Generation Interconnection

System Impact Study Report

for

Queue Project AE1-120

HILLCREST 138 KV

44 MW Capacity / 0 MW Energy

Revised September, 2019

(Initial Issue: August, 2019)

1 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: 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 an Interconnection Customer 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.

The Interconnection Customer seeking to interconnect a wind or solar generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

An Interconnection Customer 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 Revision History

This September 2019 revised System Impact Study includes minor revisions to the Point of Interconnection and Cost Summary sections of the previously issued August 2019 report.

3 General

The Interconnection Customer (IC) has proposed a Capacity only uprate of 0 MW Energy and 44 MW Capacity to its Customer Facilities (prior AB1-014 and AC2-044 queues) located in Mount Oab, Brown County, Ohio.

The installed facilities will have a total capability of 200 MW with 120 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is April 30, 2020. This study does not imply a TO commitment to this in-service date.

The project capability is summarized below:

	Energy (MW)	Capacity Interconnection Rights (MW)
AB1-014	125	47.5
Incremental AC2-066	75	28.5
Incremental AE1-120	0	44
Total MW	200	120

Queue Number	AE1-120
Project Name	HILLCREST 138 KV
Interconnection Customer	Hillcrest Solar I, LLC
State	Ohio
County	Brown
Transmission Owner	DEOK
MFO	200
MWE	0
MWC	44
Fuel	Solar
Basecase Study Year	2022

3.1 Point of Interconnection

AE1-120 will interconnect with the DEOK transmission via the Hillcrest 138 kV Substation.

3.2 Cost Summary

The AE1-120 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$0
Direct Connection Network Upgrade	$0
Non Direct Connection Network Upgrades	$0
Total Costs	$0

In addition, the AE1-120 project may be responsible for the following allocated costs

Description	Total Cost

Description	Total Cost
System Upgrades	$0

4 Transmission Owner Scope of Work

4.1 Attachment Facilities

None

4.2 Direct Connection Cost Estimate

None

4.3 Non-Direct Connection Cost Estimate

None

5 Revenue Metering and SCADA Requirements

5.1 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 Section 8 of Attachment O.

5.2 DEOK Requirements

The requirements for the prior queues AB1-014 and AC2-066 shall apply.

6 Network Impacts

The Queue Project AE1-120 was evaluated as a 44.0 MW (Capacity 44.0 MW) injection into the Hillcrest 138 kV substation in the DEOK area. Project AE1-120 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE1-120 was studied with a commercial probability of 1.00. Potential network impacts were as follows:

Summer Peak Load Flow

7 Generation Deliverability

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

None

8 Multiple Facility Contingency

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

None

9 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

10 Potential Congestion due to Local Energy Deliverability

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

11 System Reinforcements

None

12 Stability and Reactive Power Requirement for Low Voltage Ride Through

Stability Analysis is not required for the AE1-120 project.

13 Light Load Analysis

No mitigations required.

Affected Systems

14 Affected Systems

14.1 LG&E

A LG&E Affected System Study is not required for AE1-120.

14.2 MISO

MISO Impacts to be determined during later study phases (as applicable).

14.3 TVA

None

14.4 Duke Energy Progress

None

14.5 NYISO

None

Short Circuit

15 Short Circuit

The following Breakers are over duty:

None

Attachment 1

Single Line