T155 Belknap 25kV
Generation Interconnection

General

The Interconnection Customer, has proposed a 6 MW hydro power generating facility be located at the Mahoning Creek Dam, in Wayne Township, Armstrong County, Pennsylvania. The project will interconnect with the Allegheny Power (AP) distribution system. It was studied as a 6 MW injection at the Kittaning 138kV substation and evaluated for compliance with reliability criteria for summer peak conditions in 2012. The Interconnection Customer has proposed a June 2010 in service date.

Point of Interconnection: The Point of Interconnection (POI) for T155 will be the existing AP Belknap 25kV substation located in the Kittanning Service Center area. The substation will be expanded to accommodate the project.

Direct Connection Requirements

Transmission Owner Scope of Direct Connection Work

The scope of work and estimated costs for the direct connection facilities is as follows:

Belknap Substation

Expand the existing AP Belknap 25kV substation to provide a service point for T155. Belknap is an automatic transfer switching station with its normal feed from the radial Kittanning – Rural Valley N 25kV line. This line originates in the Kittanning substation. For loss of the normal feed, Belknap transfers to the backup feed. The backup feed is the Templeton – Burma 25kV line.

Major equipment to be added to the existing substation will include:

- (2) 25kV steel bays
- 25kV bus
- (1) 25kV circuit breaker
- 25kV hook stick disconnect switches
- (1) 25kV group operated vertical break switch
- 25kV interconnection metering

A dual transfer trip scheme requiring the addition of CVT's and line traps is included. The substation will also include a control building which will house all protective relaying, metering and all communications equipment, including SCADA RTU facilities. Revenue metering will be located on the feed to the generator. Site preparation including grading and an access road is included.

The estimated cost to perform this work is **$904,000** in 2010 dollars.

Kittanning Substation

- Install dual transfer trip on the Belknap 25kV terminal.
  The estimated cost to perform this work is **$170,000** in 2010 dollars.

Burma Substation

- Install dual transfer trip on the Belknap 25kV terminal.
  The estimated cost to perform this work is **$170,000** in 2010 dollars.

Templeton substation

- Install dual transfer trip on the Belknap 25kV terminal.
  The estimated cost to perform the work is **$170,000** in 2010 dollars.

Interconnection Customer Scope of Direct Connection Work

The Interconnection Customer's (IC) generating station will be remote from the AP Belknap substation and interconnection is assumed to be an underground line. Note that the figures above do not include construction of the line required to connect the IC's proposed new generating facility with the Allegheny Power Belknap substation. Route selection, line design, right-of-way acquisition and construction of such lines will be entirely the responsibility of the IC. No upgrades to the AP system have been identified with this project. The assumption is made that the IC's step up transformer will conform to AP standards with delta on the low side and grounded wye on the high side.

While we can't mandate that our personnel install protective relaying and communications equipment at the generator site, Allegheny Power has responsibility for designing the protection scheme and providing specifications for all relays to be employed on the interconnection breaker terminal at the generation site to assure that the protective relaying equipment will be compatible with that installed on the interconnection breaker terminal at the new switching station. The relaying package will likely include both primary and backup protection. Allegheny Power is also responsible for testing and calibrating all relays and performing all tests to assure that relaying at the generator site is properly installed and functional.

The estimated total cost of this engineering and field test effort is **$5,000 in 2010 dollars**.

Note: Purchase and installation of protective relaying and associated equipment at the generation site is not included in this scope of work. This phase of work is the responsibility of the customer.

The estimated cost for Allegheny Power Controls Engineering to complete a coordination review of the area, develop new relay settings, and implement the required changes is approximately **$5,000 in 2010 dollars**.

The Interconnection Customer 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

The estimated time to provide for the interconnection of this project is **23 months** after the receipt of a signed Interconnection Service Agreement and Construction Service Agreement.

The estimates in this report do not include tax gross-up.

While the information in this transmittal 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 developer will be charged for actual costs. Any under-runs or over-runs will be reconciled at the conclusion of the project.

Other Supporting Facility Charge

The Other Supporting Facilities Charges 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 T155 generator interconnection project has been estimated to be **$3,240/month in 2010 dollars**. The estimate is based on an average (or rolled-in) rate for AP's sub-transmission system, which may or may not reflect the charge determined under a direct assignment methodology for radial facilities.

Network Impacts

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only 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

Short Circuit

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

Listed below are the positive and zero sequence source equivalent impedance at the existing Belknap 25 kV substation with the line, GSU, and generators OPEN.

Positive: (0.99303+j2.30315)
Zero: (1.84972+j9.65704)

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

Stability and Reactive Power Requirements

Will be performed during the Queue T155 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