's side of the Point of Interconnection. Regulating voltage to a point other than the Point of Interconnection shall not change the Asynchronous Generating Facility's net power factor requirements set forth in Section A.iii of this Appendix H.

1. The Interconnection Customer shall not disable voltage regulation controls, without the specific permission of CAISO, while the Asynchronous Generating Facility is in operation at a power level greater than twenty (20) percent of the Asynchronous Generating Facility's maximum Generating Facility Capacity.

v. Plant Power Management

~~1. As of January 1, 2012, Asynchronous Generating Facilities must have the capability to limit active power output in response to a CAISO Dispatch Instruction or Operating Order as those terms are defined in the CAISO Tariff. This capability shall extend from the Minimum Operating Limit to the Maximum Operating Limit, as those terms are defined in the CAISO Tariff, of the Asynchronous Generating Facility in increments of five (5) MW or less. Changes to the power management set point shall not cause a change in voltage at the Point of Interconnection exceeding 0.02 per unit of the nominal voltage.~~

~~1. For Asynchronous Generating Facilities that are also Eligible Intermittent Resources as that term is defined in the CAISO Tariff, these power management requirements establish only a maximum output limit. There is no requirement for the Eligible Intermittent Resource to maintain a level of power output beyond the capabilities of the available energy source.~~

~~1. Asynchronous Generating Facilities must have the installed capability to limit power change ramp rates automatically, except for downward ramps resulting from decrease of the available energy resource for Eligible Intermittent Resources. The power ramp control shall be capable of limiting rates of power change to a value of five (5) percent, (10) percent, or twenty (20) percent of the Asynchronous Generating Facility's maximum Generating Facility Capacity per minute. The Asynchronous Generating Facility may implement this ramping limit by using stepped increments if the individual step size is five (5) MW or less.~~

~~1. Asynchronous Generating Facilities must have the installed capability to automatically reduce plant power output in response to an over-frequency condition. This frequency response control shall, when enabled at the direction of CAISO, continuously monitor the system frequency and automatically reduce the real power output of the Asynchronous Generating Facility with a droop equal to a one-hundred (100) percent decrease in plant output for a five (5) percent rise in frequency (five (5) percent droop) above an intentional dead band of 0.036 Hz.~~

iv~~vi~~. Supervisory Control and Data Acquisition (SCADA) ~~and Automated Dispatch System (ADS) Capability~~ Capability

An Asynchronous Generating Facility shall provide SCADA capability to transmit data and receive instructions from the Participating TO and CAISO to protect system reliability. The Participating TO and CAISO and the Asynchronous Generating Facility Interconnection Customer shall determine what SCADA information is essential for the proposed Asynchronous Generating Facility, taking into account the size of the plant and its characteristics, location, and importance in maintaining generation resource adequacy and transmission system reliability.

~~v~~An Asynchronous Generating Facility must be able to receive and respond to Automated Dispatch System (ADS) instructions and any other form of communication authorized by the CAISO Tariff. The Asynchronous Generating Facility's response time should be capable of conforming to the periods prescribed by the CAISO Tariff.

v~~vii~~. Power System Stabilizers (PSS)

Power system stabilizers are not required for Asynchronous Generating Facilities.

* * *

CAISO TARIFF APPENDIX CC

Large Generator Interconnection Agreement

for Interconnection Requests in a Queue Cluster Window

that are tendered ~~or execute~~ a Large Generator Interconnection Agreement on or after July 3, 2010

*** * ***

ARTICLE 9. OPERATIONS

9.6 Reactive Power.

9.6.1 Power Factor Design Criteria. For all Generating Facilities other than Asynchronous Generating Facilities, the Interconnection Customer shall design the Large Generating Facility to maintain a composite power delivery at continuous rated power output at the terminals of the Electric Generating Unit at a power factor within the range of 0.95 leading to 0.90 lagging, unless the CAISO has established different requirements that apply to all generators in the Balancing Authority Area on a comparable basis. For Asynchronous Generating Facilities, the Interconnection Customer shall design the Large Generating Facility to maintain power factor criteria in accordance with Appendix H of this LGIA.

