Generation Interconnection
Feasibility Study Report
Queue Position V3-027

General

The Interconnection Customer (IC), has proposed a 200 MW (26 MW capacity) wind powered generating facility to be located in Randolph and Webster Counties, West Virginia. V3-027 was studied as a 200 MW (26 MW of which was capacity) injection into the Allegheny Power System and evaluated for compliance with reliability criteria for summer peak conditions in 2014. The current in-service date for the project is December 1, 2013.

Point of Interconnection (POI)

V3-027 will interconnect with the Allegheny Power (AP) at either the existing Pickens 138kV substation (primary option) or the existing Monterville 138kV substation (secondary option).

Primary POI Option

V3-027 will interconnect with the AP transmission system as a direct connection into the existing Pickens 138kV substation.

Direct Connection Requirements

Transmission Owner Scope of Direct Connection Work

The Transmission Owner's (AP) scope of work includes:

Attachment Facilities

Pickens 138kV substation

- Install a 138kV line terminal with one (1) 138kV breaker, three (3) 138kV disconnect switches, 138kV steel structures, one (1) 138kV deadend structure, 138kV metering, line traps, and CVTs. Install control cables, panels, transfer trip, and associated equipment. Preliminary engineering review has found that no expansion of Pickens substation will be required to accommodate this interconnection, however a detailed design has not yet been completed. Assume connection to the Interconnection Customer (IC) is by overhead 138kV line. The IC is required to install OPGW cable between the Pickens substation and the V3-027 interconnection substation.

The estimated cost to perform this work is **$844,984** in 2012 dollars.

Allegheny Power reserves the right to review the electrical protection design and relay settings for the Interconnecting Customer 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. Allegheny Power personnel must be present at the time of commissioning to witness proper function of the protection scheme and related coordination. The estimated cost to perform this engineering review and field test effort is **$10,000 in 2012 dollars**.

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

Interconnection Customer Scope of Direct Connection Work

The Interconnection Customer will interconnect V3-027 with the APS system by constructing a customer owned 138kV circuit from their generating site to the Pickens 138kV switching station . The above cost estimates do not include construction of that line or bus work. Route selection, line design, right-of-way acquisition and construction of such lines will be entirely the responsibility of the Interconnection Customer. It's assumed that the Interconnection Customer's 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 Facility Connection Manual.

It is assumed that a fiber optic interface will be used for the protection channel between the AP and IC's station. 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 Allegheny Power Applicable Standards.

Cost and Timing Summary

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

> The estimated time to provide for the interconnection of this project is **15 months** after the receipt of a fully executed Interconnection Service Agreement and Interconnection Construction Service Agreement.

Network Impacts

Potential network impacts are as follows:

Generator Deliverability

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

None

Multiple Facility Contingency

*(Double Circuit Tower Line, Line with Failed Breaker and, Bus Fault contingencies for the **Full** energy output.*

None

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

None

Short Circuit

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's generation)

None

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project.

None

Potential Congestion due to Local Energy Deliverability (Delivery of Energy)

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 below. There is no guarantee of full deliverability 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 identified overloaded element(s). As a result of the aggregate energy resources in the area, the following violations were identified:

These are not required network upgrades.

1. The 01FRNCHC-01BUCKHN 138kV line (from bus 235332 to bus 235307 ckt 1) loads from 72.43% to 135.88% (DC power flow) of its emergency rating (191 MVA) for the operational contingency (AP_B2_546) as a result of V3-027. This project contributes approximately 121.3 MW to cause this thermal violation.

Stability Analysis

Will be completed during the V3-027 System Impact Study.

Secondary POI Option

V3-027 will interconnect with the AP transmission system as a direct connection into the existing Monterville 138kV substation.

Network Impacts

Potential network impacts are as follows:

Generator Deliverability

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

None

Multiple Facility Contingency

*(Double Circuit Tower Line, Line with Failed Breaker and, Bus Fault contingencies for the **Full** energy output.*

None

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

None

Short Circuit

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's generation)

None

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project.

None

Potential Congestion due to Local Energy Deliverability (Delivery of Energy)

These are not required network upgrades.

1. The U4-002 TAP - 01PICKEN 138kV line (from bus 291894 to bus 235387 ckt 1) loads from 50.78% to 164.42% (DC power flow) of its normal rating (176 MVA) for non-contingency conditions as a result of V3-027. This project contributes approximately 200 MW to cause this thermal violation.

2. The 01FRNCHC - 01BUCKHN 138kV line (from bus 235332 to bus 235307 ckt 1) loads from 72.42% to 135.88% (DC power flow) of its emergency rating (191 MVA) for the operational contingency (AP_B2_546) as a result of V3-027. This project contributes approximately 121.3 MW to cause this thermal violation.

3. The 01MONTRV - U4-002 TAP 138kV line (from bus 235373 to bus 291894 ckt 1) loads from -6.03% to 107.61% (DC power flow) of its normal rating (176 MVA) for non-contingency conditions as a result of V3-027. This project contributes approximately 200 MW to cause this thermal violation.

Stability Analysis

Will be completed during the V3-027 System Impact Study.