

April 21, 2013

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

**Re: California Independent System Operator Corporation  
Docket No. ER14-495  
Order 764 Compliance Filing**

Dear Secretary Bose:

The California Independent System Operator Corporation (ISO) submits this filing in compliance with the Federal Energy Regulatory Commission's Order on the integration of variable energy resources in Docket RM10-11<sup>1</sup> and Order on Compliance Filing in Docket ER14-495.<sup>2</sup> Among other directives, Order 764 instructed public utility transmission providers to revise their *pro forma* large generator interconnection agreement (LGIA) to include provisions that define variable energy resources and require new interconnection customers whose generating facilities are variable energy resources to provide meteorological and forced outage data to the public utility transmission provider for the purpose of power production forecasting.<sup>3</sup>

## **I. Background**

### **A. Order 764**

As part of Order 764, the Commission directed public utility transmission providers to modify their *pro forma* LGIA to require variable energy resources to provide meteorological and forced outage data to the public utility transmission provider for the purpose of power production forecasting.<sup>4</sup> The Commission

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<sup>1</sup> *Integration of Variable Energy Resources*, Order No. 764, FERC Stats. & Regs. ¶ 31,331 (Order No. 764), *order on reh'g and clarification*, Order No. 764-A, 141 ¶ 61,232 (Order No. 764-A) (2012), *order on clarification and reh'g*, Order No. 764-B, 144 FERC ¶ 61,222 (2013).

<sup>2</sup> *Cal. Indep. Sys. Operator Corp.*, 146 FERC ¶ 61,205 (2014). (Order on Compliance)

<sup>3</sup> Order 764 at PP 171, 210, 373, 375, Appendix C.

<sup>4</sup> Order 764 at P 171.

concluded that, without these reporting requirements in place, the terms of the *pro forma* LGIA may impair the ability of public utility transmission providers to develop and deploy power production forecasting, which in turn can lead to rates for jurisdictional services that are unjust and unreasonable or unduly discriminatory.<sup>5</sup>

### **B. The ISO's November 27, 2013 Compliance Filing**

The ISO submitted a filing in compliance with Order 764 on November 27, 2013. As part of its compliance filing, the ISO proposed to include language as directed by Order 764 in its *pro forma* LGIA contained within Appendix EE of the ISO tariff. Appendix EE is the *pro forma* LGIA that will apply to interconnection customers in queue cluster 5 and future interconnection customers.<sup>6</sup> The ISO proposed to incorporate by reference into this Appendix existing forced outage and meteorological data requirements that apply to eligible intermittent resources for interconnection customers that have generating facilities that are variable energy resources.

The ISO explained that Appendix Q of the ISO's tariff already requires all eligible intermittent resources to install and maintain equipment to collect, record and transmit meteorological data that the ISO reasonably determines necessary to develop and support power production forecasts.<sup>7</sup> With respect to forced outage data, section 9.3.10.3(b) of the ISO tariff requires an eligible intermittent resource with a PMax of greater than 10 MW for its entire generating facility to communicate a situation likely to result in a forced outage, when the outage requires removing from service or reducing the maximum output capability of the resource by one 1 MW or more.<sup>8</sup> Section 9.3.10.3.1(b) of the ISO tariff requires that if it cannot provide prior notice, an eligible intermittent resource with a PMax of greater than 10 MW for its entire generating facility must notify the ISO within 60 minutes after discovering any change in the maximum output capability of at least 1 MW that lasts for 15 minutes or longer.

## **II. Order on Compliance**

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<sup>5</sup> *Id.* at P 154.

<sup>6</sup> A queue cluster is a group of interconnection requests that is studied together, rather than serially, for the purpose of conducting the system impact study. *See generally, Cal. Indep. Sys. Operator. Corp.*, 133 FERC ¶ 61,223 (2010).

<sup>7</sup> Sections 6.1 and 6.2 of Appendix Q of the ISO tariff.

<sup>8</sup> *Cal. Indep. Sys. Operator Corp.* 131 FERC ¶ 61,087 at PP 49-55.

On March 20, 2014, the Commission issued an order conditionally accepting the ISO's compliance filing subject to further modification. In relevant part, the Commission determined that the ISO's Appendix Q, rather than setting forth the specific meteorological data required for power production forecasts, referenced the ISO business practice manuals.<sup>9</sup> The Commission expressed concern that because the relevant ISO requirements are in business practice manuals, and not the tariff, the potential exists for conflicts between possible future revisions to the business practice manuals and the requirements of Order No. 764.<sup>10</sup> The Commission, therefore, directed the ISO to submit a compliance filing that revises Appendix Q of its tariff to specify the types of meteorological data required and the frequency with which it must be provided.<sup>11</sup> The Commission stated, however, that "[t]he requirements contained in the business practice manuals currently appear to be consistent with the directives of Order No. 764."

The Commission also directed the ISO to revise the relevant section(s) of its tariff to include any forced outage reporting requirements applicable to variable energy resources that are currently contained only in the business practice manuals.<sup>12</sup>

Finally, the Commission directed the ISO to correct an omission in the language included in the *pro forma* LGIA contained in Appendix EE to the ISO tariff to specify that an interconnection customer with a variable energy resource shall provide meteorological and forced outage data to the ISO to the extent necessary for the ISO's development and deployment of power production forecasts for that class of variable energy resources.<sup>13</sup>

### **III. Additional ISO Tariff Revisions**

The ISO hereby submits revised tariff sheets to address the Commission's compliance directives. The ISO proposes to incorporate the meteorological data required by variable energy resources and the frequency with which it must be provided into Appendix Q of its tariff. The meteorological data requirements appear in Section 3 of Appendix Q and reflect information requirements for wind

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<sup>9</sup> Order on Compliance at P 18.

<sup>10</sup> *Id.*

<sup>11</sup> *Id.*

<sup>12</sup> *Id.*

<sup>13</sup> *Id.* at P 19.

and solar resources. These provisions, which track existing ISO requirements set forth in its Business Practice Manuals, include the requirement to provide site-specific information as well as operating and meteorological data associated with a wind or solar resource. The provisions also require these resources to provide sufficient back-up power to ensure reliable transmission of data. The ISO has also deleted language in Section 6.1 of Appendix Q related to wind resources that is no longer necessary in light of the changes to section 3 of Appendix Q.<sup>14</sup>

The ISO has not proposed any changes to relevant section(s) of its tariff to include forced outage reporting requirements applicable to variable energy resources. All of these requirements are already set forth in the ISO tariff.

Finally, the ISO has made a change to section 8.4 of Appendix EE to reflect that an interconnection customer with a variable energy resource shall provide meteorological and forced outage data to the ISO to the extent necessary for the ISO's development and deployment of power production forecasts for that class of variable energy resources.

#### **IV. Revised Tariff Sheets**

In addition to this transmittal letter, this filing includes the following attachments:

Attachment A - Clean ISO tariff sheets incorporating the changes contained in this compliance filing

Attachment B - Red-lined document showing the revisions contained in this compliance filing

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<sup>14</sup> The tariff sheets submitted with this filing contain revisions to Appendix Q already accepted by the Commission in Docket ER14-480. *Cal. Indep. Sys. Operator Corp.* 146 FERC ¶ 61,204 (2014).

**V. Conclusion**

The ISO requests that the Commission accept this filing as complying with the directives of the Commission's Order 764.

Please contact the undersigned if you have any questions.

Respectfully submitted,

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**Attachment A – Clean Tariff**

**Order 764 Compliance Filing in Docket ER14-795**

**California Independent System Operator Corporation**

**April 21, 2014**

## Appendix Q

### Eligible Intermittent Resources Protocol

#### 1 SCOPE

##### 1.1 Scope of Application to Parties

This EIRP applies to the CAISO and to:

- (a) Scheduling Coordinators (SCs);
- (b) Eligible Intermittent Resources; and
- (c) Participating Intermittent Resources.

##### 1.2 Liability of the CAISO

Any liability of the CAISO arising out of or in relation to this EIRP shall be subject to Section 14 of the CAISO Tariff as if references to the CAISO Tariff were references to this EIRP.

#### 2 REQUIREMENTS FOR ELIGIBLE AND PARTICIPATING INTERMITTENT RESOURCES

##### 2.1 No Mandatory Participation

Eligible Intermittent Resources may elect to be scheduled and settled as the CAISO Tariff provides for Generating Units, and are not required to seek certification as Participating Intermittent Resources.

##### 2.2 Minimum Certification Requirements

Those Eligible Intermittent Resources and Participating Intermittent Resources must meet the following requirements, as applicable.

###### 2.2.1 Agreements

The following agreements must be executed by the owner or operator of any Eligible Intermittent Resource, unless that resource is not subject to any of these agreements pursuant to the CAISO Tariff, such as an Eligible Intermittent Resource of an MSS Operator:

- (a) A Participating Generator Agreement, Net Scheduled PGA, Dynamic Scheduling Agreement for Scheduling Coordinators, or Pseudo-Tie Participating Generator Agreement that, among other things, binds the Eligible Intermittent Resource to comply with the CAISO Tariff; and
- (b) A Meter Service Agreement for CAISO Metered Entities, for all Eligible Intermittent Resources other than Dynamic System Resources.

If an Eligible Intermittent Resource intends to become a Participating Intermittent Resource, it must also execute a letter of intent, which when executed and delivered to the CAISO shall initiate the process of certifying the Participating Intermittent Resource. The form of the letter of

intent shall be specified by the CAISO in a Business Practice Manual.