9.6.2 Voltage Schedules. Once the Interconnection Customer has synchronized an Electric Generating Unit with the CAISO Controlled Grid, the CAISO or Participating TO shall require the Interconnection Customer to maintain a voltage schedule by operating the Electric Generating Unit to produce or absorb reactive power within the design limitations of the Electric Generating Unit set forth in Article 9.6.1 (Power Factor Design Criteria). CAISO's voltage schedules shall treat all sources of reactive power in the Balancing Authority Area in an equitable and not unduly discriminatory manner. The Participating TO shall exercise Reasonable Efforts to provide the Interconnection Customer with such schedules at least one (1) day in advance, and the CAISO or Participating TO may make changes to such schedules as necessary to maintain the reliability of the CAISO Controlled Grid or the Participating TO's electric system. The Interconnection Customer shall operate the Electric Generating Unit to maintain the specified output voltage or power factor within the design limitations of the Electric Generating Unit set forth in Article 9.6.1 (Power Factor Design Criteria), and as may be required by the CAISO to operate the Electric Generating Unit at a specific voltage schedule within the design limitations set forth in Article 9.6.1. If the Interconnection Customer is unable to maintain the specified voltage or power factor, it shall promptly notify the CAISO and the Participating TO.

9.6.2.1 Governors and Regulators. Whenever an Electric Generating Unit is operated in parallel with the CAISO Controlled Grid and the speed governors (if installed on the Electric Generating Unit pursuant to Good Utility Practice) and voltage regulators are capable of operation, the Interconnection Customer shall operate the Electric Generating Unit with its speed governors and voltage regulators in automatic operation. If the Electric Generating Unit's speed governors and voltage regulators are not capable of such automatic operation, the Interconnection Customer shall immediately notify the CAISO and the Participating TO and ensure that the Electric Generating Unit operates as specified in Article 9.6.2 through manual operation and that such Electric Generating Unit's reactive power production or absorption (measured in MVARs) are within the design capability of the Electric Generating Unit(s) and steady state stability limits. The Interconnection Customer shall restore the speed

governors and voltage regulators to automatic operation as soon as possible. If the Large Generating Facility's speed governors and voltage regulators are improperly tuned or malfunctioning, the CAISO shall have the right to order the reduction in output or disconnection of the Large Generating Facility if the reliability of the CAISO Controlled Grid would be adversely affected. The Interconnection Customer shall not cause its Large Generating Facility to disconnect automatically or instantaneously from the CAISO Controlled Grid or trip any Electric Generating Unit comprising the Large Generating Facility for an under or over frequency condition unless the abnormal frequency condition persists for a time period beyond the limits set forth in ANSI/IEEE Standard C37.106, or such other standard as applied to other generators in the Balancing Authority Area on a comparable basis.

~~**9.6.2.2 Loss of Voltage Control and Governor Control for Asynchronous Generating Facilities.** For Asynchronous Generating Facilities, Appendix H to this LGIA sets forth the requirements for Large Generating Facilities relating to: (i) loss of voltage control capability, (ii) governor response to frequency conditions, and (iii) ability not to disconnect automatically or instantaneously from the CAISO Controlled Grid or trip any Electric Generating Unit comprising the Large Generating Facility for an under- or over-frequency condition. Asynchronous Generating Facilities are not required to provide governor response to under-frequency conditions.~~

9.6.3 Payment for Reactive Power. CAISO is required to pay the Interconnection Customer for reactive power that Interconnection Customer provides or absorbs from an Electric Generating Unit when the CAISO requests the Interconnection Customer to operate its Electric Generating Unit outside the range specified in Article 9.6.1, provided that if the CAISO pays other generators for reactive power service within the specified range, it must also pay the Interconnection Customer. Payments shall be pursuant to Article 11.6 or such other agreement to which the CAISO and Interconnection Customer have otherwise agreed.

