

***PJM Generator Interconnection Request
Queue #W4-039
Engle 69kV
Feasibility Study***

641942

April 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,

W4-039 Engle 69kV Feasibility Study Report

General

The Interconnection Customer (IC) proposes to install PJM Project #W4-039, a 62.5 MW Biomass fuel generating facility connecting to American Electric Power (AEP) Engle 69 kV Station via a 1.4 mile transmission line. The proposed location for the generating facility is at the Coal Fields Industrial Park, 1244 Coal Fields Industrial Drive, Chavies, in Perry County, Kentucky (see Exhibit 1 for general location for proposed facility). The projected in-service date for the facility is December 31, 2013.

Attachment Facilities

W4-039 proposes to connect biomass generation facility directly to AEP's Engle 69kV Station via a 1.4 mile long transmission line. AEP's Engle Station will require the addition of a single 69kV breaker (see exhibit 2), metering, SCADA and associated equipment. The IC is expected to obtain, at their cost, the necessary right of way (approximately 1.4 miles) required to connect to AEP's Engle Station. In addition, the IC shall obtain all necessary permits for this right of way acquisition.

Shamrock 69 kV Station will require a complete rebuild and station expansion. Significant grading and a shift in station location will be required. Three 69kV breakers, a control house, line relaying, a remote terminal unit (RTU) and associated 69kV transmission line work will need to be added. The existing 69 kV structure is a two pole structure that will not facilitate three 69 kV breakers. Thus, a new steel 69 kV bay will be required to accommodate these new breakers. Thus station size will increase from 60 by 60 feet to approximately 150 feet by 200 feet in order to accommodate the additional equipment requirements.

Remote end relaying and equipment retirement will be required at Hazard Station in order to accommodate the proposed generation of 62.5 MW connecting to Engle Station

The AEP construction scope includes:

- Engle Station: Add new 69kV breaker, metering, SCADA and associated equipment. The estimated cost is **\$1,506,310**
- Rebuild Shamrock Station with 3-69kV breakers, control house, station equipment retirement, and associated transmission line work The estimated cost is **\$4,100,200**. (Network Upgrade #n2010)
- Hazard Station: Upgrade relaying on the Shamrock circuit and retire station equipment. The estimated cost is **\$471,900**. (Network Upgrade #n2011)

Total Attachment Facilities Cost: \$6,078,410

Final estimates will require a final on-site review and coordination with the IC to determine final construction requirements. Estimates are based on 2010 dollars.

The IC is responsible for all costs associated with this connection. Costs for IC's generation station and costs for the line connection from IC's generation station to AEP's Engle Station are not included in this report. The costs detailed above are reimbursable to AEP

The standard time required for construction is 12 to 18 months from the signing of an interconnection agreement.

Local AEP 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 contingency performance criteria in accordance with the AEP FERC Form 715. Therefore, this set of criteria was used to assess the impact of the proposed facility on the AEP System. The IC 62.5 MW biomass fuel generator project was studied as a 62.5 MW net energy injection consistent with the interconnection application. The results are summarized below.

Normal System (2013 Winter Conditions)

- No problems identified

Single Contingency (2013 Winter Conditions)

- No problems identified

Multiple Contingency (2013 Winter Conditions)

- No problems identified

Short Circuit Analysis

- No problems identified.

Stability Analysis

- Stability analysis was not performed as part of this Feasibility Study. The stability assessments are part of the System Impact Study. Based upon the results of this System Impact Study, the extent of system upgrades could change and the associated costs could be significantly different.

Network Upgrades

- Not Applicable for this study

Network Impacts

Queue project W4-039 was studied as a(n) 62.5 MW (62.5 MW of which was Capacity) injection into AEP's system at the 05ENGLE 69.0 kV substation. Project W4-039 was evaluated for compliance with reliability criteria for summer peak conditions in 2014.

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)

None

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