Generation Interconnection
PJM Combined Feasibility/Impact Study
and
APS Feasibility Study Report

For

PJM Generation Interconnection Request Queue Position W1-012

Millheim-Brush Junction46kV

PJM DOCS No. 603533 v1
July, 2010

Overview

Iberdrola Renewable Energies USA has submitted an Attachment N to propose the interconnection of 25 wind turbine generators for the purpose of selling up to 50 MW energy and 6.5 MW of Capacity into the PJM market. The Commercial Operation date for this project was requested to be December 31, 2013. The analysis was perfumed using a base year of 2014.

Since this project is FERC non-jurisdictional, this report will present a combined feasibility/impact study prepared by PJM, followed by a feasibility study prepared by the Transmission Owner, APS.

PJM Combined Feasibility/Impact Study Report

Network Impacts

Queue project W1-012 was studied as a 50.0MW (6.5MW of which is Capacity) injection into APS's system at the Brush J 46kV substation. Project W1-012 was evaluated for compliance with reliability criteria for summer peak conditions in 2014. Potential network impacts were as follows:

Generator Deliverability
(Single or N-1 contingencies for the Capacity portion only of the interconnection)

No problems identified.

Multiple Facility Contingency
(Double Circuit Tower Line Contingencies only with full energy output. Stuck Breaker and Bus Fault contingencies will be applied during the Impact Study)

No problems identified.

Contribution to Previously Identified Overloads
(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have % allocation of cost responsibility which will be calculated and reported for the Impact Study.)

No problems identified.

New System Reinforcements
(Upgrades required to mitigate reliability criteria violations, i.e. "Network Impacts", initially caused by the addition of this project generation)

None.

Contribution to Previously Identified System Reinforcements
(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

None.

Short Circuit

For W1-012, no initial short circuit analysis needs to be performed by PJM since the project is connected to less than 69 kV (sub transmission)

Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of the surrounding generation. Any potential problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which analyzes all overload conditions associated with the overloaded element(s) identified. As a result of the aggregate energy resources in the area, the following violations were identified.

1. The LEWISTWN-JUNI BU2 230 kV line (from bus 200513 to bus 208005 ckt 1) loads from 88.45% to 92.1% (DC power flow) of its normal rating (488 MVA) for non-contingency condition. This project contributes approximately 17.81 MW to cause the thermal violation.

APS Feasibility Study Report

This feasibility study has been prepared for PJM queue project W1-012 (Iberdrola Renewable Energies USA) by Allegheny Power.

Injection onto the Millheim – Brush Jct. 46kV Line
Attachment Facilities and Related Network Upgrades

- Construct the Tollhouse 46kV switching SS. Grade and install access road for a fenced area of approximately 80' x 120'. Install ground grid, structures, foundations, and yard stone. Install 2-46kV initial bays, 3-1200A, 46kV breakers, 18-1200A, 46kV hookstick disconnect switches, 1-1200A, 46kV vertical break switch, 9-46kV VT's, 46kV station service, 46kV metering, 46kV arresters. Install a 16' x 28' metal control building, battery and charger, AC and DC panels, SCADA, telephone service, control cables and panels, transfer trip, and associated equipment. Loop the Millheim-Brush Jct 46kV line into the station. Connection to the IC shall be an overhead 46kV line. A fiber optic link is required between the new Tollhouse SS and the IC. Note: All property associated with this station must be obtained by the IC and conveyed to AP, at no cost, in the form of either a perpetual lease or direct ownership. All rights-of-way must be obtained by the IC and transferred, at no cost, to AP.
  Estimated Cost: $2,065,624 in 2013 dollars

- Install 46kV anti-islanding (transfer trip) facilities at Centre Hall Substation.
  Estimated Cost: $187,190 in 2013 dollars

- Install 46kV anti-islanding (transfer trip) facilities at Pleasant Gap Substation.
  Estimated Cost: $187,190 in 2013 dollars

The estimated project duration is **18 months** after the receipt of an executed Interconnection Agreement and Construction Agreement. Permitting issues may delay this estimated project duration.

While the information in this report is reasonable for the scope of work defined, it should, however, be noted that the cost figures are conceptual in nature at this stage, as an engineering team has not been assigned to the project. Obviously, any change to the scope of work will require that the estimates be revisited. The costs are a best estimate, but the IC will be charged for actual costs. Any under-runs or over-runs will be reconciled at the conclusion of the project. The estimates in this report do not include tax gross-up.

The IC will interconnect with the Allegheny Power (AP) system via overhead line from a customer owned substation located approximately 4 miles from the new switching station. The above cost estimates do not include construction of that line. Route selection, line design, rights-of-way acquisition and construction of such lines will be entirely the responsibility of the IC. It is assumed that the IC's main step up transformer will conform to the AP standard with delta on the low side and grounded wye on the high side as illustrated in the AP Engineering Manual:

http://www.alleghenypower.com/PowerQuality/Attachments/e1936_00.pdf.

Short Circuit

No breakers were identified as being over their maximum interrupting rating.

AP reserves the right to review the electrical protection design and relay settings for IC facilities to ensure that the protective relaying equipment will be compatible with that installed at the new switching station. The relaying package will likely include both primary and backup protection. AP personnel must be present at the time of commissioning to inspect and witness proper function of the control scheme and related coordination. The estimated cost to perform this engineering review and field test effort is **$5,000 in 2013 dollars**.

Note: The purchase and installation of protective relaying and associated equipment at the generation site is the responsibility of the IC and is not included in this scope of work.

It is assumed that a fiber optic interface will be used for the protection channel between the AP and IC stations. The IC will be required to install metering and telemetry equipment to provide revenue metering and real-time telemetry data to PJM. The requirements for this equipment are listed in Appendix 2, Section 8 of Attachment O to the PJM Tariff, as well as PJM Manuals 01 and 14D. Protective relaying and metering design and installation must comply with the AP applicable standards.

Overloads and Required Reinforcements

Delivery of Energy

1. The LEWISTWN-JUNI BU2 230 kV line (from bus 200513 to bus 208005 ckt 1) loads from 88.45% to 92.1% (DC power flow) of its normal rating (488 MVA) for non-contingency condition. This project contributes approximately 17.81 MW to cause the thermal violation. (Note: This is not an AP facility, it is part of the PJM network and is mentioned in the PJM portion of the report above)

Other Supporting Facilities Charge

The Other Supporting Facilities Charge (OSFC) may include non-transmission facilities directly assigned and/or a general (rolled-in) facilities charge. The guidelines apply to all wholesale customers and all generators selling into or through the PJM market, regardless of capacity, not connected directly to the AP Transmission System.

The Other Supporting Facilities Charge for the W1-012 generator interconnection project has been estimated to be **$27,000/month** in 2010 dollars. The estimate is based on an average (or rolled-in) rate for West Penn's sub-transmission system.

Single Line Diagram