### **2.2.2 Composition of a Participating Intermittent Resource**

The CAISO shall develop criteria to determine whether one or more Eligible Intermittent Resources may be included within a Participating Intermittent Resource. Such criteria shall include:

- (a) A Participating Intermittent Resource must be at least one (1) MW rated capacity.
- (b) A Participating Intermittent Resource may include one (1) or more Eligible Intermittent Resources that have similar response to weather conditions or other variables relevant to forecasting Energy, as determined by the CAISO.
- (c) Each Participating Intermittent Resource shall be electrically connected at a single point on the CAISO Controlled Grid, except as otherwise permitted by the CAISO on a case-by-case basis as may be allowed under the CAISO Tariff. Interconnection to a portion of the CAISO Controlled Grid outside or not contiguous to the CAISO Balancing Authority Area does not make an Eligible Intermittent Resource that is a Dynamic System Resource or Pseudo-Tie Generating Unit eligible to be included within a Participating Intermittent Resource.
- (d) The same Scheduling Coordinator must schedule all Eligible Intermittent Resources aggregated into a single Participating Intermittent Resource.

### **2.2.3 Equipment Installation**

An Eligible Participating Intermittent Resource must install and maintain the communication equipment required pursuant to Section 3 of this EIRP, and the equipment supporting forecast data required pursuant to Section 6 of this EIRP.

### **2.2.4 Forecast Model Validation**

The CAISO must determine that sufficient historic and real-time telemetered data are available to support an accurate and unbiased forecast of Energy generation by a Participating Intermittent Resource, according to the forecasting process validation criteria described in Section 4 of this EIRP.

### **2.2.5 Information Requirements For Participating Intermittent Resource Export Fee**

In order for the CAISO to administer, implement and calculate the Participating Intermittent Resource Export Fee, each Participating Intermittent Resource jointly with, and through, its Scheduling Coordinator must provide the CAISO with the following information and documents under the schedule and conditions set forth in this section.

The CAISO will maintain the confidentiality of all information and documents received under this section in accordance with CAISO Tariff Section 20 et seq.

- (a) A certification, in the form set for in a Business Practice Manual, signed by an officer of the Participating Intermittent Resource and its Scheduling Coordinator, identifying (1) the PIR Export Percentage under Section 5.3.2 of this EIRP for resources that have elected PIRP Protective Measures, if any, and basis thereof, and (2) each contract to sell Energy or capacity from the Participating Intermittent Resource, including for each such contract, the counterparty, start and end dates, delivery point(s), quantity in MW, other temporal



terms, i.e., seasonal or hourly limitations.

The certification must be updated by resubmission to the CAISO (1) upon a request to modify the composition of the Participating Intermittent Resource under Section 2.4.2 of this EIRP; or (2) within ten (10) calendar days of final execution of a new contract or any change in counterparty, start and end dates, delivery point(s), quantity in MW, or other temporal terms, as described above, for any prior certified contract. All other contractual changes will not trigger the obligation for recertification.

- (b) Copies of all contracts, including changes, identified in the above-referenced certification; however, price information may be redacted from the contracts provided.

Each Participating Intermittent Resource, as of November 1, 2006, must initially provide the information requested by this Section 2.2.5 in accordance with a Market Notice provided by the CAISO to Participating Intermittent Resources. All other Eligible Intermittent Resources must satisfy this Section 2.2.5 in order to become a Participating Intermittent Resource after November 1, 2006.

### **2.3 Notice of Certification of a Participating Intermittent Resource**

When all requirements described in Section 2.2 of this EIRP applicable to Participating Intermittent Resources have been fulfilled, the CAISO shall notify the Scheduling Coordinator and the representatives of the Eligible Intermittent Resources comprising the Participating Intermittent Resource that the Participating Intermittent Resource has been certified, and is eligible for the settlement terms provided under Section 11.12 of the CAISO Tariff, as conditioned by the terms of this EIRP.

### **2.4 Additional Requirements**

#### **2.4.1 Forecast Fee**

An Eligible Intermittent Resource must pay the Forecast Fee for all metered Energy generated by the Eligible Intermittent Resource, as specified in CAISO Tariff Appendix F, Schedule 4.

#### **2.4.2 Modification of Participating Intermittent Resource Composition**

A Participating Intermittent Resource may seek to modify the composition of the Participating Intermittent Resource (e.g., by adding or eliminating an Eligible Intermittent Resource from the Participating Intermittent Resource). Such changes shall not be implemented without prior compliance with the written approval by the CAISO. The CAISO will apply consistent criteria and expeditiously review any proposed changes in the composition of a Participating Intermittent Resource.

#### **2.4.3 Changes in Scheduling Coordinator**

This EIRP does not impose any additional requirement for CAISO approval to change the Scheduling Coordinator for an approved Participating Intermittent Resource than would otherwise apply under the CAISO Tariff to changes in the Scheduling Coordinator representing a Generating Unit.

#### **2.4.4 Continuing Obligation**

A Participating Intermittent Resource or Eligible Intermittent Resource must meet all applicable obligations established for Participating Intermittent Resources or Eligible Intermittent Resources

under the CAISO Tariff and this EIRP, and must fully cooperate in providing all data, other information, and authorizations the CAISO reasonably requests to fulfill its obligation to validate forecast models, explain deviations, and implement the Participating Intermittent Resource Export Fees.

#### **2.4.5 Failure to Perform**

If the CAISO determines that a material deficiency has arisen in the Participating Intermittent Resource's fulfillment of its obligations under the CAISO Tariff and this EIRP, and such Participating Intermittent Resource fails to promptly correct such deficiencies when notified by the CAISO, then the eligibility of the Participating Intermittent Resource for the settlement accommodations provided in Section 11.12 of the CAISO Tariff shall be suspended until such time that the unavailable data is provided or other material deficiency is corrected to the CAISO's reasonable satisfaction. Such suspension shall not relieve the Scheduling Coordinator for the deficient Participating Intermittent Resource from paying the Forecast Fee over the duration of the period covered by the letter of intent described in Section 2.2.1(c) of this EIRP.

### **3 COMMUNICATIONS**

#### **3.1 Forecast Data**

The CAISO may require various data relevant to forecasting Energy from the Eligible Intermittent Resource to be telemetered to the CAISO, including appropriate operational data, meteorological data or other data reasonably necessary to forecast Energy.

In order for the CAISO to forecast Energy, an Eligible Intermittent Resource must provide the CAISO with MW production data and meteorological data as outlined in this Eligible Intermittent Resources Protocol. This data must be collected for a minimum of thirty (30) consecutive days and be of sufficient quality as determined by a CAISO to produce a state of the art forecast.

#### **3.1.1 Wind Generation Meteorological Station Requirements**

Each wind Eligible Intermittent Resource must install and maintain equipment required by the CAISO to support accurate power generation forecasting and the communication of such forecast, meteorological, and other required data to the CAISO consistent with the timeframes specified in this Eligible Intermittent Resource Protocol.

**3.1.1.1** Each wind Eligible Intermittent Resource shall install a minimum of one meteorological station to measure barometric pressure, temperature, wind speed and direction. If a wind Eligible Intermittent Resource has a rated capacity of five (5) MW or greater, the Eligible Intermittent Resource shall install a minimum of two meteorological stations to measure barometric pressure, temperature, wind speed and direction. If an Eligible Intermittent Resource, as part of compliance with any other contractual or regulatory requirement outside of this Eligible Intermittent Resource Protocol, provides data from more than the two required meteorological stations to an entity other than the CAISO, then the Eligible Intermittent Resource must also submit data from any additional meteorological station to the CAISO.

**3.1.1.2** Each wind Eligible Intermittent Resource shall locate its meteorological station(s) on the windward side of the wind farm. Each wind Eligible Intermittent Resource must install one meteorological station at the average hub height of the wind turbines. The second meteorological station, if any, may be co-located on the primary meteorological station and installed approximately 30 meters below the average hub height. Hub height is the

distance from the ground to the center of the turbine axis. Where placement of the meteorological station(s) in accordance with this Eligible Intermittent Resource Protocol would reduce production or violate a local, state, or federal statute, regulation or ordinance, the CAISO, in coordination with any applicable forecast service provider, will coordinate with the Eligible Intermittent Resource to identify an acceptable placement of the meteorological station.

**3.1.1.3** The use of SODAR<sup>1</sup> and/or LIDAR<sup>2</sup> equipment may be an acceptable substitute for wind direction and velocity only after obtaining prior agreement from the CAISO.

**3.1.2 Wind Generation Meteorological Data Requirements**

Table Q-1 details the units and accuracy of measurements for telemetry data points wind Eligible Intermittent Resources must send to the CAISO in real time (i.e., every 4 seconds).

Table Q-1 Wind Eligible Intermittent Resources Telemetry Data Points

Element	Device(s) Needed	Units	Accuracy
Wind Speed (Meter / Second)	Anemometer, wind vane and wind mast	m/s	± 2m/s
Air Temperature (Degrees Celsius)	Temperature probe & shield for ambient temp	°C	± 1°
Barometric Pressure (hecto Pascals)	Barometer	hPA	± 60 hPa
Real Time Data		MWs	

**3.1.3 Designated Turbines**

For any wind eligible Intermittent Resource, designated turbines are required to improve forecast accuracy within a wind park. The CAISO shall identify a designated turbine, from which the Eligible Intermittent Resource shall provide nacelle wind speed and generation in MWs every four seconds.

**3.1.4 Topographical Map**

A wind Eligible Intermittent Resource must submit a topographical map that illustrates the location

<sup>1</sup> SODAR means Sonic Detection and Ranging- a meteorological instrument also known as a wind profiler which measures the scattering of sound waves by atmospheric turbulence.

<sup>2</sup> LIDAR means Light Detection and Ranging - a meteorological instrument which measures the properties of scattered light waves caused by atmospheric turbulence.

and height for each wind turbine within a wind park. The map must identify all meteorological stations and turbine location by latitude and longitude and should be in degrees/decimals using WGS84 geodetic datum only.

