

***Generation Interconnection  
Combined Feasibility/System Impact  
Study Report***

***For***

***PJM Generation Interconnection Request  
Queue Position V3-062***

***McConnellsburg-Guilford 138kV***

**January 2010**

## **Preface**

The intent of the Combined Feasibility/System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: Network or Local Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM or Interconnected Transmission Owner system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate Interconnected Transmission Owner.

In some instances an Interconnection Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, may also contribute to the need for the same network reinforcement. The possibility of sharing the reinforcement costs with other projects may be identified in the Feasibility Study, but the actual allocation will be deferred until the System Impact Study is performed.

The Combined Feasibility/System Impact Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study. The project developer must secure and convey any property or rights-of-way necessary for the Transmission Owner to construct, operate, and maintain their facilities. This conveyance must be in the form of either a deed or a permanent easement.

## **General**

CornerStone Power Franklin County, LLC, the Interconnection Customer (IC), has proposed a 20 MW (7.6 MW capacity) solar powered generating facility to be located at the northwest corner of Grapevine and Barnes Road in Franklin County, Pennsylvania. The project will consist of ground mounted fixed axis solar photovoltaic arrays with twenty (20) inverters. V3-062 was studied as a 20 MW (7.6 MW of which was capacity) injection into the 138kV Allegheny Power System between the McConnellsburg and Texas Eastern No.6 substations. The project was studied on a combined feasibility-impact basis which utilizes an AC analysis, and incorporates all contingency types. Project V3-062 was evaluated for compliance with reliability criteria for summer peak conditions in 2014. The current in-service date for the project is October 1, 2011.

### **Point of Interconnection**

V3-062 will interconnect with the Allegheny Power (AP) transmission system at the future Warm Spring 138kV switching station (see Attachment 1).

### **Direct Connection Requirements**

## **Transmission Owner Scope of Direct Connection Work**

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

### **Attachment Facilities**

#### **Warm Spring 138kV Switching Station**

- Construct a new 138kV switching station on property provided by the IC at no cost to AP. Note: All rights-of-way and easements must be conveyed to AP by the IC in the form of either direct ownership or a perpetual lease. The Warm Spring 138kV interconnection switching station will be situated adjacent to the existing McConnellsburg-Texas Eastern 6 Tap 138kV transmission line at a point approximately 11.2 line miles from McConnellsburg substation and 5.8 line miles from Texas Eastern 6 Tap (Structure 257-34).
- Install three (3) 138kV breakers, seven (7) 138kV breaker disconnect switches, 138kV metering, 138kV bus supports, two (2) 138kV dead-end structures, one (1) 138kV power VT, foundations, a 16' x 28' metal control building, SCADA and communications, telephone service, battery, control cables, panels, and associated equipment. Provide fence, grading, access roads, ground grid, and cable trench to accommodate an approximately 200' x 210' fenced station area. Install 138kV transfer trip facilities with communication to breakers at Cherry Run, McConnellsburg, Guilford, Warm Spring, and V3-062. Assume connection to the IC by bus tubing to the IC's adjacent facilities, the IC will install fiber optic cable to their station, and property will be acquired at no cost to AP.

The estimated cost to perform this work is **\$3,522,300** in 2011 dollars. (PJM Network Upgrade Number n1809)

- Construct a 0.1 mile 954kcmil ACSR 138kV wood pole loop line from the existing McConnellsburg-Texas Eastern 6 Tap 138kV transmission line at a point approximately 11.2 line miles from McConnellsburg substation and 5.8 line miles from Texas Eastern 6 Tap (Structure 257-34). Assume R/W to be acquired from IC at no cost to AP.

The estimated cost to perform this work is **\$211,400** in 2011 dollars. (PJM Network Upgrade Number n1810)

### **Network Upgrades**

- Install 138kV transfer trip facilities at Cherry Run substation.

The estimated cost to perform this work is **\$48,500** in 2011 dollars. (Network Upgrade Number n1811)

- Install 138kV transfer trip facilities at McConnellsburg substation.

The estimated cost to perform this work is **\$50,200** in 2011 dollars. (Network Upgrade Number n1812)

- Install 138kV transfer trip facilities at Guilford substation.

The estimated cost to perform this work is \$50,200 in 2011 dollars. (Network Upgrade Number n1813)

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 2011 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 V3-062 with the APS system by constructing a customer owned 138kV circuit from their generating site to the new Warm Spring 138 kV 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 is assumed that the Interconnection Customer's substation will be adjacent to the new Warm Spring 138kV switching station and connected via bus tubing. It's further 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:

<http://www.alleghenypower.com/Bus2Bus/Gen%20Trans%20AP%20Facility%20Connection%20Requirements.pdf>

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 **18 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

**Stability Analysis**

Not required.

Attachment 1

