



## Wind Lost Opportunity Cost Eligibility

### Problem / Opportunity Statement

Requirements for wind resources to be eligible for Lost Opportunity Cost credits are described in various PJM Manuals, but these requirements ought to be explicitly listed in the PJM Tariff. A PJMTariff revision is required to align compensation with existing requirements within PJM manuals. Aligning tariff and manuals will result in increased reliability and market efficiency.

On June 1, 2012, Section 5.2.6 of [PJM Manual 28](#), Operating Agreement Accounting, was updated to incorporate details on lost opportunity cost credit calculation for wind units per FERC Docket #ER12-1422. Section 5.2.6, Credits for Resources Reduced or Suspended due to a Transmission Constraint or for Other Reliability Reasons, states:

“Pool-scheduled or self-scheduled wind generators are only eligible for the above-referenced credit if they:

- Operated the resource according to PJM Manual requirements for wind resources”

Requirements for wind resources are described in various places in the PJM Tariff and Manuals:

1. [PJM OATT](#), Schedule H, Interconnection Requirements for a Wind Generation Facility:

iii. Supervisory Control and Data Acquisition (SCADA) Capability

The wind generation facility shall provide SCADA capability to transmit data and receive instructions from the Transmission Provider to protect system reliability. The Transmission Provider and the wind generation facility Interconnection Customer shall determine what SCADA information is essential for the proposed wind generation facility, taking into account the size of the facility and its characteristics, location, and importance in maintaining generation resource adequacy and transmission system reliability in its area.

2. [PJM Manual M14D](#) - Generator Operational Requirements, Section 8: Wind Farms Requirements:

8.2.2 Aggregate Real Time Output

The Wind Farms are required to provide the real time aggregate Wind Farm MW output along with other data points. This output should be telemetered at low-side net and high side-net of the Wind Farm.

8.2.3 Real Time Meteorological Tower (or mutually agreed upon alternative source)

Each wind farm must install at least one meteorological tower (or wind speed and direction from selected turbines’ anemometer and wind vane) in the farm and provide real time meteorological data to PJM though ICCP or DNP 3.0, Level 2 link.

The meteorological data shall include the following parameters:

Parameter	Units	
Wind Speed	meters/second	Required
Wind Direction	Degree from True North	Required
Temperature	Fahrenheit	Preferred
Pressure	Hectopascals	Preferred



3. [PJM Manual M14D](#) - Generator Operational Requirements, Attachment L – Wind Farm Communications Model

Manual dispatch directives to multiple wind owners delay controlling actions resulting in less efficient market operations and a potential adverse impact to system reliability. Manual dispatch to a subset of owners at a common Wind Farm may result in customers questioning curtailments and additional administrative procedures to ensure fair/equitable reductions to an aggregate plant on a rotating basis. A single SCED basepoint for a Wind Farm to a single MOC Generation System Operator is an effective solution to ensure efficient and reliable operations.

The purpose of this section is to define a dependable real-time communications model to manage wind, ensuring:

1. A single MOC Generation System Operator (single operational contact) for the processing of all real-time dispatch electronic signals and operational issues.
2. Accurate outage data, which is essential for an accurate Wind Power Forecast
3. Prompt wind power reduction via the mandatory use of the “Curtailment Indicator,” which typically would occur as a last resort just prior to emergency procedures.

4. [PJM OATT](#), Part IV, Interconnections with the Transmission System, Section 36.1.1, Interconnection Services for Generation:

Consistent with Section 1.7.4(i) of Schedule 1 to the Operating Agreement, to the extent its generating facility is dispatchable, an Interconnection Customer shall submit an Economic Minimum in the real-time market that is no greater than the higher of its physical operating minimum or its Capacity Interconnection Rights.

### Related Discussions from the RLGCTF

At its February 17, 2012 meeting, PJM’s Market Implementation Committee (“MIC”) approved the creation of the Reliability Limited Generator Compensation Task Force (“RLGCTF”) to examine and address the issue of generator compensation due to transmission system stability restrictions. The responsibilities of the RLGCTF were to (i) educate stakeholders on when stability limitations could cause generating unit output to be limited and (ii) consider whether revisions should be made with the Tariff, Operating Agreement, and PJM Manuals to modify the amount of compensation due to Market Sellers.

After consideration of several proposals, the RLGCTF ultimately determined that it would propose to the Markets and Reliability Committee (“MRC”) and the Members Committee (“MC”) that the Tariff and Operating Agreement be revised to limit the level of LOC that Market Sellers should be compensated to the lesser of the Economic Maximum or Maximum Facility Output of the generating unit. The proposed revisions to the Tariff and Operating Agreement to incorporate these changes were endorsed by the MRC at its January 31, 2013 meeting, by acclamation with two objections and one abstention. The MC, at its meeting held on February 28, 2013, endorsed PJM’s proposed revisions to the Tariff and approved the revisions to the Operating Agreement by acclamation, with one objection and one abstention.