### 3.1.5 Site Information Form

A wind Eligible Intermittent Resource must complete and submit the site information in Table Q-2 according to the schedule and data submittal requirements of the CAISO new resource implementation process. For plant location, the Eligible Intermittent Resource must use latitude and Longitude expressed in degrees/decimals using WGS84 geodetic datum only.

Table Q-2 Wind Site Information Form

Site Name & Physical Address								
CAISO RES_ID								
Generation Capacity (AC)								
Plant Location  Use as many points as necessary to describe the site	Corner 1		Corner 2		Corner 3		Corner 4	
	Lat	Long	Lat	Long	Lat	Long	Lat	Long
Meteorological Station Location  Provide the location of all met data collection point at the site.	Met 1		Equipment Type		Met 2		Equipment Type	
Met Information	ID	Lat	Long	Height Agl	ID	Lat	Long	Height Agl
	Group 1		Group 2		Group 3		Lat	Long
Number of Turbines								
Turbine								

Manufacturer					
Turbine Model					
Turbine Maximum Generation Capacity					
Turbine Height Above Ground Level					
Cut In Speed (m/s)					
Rated Speed (m/s)					
Cut Out Speed (m/s)					
Cold Weather Package (Yes or No)					
Hot Weather Package (Yes or No)					
Low Temperature Cut Out (deg C)					
High Temperature Cut Out (deg C)					

### 3.2.1 Solar Generation Meteorological Station Requirements

Each solar Eligible Intermittent Resource must install and maintain equipment required by the CAISO to support accurate power generation forecasting and the communication of such forecast, meteorological, and other required data to the CAISO consistent with the timeframes specified in this Eligible Intermittent Resource Protocol.

**3.2.1.1** Each solar Eligible Intermittent Resource shall install a minimum of one meteorological station. If a solar Eligible Intermittent Resource has a rated capacity of five (5) MW or greater, the Eligible Intermittent Resource shall install a minimum of two meteorological stations. If an Eligible Intermittent Resource, as part of compliance with any other contractual or regulatory requirement outside of this Eligible Intermittent Resource Protocol, provides data from more than the two required meteorological stations to an entity other than the CAISO, then the Eligible Intermittent Resource must also submit data from any additional meteorological station to the CAISO.

**3.2.1.2** Solar Eligible Intermittent Resources that require direct normal irradiance (DNI) and global horizontal irradiance (GHI) measurements may provide alternate radiometry meteorological station data. For example, one meteorological station may report DNI and another meteorological station may report GHI. All other meteorological data reporting requirements shall remain the same.

**3.2.1.3** Solar Eligible Intermittent Resources' meteorological stations shall cover at least 90 percent of the facility's footprint for each Resource ID.

**3.2.1.4** Solar Eligible Intermittent Resources may satisfy the meteorological station location requirements by entering a mutually agreeable sharing agreement(s) with another solar Eligible Intermittent Resources after obtaining the CAISO's prior approval when the following conditions apply:

- (a) One Eligible Intermittent Resource (the host plant) meets the requirement; and
- (b) The site of the other Eligible Intermittent Resource (the sharing plant) lies contiguous to or overlaps the site of the host plant, or
- (c) Meteorological conditions on the sharing plant site are substantially similar to those on the Host Plant site.

Proof of the agreement between the host plant and sharing plant must be provided to the CAISO. Should the agreement terminate, the sharing plant must independently demonstrate it meets the meteorological tower requirements specified in this Eligible Intermittent Resource Protocol.

**3.2.2 Solar Meteorological Data Requirements**

Table Q-3 details the units and accuracy of measurements for telemetry data points solar Eligible Intermittent Resources must send to the CAISO in real time (i.e., every 4 seconds).

Table Q-3 Solar Eligible Intermittent Resources Telemetry Data Points

Element	Device(s) Needed	Units	Accuracy
Wind Speed (Meter / Second)	Anemometer, wind vane and wind mast	m/s	± 2m/s
Wind Direction (Degrees - Zero North 90CW)	Anemometer, wind vane and wind mast	Degrees	± 5°
Air Temperature (Degrees Celsius)	Temperature probe & shield for ambient temp	°C	± 1°
Barometric Pressure (hecto Pascals)	Barometer	hPA	± 60 hPa
Back Panel Temperature (Degree C)	Temperature probe for back panel temperature	°C	± 1°
Plane of Array Irradiance	Pyranometer or	W/m <sup>2</sup>	± 25 W/m <sup>2</sup>

Watts\Meter Sq.	Equivalent		
Global Horizontal Irradiance Watts\Meter Sq.	Pyranometer or Equivalent	W/m <sup>2</sup>	± 25 W/m <sup>2</sup>
Direct Irradiance Watts\Meter Sq.	Pyranometer or Equivalent	W/m <sup>2</sup>	± 25 W/m <sup>2</sup>

Table Q-4 details the minimum required (R) measurement of solar irradiance by each solar generating technology that solar Eligible Intermittent Resources must send to the CAISO consistent with the requirements of this Eligible Intermittent Resource Protocol.

Table Q-4 Irradiance and Back Plane Required Measurements

	Direct Irradiance (DIRD)	Global Horizontal Irradiance (GHIRD)	Global Irradiance/ Plane of Array (PAIRD)	Back Panel Temperature (BPTMP)
Flat-Plate PV (fixed / horizontal / flat roof)			R	R
Flat-Plate PV (fixed angle / azimuth tracking)			R	R
Flat-Plate PV (DNI zenith & azimuth tracking)	R		R	R
Flat-Panel Solar (thermal fixed angle mounted)			R	R
Flat-Panel Thermal Collector (azimuth tracking)			R	R
Low Concentrating PV (LCPV)	R	R		
High Concentrating PV (HCPV)	R	R		

	Direct Irradiance (DIRD)	Global Horizontal Irradiance (GHIRD)	Global Irradiance/ Plane of Array (PAIRD)	Back Panel Temperature (BPTMP)
Concentrated Solar Thermal (solar through zenith tracking)	R	R		
Heliostat Power (tracking focusing mirrors)	R	R		
Greenhouse Power Tower (hot air convection turbine)			R	
Stirling Engine (concentrated solar power generation)	R	R		

### 3.2.3 Site Form Information

A solar Eligible Intermittent Resource must complete and submit the site information in Table Q-5 according to the schedule and data submittal requirements of the CAISO new resource implementation process. Latitude and Longitude should be in degrees/decimals using WGS84 geodetic datum only.

Table Q-5 CAISO Solar Site Required Information Form

Site Name & Physical Address				
CAISO RES_ID				
Plant Type	PV or Thermal	If thermal, supplemental heating?	Y/N	
Plant Location	Corner 1	Corner 2	Corner 3	Corner 4
Use as many points as necessary to describe the site				



	Lat	Long	Lat	Long	Lat	Long	Lat	Long
Meteorological Station Location  Provide the location of all met data collection point at the site.	Met 1		Equipment Type		Met 2		Equipment Type	
Met Information	ID	Lat	Long	Height Agl	ID	Lat	Long	Height Agl
Generation Capacity	DC				AC			
Use multiple Groups for different panel types and installations								
	Group 1		Group 2		Group 3		Lat	Long
Panel Manufacturer								
Panel Model								
Number of Panels								
Panel Power Rating								
Number of inverters								
Inverter ratings								
Tracking (Yes or No)								
Single or Dual Axis Tracking								
Tracker Manufacturer								
Tracker Model								
Wind Protection (Speed in m/s for								

storage)					
Altitude Angle of Panels					
Azimuth Angle of Fixed Panels					
Height of Panels Above Ground Level					
Concentrating PV (Yes or No)					

### 3.3 Power Reliability Requirements

Each Eligible Intermittent Resource shall provide a backup power source for the Remote Intelligent Gateway, meteorological station equipment, revenue meter, and essential communication equipment (including, but not limited to, the router, network switch, fiber optic transceiver, 120V plug-in power supplies). The backup power source shall be sized accordingly to carry that equipment load. A backup power supply may include, but is not limited to, an uninterruptable power source (UPS) or a battery bank with solar panel charger. Whichever backup power source the Eligible Intermittent Resource installs, it shall be sized and provide power until the primary power source is restored.

### 3.4 Standards

The standards for communications shall be the monitoring and communications requirements for Generating Units providing only Energy; as such standards may be amended from time to time, and published on the CAISO Website.

### 3.5 Cost Responsibility

An Eligible Intermittent Resource is responsible for expenses associated with engineering, installation, operation and maintenance of required communication equipment.

## 4 FORECASTING

The CAISO is responsible for overseeing the development of tools or services to forecast Energy for Participating Intermittent Resources. The CAISO will use its best efforts to develop accurate and unbiased forecasts, as limited by the availability of relevant explanatory data. Objective criteria and thresholds for unbiased, accurate forecasts shall be used to certify Participating Intermittent Resources in accordance with Section 2.2.4 of this EIRP.

### 4.1 [NOT USED]

### 4.2 [NOT USED]

### 4.3 Confidentiality

The CAISO shall maintain the confidentiality of proprietary data for each Participating Intermittent Resource in accordance with Section 20 of the CAISO Tariff.

## **5 SCHEDULING AND SETTLEMENT**

### **5.1 Schedules**

For all Generating Units that comprise the Participating Intermittent Resources shall comply with the Bidding and scheduling rules specified in Sections 4.8, 30, 31, and 34.

### **5.2 Settlement**

After a Participating Intermittent Resource is certified, Settlement shall be determined for each Settlement Period based on consistency of Bids submitted on behalf of such Participating Intermittent Resource with the rules specified in the CAISO Tariff and this EIRP.

### **5.3 Participating Intermittent Resource Export Fee**

The rules specified in this Section 5.3 and its subsection applies only to Participating Intermittent Resources that have elected PIRP Protective Measures and do not apply to resources that have not elected for such measures.