* * *

Appendix H
To LGIA

INTERCONNECTION REQUIREMENTS FOR AN ASYNCHRONOUS GENERATING FACILITY

Appendix H sets forth interconnection requirements specific to all Asynchronous Generating Facilities. Existing individual generating units of an Asynchronous Generating Facility that are, or have been, interconnected to the CAISO Controlled Grid at the same location are exempt from the requirements of this Appendix H for the remaining life of the existing generating unit. Generating units that are replaced, however, shall meet the requirements of this Appendix H.

A. Technical Requirements Applicable to Asynchronous Generating Facilities

i. Low Voltage Ride-Through (LVRT) Capability

An Asynchronous Generating Facility shall be able to remain online during voltage disturbances up to the time periods and associated voltage levels set forth in the requirements below.

~~2.~~ 1. An Asynchronous Generating Facility shall remain online for the voltage disturbance caused by any fault on the transmission grid, or within the Asynchronous Generating Facility between the Point of Interconnection and the high voltage terminals of the Asynchronous Generating Facility's step up transformer, having a duration equal to the lesser of the normal

three-phase fault clearing time (4-9 cycles) or one-hundred fifty (150) milliseconds, plus any subsequent post-fault voltage recovery to the final steady-state post-fault voltage. Clearing time shall be based on the maximum normal clearing time associated with any three-phase fault location that reduces the voltage at the Asynchronous Generating Facility's Point of Interconnection to 0.2 per-unit of nominal voltage or less, independent of any fault current contribution from the Asynchronous Generating Facility.

~~2.~~ 2. An Asynchronous Generating Facility shall remain online for any voltage disturbance caused by a single-phase fault on the transmission grid, or within the Asynchronous Generating Facility between the Point of Interconnection and the high voltage terminals of the Asynchronous Generating Facility's step up transformer, with delayed clearing, plus any subsequent post-fault voltage recovery to the final steady-state post-fault voltage. Clearing time shall be based on the maximum backup clearing time associated with a single point of failure (protection or breaker failure) for any single-phase fault location that reduces any phase-to-ground or phase-to-phase voltage at the Asynchronous Generating Facility's Point of Interconnection to 0.2 per-unit of nominal voltage or less, independent of any fault current contribution from the Asynchronous Generating Facility.

~~2.~~ 3. Remaining on-line shall be defined as continuous connection between the Point of Interconnection and the Asynchronous Generating Facility's units, without any mechanical isolation. Asynchronous Generating Facilities may cease to inject current into the transmission grid during a fault.

~~2.~~ 4. The Asynchronous Generating Facility is not required to remain on line during multi-phased faults exceeding the duration described in Section A.i.1 of this Appendix H or single-phase faults exceeding the duration described in Section A.i.2 of this Appendix H.

~~2.~~ 5. The requirements of this Section A.i. of this Appendix H do not apply to faults that occur between the Asynchronous Generating Facility's terminals and the high side of the step-up transformer to the high-voltage transmission system.

~~2.~~ 6. Asynchronous Generating Facilities may be tripped after the fault period if this action is intended as part of a special protection system.

~~2.~~ 7. Asynchronous Generating Facilities may meet the requirements of this Section A.i of this Appendix H through the performance of the generating units or by installing additional equipment within the Asynchronous Generating Facility, or by a combination of generating unit performance and additional equipment.

~~2.~~ 8. The provisions of this Section A.i of this Appendix H apply only if the voltage at the Point of Interconnection has remained within the range of 0.9 and 1.10 per-unit of nominal voltage for the preceding two seconds, excluding any sub-cycle transient deviations.

