Generation Interconnection System Impact Study Report

For

PJM Generation Interconnection Request Queue Position AC1-044

Kammer-Vassell 765 kV

January 2018

Preface

The intent of the System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. 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. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

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 or merchant transmission upgrade, 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 System Impact Study is performed.

The System Impact 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

Guernsey Power Station, LLC proposes to increase the generation of its previous PJM Project #AB2-067, an 1100.0 MW (1100.0 MW Capacity) natural gas generating facility by 550.0 MW (550.0 MW Capacity) in Guernsey, Ohio (see Figure 2). The point of interconnection is to AEP's Kammer – Vassell 765 kV circuit (see Figure 1). Both projects will be known as the "The Guernsey Power Station" and are summarized in the table below:

	AB2-067	**AC1-044**
Plant Configuration	1 x 1 CC	1 x 1 CC
Maximum Facility Output (MW)	1,100	550
Capacity (MW)	1,100	550
Planned Backfeed	September 1, 2019	September 1, 2019
Planned In-Service	September 1, 2020	September 1, 2020

Table 1

Attachment Facilities

Point of Interconnection (Kammer – Vassell 765 kV Line)

PJM Project AB2-067 will pay for the necessary direct connection work required. Project AC1-044 will share the same Generator lead to the new 765 kV interconnection switching station being constructed by Project AB2-067. PJM project AC1-044 will be required to pay for the direct connection work if PJM project AB2-067 withdraws.

- Adjust relay settings at the New 765 kV Switching Station
  - **Estimated Cost: $100,000**

- Upgrade the 765 kV revenue meter if the installed meter for the AB2-067 is not adequate for the additional generation.
  - **Estimated Cost: $200,000**

Note: The customer should review the capability of the lead from the point of ownership transition into the generating plant to ensure that it is sufficient to accommodate the increase generation output.

Interconnection Customer Requirements

It is understood that Guernsey Power Station is responsible for all costs associated with this interconnection. The cost of Guernsey Power Station's generating plant and the costs for the line connecting the generating plant to Guernsey Power Station's switching station are not included in this report; these are assumed to be Guernsey Power Station'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.

Requirement from the PJM Open Access Transmission Tariff:

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.

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.

AEP Requirements

The Interconnection Customer will be required to comply with all AEP Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "Requirements for Connection of New Facilities or Changes to Existing Facilities Connected to the AEP Transmission System" document located at the following link:

http://www.pjm.com/~/media/planning/plan-standards/private-aep/aep-interconnection-requirements.ashx

AC1-044 Generator Regulation or Reactive Support Requirements

As specified in Part VI, Attachment O Appendix 2 at 4.7.1.1 of the PJM OATT, the Project AC1-044 generator shall design its "Facility" to maintain a composite power factor delivery at continuous rated power output at the point of interconnection at a power factor of at least 0.95 leading (absorbing vars) to 0.90 lagging (supplying vars).

Network Impacts

The Queue Project AC1-044 was evaluated as a 550.0 MW (Capacity 550.0 MW) injection into the AB2-067 Interconnection 765 kV substation (cut into the Kammer – Vassell 765 kV line) in the AEP area. Project AC1-044 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC1-044 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Base Case Used

Summer Peak Analysis – 2020 Case

Contingency Descriptions

The following contingencies resulted in overloads:

None

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)

None

Stability Analysis

Stability Analysis will be completed as part of the scope of the Facilities Study.

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

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.

Note: Only the most severely overloaded conditions are listed below. 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 shall study all overload conditions associated with the overloaded element(s) identified.

None

Additional Limitations of Concern

None

System Reinforcements

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.

Conclusion

Based upon the results of this System Impact Study, the increase of 550.0 MW (PJM Project #AC1-044) natural gas generation to Guernsey Power Station's previous request (PJM Project #AB2-067) will require the following additional interconnection charges. This plan of service will interconnect the proposed natural gas generating facility in a manner that will provide operational reliability and flexibility to both the AEP system and the Guernsey Power Station's generating facility.

Cost Breakdown for Point of Interconnection (Kammer-Vassell 765 kV Line)			
Attachment Cost	PJM Project AB2-067 will pay for the necessary direct connection work required. Project AC1-044 will share the same Generator lead to the new 765 kV interconnection switching station being constructed for Project AB2-067. PJM project AC1-044 will be required to pay for the direct connection work if PJM project AB2-067 withdraws.		PJM Project #AB2-067 to pay for Attachment Facilities
Non-Direct Connection Cost Estimate	n5494	Upgrade the 765 kV Revenue Metering	$200,000
	n5495	Adjust relay settings at the New 765 kV Switching Station	$100,000
	Total Estimated Cost for Project AC1-044		**$300,000**

Table 2

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.