#### **5.3.1 Exemptions**

After November 1, 2006, Participating Intermittent Resources shall be subject to the Participating Intermittent Resource Export Fee, as set forth in Schedule 4 of Appendix F, for Energy generated, except to the extent the Participating Intermittent Resource is exempt under one or more of the following conditions:

- (a) The owner of a Participating Intermittent Resource, as of November 1, 2006, utilizes the Energy generated from the Participating Intermittent Resource to meet its own Native Load outside the CAISO Balancing Authority Area. Should any Participating Intermittent Resource subject to this exemption increase its PMax set forth in the CAISO's Master File by modification under Section 2.4.2 of this EIRP, the exemption will not apply to the added capacity unless exempt under another subsection of this Section 5.3.1.

If the Participating Intermittent Resource subject to this exemption changes ownership, the Participating Intermittent Resource Export Fee will apply, except where the prior exempt owner demonstrates that the entire output of the Participating Intermittent Resource continues to be delivered to the exempt owner under a power purchase agreement for the purpose of serving the prior exempt owner's Native Load. The exemption will then continue only for the period of the power purchase agreement as provided in accordance with Section 2.2.5 of this EIRP and cannot exceed the MW quantity originally exempted.

- (b) A Participating Intermittent Resource demonstrates in its certification under Section 2.2.5(a) of this EIRP an export contract with a starting term prior to November 1, 2006. An export contract is any power purchase agreement to sell Energy to any entity other than a Load Serving Entity with an obligation under law or franchise to serve Demand within the CAISO Balancing Authority Area.

The exemption will apply to any extension of the current export contract through

an evergreen or other existing extension provision. The exemption terminates upon termination of the export contract. Should any Participating Intermittent Resource subject to this exemption increase its PMax set forth in the CAISO's Master File by modification under Section 2.4.2 of this EIRP, the exemption will apply only to Energy generated up to the contract quantity, unless the Participating Intermittent Resource demonstrates a basis for exemption under subsection (c) for the expanded capacity.

- (c) A Participating Intermittent Resource demonstrates in its certification under Section 2.2.5(a) of this EIRP a contract to sell Energy to a Load Serving Entity with Native Load within the CAISO Balancing Authority Area. Energy service providers with contractual obligations with customers within the CAISO Balancing Authority Area would be deemed a Load Serving Entity with an obligation to serve Native Load within the CAISO Balancing Authority Area.

The exemption will apply to any extension of the current contract through an evergreen or other existing extension provision. The exemption terminates upon termination of the contract. Should any Participating Intermittent Resource subject to this exemption increase its PMax set forth in the CAISO's Master File by modification under Section 2.4.2 of this EIRP, the exemption will continue to apply only to Energy generated up to the contract quantity unless the Participating Intermittent Resource demonstrates a basis for exemption under this subsection (c) for the expanded capacity.

### **5.3.2 Participating Intermittent Resource Export Percentage**

Based on the information required in Section 2.2.5 of this EIRP and application of the exemptions to the Participating Intermittent Resource Export Fee in Section 5.3.1 of this EIRP, the CAISO will determine a PIR Export Percentage for each Participating Intermittent Resource that will be calculated as the ratio of the Participating Intermittent Resource's PMax in the CAISO Master File minus the MW, subject to an exemption under Section 5.3.1 of this EIRP on a MW basis to the Participating Intermittent Resource's PMax in the CAISO Master File. For example, a Participating Intermittent Resource with a PMax of 100 MW and a contract with a CAISO Balancing Authority Area Load Serving Entity for 40 MW would have a PIR Export Percentage of  $(100-40)/100 = 60\%$ . A Participating Intermittent Resource with a PIR Export Percentage greater than zero (0) will be deemed an Exporting Participating Intermittent Resource. The CAISO will notify the Participating Intermittent Resource and its Scheduling Coordinator of the facility's PIR Export Percentage. Any dispute regarding the CAISO's determination of the PIR Export Percentage shall be subject to the dispute resolution procedures under Section 13 of the CAISO Tariff.

### **5.3.3 Monthly Application of Participating Intermittent Resource Export Fee**

Each month the CAISO will charge Exporting Participating Intermittent Resources the Participating Intermittent Resource Export Fee, as set forth in Schedule 4 of Appendix F.

### **5.3.4 Allocation of Credit for Participating Intermittent Resource Export Fees Received**

Payments received by the CAISO from application of the Participating Intermittent Resource Export Fee in accordance with this Section 5.3 shall be allocated as a credit on a quarterly basis to Scheduling Coordinators with Net Negative Uninstructed Deviations in proportion to the to the amount of Net Negative Uninstructed Deviations that each Scheduling Coordinator was assessed for Participating Intermittent Resources Settlement charges for the applicable CAISO Charge Code during the prior quarter.

### **5.3.5 Recording of Exemptions and Notice of Termination**

The CAISO will record any exemption period ending date, if applicable, for each Participating Intermittent Resource. At the conclusion of the exemption period, the CAISO will notify the Scheduling Coordinator for the Participating Intermittent Resource that the facility is no longer exempt from the Participating Intermittent Resource Export Fee.

### **5.3.6 Annual Confirmation**

On December 31 of each calendar year, each Participating Intermittent Resource shall confirm in the form set forth in a Business Practice Manual, signed by an officer of the Participating Intermittent Resource, that the operations of the Participating Intermittent Resource are consistent with any certification(s) provided to the CAISO under Section 2.2.5 of this EIRP.

### **5.3.7 Audit Rights**

In addition to the rights set forth in CAISO Tariff Section 4.6.9, the CAISO shall have the right to contact any counterparty to a contract relied upon under Section 5.3.1 of this EIRP for purposes of determining compliance with this EIRP.

## **6 DATA COLLECTION FACILITIES**

An Eligible Intermittent Resource not otherwise exempt must install and maintain equipment to collect, record and transmit data that the CAISO reasonably determines is necessary to develop and support a forecast model that meets the requirements of Section 4 of this EIRP.

### **6.1 Other Eligible Intermittent Resources**

Eligible Intermittent Resources other than wind projects will be required to provide data of comparable relevance to estimating Energy generation. Standards will be developed as such projects are identified and will be specified in this Eligible Intermittent Resources Protocol..

## **7 PROGRAM MONITORING**

The CAISO shall monitor the operation of these rules, and will in particular seek to eliminate any gaming opportunities provided by the flexibility provided Participating Intermittent Resources to self-select participation on an hourly basis.

Participating Intermittent Resources are expected to bid, schedule, and otherwise perform in good faith, and not seek to act strategically in a manner that causes financial gain through systematic behavior, where such gain results solely from the settlement accommodations provided under CAISO Tariff Section 11.12.

If requirements specified in this EIRP are not met, then Participating Intermittent Resource certification may be revoked pursuant to Section 2.4.5 of this EIRP. Any patterns of strategic behavior by Participating Intermittent Resources will be tracked, and the statistical significance of such deviations will be used by the CAISO to evaluate whether changes in the rules defined in this EIRP are appropriate.

The CAISO will monitor the impact of rules for Participating Intermittent Resources on Imbalance Energy and Regulation costs to the CAISO.

## **8 AMENDMENTS**

If the CAISO determines a need for an amendment to this EIRP, the CAISO will follow the requirements as set forth in Section 15 of the CAISO Tariff.

## Appendix EE

### Large Generator Interconnection Agreement

#### for Interconnection Requests Processed under the Generator Interconnection and Deliverability

#### Allocation Procedures (Appendix CC of the CAISO Tariff)

\* \* \*

#### Article 8. Communications

- 8.1 Interconnection Customer Obligations.** The Interconnection Customer shall maintain satisfactory operating communications with the CAISO in accordance with the provisions of the CAISO Tariff and with the Participating TO's dispatcher or representative designated by the Participating TO. The Interconnection Customer shall provide standard voice line, dedicated voice line and facsimile communications at its Large Generating Facility control room or central dispatch facility through use of either the public telephone system, or a voice communications system that does not rely on the public telephone system. The Interconnection Customer shall also provide the dedicated data circuit(s) necessary to provide Interconnection Customer data to the CAISO and Participating TO as set forth in Appendix D, Security Arrangements Details. The data circuit(s) shall extend from the Large Generating Facility to the location(s) specified by the CAISO and Participating TO. Any required maintenance of such communications equipment shall be performed by the Interconnection Customer. Operational communications shall be activated and maintained under, but not be limited to, the following events: system paralleling or separation, scheduled and unscheduled shutdowns, equipment clearances, and hourly and daily load data.
- 8.2 Remote Terminal Unit.** Prior to the Initial Synchronization Date of each Electric Generating Unit, a Remote Terminal Unit, or equivalent data collection and transfer equipment acceptable to the Parties, shall be installed by the Interconnection Customer, or by the Participating TO at the Interconnection Customer's expense, to gather accumulated and instantaneous data to be telemetered to the location(s) designated by the CAISO and by the Participating TO through use of a dedicated point-to-point data circuit(s) as indicated in Article 8.1.
- Telemetry to the CAISO shall be provided in accordance with the CAISO's technical standards for direct telemetry. For telemetry to the Participating TO, the communication protocol for the data circuit(s) shall be specified by the Participating TO. Instantaneous bi-directional real power and reactive power flow and any other required information must be telemetered directly to the location(s) specified by the Participating TO.
- Each Party will promptly advise the other Parties if it detects or otherwise learns of any metering, telemetry or communications equipment errors or malfunctions that require the attention and/or correction by another Party. The Party owning such equipment shall correct such error or malfunction as soon as reasonably feasible.
- 8.3 No Annexation.** Any and all equipment placed on the premises of a Party shall be and remain the property of the Party providing such equipment regardless of the mode and manner of annexation or attachment to real property, unless otherwise mutually agreed by the Parties.
- 8.4 Provision of Data from a Variable Energy Resource.** The Interconnection Customer whose Generating Facility is a Variable Energy Resource shall provide meteorological and forced outage data to the CAISO to the extent necessary for the CAISO's development and deployment of power production forecasts for that class of Variable Energy Resources. The Interconnection Customer with a Variable Energy Resource having wind as the energy source, at a minimum, will

be required to provide the CAISO with site-specific meteorological data including: temperature, wind speed, wind direction, and atmospheric pressure. The Interconnection Customer with a Variable Energy Resource having solar as the energy source, at a minimum, will be required to provide the CAISO with site-specific meteorological data including: temperature, atmospheric pressure, and irradiance. The CAISO and Interconnection Customer whose Generating Facility is a Variable Energy Resource shall mutually agree to any additional meteorological data that are required for the development and deployment of a power production forecast. The Interconnection Customer whose Generating Facility is a Variable Energy Resource also shall submit data to the CAISO regarding all forced outages to the extent necessary for the CAISO's development and deployment of power production forecasts for that class of Variable Energy Resources. The exact specifications of the meteorological and forced outage data to be provided by the Interconnection Customer to the CAISO, including the frequency and timing of data submittals, shall be made taking into account the size and configuration of the Variable Energy Resource, its characteristics, location, and its importance in maintaining generation resource adequacy and transmission system reliability in its area. All requirements for meteorological and forced outage data must be commensurate with the power production forecasting employed by the CAISO. Such requirements for meteorological and forced outage data are set forth in Appendix C, Interconnection Details, of this LGIA, as they may change from time to time.



