

Generation Interconnection

Feasibility Study Report

Queue Position AB1-171

The Interconnection Customer (IC), has proposed a natural gas generating facility in Waynesburg, PA. The installed facilities will have a total capability of 20 MW with 20 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is December 31, 2016. **This study does not imply a West Penn Power commitment to this in-service date.**

Point of Interconnection

AB1-171 will interconnect with the West Penn Power Company transmission system at the 25 kV bus in the Franklin Substation.

Cost Summary

The AB1-171 project will be responsible for the following costs:

Description	Total Cost
Transmission Owner facilities	\$ 300,100
Direct Connection Cost	\$ 88,000
Non-Direct Connection Cost	\$ 0
Total Costs	\$ 388,100

Attachment Facilities

The total preliminary cost estimate for the Attachment work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
Franklin SS - Install 25kV line terminal for service to IC -1	\$ 200,100
Total Attachment Facility Costs	\$ 200,100

Direct Connection Cost Estimate

The total preliminary cost estimate for the Attachment work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
Franklin SS -- Install 25kV line terminal for service to IC -2	\$ 88,000
Total Attachment Facility Costs	\$ 88,000

Non-Direct Connection Cost Estimate

The total preliminary cost estimate for the Attachment work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
Franklin SS -- Install 25kV line terminal for service to IC -2	\$ 100,000
Total Attachment Facility Costs	\$ 100,000

Transmission Owner Scope of Work

Results from the PJM and FE Power Flow Analysis show that there are no FE Planning Criteria violations directly attributable to the project. Therefore the IC is not responsible for network upgrades.

Note that all cost estimates contained in this document were produced without a detailed engineering review and are therefore subject to revision. More accurate estimates will be determined as a part of the System Impact Study. The Interconnection Customer will be responsible for the actual cost of the direct connection that is implemented. West Penn FE herein reserves the right to return to any issues in this document and, upon appropriate justification, request additional monies to complete any reinforcements to the transmission system.

Schedule

Based on the scope of the Attachment Facilities, it is expected to take a minimum of twelve months (12) from the signing of applicable agreements to complete the facility additions required for the project. Full payment of the estimated cost of the project will be required upon execution of the Interconnection Construction Service Agreement (ICSA). A true up of the actual cost versus estimated cost of the project will be performed by First Energy at the end of the project. The Interconnection Customer will be responsible for providing all easements, properties and permits that may be required to construct the associated Attachment Facilities. The schedule above is based on the assumption that there will be no environmental issues with any of the new properties associated with this project, that there will be no delays in acquiring any necessary permits.

Interconnection Customer Requirements

The Interconnection Customer will be responsible for meeting all criteria as specified in the applicable sections of the "FE Requirements for Transmission Connected Facilities" document including:

1. The purchase and installation of a fully rated circuit breaker on the high side of the AB1-171 step-up transformer.
2. The purchase and installation of a lockable switch at the point of interconnection. This switch must be accessible by First Energy.
3. The purchase and installation of the minimum required FE generation interconnection relaying and control facilities. This includes over/under voltage protection, over/under frequency protection, and zero sequence voltage protection relays.
4. The purchase and installation of a 25kV interconnection metering instrument transformer. FE will provide the ratio and accuracy specifications based on the customer load and generation levels.
5. The purchase and installation of a revenue class meter for each unit to measure the power delivered in compliance with the FE standards.
6. The purchase and installation of supervisory control and data acquisition (SCADA) equipment to provide information in a compatible format to the FE Transmission System Control Center. The RTU, the communications channel and all related equipment will be furnished and maintained by the IC. The RTU must communicate with the FirstEnergy EMS via DNP 3.0 protocol.
7. The establishment of dedicated communication circuits for SCADA report to the FE Transmission System Control Center.
8. A compliance with the FE and PJM generator power factor and voltage control requirements.
9. The execution of a back-up service agreement, if required, to serve the developers load supplied from the POI when the units are out-of-service.

The above requirements are in addition to any metering required by PJM.

Revenue Metering and SCADA Requirements

PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

Transmission Owner Requirements

The Interconnection Customer will be required to comply with all FE Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "FirstEnergy Requirements for Transmission Connected Facilities" document located at the following links:

<http://www.firstenergycorp.com/feconnect>

<http://www.pjm.com/planning/design-engineering/to-tech-standards.aspx>

Network Impacts

Project AB1-171 was evaluated as a 20.0 MW (Capacity 20.0 MW) injection at the Franklin 25kV substation in the APS area. Project AB1-171 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). The Study is based on Summer Peak Analysis – 2019. Project AB1-171 was studied with a commercial probability of 53%. Potential network impacts were 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, Fault with a Stuck 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

Steady-State Voltage Requirements

(Results of the steady-state voltage studies should be inserted here)

To be determined

Short Circuit

(Summary of impacted circuit breakers)

AB1-171 did not cause any breakers to become newly over duty and did not have a > 3% contribution to any existing over duty breakers.

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 Merchant Transmission Interconnection request.

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 will study all overload conditions associated with the overloaded element(s) identified.

Not applicable because Capacity and energy exports proposed by Interconnection Customer are equal.

Light Load Analysis - 2019

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

System Reinforcements

None identified.

Additional Interconnection Customer Responsibilities:

1. An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.
2. The Interconnection Customer may be required to install and/or pay for metering as necessary to properly track real time output of the facility as well as installing metering which shall be used for billing purposes. See Section 8 of Appendix 2 to the Interconnection Service Agreement as well as Section 4 of PJM Manual 14D for additional information.
3. The Interconnection Customer seeking to interconnect a wind generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per item 5.iv. of Schedule H to the Interconnection Service Agreement.
4. The Interconnection Customer may be required to coordinate with other generators that are connected to the substation bus regarding any outages that may be required to implement the upgrades on the ringbus. For those elements of the upgrades that are shared by the generating entities, there may be an agreement necessary between their companies for the maintenance and sharing of the equipment before an Interconnection Service Agreement can be crafted.