



Generation Interconnection

Revised Combined Feasibility / System Impact Study Report

for

Queue Project AG1-158

MIDDLETOWN 34.5 KV

0 MW Capacity / 16 MW Energy

January 2021

Revised: April 2021

Table of Contents

- 1 Introduction..... 3
- 2 Preface..... 3
- 3 General..... 4
- 4 Revision Summary 4
- 5 Point of Interconnection..... 4
- 6 Cost Summary 4
- 7 Transmission Owner Scope of Work..... 6
- 8 Schedule..... 6
- 9 Revenue Metering and SCADA Requirements 6
 - 9.1 PJM Requirements 6
 - 9.2 Meteorological Data Reporting Requirements 6
 - 9.3 Interconnected Transmission Owner Requirements..... 7
- 10 Summer Peak - Load Flow Analysis 7
 - 10.1 Generation Deliverability 7
 - 10.2 Multiple Facility Contingency 7
 - 10.3 Contribution to Previously Identified Overloads..... 7
 - 10.4 Potential Congestion due to Local Energy Deliverability..... 7
 - 10.5 System Reinforcements - Summer Peak Load Flow - Primary POI..... 8
- 11 Short Circuit Analysis..... 8
 - 11.1 System Reinforcements - Short Circuit..... 8
- 12 Affected Systems 8
- 13 Attachment 1: One Line Diagram 9

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). The Interconnected Transmission Owner (ITO) is PECO.

2 Preface

The intent of the Combined Feasibility / System Impact 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. Cost allocation rules for network upgrades can be found in PJM Manual 14A, Attachment B. 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 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 Combined Feasibility / System Impact 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.

3 General

The Interconnection Customer (IC), **Buckeye Terminals, LLC**, has proposed a Solar generating facility located in Delaware County, Pennsylvania. The installed facilities will have a total capability of 16 MW with 0 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is June 16, 2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-158
Project Name	MIDDLETOWN 34.5 KV
State	Pennsylvania
County	Delaware
Transmission Owner	PECO
MFO	16
MWE	16
MWC	0
Fuel	Solar
Basecase Study Year	2024

Any new service customers who can feasibly be commercially operable prior to June 1st of the basecase study year are required to request interim deliverability analysis.

4 Revision Summary

The Report was updated to include an estimated ITO construction timeline in Section 8 Schedule.

5 Point of Interconnection

AG1-158 will interconnect with the PECO Distribution system at the Middletown 34.5 kV circuit 3341.

6 Cost Summary

The AG1-158 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$3,242,500
Total System Network Upgrade Costs	\$0
Total Costs	\$3,242,500

This cost excludes a Federal Income Tax Gross Up charges. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 2016-36, 2016-25 I.R.B. (6/20/2016). If at

a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

7 Transmission Owner Scope of Work

AG1-158 is a request to interconnect to a non-Ferc jurisdictional circuit. As a result, the scope, cost and schedule for the physical interconnection to the Transmission Owner distribution system will be captured in a two party Interconnection Agreement between the Transmission Owner and the Interconnection Customer.

A preliminary estimate is provided below:

High Level Scope of Work	Estimated Cost
Distribution Circuit Modifications	\$200,000
Installation of a new terminal pole with 1/0 Al conductor at project site	\$32,000
Installation of a PCC Recloser at project site	\$50,000
Middletown & Chester Substation Equipment & Protective Relay Installation/Modifications	\$220,000
Installation of Fiber for Direct Transfer Trip (approx. 16 miles)	\$2,192,000
Total	\$2,594,000
Total (with 25% contingency)	\$3,242,500

8 Schedule

The estimated time to complete the scope of work is 24 months after the Interconnection Agreement (IA) is signed and PECO receives Notice to Proceed from the IC.

9 Revenue Metering and SCADA Requirements

9.1 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.

9.2 Meteorological Data Reporting Requirements

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

- Back Panel temperature (Fahrenheit) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Irradiance (Watts/meter²) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Ambient air temperature (Fahrenheit) - (Accepted, not required)
- Wind speed (meters/second) - (Accepted, not required)

- Wind direction (decimal degrees from true north) - (Accepted, not required)

9.3 Interconnected Transmission Owner Requirements

The IC will be required to comply with all Interconnected Transmission Owner's revenue metering requirements for generation interconnection customers located at the following link:

<http://www.pjm.com/planning/design-engineering/to-tech-standards/>

10 Summer Peak - Load Flow Analysis

The Queue Project AG1-158 was evaluated as a 16.0 MW (Capacity 0.0 MW) injection at the Middletown 35 kV substation in the PECO area. Project AG1-158 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-158 was studied with a commercial probability of 100.0 %. Potential network impacts were as follows:

10.1 Generation Deliverability

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

None

10.2 Multiple Facility Contingency

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

None

10.3 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

10.4 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

10.5 System Reinforcements - Summer Peak Load Flow - Primary POI

None

11 Short Circuit Analysis

The following Breakers are overdutied:

None

11.1 System Reinforcements - Short Circuit

None

12 Affected Systems

None

13 Attachment 1: One Line Diagram