Figure 1: Point of Interconnection (Kammer - Vassell 765 kV Line)

Single-Line Diagram

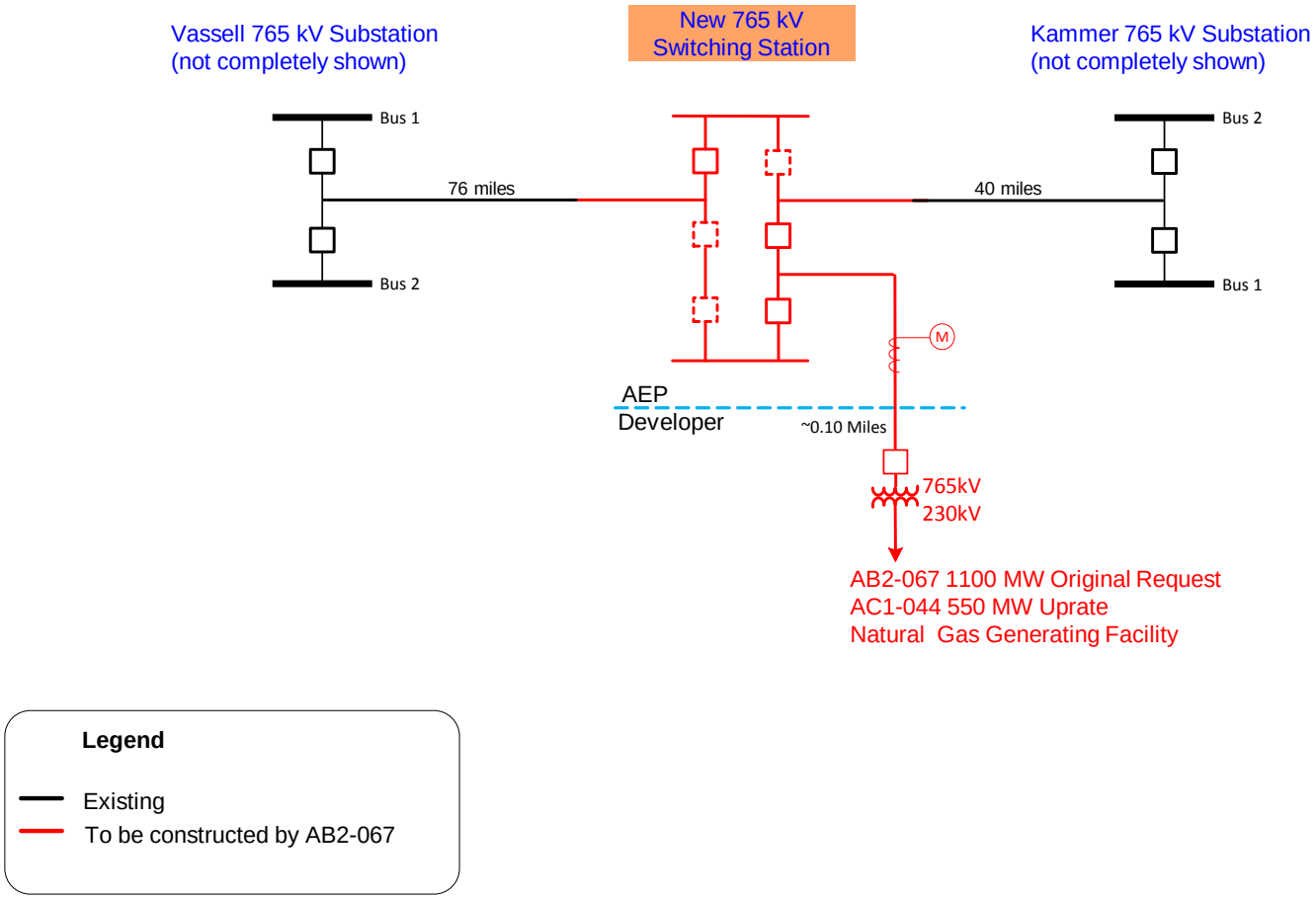

Figure 2: Point of Interconnection (Kammer – Vassell 765 kV Line)