**Attachment B – Marked Tariff**

**Order 764 Compliance Filing in Docket ER14-795**

**California Independent System Operator Corporation**

**April 21, 2014**

## Appendix Q

### Eligible Intermittent Resources Protocol

#### 1 SCOPE

##### 1.1 Scope of Application to Parties

This EIRP applies to the CAISO and to:

- (a) Scheduling Coordinators (SCs);
- (b) Eligible Intermittent Resources; and
- (c) Participating Intermittent Resources.

##### 1.2 Liability of the CAISO

Any liability of the CAISO arising out of or in relation to this EIRP shall be subject to Section 14 of the CAISO Tariff as if references to the CAISO Tariff were references to this EIRP.

#### 2 REQUIREMENTS FOR ELIGIBLE AND PARTICIPATING INTERMITTENT RESOURCES

##### 2.1 No Mandatory Participation

Eligible Intermittent Resources may elect to be scheduled and settled as the CAISO Tariff provides for Generating Units, and are not required to seek certification as Participating Intermittent Resources.

##### 2.2 Minimum Certification Requirements

Those Eligible Intermittent Resources and Participating Intermittent Resources must meet the following requirements, as applicable.

###### 2.2.1 Agreements

The following agreements must be executed by the owner or operator of any Eligible Intermittent Resource, unless that resource is not subject to any of these agreements pursuant to the CAISO Tariff, such as an Eligible Intermittent Resource of an MSS Operator:

- (a) A Participating Generator Agreement, Net Scheduled PGA, Dynamic Scheduling Agreement for Scheduling Coordinators, or Pseudo-Tie Participating Generator Agreement that, among other things, binds the Eligible Intermittent Resource to comply with the CAISO Tariff; and
- (b) A Meter Service Agreement for CAISO Metered Entities, for all Eligible Intermittent Resources other than Dynamic System Resources.

If an Eligible Intermittent Resource intends to become a Participating Intermittent Resource, it must also execute a letter of intent, which when executed and delivered to the CAISO shall initiate the process of certifying the Participating Intermittent Resource. The form of the letter of

intent shall be specified by the CAISO in a Business Practice Manual.

### **2.2.2 Composition of a Participating Intermittent Resource**

The CAISO shall develop criteria to determine whether one or more Eligible Intermittent Resources may be included within a Participating Intermittent Resource. Such criteria shall include:

- (a) A Participating Intermittent Resource must be at least one (1) MW rated capacity.
- (b) A Participating Intermittent Resource may include one (1) or more Eligible Intermittent Resources that have similar response to weather conditions or other variables relevant to forecasting Energy, as determined by the CAISO.
- (c) Each Participating Intermittent Resource shall be electrically connected at a single point on the CAISO Controlled Grid, except as otherwise permitted by the CAISO on a case-by-case basis as may be allowed under the CAISO Tariff. Interconnection to a portion of the CAISO Controlled Grid outside or not contiguous to the CAISO Balancing Authority Area does not make an Eligible Intermittent Resource that is a Dynamic System Resource or Pseudo-Tie Generating Unit eligible to be included within a Participating Intermittent Resource.
- (d) The same Scheduling Coordinator must schedule all Eligible Intermittent Resources aggregated into a single Participating Intermittent Resource.

### **2.2.3 Equipment Installation**

An Eligible Participating Intermittent Resource must install and maintain the communication equipment required pursuant to Section 3 of this EIRP, and the equipment supporting forecast data required pursuant to Section 6 of this EIRP.

### **2.2.4 Forecast Model Validation**

The CAISO must determine that sufficient historic and real-time telemetered data are available to support an accurate and unbiased forecast of Energy generation by a Participating Intermittent Resource, according to the forecasting process validation criteria described in Section 4 of this EIRP.

### **2.2.5 Information Requirements For Participating Intermittent Resource Export Fee**

In order for the CAISO to administer, implement and calculate the Participating Intermittent Resource Export Fee, each Participating Intermittent Resource jointly with, and through, its Scheduling Coordinator must provide the CAISO with the following information and documents under the schedule and conditions set forth in this section.

The CAISO will maintain the confidentiality of all information and documents received under this section in accordance with CAISO Tariff Section 20 et seq.

- (a) A certification, in the form set for in a Business Practice Manual, signed by an officer of the Participating Intermittent Resource and its Scheduling Coordinator, identifying (1) the PIR Export Percentage under Section 5.3.2 of this EIRP for resources that have elected PIRP Protective Measures, if any, and basis thereof, and (2) each contract to sell Energy or capacity from the Participating Intermittent Resource, including for each such contract, the counterparty, start and end dates, delivery point(s), quantity in MW, other temporal

terms, i.e., seasonal or hourly limitations.

The certification must be updated by resubmission to the CAISO (1) upon a request to modify the composition of the Participating Intermittent Resource under Section 2.4.2 of this EIRP; or (2) within ten (10) calendar days of final execution of a new contract or any change in counterparty, start and end dates, delivery point(s), quantity in MW, or other temporal terms, as described above, for any prior certified contract. All other contractual changes will not trigger the obligation for recertification.

- (b) Copies of all contracts, including changes, identified in the above-referenced certification; however, price information may be redacted from the contracts provided.

Each Participating Intermittent Resource, as of November 1, 2006, must initially provide the information requested by this Section 2.2.5 in accordance with a Market Notice provided by the CAISO to Participating Intermittent Resources. All other Eligible Intermittent Resources must satisfy this Section 2.2.5 in order to become a Participating Intermittent Resource after November 1, 2006.

### **2.3 Notice of Certification of a Participating Intermittent Resource**

When all requirements described in Section 2.2 of this EIRP applicable to Participating Intermittent Resources have been fulfilled, the CAISO shall notify the Scheduling Coordinator and the representatives of the Eligible Intermittent Resources comprising the Participating Intermittent Resource that the Participating Intermittent Resource has been certified, and is eligible for the settlement terms provided under Section 11.12 of the CAISO Tariff, as conditioned by the terms of this EIRP.

### **2.4 Additional Requirements**

#### **2.4.1 Forecast Fee**

An Eligible Intermittent Resource must pay the Forecast Fee for all metered Energy generated by the Eligible Intermittent Resource, as specified in CAISO Tariff Appendix F, Schedule 4.

#### **2.4.2 Modification of Participating Intermittent Resource Composition**

A Participating Intermittent Resource may seek to modify the composition of the Participating Intermittent Resource (e.g., by adding or eliminating an Eligible Intermittent Resource from the Participating Intermittent Resource). Such changes shall not be implemented without prior compliance with the written approval by the CAISO. The CAISO will apply consistent criteria and expeditiously review any proposed changes in the composition of a Participating Intermittent Resource.

#### **2.4.3 Changes in Scheduling Coordinator**

This EIRP does not impose any additional requirement for CAISO approval to change the Scheduling Coordinator for an approved Participating Intermittent Resource than would otherwise apply under the CAISO Tariff to changes in the Scheduling Coordinator representing a Generating Unit.

#### **2.4.4 Continuing Obligation**

A Participating Intermittent Resource or Eligible Intermittent Resource must meet all applicable obligations established for Participating Intermittent Resources or Eligible Intermittent Resources

under the CAISO Tariff and this EIRP, and must fully cooperate in providing all data, other information, and authorizations the CAISO reasonably requests to fulfill its obligation to validate forecast models, explain deviations, and implement the Participating Intermittent Resource Export Fees.

#### **2.4.5 Failure to Perform**

If the CAISO determines that a material deficiency has arisen in the Participating Intermittent Resource's fulfillment of its obligations under the CAISO Tariff and this EIRP, and such Participating Intermittent Resource fails to promptly correct such deficiencies when notified by the CAISO, then the eligibility of the Participating Intermittent Resource for the settlement accommodations provided in Section 11.12 of the CAISO Tariff shall be suspended until such time that the unavailable data is provided or other material deficiency is corrected to the CAISO's reasonable satisfaction. Such suspension shall not relieve the Scheduling Coordinator for the deficient Participating Intermittent Resource from paying the Forecast Fee over the duration of the period covered by the letter of intent described in Section 2.2.1(c) of this EIRP.

### **3 COMMUNICATIONS**

#### **3.1 Forecast Data**

The CAISO may require various data relevant to forecasting Energy from the Eligible Intermittent Resource to be telemetered to the CAISO, including appropriate operational data, meteorological data or other data reasonably necessary to forecast Energy.

