U2-055 Karthaus-Milesburg 230kV
Generation Interconnection

General

The Interconnection Customer has proposed an 89.1 MWE wind power generating facility to be located near Snowshoe, Union Township, Centre County, Pennsylvania. The project was evaluated for compliance with reliability criteria for summer peak conditions in 2012. The planned in service date of the project is July 1, 2012.

Point of Interconnection

U2-055 will interconnect with the AP transmission system at the future Uzzell Road 230kV substation adjacent to the existing Milesburg-Moshannon 230kV circuit. U2-055 was studied as an 89.1 MW injection into the AP system at the Karthaus-Milesburg 230kV circuit.

Direct Connection Requirements

Transmission Owner Scope of Direct Connection Work

The Transmission Owner's (Allegheny Power) scope of work for the direct connection facility includes:

- Obtain property at no cost to AP and cut the existing Milesburg-Moshannon 230V line. Construct a one (1) span 230kV line loop into the proposed 230kV Uzzell Road substation.
  Estimated Cost: $210,000 in 2010 dollars

- Uzzell Road 230kV substation. Substation property and permitting to be obtained by the developer at no cost to AP. Grade the site, install fence, ground grid, yard stone, and access roads. Construct a 230kV breaker station in a ring bus configuration consisting of: three (3) 230kV breakers, 230kV metering, seven (7) 230kV disconnect switches, three (3) 230kV deadend structures, 230kV power VT for station service, metal control building, control cables, panels and equipment, SCADA, telephone service, and associated facilities.
  Estimated Cost: $3,000,000 in 2010 dollars

- Install facilities for transfer trip at Milesburg 230kV substation. Install 230kV line trap, CVT, transfer trip panel and associated equipment.
  Estimated Cost: $200,000 in 2010 dollars

- Install facilities for transfer trip at Moshannon 230kV substation. Install 230kV line trap, CVT, transfer trip panel and associated equipment.
  Estimated Cost: $200,000 in 2010 dollars

Interconnection Customer Scope of Direct Connection Work

The Interconnection Customer (IC) has assumed full responsibility for the design and construction of all facilities associated with the U2-055 generating facility and the 230kV direct connection line on the IC side of the POI. The IC will interconnect U2-055 with the AP system by constructing a customer-owned 230kV circuit from the generating station site to AP's Uzzell Road 230kV substation. Route selection, line design, right-of-way acquisition and construction of such lines will be entirely the responsibility of the IC. Cost estimates do not include construction of that line. It is assumed that the ICs step up transformer will conform to the AP standard of delta on the low side and grounded wye on the high side. It is further assumed that a fiber optic interface will be used for the protection channel between the AP and developer's 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 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 that the cost figures are conceptual in nature at this stage and that an engineering team has not yet 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 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, land acquisition, or any network upgrades which may have been identified and required by this project.

The estimated time to provide for the interconnection of this project is **24 months** after the receipt of a signed Interconnection Service Agreement and Construction Service Agreement.

Network Impacts

Potential network impacts are as follows:

Generator Deliverability

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

None

Multiple Facility Contingency

*(Double Circuit Tower Line contingencies only for the **full energy** output. Stuck breaker and bus fault contingencies will be performed for the System Impact Study)*

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)

1. The SHELOCTA-KEYSTONE 230kV PENELEC line (from bus 505 to bus 521 circuit 1) loads from 118.23% to 119.45% (DC power flow) of its emergency rating (841MVA) for the tower line outage (83). This project contributes approximately 10.4MW to the thermal violation.

Short Circuit

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

Stability and Reactive Power Requirements

Will be performed during the Queue U2-055 System Impact Study.

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 System Impact Study)

1. To mitigate the SHELOCTA-KEYSTONE 230kV (PENELEC) overload would require the replacement of a disconnect switch at the Shelocta Substation (estimated to cost $100,000) and a disconnect switch (estimated to cost $100,000) and two CT circuits (estimated to cost $280,000) at the Keystone Substation. Further upgrades would require the upgrade/reconductor of 2.26 miles of transmission line (estimated to cost $1,356,000).

Delivery of Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request with all earlier queues at their energy output and the system at peak load with all transmission facilities in service. Any problems identified below may result in operational restrictions to the project under study or other PJM generation. There may also be other conditions causing congestion which were not studied. The developer can proceed with network upgrades to eliminate the potential congestion at their discretion by submitting a Merchant Transmission Interconnection request now or in the future. ***These are not required reliability upgrades.***

As a result of the aggregate energy resources in the area, the following potential congestion was identified:

1. The #00C-E.TWANDA 230kV (PENELEC) line (from bus 92303 to bus 382 ckt 1) loads from 106.6% to 109.4% (DC power flow) of its normal rating (488 MVA) for non-contingency condition. This project contributes approximately 13.7 MW to the thermal congestion.

2. The #00C-E.TWANDA 230kV (PENELEC) line (from bus 92303 to bus 382 ckt 1) loads from 112.6% to 116.8% (DC power flow) of its emergency rating (554 MVA) for the single line contingency outage (PN27). This project contributes approximately 23.4 MW to the thermal congestion.

3. The SHADE GP-ROXBURY 115kV (PENELEC) line (from bus 223 to bus 221 ckt 1) loads from 109.2% to 115.4% (DC power flow) of its emergency rating (150 MVA) for the single line contingency outage (PN29_WITH_S44OPT1B). This project contributes approximately 9.2 MW to the thermal congestion.

4. The 01SHINGL-LEWISTWN 230kV **(**AP/PENELEC) line (from bus 20248 to bus 214 ckt 1) loads from 112.3% to 120.7% (DC power flow) of its emergency rating (505 MVA) for the single line contingency outage (GROVER_TWANDA_B). This project contributes approximately 42.6 MW to the thermal congestion. To mitigate the AP portion of this overload would require the upgrade of the line trap and terminal equipment at the Lewistown terminal in the Shingletown substation. The estimated cost to perform this work is **$91,000** and will take **12 months** to complete after the receipt of a signed Interconnection Service Agreement and Construction Service Agreement.

5. The HOMER CT-SHELOCTA 230kV (PENELEC) line (from bus 477 to bus 505 ckt 1) loads from 155.7% to 156.7% (DC power flow) of its emergency rating (854 MVA) for the single line contingency outage (PN33A). This project contributes approximately 8.4 MW to the thermal congestion.

6. The 01ELKO-01ELKO 230/138kV (AP) transformer (from bus 20175 to bus 20174 ckt 1) loads from 97.1% to 101.5% (DC power flow) of its emergency rating (262 MVA) for the single line contingency outage (APS-SB-186). This project contributes approximately 11.6 MW to the thermal congestion. To mitigate this overload would require the upgrade of the 230-138kV transformer at Elko substation to a 210/280/350 (392) MVA unit and replace the 138kV transformer breaker. The estimated cost to perform this work is **$5,800,000** and will take **18 months** to complete after the receipt of a signed Interconnection Service Agreement and Construction Service Agreement.

7. The S44COP1-JUNIATA 230kV (PENELEC/PL) line (from bus 90679 to bus 3069 ckt 1) loads from 122.0% to 126.8% (DC power flow) of its emergency rating (617 MVA) for the single line contingency outage (GROVER_TWANDA_B). This project contributes approximately 29.8 MW to the thermal congestion.