Generation Interconnection

Impact Study Report

for

Queue Project AE2-035

LENA 138 KV

21 MW Capacity / 50 MW Energy

February, 2020

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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.

2 General

Acciona Energy USA Global LLC, the Interconnection Customer (IC), has proposed a solar generating facility to be located in Stephenson County, Illinois. The installed facilities will have a capability of 50 MW with 21 of new request MW of this output being recognized by PJM as capacity. Note, this project is an increase to the Interconnection Customer's prior queue project AD2-172, which will share the same property and connection point. A light load analysis is not required for the AE2-035 project.

Queue Number	**AE2-035**
Project Name	LENA 138 KV
Interconnection Customer	Acciona Energy USA Global LLC
State	Illinois
County	Stephenson
Transmission Owner	ComEd
MFO	50
MWE	50

Queue Number	AE2-035
MWC	21
Fuel	Solar
Basecase Study Year	2022

2.1 Point of Interconnection

Queue Position AE2-035, a 50 MW solar facility, will interconnect with the ComEd transmission system by connecting to the customer-owned 138 kV EcoGrove TSS 969. AE2-035 will interconnect with the ComEd transmission system at the Lena 138kV substation via line L11904.

2.2 Cost Summary

AE2-035 will be responsible for the following costs associated with the physical interconnection of the project:

Description	Total Cost
Attachment Facilities	$200,000
Direct Connection Network Upgrade	$0
Non Direct Connection Network Upgrades	$0
Total Costs	$200,000

In addition, the AE2-035 project may be responsible for a contribution to the following costs associated with network upgrades:

Description	Total Cost
System Upgrades	$0

Cost allocations for these upgrades will be provided in the System Impact Study Report.

3 Transmission Owner Scope of Work

Attachment Facilities

Review and possible upgrade of SCADA, Communication, relays and metering.

Direct Connection Network Upgrades

None

Non-Direct Connection Network Upgrades

None

4 Attachment Facilities Cost Estimate

The total preliminary cost estimate for the Attachment work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
SCADA, communication, relays and metering	$200,000
Total Attachment Facility Costs	**$200,000**

5 Direct Connection Cost Estimate

The total preliminary cost estimate for the Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
Total Direct Connection Facility Costs	**$0**

6 Non-Direct Connection Cost Estimate

The total preliminary cost estimate for the Non-Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
Total Non-Direct Connection Facility Costs	**$0**

7 Schedule

ComEd would take approximately 18-months to review and possibly upgrade SCADA, Communication, relays and metering after the ISA / ICSA are signed.

8 Transmission Owner Analysis

See Section 3

9 Interconnection Customer Requirements

ComEd interconnection requirements can be found at https://www.pjm.com/planning/design-engineering/to-tech-standards/private-comed.aspx

To the extent that these Applicable Technical Requirements and Standards may conflict with the terms and conditions of the Tariff, the Tariff shall control.

ComEd distribution line drops to move customer cranes and heavy equipment is not part of PJM process. The customer should directly contact ComEd New Business Group to arrange for line drops, if needed.

10 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 Section 8 of Attachment O.

11 Network Impacts

The Queue Project AE2-035 was evaluated as a 50.0 MW (Capacity 21.0 MW) injection into the Lena 138 kV substation in the ComEd area. Project AE2-035 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-035 was studied with a commercial probability of 1.00. Potential network impacts were as follows:

Summer Peak Load Flow

12 Generation Deliverability

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

None

13 Multiple Facility Contingency

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

None

14 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

15 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.

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
2121396	271498	FREEPORT ;BT	138.0	CE	271494	FREEPORT ;2R	138.0	CE	1	COMED_P2-1_119-L11904__	operation	173.0	78.69	107.59	DC	49.99

16 System Reinforcements

None

Light Load Analysis

Not required

17 Flow Gate Details

The following indices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact. It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

None

18 Affected Systems

18.1 LG&E

None

18.2 MISO

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

18.3 TVA

None

18.4 Duke Energy Progress

None

18.5 NYISO

None

19 Contingencies

Contingency Name	Contingency Definition
COMED_P2-1_119-L11904__	CONTINGENCY 'COMED_P2-1_119-L11904__' TRIP BRANCH FROM BUS 271897 TO BUS 271498 CKT 1 / LANCASTER; R 138 FREEPORT ;BT END

20 Short Circuit

The following breakers are overdutied:

None

21 Stability Analysis

To be completed during Facilities Study phase.

22 Single line Diagram