Generation Interconnection

Combined Feasibility / Impact Study Report

for

Queue Project AF1-140

CLAYSBURG 23 KV

9.78 MW Capacity / 16.3 MW Energy

January 2020

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1 Introduction

This Combined Feasibility/System Impact Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 36.2, as well as the Feasibility Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). PJM studied the AF1-140 project as an injection into the Pennsylvania Electric Company (PENELEC) system at Claysburg 23 kV Substation. The customer has proposed to physically interconnect with Valley Rural Electric Cooperative (VREC) distribution facilities.[1] VREC is a cooperative in the Pennsylvania Electric Company (PENELEC) zone.

2 Preface

The intent of the combined feasibility/system impact 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.

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.

The 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 VREC or PENELEC, the costs associated with them will be addressed when seeking an Interconnection Agreement as outlined below. Developer will also be responsible for providing and installing metering equipment in compliance with applicable PJM and Transmission Owner standards.

[1] The AF1-140 customer is responsible to contact VREC regarding interconnection with their facilities as they will need permission from the Cooperative to interconnect. PJM will also require a one line diagram to be included in the Wholesale Market Participation Agreement (WMPA) with the customer and PENELEC. The AF1-140 customer is responsible to provide PJM with a contact who can provide this information for the agreement. If the AF1-140 customer does not receive permission from VREC to interconnect, then PJM will not tender the WMPA.

3 General

The Interconnection Customer (IC), has proposed a Solar generating facility located in Blair County, Pennsylvania. The installed facilities will have a total capability of 16.3 MW with 9.78 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is 06/01/2022. This study does not imply a TO commitment to this in-service date.

Final attachment facilities and local upgrades (if required) along with terms and conditions to interconnect AF1-140 will be specified in a separate two party Interconnection Agreement (IA) between Valley Rural Electric Cooperative and the Interconnection Customer as this project is considered FERC non-jurisdictional per the PJM Open Access Transmission Tariff (OATT).[1]

From the transmission perspective, no network impacts were identified as detailed in the "Network Impacts" section below.

Queue Number	AF1-140
Project Name	CLAYSBURG 23 KV
State	Pennsylvania
County	Blair
Transmission Owner	PENELEC
MFO	16.3
MWE	16.3
MWC	9.78
Fuel	Solar
Basecase Study Year	2023

4 Point of Interconnection

AF1-140 will physically interconnect with the VREC 23 kV system. PJM studied AF1-140 as an injection into the PENELEC distribution system at the Claysburg 23 kV substation. VREC is a cooperative in the PENELEC zone. The customer is responsible to contact VREC regarding interconnection with their facilities as they will need permission from the cooperative to interconnect.[1]

5 Transmission Owner Scope/Cost/Schedule Summary

Scope, cost and schedule for the final attachment facilities and local upgrades (if required) to interconnect AE2-115 will be specified in a separate two party Interconnection Agreement (IA) between Valley Rural Electric Cooperative and the Interconnection Customer as this project is considered FERC non-jurisdictional per the PJM Open Access Transmission Tariff (OATT).

From the transmission perspective, no network impacts were identified as detailed in the "Network Impacts" section below.

6 Interconnection Customer Requirements

The proposed IC's facilities must be designed in accordance with the document titled FirstEnergy Distribution Engineering Practices Interconnection of Customer-Owned Generation to the FirstEnergy Distribution System dated 11/17/14 located at the following link:

http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx

Please contact VREC for their interconnection requirements.

7 Power Factor Requirements

Interconnection Customer shall design its generation facility to operate at unity power factor with a power inverter capable of varying its power factor from 0.95 leading to 0.95 lagging measured at the high side of the facility substation transformers.

8 Revenue Metering and SCADA Requirements

8.1 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.

8.1.1 Meteorological Data Reporting Requirement

The solar generation facility shall provide the Transmission Provider with site-specific meteorological data including:

- Temperature (degrees Fahrenheit)
- Atmospheric pressure (hectopascals)
- Irradiance
- Forced outage data

8.2 PENELEC Requirements

The FE operating company (Penelec) shall provide, own, operate, test, and maintain the revenue metering equipment at the Interconnection Customer's (IC) expense. The revenue metering equipment includes, but is not limited to, current transformers, voltage transformers, secondary wires, meter socket, bidirectional revenue meter, and associated devices. The IC shall mount the instrument transformers unless otherwise agreed to by Penelec. The instrument transformers and meter socket shall be installed in a location that is readily accessible to authorized Penelec representatives. Penelec will provide the IC access to bidirectional kWh and kVARh pulses from the Penelec meter at the IC's expense if requested. The IC shall, at its expense, install, own, operate, test, and maintain any metering and telemetry equipment that may be required to provide real-time meter data to FE or PJM.

9 Network Impacts

The Queue Project AF1-140 was evaluated as a 16.3 MW (Capacity 9.8 MW) injection at the Claysburg 23 kV substation in the PENELEC area. Project AF1-140 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-140 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Summer Peak Load Flow

9.1 Generation Deliverability

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

None

9.2 Multiple Facility Contingency

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

None

9.3 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

9.4 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

9.5 Steady State Voltage Requirements

None

9.6 Stability

Not required for this project.

9.7 System Reinforcements

None.

9.8 Light Load Analysis

Not required for solar projects.

Affected Systems

9.9 Affected Systems

None.

Short Circuit

9.10 Short Circuit

The following Breakers are overduty:

None.