PURPOSE

This document applies to wind Generators and describes technical standards that such wind Generators must satisfy to be qualified as a Participating Intermittent Resource (PIR) under the CAISO's Participating Intermittent Resource Program (PIRP). The requirements set forth herein apply to all applicable Eligible Intermittent Resources (EIR) whether pursuing initial or continuing PIR status.

Background

In 2008, the CAISO, in conjunction with AWS Truewind, documented for all wind Generators in PIRP during 2007 the relationship between forecast accuracy and site data availability.¹ The CAISO’s report concluded that the ability to develop an accurate real time production forecast for any particular wind Generator correlates to the availability of site specific and precise real time data. Other studies performed by other system operators have reached similar conclusions.² The CAISO subsequently evaluated the root cause of data unavailability.³ The root cause analysis identified power loss due to planned or forced outages and other equipment failure at the generating site as accounting for over 90% of the data unavailability during the study period. The requirements imposed on all PIRs, in part, implement the recommendations articulated in the root cause study.

Resource Eligibility

It is an ongoing and continuous obligation of PIRs to satisfy all criteria⁴ set forth in the Eligible Intermittent Resource Protocol at Appendix Q of the CAISO Tariff (EIRP).⁵ This document facilitates compliance by providing information on the following:

¹ (CAISO Website upon posting)
³ ERCOT(http://nodal.ercot.com/docs/pd/ems/pdf/wpforc/ems_wind_power_forecasting_req_b2_v3_0.doc)
⁴ NYISO Presentation/Anecdotally UWIG conference Oct 2, 2008
⁵ (CAISO Website)

¹ http://www.caiso.com/1fdb/1fdb6b0c5e170.pdf. EIRP Section 2.4.5 addresses the procedures associated with and consequences of the failure of a PIR to fully comply with the PIR's obligations under the CAISO Tariff or EIRP.

James Blatchford 11/25/2008  
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The form of the Letter of Intent to become a PIR (Appendix A) [EIRP Sec. 2.2.1(c)]
Data relevant to forecasting, including operational and meteorological data [EIRP Sec. 2.2.3 and 3.1]
Monitoring and communications requirements [EIRP Sec. 3.2]
Forecasting data equipment requirements [EIRP Sec. 2.2.3, 6, and 6.2]

Letter of Intent

The form Letter of Intent required by the EIRP is set forth as Appendix A hereto. The Letter of Intent includes the requirement that the proposed PIR submit, as Attachment A to the Letter of Intent, a copy of the California Energy Commissions’ Renewable Portfolio Standard (RPS) Certification identifying the facility as RPS eligible.

Physical Site Data

Wind power producers or their SCs must provide the CAISO with accurate information regarding the physical site location of the EIR before a forecast will be produced. The information must include (1) the location (latitude and longitude coordinates), and elevation each wind turbine hub height and (2) the location (latitude and longitude coordinates), and elevation of meteorological collection devices.

Meteorological and Production Data

As outlined in the EIRP, meteorological data must be provided to the CAISO via the Data Processing Gateway (DPG) for accurate power generation forecasting. In order to enhance the accuracy of the wind forecast, the wind speed and direction data must be provided from multiple turbines in addition to the data received from the meteorological towers within the footprint of a wind park.

The PIR must provide anemometer data from no less than one (1) turbine for every 5 turbines within the footprint of the park. The turbine providing the nacelle anemometer data will be located to represent the topology of the adjacent group of five (5) turbines. For example, if a wind farm has 5 turbines on a ridgeline a turbine that is least affected

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buy the wake effect of the other turbines would be designated to provide the nacelle anemometer information. Exception to this standard could be made if there were less than 5 units in the same area. If there were more than five (5) adjacent turbines, but less than ten (10), then two (2) turbines would be designated to provide nacelle anemometer information.

The turbines locations (latitude and longitude) must be sent to the CAISO. The latitude and longitude will be forwarded to the FSP with the identification of the associated anemometer data IDs. The wind speed and direction from this nacelle anemometer turbine will be identified and sent to the CAISO via DPG along with data received from the meteorological towers and MW production data.

