U2-032 Elbow Mountain
Generation Interconnection

General

The Interconnection Customer has proposed a 20 MWE wind power generating facility to be located in the Elbow area of Garrett County, Maryland. The project was evaluated for compliance with reliability criteria for summer peak conditions in 2012. The planned in service date of the project is December, 2010.

U2-032 will interconnect with the Allegheny Power (AP) transmission system at either the future Elbow Mountain 138kV substation (Option 1) or at the future Elbow Mountain 500kV substation (Option 2).

Option 1

Point of Interconnection

U2-032 option 1 will interconnect with the AP transmission system at the future Elbow Mountain 138kV substation adjacent to the existing Garrett-Ridgeley 138kV circuit. Option 1 was studied as a 20 MW injection into the AP system at the Savage 138kV substation.

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 Garrett-Ridgeley 138kV line. Construct one (1) span (0.1 mile) 954 ACSR 138kV line loop into the proposed 138kV Elbow Mountain substation.

  Estimated Cost: $210,000 in 2010 dollars

- Elbow Mountain 138kV 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 138kV breaker station in a ring bus configuration consisting of: three (3) 138kV breakers, 138kV metering, seven (7) 138kV disconnect switches, three (3) 138kV deadend structures, 138kV power VT for station service, metal control building, control cables, panels and equipment, SCADA, telephone service, and associated facilities.

  Estimated Cost: $2,900,000 in 2010 dollars

- Install facilities for transfer trip at Garrett 138kV substation. Install 138kV line trap, CVT, transfer trip panel and associated equipment.

  Estimated Cost: $180,000 in 2010 dollars

- Install facilities for transfer trip at Ridgeley 138kV substation. Install 138kV line trap, CVT, transfer trip panel and associated equipment.

  Estimated Cost: $180,000 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 U2-032 generating facility and the 138kV direct connection line on the IC side of the POI. The IC will interconnect U2-032 with the AP system by constructing a customer-owned 138kV circuit from the generating station site to AP's Elbow Mountain 138kV 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)

None

Short Circuit

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

Stability and Reactive Power Requirements

Will be performed during the Queue U2-032 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)

None

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 S14C-01RIDGLY 138kV line loads from 116.8% to 124.7% (DC power flow) of its emergency rating (193 MVA) for the single line contingency outage (APS-SB-79A). This project contributes approximately 15.3 MW to the thermal congestion. To mitigate this overload would require the reconductor of 4 miles of circuit from 556 ACSR to 954 ACSR. The estimated cost to perform this work is **$1,540,000** and will take **24 months** to complete after the receipt of a signed Interconnection Service Agreement and Construction Service Agreement.

2. The SAVAGE-01CARLOS 138kV line loads from 102.4% to 110.4% (DC power flow) of its emergency rating (201 MVA) for the single line contingency outage (APS-SB-79A). This project contributes approximately 16.1 MW to the thermal congestion. To mitigate this overload would require the reconductor of 2.19 miles of circuit from 556 ACSR to 954 ACSR. The estimated cost to perform this work is **$775,000** and will take **18 months** to complete after the receipt of a signed Interconnection Service Agreement and Construction Service Agreement.

Option 2

Point of Interconnection

U2-032 option 2 will interconnect with the Allegheny Power transmission system at the future Elbow Mountain 500kV substation adjacent to the existing Hatfield-Black Oak 500kV circuit. Option 2 was studied as a 20 MW injection into the AP system at the Hatfield-Black Oak 500kV line.

Direct Connection Requirements

Transmission Owner Scope of Direct Connection Work

The Transmission Owner's scope of work for the direct connection facility includes:

- Obtain property at no cost to AP and cut the existing Hatfield-Black Oak 500kV line approximately 12.5 miles from Black Oak substation. Construct one (1) span (0.1 mile) 500kV line loop into the proposed 500kV Elbow Mountain substation.

  Estimated Cost: $1,500,000 in 2010 dollars

- Elbow Mountain 500kV 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 500kV breaker station in a ring bus configuration consisting of three (3) 500kV breakers, 500kV metering, seven (7) 500kV disconnect switches, three (3) 500kV deadend structures, 500kV power VT for station service, metal control building, control cables, panels and equipment, SCADA, telephone service, and associated facilities.

Estimated Cost: $13,500,000 in 2010 dollars

- Hatfield 500 kV substation. Install facilities for transfer trip.

Estimated Cost: $300,000 in 2010 dollars

- Black Oak 500kV substation. Install facilities for transfer trip.

Estimated Cost: $300,000 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 U2-032 generating facility and the 500kV direct connection line on the IC side of the POI. The IC will interconnect U2-032 with the AP system by constructing a customer-owned 500kV circuit from the generating station site to AP's new Elbow Mountain 500kV 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 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 **30 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 **full energy** output of the interconnection request)*

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)

None

Short Circuit

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

Stability and Reactive Power Requirements

Will be performed during the Queue U2-032 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)

None

Delivery of Energy Portion of Interconnection Request

(PJM also studied the delivery of the energy portion of this Interconnection Request. Any 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 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 shall study all overload conditions associated with the overloaded element(s) identified.

None