PJM Generator Interconnection Request
Queue AB2-064
RP Mone 345 kV
Feasibility Study Report

August 2016

Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, 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 impact study is performed.

The Feasibility 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.

General

The Interconnection Customer proposes to install PJM Project #AB2-064, a 40 MW (15.2 MW Capacity) solar generating facility in Allen County, Ohio (see Figure 2). The generating facility will consist of eighteen (18) 2.2 MW inverters. The primary point of interconnection is at the RP Mone 345 kV substation (see Figure 2) and the secondary point of interconnection is at the Southwest Lima 345 kV substation (see Figure 4).

The requested Backfeed date is October 1, 2018.
The requested in service date is December 31, 2018.

The objective of this Feasibility Study is to determine budgetary cost estimates and approximate construction timelines for identified transmission facilities required to connect the proposed generating facilities to the AEP transmission system. These reinforcements include the Attachment Facilities, Local Upgrades, and Network Upgrades required to maintain the reliability of the AEP transmission system. Stability analysis is not included as part of this study.

Attachment Facilities

Primary Point of Interconnection (RP Mone 345 kV Substation)

To accommodate the interconnection at the RP Mone 345 kV substation, the substation will have to be expanded requiring the installation of a new 345 kV breaker, extending the two 345 kV buses, associated protection and control equipment, SCADA, and 345 kV revenue metering.

Direct Connection to the RP Mone 345 kV Substation Work and Cost:

- Expand the substation, install one new 345 kV circuit breaker, and extend the 345 kV Bus #1 (see Figure 1). Installation of associated protection and control equipment, SCADA, and 345 kV revenue metering will also be required.
- **Estimated Station Cost: $3,000,000**

Protection and Relay Work and Cost:

- Install line protection and controls at the RP Mone 345 kV substation station.
- **Estimated Cost: $600,000**

Secondary Point of Interconnection (Southwest Lima 345 kV Substation)

PJM project W3-088 will pay for the necessary direct connection worked required at the Southwest Lima 345 kV substation. No additional attachment facilities are required to accommodate the additional solar generation associated with the AB2-064 request (see Figure 3).

It is understood that The Interconnection Customer is responsible for all costs associated with this interconnection. The costs above are reimbursable to AEP. The cost of Long Prairie Wind I, LLC's generating plant and the costs for the line connecting the generating plant to the RP Mone 345 kV substation are not included in this report; these are assumed to be Long Prairie Wind I, LLC's responsibility.

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

Local and Network Impacts for the Primary Point of Interconnection

The impact of the proposed generating facility on the AEP System was assessed for adherence with applicable reliability criteria. AEP planning criteria require that the transmission system meet single contingency performance criteria in accordance with the AEP FERC Form 715. Therefore, this criterion was used to assess the impact of the proposed facility on the AEP System. The Queue Project AB2-064 was evaluated as a 40.0 MW (Capacity 15.2 MW) injection at the RP Mone 345kV substation in the AEP area. Project AB2-064 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AB2-064 was studied with a commercial probability of 53%. Project #AB2-064 was evaluated for compliance with reliability criteria for summer peak conditions in 2020.

Potential network impacts were as follows for the Primary Point of Interconnection (RP Mone 345 kV Substation):

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

Short Circuit
(Summary of impacted circuit breakers)

None

Stability Analysis

To be determined in the System Impact Study

Voltage Variations

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 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.

None

Local and Network Impacts for the Primary Point of Interconnection
The impact of the proposed generating facility on the AEP System was assessed for adherence with applicable reliability criteria. AEP planning criteria require that the transmission system meet single contingency performance criteria in accordance with the AEP FERC Form 715. Therefore, this criterion was used to assess the impact of the proposed facility on the AEP System. The Queue Project AB2-064 was evaluated as a 40.0 MW (Capacity 15.2 MW) injection at the Southwest Lima 345kV substation in the AEP area. Project AB2-064 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AB2-064 was studied with a commercial probability of 53%. Project #AB2-064 was evaluated for compliance with reliability criteria for summer peak conditions in 2020.

Potential network impacts were as follows for the Secondary Point of Interconnection (Southwest Lima 345 kV Substation):

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

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(Summary of impacted circuit breakers)

None

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None

Additional Limitations of Concern

None

Local/Network Upgrades

None

Schedule

It is anticipated that the time between receipt of executed agreements and Commercial Operation may range from 12 to 18 months if no line work is required. If line work is required, construction time would be between 24 to 36 months after signing an interconnection agreement.

Note: The time provided between anticipated normal completion of System Impact, Facilities Studies, subsequent execution of ISA and ICSA documents, and the proposed Backfeed Date is shorter than usual and may be difficult to achieve.

Conclusion

Based upon the results of this Feasibility Study, the construction of the 40 MW (15.2 MW Capacity) solar generating facility of The Interconnection Customer (PJM Project #AB2-064) will require the following additional interconnection charges. This plan of service will interconnect the proposed solar generating facility in a manner that will provide operational reliability and flexibility to both the AEP system and the Interconnection Customer solar generating facility.

Cost Breakdown for the Primary Point of Interconnection (RP Mone 345 kV Substation):

- **Estimated Cost to connect to the RP Mone 345 kV Substation: $3,000,000**
- **Estimated Protection and Relay Cost: $600,000**
- **Total Estimated Cost for Project AB2-064: $3,600,000**

The estimates are preliminary in nature, as they were determined without the benefit of detailed engineering studies. Final estimates will require an on-site review and coordination to determine final construction requirements.

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.