It is understood that wind data collected at the nacelle anemometer will not represent the true wind value at a park but it will represent the apparent wind which can be correlated to the co-located turbines.

The need for this requirement is to a) ensure multiple data streams for anemometer information and b) ensure a more accurate representation of the data points to calculate wind energy production at the park.

The PIR must also install a minimum of two (2) meteorological stations with barometric pressure, temperature, wind speed and direction measured at the hub height for at least one met tower. The second tower will be used to measure the barometric pressure, temperature, wind speed and direction at a point 30 meters below the average hub height the location of the towers shall be near the centroid of the park in an area that will not be influenced by turbine wake effects.

In addition, each meteorological station must have a backup power source that is independent of the primary power source for the station.

The FSP requires production and meteorological data will be collected for a minimum of sixty (60) days before the PV or ST EIR is considered in the PIRP. This data must be collected in advance in order to train the forecast models (e.g. artificial neural networks) responsible for producing the power production (MW) forecast for each site.

Table 1 details the units and precision of measurements to be sent to the CAISO.
### Maintenance & Calibration

The meteorological towers sending telemetered information to CAISO must be calibrated annually to National Institute of Standards and Technology ("NIST") standards.

### Outage Data

If a PIR is reducing its production from its stated maximum production value (pMax) by more than one (1) MW, it is the responsibility of the PIR (or its Scheduling Coordinator) to provide the CAISO with plant outage information via the CAISO’s Scheduling Logging for the ISO of California (SLIC) reporting system. This data is needed to ensure the energy forecast does not exceed the plant’s reported derated capability and to ensure an accurate forecast.

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<th>Measurement</th>
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<th>Precision</th>
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<td>Wind Direction</td>
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<tr>
<td>Ambient Air Temperature</td>
<td>Degrees Centigrade (°C)</td>
<td>1 degree C</td>
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<tr>
<td>Barometric Pressure</td>
<td>HectoPascals (HPa)</td>
<td>60 Pa</td>
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<tr>
<td>Aggregate Resource Generation</td>
<td>Mega-Watts (MW)</td>
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Appendix A
FORM OF LETTER OF INTENT TO BECOME
PARTICIPATING INTERMITTENT RESOURCE

[Entity Letterhead]

[Date]

Attn: Project Manager, Model and Contract Implementation
California Independent System Operator Corporation
151 Blue Ravine Road
Folsom, CA 95630

Re: Intent to become a Participating Intermittent Resource

In accordance with Section 2.2.1 of the California Independent System Operator Corporation’s (“CAISO”) Eligible Intermittent Resource Protocol (the “Protocol”), this letter provides [name of Entity]’s notice to the CAISO that it intends to become a Participating Intermittent Resource (the “Letter of Intent”).

[Name of Entity] requests that the CAISO initiate the process of certifying its facilities known as [project name] as a Participating Intermittent Resource. [Name of Entity] agrees that, prior to the date of such certification, it will execute a Participating Generator Agreement and a Meter Service Agreement for ISO Metered Entities as required by Section 2.2.1 of the Protocol and thereafter will pay the Forecast Fee as required by Section 2.4.1 of the Protocol.

Further, [name of Entity] agrees that [project name] will remain a Participating Intermittent Resource for a period of at least [insert number of years greater than or equal to one] year(s) following the date of its certification, over which time the maximum Forecast Fee shall be as specified in Schedule 4 of CAISO Tariff Appendix F in effect as of the date of this Letter of Intent, and that [project name] shall thereafter continue to be a Participating Intermittent Resource unless this Letter of Intent is cancelled with thirty (30) days written notice to the CAISO.

Finally, attached to this Letter of Intent as Attachment A is a copy of the California Energy Commissions’ Renewable Portfolio Standard (RPS) Certification identifying [name of facility] as RPS eligible.

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Sincerely,

[Name of Entity]

[Name and title of person with authority to sign commitments for Entity]

**APPROVAL**

<table>
<thead>
<tr>
<th>Approved By</th>
<th>Signature</th>
<th>Date</th>
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<tr>
<td>Jim Blatchford</td>
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