The requirements of this Section A.i in this Appendix H shall not apply to any Asynchronous Generating Facility that can demonstrate to the CAISO a binding commitment, as of July 3~~May 18~~, 2010, to purchase inverters for thirty (30) percent or more of the Generating Facility's maximum Generating Facility Capacity that are incapable of complying with the requirements of this Section A.i in this Appendix H. The Interconnection Customer must include a statement from the inverter manufacturer confirming the inability to comply with this requirement in addition to any information requested by the CAISO to determine the applicability of this exemption.

ii. Frequency Disturbance Ride-Through Capability

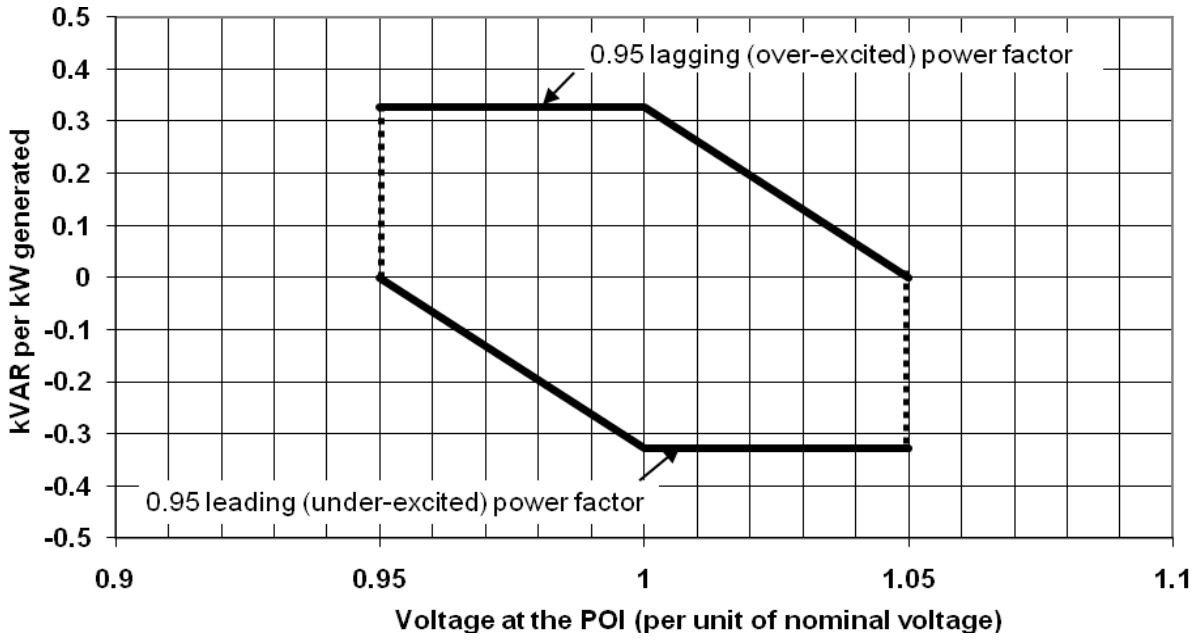
An Asynchronous Generating Facility shall comply with the off nominal frequency requirements set forth in the WECC Under Frequency Load Shedding Relay Application Guide or successor requirements as they may be amended from time to time.

iii. Power Factor Design ~~and Operating Requirements~~Criteria (Reactive Power)

An Asynchronous Generating Facility shall operate within a power factor within the range of 0.95 leading to 0.95 lagging, measured at the Point of Interconnection as defined in this LGIA in order to maintain a specified voltage schedule, if the Phase II Interconnection Study shows that such a requirement is necessary to ensure safety or reliability. The power factor range standard can be met by using, for example, power electronics designed to supply this level of reactive capability (taking into account any limitations due to voltage level, real power output, etc.) or fixed and switched capacitors, or a combination of the two, if agreed to by the Participating TO and CAISO. The Interconnection Customer shall not disable power factor equipment while the Asynchronous Generating Facility is in operation. Asynchronous Generating Facilities shall also be able to provide sufficient dynamic voltage support in lieu of the power system stabilizer and automatic voltage regulation at the generator excitation system if the Phase II Interconnection Study shows this to be required for system safety or reliability.