On March 29, 2013, PJM Interconnection, L.L.C. (PJM) filed revisions to Attachment K-Appendix of the PJM Open Access Transmission Tariff (Tariff) and Schedule 1 of the Amended and Restated PJM Operating Agreement (Operating Agreement). The proposed change to Schedule 1 adding Section 3.1.1 is shown below:

“Section 3.1.1 of Schedule 1, Accounting and Billing, Operating Reserves

3.1.1 Settlements.



## Problem Statement / Issue Charge

The Office of the Interconnection shall calculate energy prices, charges, credits, LMP, opportunity costs and all other costs as prescribed by the Tariff, Operating Agreement, RAA or other applicable Commission-accepted agreement. As a general matter, resources must operate pursuant to the applicable requirements of the Tariff, Operating Agreement and PJM Manuals, and in particular within reliability limits and in compliance with dispatch instructions, as determined by the Office of the Interconnection, to be eligible to receive the full entitlement of all potential sources of revenue for their output of energy or the reduction thereof at the direction of the Office of the Interconnection.”

In a [letter order](#) dated 5/29/2013, FERC approved parts of PJM’s filing but rejected PJM’s proposed section 3.1.1, stating:

“We find that this provision as drafted fails to give market sellers adequate notice because PJM has failed to provide any detail or tariff language describing the specific circumstances under which compensation would be reduced or how the compensation would be reduced. Furthermore, PJM has not shown that it is just and reasonable for PJM to have the discretion to reset compensation levels retroactively when neither the particular circumstances that would trigger PJM’s actions nor the financial consequences are specified in the tariff.”

In light of this finding by FERC, PJM believes that it is necessary to state specifically in the tariff the PJM requirements which must be satisfied in order for a wind generator to be eligible for lost opportunity credits, per PJM Manual M28, Section 5.2.6.

### Issue Source

PJM

### Stakeholder Group Assignment

Markets and Reliability Committee – because this issue is tightly bound and straightforward, consideration of a proposed solution will be considered at the initiation of the issue in accordance with section 11.2 of PJM Manual 34, PJM Stakeholder Process

### Key Work Activities

Review, vet and endorse proposed Tariff and Operating Agreement revisions.

### Expected Deliverables

Proposed Tariff and Operating Agreement revisions

### Expected Overall Duration of Work

Two months

### Decision-making Method

Tier one, or consensus on a single proposal is preferred



**Proposed Solution**

PJM Tariff, Section 3.2.3(f-4) of Schedule 1, Accounting and Billing, Operating Reserves, LOC for Wind is proposed to be updated as shown below.

**3.2.3 Operating Reserves.**

(f-4) A Market Seller’s wind generating unit that is pool-scheduled or self-scheduled, has SCADA capability to transmit and receive instructions from the Office of the Interconnection, has provided data and established processes to follow PJM basepoints pursuant to the requirements for wind generating units as further detailed in this Agreement, the Tariff and the PJM Manuals, and which is operating as requested by the Office of the Interconnection, the output of which is reduced or suspended at the request of the Office of the Interconnection due to a transmission constraint or other reliability issue, and for which the hourly integrated, real-time LMP at the unit’s bus is higher than the unit’s offer corresponding to the level of output requested by the Office of the Interconnection (as indicated either by the desired MWs of output from the unit determined by PJM’s unit dispatch system or as directed by the PJM dispatcher through a manual override), shall be credited hourly in an amount equal to  $\{(LMP_{DMW} - AG) \times (URTLMP - UB)\}$ , where:

LMP<sub>DMW</sub> equals the lesser of the PJM forecasted output for the unit or level of output for the unit determined according to the point on the scheduled offer curve on which the unit was operating corresponding to the hourly integrated real time LMP, and shall be limited to the lesser of the unit’s Economic Maximum or the unit’s Maximum Facility Output;

AG equals the actual hourly integrated output of the unit;

URTLMP equals the real time LMP at the unit’s bus;

UB equals the unit offer for that unit for which output is reduced or suspended, determined according to the real-time scheduled offer curve on which the unit was operating, unless such schedule was a price-based schedule and the offer associated with that price schedule is less than the cost-based offer provided for the unit, in which case the offer for the unit will be determined from the cost-based schedule; and

where  $URTLMP - UB$  shall not be negative.

In the event the Office of the Interconnection experiences a technical problem or malfunction with its wind forecasting tool that results in an erroneous forecast for a wind resource during a period of time for which the wind resource is eligible for lost opportunity cost, the Office of the Interconnection and the Market Seller will attempt to reach a mutually agreeable forecast value for settlement purposes. If the Office of the Interconnection and the Market Seller do not come to mutual agreement on an acceptable forecast value, the Office of the Interconnection shall utilize the forecast value that it determines is appropriate.