Generation Interconnection Feasibility Study Report

For

PJM Generation Interconnection Request Queue Position W4-042

McConnellsburg 34.5kV Project

April, 2011

Overview

The Interconnection Custom (IC) has submitted an Attachment N to propose the interconnection of 20 MW of solar generation on a property located in Pennsylvania for the purpose of selling up to 20 MW energy and 7.6 MW of Capacity into the PJM market via the West Penn Power network.
The Commercial Operation date for this project was requested to be December, 2012 with back feed required in September of 2012. The analysis was performed using a 2014 base year. The Primary Point of Interconnection (POI) is a distribution interconnection and not under FERC jurisdiction. Conversely, the Secondary POI is onto the transmission system and therefore is under FERC jurisdiction.

PJM Report on the Transmission System

This portion of the report addresses the impacts on and the required reinforcements to that part of the transmission system under PJM jurisdiction.

Network Impacts

Queue project W4-042 was studied as a 20.0 MW (7.6 MW of which was Capacity) injection into the West Penn Power system. Project W4-042 was evaluated for compliance with reliability criteria for summer peak conditions in 2014.

PRIMARY POI: McConnellsburg substation at 34.5 kV

Potential transmission network impacts are as follows:

Generator Deliverability

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

No violations identified.

Multiple Facility Contingency

(Double Circuit Tower Line contingencies only with full energy output. Stuck Breaker and Bus Fault contingencies will be applied during the Impact Study)

No violations identified.

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.)

No violations identified.

New System Reinforcements
(Upgrades required to mitigate reliability criteria violations, i.e. "Network Impacts", initially caused by the addition of this project generation.)

None required.

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 Impact Study.)

None required.

Short Circuit
(Report over-dutied breakers.)

None required.

Energy Portion of Interconnection Request
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. 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 analyzes all overload conditions associated with the overloaded element(s) identified. As a result of the aggregate energy resources in the area, the following violations were identified.*

No violations identified.

SECONDARY POI: McConnellsburg substation at 138kV

Potential transmission network impacts are as follows:

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

No violations identified.

Multiple Facility Contingency
(Double Circuit Tower Line contingencies only with full energy output. Stuck Breaker and Bus Fault contingencies will be applied during the Impact Study)

No violations identified.

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.)

No violations identified.

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. "Network Impacts", initially caused by the addition of this project generation.)

None required.

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 Impact Study.)

None required.

Short Circuit

(Report over-dutied breakers.)

None required.

Energy Portion of Interconnection Request

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. 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 analyzes all overload conditions associated with the overloaded element(s) identified. As a result of the aggregate energy resources in the area, the following violations were identified.*

No violations identified.

West Penn Power (FirstEnergy) Feasibility Analysis Report

This portion of this Feasibility Study Report has been prepared for this PJM queue project by West Penn Power (FirstEnergy). It addresses the impacts on and required reinforcements to that portion of the network at the distribution level, including the attachment and direct connection facilities.

PRIMARY POI: Injection into the McConnellsburg 34.5kV Bus

Attachment Facilities and Related Network Upgrades

- At McConnellsburg SS, install 1-1200A, 34.5kV breaker in an existing 34.5kV bay, install breaker foundation, 6-1200A, 34.5kV hookstick disconnects, 1-600A, 34.5kV vertical break switch, 34.5kV arresters, conductor, connectors, control cables and panels, grounding, and associated equipment. A fiberoptic link is required between McConnellsburg SS and W4-042.

Estimated Cost: $245,025 in 2012 dollars

The estimated project duration is **15 months** after the receipt of an executed Interconnection Service Agreement and Construction Agreement.

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 IC will be charged for actual costs. Any under-runs or over-runs will be reconciled at the conclusion of the project. The estimates in this report do not include tax gross-up.

The IC will interconnect with the West Penn Power (TO) system via a customer owned 34.5kV line from a customer owned substation located approximately 0.25 miles from the McConnellsburg substation. The above cost estimates do not include construction of that line. Route selection, line design, rights-of-way acquisition and construction of such lines will be entirely the responsibility of the IC. It is assumed that the IC's main step up transformer will conform to the TO standard with delta on the low side and grounded wye on the high side.

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

The TO reserves the right to review the electrical protection design and relay settings for IC facilities to ensure that the protective relaying equipment will be compatible with that installed on West Penn facilities. The relaying package will likely include both primary and backup protection. West Penn personnel must be present at the time of commissioning to inspect and witness proper function of the control scheme and related coordination. The estimated cost to perform this engineering review and field test effort is **$5,000 in 2011 dollars**.

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

It is assumed that a fiber optic interface will be used for the protection channel between the TO and IC 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 TO applicable standards.

The IC's inverters shall operate at a nominal power factor of unity. However, the IC shall also install sufficient reactive support (i.e. an SVC, STATCOM, etc.) to limit voltage flicker at the point of interconnection to no more than 3%.

Overloads and Required Reinforcements

No thermal violations were identified as a result of this project.

Other Supporting Facilities Charge

The Other Supporting Facilities Charge (OSFC) 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 TO's Transmission System.

The Other Supporting Facilities Charge for the W2-095 generator interconnection project has been estimated to be **$10,800/month** in 2011 dollars. The estimate is based on an average (or rolled-in) rate for West Penn's sub-transmission system.

SECONDARY POI: Injection into the McConnellsburg 138kV Bus

Overloads and Required Reinforcements

No thermal violations were identified as a result of this project.