~~2. Asynchronous Generating Facilities shall meet the following design requirements:~~

~~b. An Asynchronous Generating Facility shall be designed to have sufficient reactive power sourcing capability to achieve a net power factor of 0.95 lagging or less at the Point of Interconnection, at the Generating Facility's maximum Generating Facility Capacity. An Asynchronous Generating Facility shall be designed to have net reactive power sourcing and absorption capability sufficient to achieve or exceed the net reactive power range in Figure 1 as a function of the Point of Interconnection voltage, without exceeding the ratings of any equipment in the Asynchronous Generating Facility. The Point of Interconnection voltage is specified in per unit of the nominal voltage.~~



~~Figure 1~~

~~b. Net power factor shall be measured at the Point of Interconnection as defined in this LGIA.~~

b. Asynchronous Generating Facilities may meet the power factor range requirement by using power electronics designed to supply the required level of reactive capability (taking into account any limitations due to voltage level and real power output) or fixed and switched capacitors, or a combination of the two.

b. Asynchronous Generating Facilities shall also provide dynamic voltage support if the Interconnection Study requires dynamic voltage support for system safety or reliability.

b. Asynchronous Generating Facilities shall vary the reactive power output between the full sourcing and full absorption capabilities such that any step change in the reactive power output does not cause a step change in voltage at the Point of Interconnection greater than 0.02 per unit of the nominal voltage.

b. The maximum voltage change requirement shall apply when the CAISO Controlled Grid is fully intact (no line or transformer outages), or during outage conditions which do not decrease the three-phase short circuit capacity at the Point of Interconnection to less than ninety (90) percent of the three-phase short-circuit capacity that would be present without the transmission network outage.

2. Asynchronous Generating Facilities shall meet the following operational requirements:

2. When plant output power is greater than twenty (20) percent of the Asynchronous Generating Facility's maximum Generating Facility Capacity, the Asynchronous Generating Facility shall have a net reactive power range at least as great as specified in Figure 1 at the Point of Interconnection, based on the actual real power output level delivered to the Point of Interconnection.

2. Power output may be curtailed at the direction of CAISO to a value where the net power factor range is met, if the reactive power capability of an Asynchronous Generating Facility is partially or totally unavailable, and if continued operation causes deviation of the voltage at the Point of Interconnection outside +/- 0.02 per unit of scheduled voltage level.

2. When the output power of the Asynchronous Generating Facility is less than twenty (20) percent of the Generating Facility's maximum Generating Facility Capacity, the net reactive power shall remain within the range between –6.6% and +6.6% of the Asynchronous Generating Facility's real power rating.

2. If the Point of Interconnection voltage exceeds 1.05 per unit, the Asynchronous Generating Facility shall provide reactive power absorption to the extent possible without violating the ratings of any of the Asynchronous Generating Facility's equipment.

2. If the Point of Interconnection voltage is less than 0.95 per unit, the Asynchronous Generating Facility shall provide reactive power injection to the extent possible without violating the ratings of any of the Asynchronous Generating Facility's equipment.

iv. Voltage Regulation and Reactive Power Control Requirements

2. The Asynchronous Generation Facility's reactive power capability shall be controlled by an automatic system having both voltage regulation and a net power factor regulation operating modes. The default mode of operation will be voltage regulation.

2. The voltage regulation function mode shall automatically control the net reactive power of the Asynchronous Generating Facility to regulate the Point of Interconnection positive sequence component of voltage to within a tolerance of +/- 0.02 per unit of the nominal voltage schedule assigned by the Participating TO or CAISO, within the constraints of the reactive power capacity

of the Asynchronous Generation Facility. Deviations outside of this voltage band, except as caused by insufficient reactive capacity to maintain the voltage schedule tolerances, shall not exceed five (5) minutes duration per incident.

