

***PJM Generator Interconnection Request
Queue #X1-009
Sterling (Allen County Solar) 34.5kV
Feasibility Study***

65905 1

August 2011

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,

X1-009 Sterling (Allen County Solar) 34.5kV Feasibility Study Report

General

The interconnection customer (IC) proposes to install PJM Project #X1-009, a 20 MW (7.6 MW capacity) solar generating facility. The primary point of interconnection studied is at the Sterling 138/34.5 kV Station (Figure 1). The secondary point of interconnection studied is to tap the Foundry Park #2 34.5 kV – Sterling 34.5 kV line (Figure 1). The location of the solar generating facility is in Allen County, Ohio, approximately 1500 feet southwest of Sterling station. The name of the project is “Allen County Solar”

The proposed back feed date is October 1, 2012

The projected in-service date is scheduled for December 1, 2012.

Attachment Facilities

Option #1 – Sterling 34.5kV Station

The primary point of interconnection (POI) for the project will be at the Sterling 138/34.5 kV Station via a single 34.5 kV breaker. The IC will build a 0.5 mile radial line connecting to the 34.5 kV breaker at the Sterling 138/34.5 kV Station (Figure 2). The interconnection cost for this option is \$290,000. Protection schemes will need to be modified at the station and 34.5 kV metering will need to be installed.

AEP work:

- Install a new 34.5 kV circuit breaker and 34.5kV metering and modify the existing protection schemes at Sterling Station. Estimated cost is **\$290,000**.

Total Estimated Cost is **\$290,000**

Note that the IC station facilities and any facilities outside the new station were not included in the cost estimates. These are assumed to be Element Power’s responsibility. 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. It will take approximately 18 months after obtaining the authorization to construct the facilities as outlined above.

Option #2 – Foundry Park #2-Sterling 34.5kV Circuit

The secondary point of interconnection (POI) for the project will be to tap the Foundry Park #2 34.5 kV – Sterling 34.5 kV line via a new in-line switching station (Figure 3). The station is to

consist of three (3) 34.5 kV circuit breakers configured in a breaker and one half bus arrangement operated as a ring-bus with 34.5 kV metering. AEP will retain ownership of the proposed in-line station facilities. In addition, remote terminal relaying will need to be upgraded to facilitate the new station. The interconnection cost for this option is \$3,850,000.

AEP work:

- Install a new 3-breaker, 34.5 kV, ring bus, interconnection station including 34.5kV metering, SCADA and associated equipment into the Foundry Park #2-Sterling circuit. Estimated cost is **\$3,350,000**.
- Loop the 34.5 kV Foundry Park #2-Sterling line into and out of the new interconnection station. Estimated cost is **\$300,000**
- Replace relay equipment at Foundry Park 34.5kV station. Estimated cost is **\$100,000**.
- Replace relay equipment at Sterling 34.5kV station. Estimated cost is **\$100,000**.

Note that the IC station facilities and any facilities outside the new station were not included in the cost estimates. These are assumed to be Element Power's responsibility. 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. It will take approximately 18 months after obtaining the authorization to construct the facilities as outlined above.

Local Network Impacts

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 IC solar project was studied as a 20 MW (7.6 MW capacity) generating facility consistent with the interconnection application. Both interconnection options were studied and the results were the same. The results are summarized below.

Normal System (2015 Summer Conditions Capacity Level)

- No problems identified.

Single Contingency (2015 Summer Conditions Capacity Level)

- No problems identified.

Multiple Contingency (2015 Summer Conditions Full Output)

- No problems identified.

Single Contingency (2015 Summer Conditions Full Output)

- No problems identified

Short Circuit Analysis

- No problems identified

Contributions to Previously Identified Network Limitations

- No problems identified.

Additional Concerns – Full Output

- None

Network Upgrades

- None required.

Network Impacts

Queue project X1-009 was studied as a(n) 20.0 MW (7.6 MW of which was Capacity) injection into AEP's system at the Sterling 138 kV line. Project X1-009 was evaluated for compliance with reliability criteria for summer peak conditions in 2015.

Generator Deliverability

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

No problems identified

Multiple Facility Contingency

(Double Circuit Tower Line, Line with Failed Breaker and Bus Fault contingencies for the full energy output)

No problems identified

Short Circuit

(Summary form of Cost allocation for breakers will be inserted here if any)

- No problems 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 problems 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

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)

(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

- None

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.

- None

Figure 1: X1-009 Point of Interconnection

Figure 2: Simplified diagram of the primary point of interconnection

Figure 3: Simplified diagram of the secondary point of interconnection