In order for the CAISO to forecast Energy, an Eligible Intermittent Resource must provide the CAISO with MW production data and meteorological data as outlined in this Eligible Intermittent Resources Protocol. This data must be collected for a minimum of thirty (30) consecutive days and be of sufficient quality as determined by a CAISO to produce a state of the art forecast.

#### **3.1.1 Wind Generation Meteorological Station Requirements**

Each wind Eligible Intermittent Resource must install and maintain equipment required by the CAISO to support accurate power generation forecasting and the communication of such forecast, meteorological, and other required data to the CAISO consistent with the timeframes specified in this Eligible Intermittent Resource Protocol.

**3.1.1.1** Each wind Eligible Intermittent Resource shall install a minimum of one meteorological station to measure barometric pressure, temperature, wind speed and direction. If a wind Eligible Intermittent Resource has a rated capacity of five (5) MW or greater, the Eligible Intermittent Resource shall install a minimum of two meteorological stations to measure barometric pressure, temperature, wind speed and direction. If an Eligible Intermittent Resource, as part of compliance with any other contractual or regulatory requirement outside of this Eligible Intermittent Resource Protocol, provides data from more than the two required meteorological stations to an entity other than the CAISO, then the Eligible Intermittent Resource must also submit data from any additional meteorological station to the CAISO.

**3.1.1.2** Each wind Eligible Intermittent Resource shall locate its meteorological station(s) on the windward side of the wind farm. Each wind Eligible Intermittent Resource must install one meteorological station at the average hub height of the wind turbines. The second meteorological station, if any, may be co-located on the primary meteorological station and installed approximately 30 meters below the average hub height. Hub height is the

distance from the ground to the center of the turbine axis. Where placement of the meteorological station(s) in accordance with this Eligible Intermittent Resource Protocol would reduce production or violate a local, state, or federal statute, regulation or ordinance, the CAISO, in coordination with any applicable forecast service provider, will coordinate with the Eligible Intermittent Resource to identify an acceptable placement of the meteorological station.

**3.1.1.3** The use of SODAR<sup>1</sup> and/or LIDAR<sup>2</sup> equipment may be an acceptable substitute for wind direction and velocity only after obtaining prior agreement from the CAISO.

**3.1.2 Wind Generation Meteorological Data Requirements**

Table Q-1 details the units and accuracy of measurements for telemetry data points wind Eligible Intermittent Resources must send to the CAISO in real time (i.e., every 4 seconds).

Table Q-1 Wind Eligible Intermittent Resources Telemetry Data Points

<u>Element</u>	<u>Device(s) Needed</u>	<u>Units</u>	<u>Accuracy</u>
<u>Wind Speed (Meter / Second)</u>	<u>Anemometer, wind vane and wind mast</u>	<u>m/s</u>	<u>± 2m/s</u>
<u>Air Temperature (Degrees Celsius)</u>	<u>Temperature probe &amp; shield for ambient temp</u>	<u>°C</u>	<u>± 1°</u>
<u>Barometric Pressure (hecto Pascals)</u>	<u>Barometer</u>	<u>hPA</u>	<u>± 60 hPa</u>
<u>Real Time Data</u>		<u>MWs</u>	

**3.1.3 Designated Turbines**

For any wind eligible Intermittent Resource, designated turbines are required to improve forecast accuracy within a wind park. The CAISO shall identify a designated turbine, from which the Eligible Intermittent Resource shall provide nacelle wind speed and generation in MWs every four seconds.

**3.1.4 Topographical Map**

A wind Eligible Intermittent Resource must submit a topographical map that illustrates the location

<sup>1</sup> SODAR means Sonic Detection and Ranging- a meteorological instrument also known as a wind profiler which measures the scattering of sound waves by atmospheric turbulence.

<sup>2</sup> LIDAR means Light Detection and Ranging - a meteorological instrument which measures the properties of scattered light waves caused by atmospheric turbulence.

and height for each wind turbine within a wind park. The map must identify all meteorological stations and turbine location by latitude and longitude and should be in degrees/decimals using WGS84 geodetic datum only.

**3.1.5 Site Information Form**

A wind Eligible Intermittent Resource must complete and submit the site information in Table Q-2 according to the schedule and data submittal requirements of the CAISO new resource implementation process. For plant location, the Eligible Intermittent Resource must use latitude and Longitude expressed in degrees/decimals using WGS84 geodetic datum only.

Table Q-2 Wind Site Information Form

<u>Site Name &amp; Physical Address</u>								
<u>CAISO RES_ID</u>								
<u>Generation Capacity (AC)</u>								
<u>Plant Location</u>  <u>Use as many points as necessary to describe the site</u>	<u>Corner 1</u>		<u>Corner 2</u>		<u>Corner 3</u>		<u>Corner 4</u>	
	<u>Lat</u>	<u>Long</u>	<u>Lat</u>	<u>Long</u>	<u>Lat</u>	<u>Long</u>	<u>Lat</u>	<u>Long</u>
<u>Meteorological Station Location</u>  <u>Provide the location of all met data collection point at the site.</u>	<u>Met 1</u>		<u>Equipment Type</u>		<u>Met 2</u>		<u>Equipment Type</u>	
<u>Met Information</u>	<u>ID</u>	<u>Lat</u>	<u>Long</u>	<u>Height</u> <u>Agl</u>	<u>ID</u>	<u>Lat</u>	<u>Long</u>	<u>Height</u> <u>Agl</u>
	<u>Group 1</u>		<u>Group 2</u>		<u>Group 3</u>		<u>Lat</u>	<u>Long</u>
<u>Number of Turbines</u>								
<u>Turbine</u>								

<u>Manufacturer</u>					
<u>Turbine Model</u>					
<u>Turbine Maximum Generation Capacity</u>					
<u>Turbine Height Above Ground Level</u>					
<u>Cut In Speed (m/s)</u>					
<u>Rated Speed (m/s)</u>					
<u>Cut Out Speed (m/s)</u>					
<u>Cold Weather Package (Yes or No)</u>					
<u>Hot Weather Package (Yes or No)</u>					
<u>Low Temperature Cut Out (deg C)</u>					
<u>High Temperature Cut Out (deg C)</u>					

### **3.2.1 Solar Generation Meteorological Station Requirements**

Each solar Eligible Intermittent Resource must install and maintain equipment required by the CAISO to support accurate power generation forecasting and the communication of such forecast, meteorological, and other required data to the CAISO consistent with the timeframes specified in this Eligible Intermittent Resource Protocol.

**3.2.1.1** Each solar Eligible Intermittent Resource shall install a minimum of one meteorological station. If a solar Eligible Intermittent Resource has a rated capacity of five (5) MW or greater, the Eligible Intermittent Resource shall install a minimum of two meteorological stations. If an Eligible Intermittent Resource, as part of compliance with any other contractual or regulatory requirement outside of this Eligible Intermittent Resource Protocol, provides data from more than the two required meteorological stations to an entity other than the CAISO, then the Eligible Intermittent Resource must also submit data from any additional meteorological station to the CAISO.

**3.2.1.2** Solar Eligible Intermittent Resources that require direct normal irradiance (DNI) and global horizontal irradiance (GHI) measurements may provide alternate radiometry meteorological station data. For example, one meteorological station may report DNI and another meteorological station may report GHI. All other meteorological data reporting requirements shall remain the same.



3.2.1.3 Solar Eligible Intermittent Resources' meteorological stations shall cover at least 90 percent of the facility's footprint for each Resource ID.

3.2.1.4 Solar Eligible Intermittent Resources may satisfy the meteorological station location requirements by entering a mutually agreeable sharing agreement(s) with another solar Eligible Intermittent Resources after obtaining the CAISO's prior approval when the following conditions apply:

- (a) One Eligible Intermittent Resource (the host plant) meets the requirement; and
- (b) The site of the other Eligible Intermittent Resource (the sharing plant) lies contiguous to or overlaps the site of the host plant, or
- (c) Meteorological conditions on the sharing plant site are substantially similar to those on the Host Plant site.

Proof of the agreement between the host plant and sharing plant must be provided to the CAISO. Should the agreement terminate, the sharing plant must independently demonstrate it meets the meteorological tower requirements specified in this Eligible Intermittent Resource Protocol.

### 3.2.2 Solar Meteorological Data Requirements

Table Q-3 details the units and accuracy of measurements for telemetry data points solar Eligible Intermittent Resources must send to the CAISO in real time (i.e., every 4 seconds).

Table Q-3 Solar Eligible Intermittent Resources Telemetry Data Points

<u>Element</u>	<u>Device(s) Needed</u>	<u>Units</u>	<u>Accuracy</u>
<u>Wind Speed (Meter / Second)</u>	<u>Anemometer, wind vane and wind mast</u>	<u>m/s</u>	<u>± 2m/s</u>
<u>Wind Direction (Degrees - Zero North 90CW)</u>	<u>Anemometer, wind vane and wind mast</u>	<u>Degrees</u>	<u>± 5°</u>
<u>Air Temperature (Degrees Celsius)</u>	<u>Temperature probe &amp; shield for ambient temp</u>	<u>°C</u>	<u>± 1°</u>
<u>Barometric Pressure (hecto Pascals)</u>	<u>Barometer</u>	<u>hPA</u>	<u>± 60 hPa</u>
<u>Back Panel Temperature (Degree C)</u>	<u>Temperature probe for back panel temperature</u>	<u>°C</u>	<u>± 1°</u>
<u>Plane of Array Irradiance</u>	<u>Pyranometer or</u>	<u>W/m<sup>2</sup></u>	<u>± 25 W/m<sup>2</sup></u>

<u>Watts\Meter Sq.</u>	<u>Equivalent</u>		
<u>Global Horizontal Irradiance Watts\Meter Sq.</u>	<u>Pyranometer or Equivalent</u>	<u>W/m<sup>2</sup></u>	<u>± 25 W/m<sup>2</sup></u>
<u>Direct Irradiance Watts\Meter Sq.</u>	<u>Pyranometer or Equivalent</u>	<u>W/m<sup>2</sup></u>	<u>± 25 W/m<sup>2</sup></u>

Table Q-4 details the minimum required (R) measurement of solar irradiance by each solar generating technology that solar Eligible Intermittent Resources must send to the CAISO consistent with the requirements of this Eligible Intermittent Resource Protocol.