2. The power factor mode will regulate the net power factor measured at the Point of Interconnection. If the Asynchronous Generating Facility uses discrete reactive banks to provide reactive capability, the tolerances of the power factor regulation shall be consistent with the reactive banks' sizes meeting the voltage regulation tolerances specified in the preceding paragraph.

2. The net reactive power flow into or out of the Asynchronous Generating Facility, in any mode of operation, shall not cause the positive sequence component of voltage at the Point of Interconnection to exceed 1.05 per unit, or fall below 0.95 per unit.

2. The CAISO, in coordination with the Participating TO, may permit the Interconnection Customer to regulate the voltage at a point on the Asynchronous Generating Facility's side of the Point of Interconnection. Regulating voltage to a point other than the Point of Interconnection shall not change the Asynchronous Generating Facility's net power factor requirements set forth in Section A.iii of this Appendix H.

2. The Interconnection Customer shall not disable voltage regulation controls, without the specific permission of CAISO, while the Asynchronous Generating Facility is in operation at a power level greater than twenty (20) percent of the Asynchronous Generating Facility's maximum Generating Facility Capacity.

v. Plant Power Management

2. As of January 1, 2012, Asynchronous Generating Facilities must have the capability to limit active power output in response to a CAISO Dispatch Instruction or Operating Order as those terms are defined in the CAISO Tariff. This capability shall extend from the Minimum Operating Limit to the Maximum Operating Limit, as those terms are defined in the CAISO Tariff, of the Asynchronous Generating Facility in increments of five (5) MW or less. Changes to the power management set point shall not cause a change in voltage at the Point of Interconnection exceeding 0.02 per unit of the nominal voltage.

2. For Asynchronous Generating Facilities that are also Eligible Intermittent Resources as that term is defined in the CAISO Tariff, these power management requirements establish only a maximum output limit. There is no requirement for the Eligible Intermittent Resource to maintain a level of power output beyond the capabilities of the available energy source.

2. Asynchronous Generating Facilities must have the installed capability to limit power change ramp rates automatically, except for downward ramps resulting from decrease of the available energy resource for Eligible Intermittent Resources. The power ramp control shall be capable of limiting rates of power change to a value of five (5) percent, (10) percent, or twenty (20) percent of the Asynchronous Generating Facility's maximum Generating Facility Capacity per minute. The Asynchronous Generating Facility may implement this ramping limit by using stepped increments if the individual step size is five (5) MW or less.

2. Asynchronous Generating Facilities must have the installed capability to automatically reduce plant power output in response to an over-frequency condition. This frequency response control shall, when enabled at the direction of CAISO, continuously monitor the system frequency and automatically reduce the real power output of the Asynchronous Generating Facility with a droop equal to a one-hundred (100) percent decrease in plant output for a five (5) percent rise in frequency (five (5) percent droop) above an intentional dead band of 0.036 Hz.

ivvi. Supervisory Control and Data Acquisition (SCADA) and Automated Dispatch System (ADS) Capability Capability

An Asynchronous Generating Facility shall provide SCADA capability to transmit data and receive instructions from the Participating TO and CAISO to protect system reliability. The Participating TO and CAISO and the Asynchronous Generating Facility Interconnection Customer shall determine what SCADA information is essential for the proposed Asynchronous Generating Facility, taking into account the size of the plant and its characteristics, location, and importance in maintaining generation resource adequacy and transmission system reliability.

An Asynchronous Generating Facility must be able to receive and respond to Automated Dispatch System (ADS) instructions and any other form of communication authorized by the CAISO Tariff. The Asynchronous Generating Facility's response time should be capable of conforming to the periods prescribed by the CAISO Tariff.

vvii. Power System Stabilizers (PSS)

Power system stabilizers are not required for Asynchronous Generating Facilities.

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