Table Q-4 Irradiance and Back Plane Required Measurements

	<u>Direct Irradiance (DIRD)</u>	<u>Global Horizontal Irradiance (GHIRD)</u>	<u>Global Irradiance/ Plane of Array (PAIRD)</u>	<u>Back Panel Temperature (BPTTEMP)</u>
<u>Flat-Plate PV (fixed / horizontal / flat roof)</u>			<u>R</u>	<u>R</u>
<u>Flat-Plate PV (fixed angle / azimuth tracking)</u>			<u>R</u>	<u>R</u>
<u>Flat-Plate PV (DNI zenith &amp; azimuth tracking)</u>	<u>R</u>		<u>R</u>	<u>R</u>
<u>Flat-Panel Solar (thermal fixed angle mounted)</u>			<u>R</u>	<u>R</u>
<u>Flat-Panel Thermal Collector (azimuth tracking)</u>			<u>R</u>	<u>R</u>
<u>Low Concentrating PV (LCPV)</u>	<u>R</u>	<u>R</u>		
<u>High Concentrating PV (HCPV)</u>	<u>R</u>	<u>R</u>		

	<u>Direct Irradiance (DIRD)</u>	<u>Global Horizontal Irradiance (GHIRD)</u>	<u>Global Irradiance/ Plane of Array (PAIRD)</u>	<u>Back Panel Temperature (BTEMP)</u>
<u>Concentrated Solar Thermal (solar through zenith tracking)</u>	R	R		
<u>Heliostat Power (tracking focusing mirrors)</u>	R	R		
<u>Greenhouse Power Tower (hot air convection turbine)</u>			R	
<u>Stirling Engine (concentrated solar power generation)</u>	R	R		

### **3.2.3 Site Form Information**

A solar Eligible Intermittent Resource must complete and submit the site information in Table Q-5 according to the schedule and data submittal requirements of the CAISO new resource implementation process. Latitude and Longitude should be in degrees/decimals using WGS84 geodetic datum only.

Table Q-5 CAISO Solar Site Required Information Form

<u>Site Name &amp; Physical Address</u>				
<u>CAISO RES_ID</u>				
<u>Plant Type</u>	<u>PV or Thermal</u>	<u>If thermal, supplemental heating?</u>	<u>Y/N</u>	
<u>Plant Location</u> <u>Use as many points as necessary to describe the site</u>	<u>Corner 1</u>	<u>Corner 2</u>	<u>Corner 3</u>	<u>Corner 4</u>

	<u>Lat</u>	<u>Long</u>	<u>Lat</u>	<u>Long</u>	<u>Lat</u>	<u>Long</u>	<u>Lat</u>	<u>Long</u>
<u>Meteorological Station Location</u>  Provide the location of all met data collection point at the site.	<u>Met 1</u>		<u>Equipment Type</u>		<u>Met 2</u>		<u>Equipment Type</u>	
<u>Met Information</u>	<u>ID</u>	<u>Lat</u>	<u>Long</u>	<u>Height</u> <u>Agl</u>	<u>ID</u>	<u>Lat</u>	<u>Long</u>	<u>Height</u> <u>Agl</u>
<u>Generation Capacity</u>	<u>DC</u>				<u>AC</u>			
<u>Use multiple Groups for different panel types and installations</u>								
	<u>Group 1</u>		<u>Group 2</u>		<u>Group 3</u>		<u>Lat</u>	<u>Long</u>
<u>Panel Manufacturer</u>								
<u>Panel Model</u>								
<u>Number of Panels</u>								
<u>Panel Power Rating</u>								
<u>Number of inverters</u>								
<u>Inverter ratings</u>								
<u>Tracking (Yes or No)</u>								
<u>Single or Dual Axis Tracking</u>								
<u>Tracker Manufacturer</u>								
<u>Tracker Model</u>								
<u>Wind Protection (Speed in m/s for</u>								

<u>storage)</u>					
<u>Altitude Angle of Panels</u>					
<u>Azimuth Angle of Fixed Panels</u>					
<u>Height of Panels Above Ground Level</u>					
<u>Concentrating PV (Yes or No)</u>					

### **3.3 Power Reliability Requirements**

Each Eligible Intermittent Resource shall provide a backup power source for the Remote Intelligent Gateway, meteorological station equipment, revenue meter, and essential communication equipment (including, but not limited to, the router, network switch, fiber optic transceiver, 120V plug-in power supplies). The backup power source shall be sized accordingly to carry that equipment load. A backup power supply may include, but is not limited to, an uninterruptable power source (UPS) or a battery bank with solar panel charger. Whichever backup power source the Eligible Intermittent Resource installs, it shall be sized and provide power until the primary power source is restored.

### **3.24 Standards**

The standards for communications shall be the monitoring and communications requirements for Generating Units providing only Energy; as such standards may be amended from time to time, and published on the CAISO Website.

### **3.35 Cost Responsibility**

An Eligible Intermittent Resource is responsible for expenses associated with engineering, installation, operation and maintenance of required communication equipment.

## **4 FORECASTING**

The CAISO is responsible for overseeing the development of tools or services to forecast Energy for Participating Intermittent Resources. The CAISO will use its best efforts to develop accurate and unbiased forecasts, as limited by the availability of relevant explanatory data. Objective criteria and thresholds for unbiased, accurate forecasts ~~shall be set forth in a Business Practice Manual, and~~ shall be used to certify Participating Intermittent Resources in accordance with Section 2.2.4 of this EIRP.

**4.1 [NOT USED]**

**4.2 [NOT USED]**

### **4.3 Confidentiality**

The CAISO shall maintain the confidentiality of proprietary data for each Participating Intermittent Resource in accordance with Section 20 of the CAISO Tariff.

## **5 SCHEDULING AND SETTLEMENT**

### **5.1 Schedules**

For all Generating Units that comprise the Participating Intermittent Resources shall comply with the Bidding and scheduling rules specified in Sections 4.8, 30, 31, and 34.

### **5.2 Settlement**

After a Participating Intermittent Resource is certified, Settlement shall be determined for each Settlement Period based on consistency of Bids submitted on behalf of such Participating Intermittent Resource with the rules specified in the CAISO Tariff and this EIRP.

### **5.3 Participating Intermittent Resource Export Fee**

The rules specified in this Section 5.3 and its subsection applies only to Participating Intermittent Resources that have elected PIRP Protective Measures and do not apply to resources that have not elected for such measures.

#### **5.3.1 Exemptions**

After November 1, 2006, Participating Intermittent Resources shall be subject to the Participating Intermittent Resource Export Fee, as set forth in Schedule 4 of Appendix F, for Energy generated, except to the extent the Participating Intermittent Resource is exempt under one or more of the following conditions:

- (a) The owner of a Participating Intermittent Resource, as of November 1, 2006, utilizes the Energy generated from the Participating Intermittent Resource to meet its own Native Load outside the CAISO Balancing Authority Area. Should any Participating Intermittent Resource subject to this exemption increase its PMax set forth in the CAISO's Master File by modification under Section 2.4.2 of this EIRP, the exemption will not apply to the added capacity unless exempt under another subsection of this Section 5.3.1.

If the Participating Intermittent Resource subject to this exemption changes ownership, the Participating Intermittent Resource Export Fee will apply, except where the prior exempt owner demonstrates that the entire output of the Participating Intermittent Resource continues to be delivered to the exempt owner under a power purchase agreement for the purpose of serving the prior exempt owner's Native Load. The exemption will then continue only for the period of the power purchase agreement as provided in accordance with Section 2.2.5 of this EIRP and cannot exceed the MW quantity originally exempted.

- (b) A Participating Intermittent Resource demonstrates in its certification under Section 2.2.5(a) of this EIRP an export contract with a starting term prior to November 1, 2006. An export contract is any power purchase agreement to sell Energy to any entity other than a Load Serving Entity with an obligation under law or franchise to serve Demand within the CAISO Balancing Authority Area.

The exemption will apply to any extension of the current export contract through an evergreen or other existing extension provision. The exemption terminates upon termination of the export contract. Should any Participating Intermittent Resource subject to this exemption increase its PMax set forth in the CAISO's Master File by modification under Section 2.4.2 of this EIRP, the exemption will apply only to Energy generated up to the contract quantity, unless the Participating Intermittent Resource demonstrates a basis for exemption under subsection (c) for the expanded capacity.

- (c) A Participating Intermittent Resource demonstrates in its certification under Section 2.2.5(a) of this EIRP a contract to sell Energy to a Load Serving Entity with Native Load within the CAISO Balancing Authority Area. Energy service providers with contractual obligations with customers within the CAISO Balancing Authority Area would be deemed a Load Serving Entity with an obligation to serve Native Load within the CAISO Balancing Authority Area.

The exemption will apply to any extension of the current contract through an evergreen or other existing extension provision. The exemption terminates upon termination of the contract. Should any Participating Intermittent Resource subject to this exemption increase its PMax set forth in the CAISO's Master File by modification under Section 2.4.2 of this EIRP, the exemption will continue to apply only to Energy generated up to the contract quantity unless the Participating Intermittent Resource demonstrates a basis for exemption under this subsection (c) for the expanded capacity.

### **5.3.2 Participating Intermittent Resource Export Percentage**

Based on the information required in Section 2.2.5 of this EIRP and application of the exemptions to the Participating Intermittent Resource Export Fee in Section 5.3.1 of this EIRP, the CAISO will determine a PIR Export Percentage for each Participating Intermittent Resource that will be calculated as the ratio of the Participating Intermittent Resource's PMax in the CAISO Master File minus the MW, subject to an exemption under Section 5.3.1 of this EIRP on a MW basis to the Participating Intermittent Resource's PMax in the CAISO Master File. For example, a Participating Intermittent Resource with a PMax of 100 MW and a contract with a CAISO Balancing Authority Area Load Serving Entity for 40 MW would have a PIR Export Percentage of  $(100-40)/100 = 60\%$ . A Participating Intermittent Resource with a PIR Export Percentage greater than zero (0) will be deemed an Exporting Participating Intermittent Resource. The CAISO will notify the Participating Intermittent Resource and its Scheduling Coordinator of the facility's PIR Export Percentage. Any dispute regarding the CAISO's determination of the PIR Export Percentage shall be subject to the dispute resolution procedures under Section 13 of the CAISO Tariff.

### **5.3.3 Monthly Application of Participating Intermittent Resource Export Fee**

Each month the CAISO will charge Exporting Participating Intermittent Resources the Participating Intermittent Resource Export Fee, as set forth in Schedule 4 of Appendix F.

### **5.3.4 Allocation of Credit for Participating Intermittent Resource Export Fees Received**

Payments received by the CAISO from application of the Participating Intermittent Resource Export Fee in accordance with this Section 5.3 shall be allocated as a credit on a quarterly basis to Scheduling Coordinators with Net Negative Uninstructed Deviations in proportion to the to the amount of Net Negative Uninstructed Deviations that each Scheduling Coordinator was assessed for Participating Intermittent Resources Settlement charges for the applicable CAISO Charge Code during the prior quarter.

### **5.3.5 Recording of Exemptions and Notice of Termination**

The CAISO will record any exemption period ending date, if applicable, for each Participating Intermittent Resource. At the conclusion of the exemption period, the CAISO will notify the Scheduling Coordinator for the Participating Intermittent Resource that the facility is no longer exempt from the Participating Intermittent Resource Export Fee.

### 5.3.6 Annual Confirmation

On December 31 of each calendar year, each Participating Intermittent Resource shall confirm in the form set forth in a Business Practice Manual, signed by an officer of the Participating Intermittent Resource, that the operations of the Participating Intermittent Resource are consistent with any certification(s) provided to the CAISO under Section 2.2.5 of this EIRP.

### 5.3.7 Audit Rights

In addition to the rights set forth in CAISO Tariff Section 4.6.9, the CAISO shall have the right to contact any counterparty to a contract relied upon under Section 5.3.1 of this EIRP for purposes of determining compliance with this EIRP.

## 6 DATA COLLECTION FACILITIES

An Eligible Intermittent Resource not otherwise exempt must install and maintain equipment to collect, record and transmit data that the CAISO reasonably determines is necessary to develop and support a forecast model that meets the requirements of Section 4 of this EIRP.

### 6.1 ~~Wind Resources~~

~~An Eligible Intermittent Resource powered by wind must install at least one meteorological tower at a project location that is representative of the microclimate within the project boundary.~~

~~The meteorological tower must rely on equipment typically used in the wind industry to continuously monitor weather conditions at a wind resource site. Data collected shall be consistent with requirements set forth in a Business Practice Manual. Such data must be gathered and telemetered to the CAISO in accordance with Section 3 of this EIRP.~~

~~If objective standards developed by the CAISO indicate that the meteorological data may not be sufficiently representative of conditions affecting Energy output or changes in Energy output by that Eligible Intermittent Resource, then the CAISO may require that additional meteorological equipment be temporarily installed at another location within the project boundary. The cost of such equipment, which may be temporarily installed by the Eligible Intermittent Resource or the CAISO, shall be the responsibility of the Eligible Intermittent Resource.~~

~~If objective standards indicate that the data collected from such a temporary site contribute significantly to the development of an accurate and unbiased forecast, then the Eligible Intermittent Resource shall be responsible for installing and arranging for the telemetry of data from an additional permanent meteorological tower at such site, and for the reasonable cost, if any, that the CAISO may have incurred to install and remove the temporary equipment. Relocation of the original meteorological tower to the new site will be allowed if the CAISO determines that a sufficiently accurate and unbiased forecast can be generated from a single relocated meteorological tower.~~



~~The CAISO may establish exemptions from requirements of this Section 6.1 in a Business Practice Manual.~~

## **6.12 Other Eligible Intermittent Resources**

Eligible Intermittent Resources other than wind projects will be required to provide data of comparable relevance to estimating Energy generation. Standards will be developed as such projects are identified and will be specified in this Eligible Intermittent Resources Protocol, ~~a Business Practice Manual~~.

## **7 PROGRAM MONITORING**

The CAISO shall monitor the operation of these rules, and will in particular seek to eliminate any gaming opportunities provided by the flexibility provided Participating Intermittent Resources to self-select participation on an hourly basis.

Participating Intermittent Resources are expected to bid, schedule, and otherwise perform in good faith, and not seek to act strategically in a manner that causes financial gain through systematic behavior, where such gain results solely from the settlement accommodations provided under CAISO Tariff Section 11.12.

If requirements specified in this EIRP are not met, then Participating Intermittent Resource certification may be revoked pursuant to Section 2.4.5 of this EIRP. Any patterns of strategic behavior by Participating Intermittent Resources will be tracked, and the statistical significance of such deviations will be used by the CAISO to evaluate whether changes in the rules defined in this EIRP are appropriate.

The CAISO will monitor the impact of rules for Participating Intermittent Resources on Imbalance Energy and Regulation costs to the CAISO.

## **8 AMENDMENTS**

If the CAISO determines a need for an amendment to this EIRP, the CAISO will follow the requirements as set forth in Section 15 of the CAISO Tariff.

## Appendix EE

### Large Generator Interconnection Agreement

#### for Interconnection Requests Processed under the Generator Interconnection and Deliverability

#### Allocation Procedures (Appendix CC of the CAISO Tariff)

\* \* \*

#### Article 8. Communications

- 8.1 Interconnection Customer Obligations.** The Interconnection Customer shall maintain satisfactory operating communications with the CAISO in accordance with the provisions of the CAISO Tariff and with the Participating TO's dispatcher or representative designated by the Participating TO. The Interconnection Customer shall provide standard voice line, dedicated voice line and facsimile communications at its Large Generating Facility control room or central dispatch facility through use of either the public telephone system, or a voice communications system that does not rely on the public telephone system. The Interconnection Customer shall also provide the dedicated data circuit(s) necessary to provide Interconnection Customer data to the CAISO and Participating TO as set forth in Appendix D, Security Arrangements Details. The data circuit(s) shall extend from the Large Generating Facility to the location(s) specified by the CAISO and Participating TO. Any required maintenance of such communications equipment shall be performed by the Interconnection Customer. Operational communications shall be activated and maintained under, but not be limited to, the following events: system paralleling or separation, scheduled and unscheduled shutdowns, equipment clearances, and hourly and daily load data.
- 8.2 Remote Terminal Unit.** Prior to the Initial Synchronization Date of each Electric Generating Unit, a Remote Terminal Unit, or equivalent data collection and transfer equipment acceptable to the Parties, shall be installed by the Interconnection Customer, or by the Participating TO at the Interconnection Customer's expense, to gather accumulated and instantaneous data to be telemetered to the location(s) designated by the CAISO and by the Participating TO through use of a dedicated point-to-point data circuit(s) as indicated in Article 8.1.
- Telemetry to the CAISO shall be provided in accordance with the CAISO's technical standards for direct telemetry. For telemetry to the Participating TO, the communication protocol for the data circuit(s) shall be specified by the Participating TO. Instantaneous bi-directional real power and reactive power flow and any other required information must be telemetered directly to the location(s) specified by the Participating TO.
- Each Party will promptly advise the other Parties if it detects or otherwise learns of any metering, telemetry or communications equipment errors or malfunctions that require the attention and/or correction by another Party. The Party owning such equipment shall correct such error or malfunction as soon as reasonably feasible.
- 8.3 No Annexation.** Any and all equipment placed on the premises of a Party shall be and remain the property of the Party providing such equipment regardless of the mode and manner of annexation or attachment to real property, unless otherwise mutually agreed by the Parties.
- 8.4 Provision of Data from a Variable Energy Resource.** The Interconnection Customer whose Generating Facility is a Variable Energy Resource shall provide meteorological and forced outage data to the CAISO to the extent necessary for the CAISO's development and deployment of power production forecasts for that class of Variable Energy Resources. The Interconnection Customer with a Variable Energy Resource having wind as the energy source, at a minimum, will

be required to provide the CAISO with site-specific meteorological data including: temperature, wind speed, wind direction, and atmospheric pressure. The Interconnection Customer with a Variable Energy Resource having solar as the energy source, at a minimum, will be required to provide the CAISO with site-specific meteorological data including: temperature, atmospheric pressure, and irradiance. The CAISO and Interconnection Customer whose Generating Facility is a Variable Energy Resource shall mutually agree to any additional meteorological data that are required for the development and deployment of a power production forecast. The Interconnection Customer whose Generating Facility is a Variable Energy Resource also shall submit data to the CAISO regarding all forced outages to the extent necessary for the CAISO's development and deployment of power production forecasts for that class of Variable Energy Resources. The exact specifications of the meteorological and forced outage data to be provided by the Interconnection Customer to the CAISO, including the frequency and timing of data submittals, shall be made taking into account the size and configuration of the Variable Energy Resource, its characteristics, location, and its importance in maintaining generation resource adequacy and transmission system reliability in its area. All requirements for meteorological and forced outage data must be commensurate with the power production forecasting employed by the CAISO. Such requirements for meteorological and forced outage data are set forth in Appendix C, Interconnection Details, of this LGIA, as they may change from time to time.