# Generation Interconnection

# System Impact Study Report

# for

# Queue Project AG1-080

# DELAIR-LOCUST STREET 69 KV

# 10.7 MW Capacity / 19.9 MW Energy

Issued: August 2021
Revision 1: June 2022
Revision 2: August 2022

# Table of Contents

# 1 Introduction

This System Impact Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 205, as well as the System Impact Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is PSEG.

# 2 Revision History

Revision 0 – Initial issue
Revision 1 – Updated cost estimates and Interconnection Customer Scope of Work
Revision 2 – Updated Transmission Owner Scope of Work

# 3 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.

## 4 General

The Interconnection Customer (IC) has proposed a Solar generating facility located in Camden County, New Jersey. The installed facilities will have a total capability of 19.9 MW with 10.7 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is December 23, 2022. This study does not imply a TO commitment to this in-service date.

| Queue Number | AG1-080 |
|---|---|
| Project Name | DELAIR-LOCUST STREET 69 KV |
| State | New Jersey |
| County | Camden |
| Transmission Owner | PSEG |
| MFO | 19.9 |
| MWE | 19.9 |
| MWC | 10.7 |
| 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.

## 5 Point of Interconnection

AG1-080 will interconnect with the PSEG on transmission system tapping the Delair to Locust Street 69 kV Line. The Point of Interconnection will be located at the line disconnect switches on the high side of the IC's circuit breaker.

## 6 Cost Summary

The AG1-080 project will be responsible for the following costs:

| Description | Total Cost |
|---|---|
| Total Physical Interconnection Costs | $ 2,140,000 |
| Allocation towards System Network Upgrade Costs (PJM Identified - Summer Peak)* | $ 0 |
| Allocation towards System Network Upgrade Costs (PJM Identified - Light Load)* | $ 0 |
| Allocation towards System Network Upgrade Costs (TO Identified)* | $ 0 |
| Total Costs | $ 2,140,000 |

*As your project progresses through the study process and other projects modify their request or withdraw, then your cost allocation could change.

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 88-129. 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.

Note 1: PJM Open Access Transmission Tariff (OATT) section 217.3A outline cost allocation rules. The rules are further clarified in PJM Manual 14A Attachment B. The allocation of costs for a network upgrade will start with the first Queue project to cause the need for the upgrade. Later queue projects will receive cost allocation contingent on their contribution to the violation and are allocated to the queues that have not closed less than 5 years following the execution of the first Interconnection Service Agreement which identifies the need for this upgrade.

## 7 Transmission Owner Scope of Work

PSE&G upgrades and additions include the attachment facilities and non-direct network upgrades. Interconnected Transmission Owner will complete all permitting activities and submittals necessary to construct the 69 kV overhead span over existing railroad facilities.

The total physical interconnection costs is given in the table below:

| Description | Total Cost |
|---|---|
| **Attachment Facilities:** Installation of revenue grade metering | $ 150,000 |
| **Direct Connection Network Upgrades** | $ 0 |
| **Non-Direct Connection Network Upgrades** Loop existing I-737 circuit into the IC constructed 3 breaker ring bus station. Relay modifications at remote ends of circuit. | $ 1,990,000 |
| **Total Physical Interconnection Costs** | **$ 2,140,000.00** |

The cost breakdown is as follows:

| | Direct Labor | Indirect Labor | Direct Material | Indirect Material | Total |
|---|---|---|---|---|---|
| **Attachment Facilities** | $70,000 | $20,000 | $50,000 | $10,000 | **$150,000** |
| **Non-Direct** | $1,340,000 | $200,000 | $390,000 | $60,000 | **$1,990,000** |
| **Total** | **$1,410,000** | **$220,000** | **$440,000** | **$70,000** | **$2,140,000** |

Assumptions:

- Developer to install Air Insulated Switchgear consistent with PSE&G's Plant Engineering Policies and Procedures manual Chapters 6 & 11 which can be found on PJM's website at the following link: https://www.pjm.com/planning/design-engineering/to-tech-standards/private-pseg
- The current estimate involves crossing railroad tracks to access the project site. It is assumed the affected railroad entities will provide timely approval of an overhead crossing with minimal design modification.
- The Developer will provide adequate easements to allow PSE&G to extend the I-737 circuit from River Road to the IC constructed substation.

## 8 Interconnection Customer Scope of Work

Interconnection Customer shall construct and, unless otherwise indicated, shall own, the following Interconnection Facilities:

a) One (1) 34.5/69kV generator step-up transformer
b) 69 kV line beginning at the high side of the generator step-up transformer (GSU) and extending to the Point of Interconnection;
c) Circuit breakers and associated equipment; and
d) Relay and protective equipment, and Supervisory Control and Data Acquisition (SCADA) and telecommunications equipment to comply with the Applicable Technical Requirements and Standards identified in Schedule D of this ISA.

The Interconnection Customer will also construct a new three (3) breaker 69kV ring bus adjacent to its new generating facility, including a new 69kV bus, 69kV breakers, and associated equipment. A new generator lead line and associated breaker and equipment will be constructed to connect the new 69kV interconnection substation to the Point of Interconnection.

## 9 Schedule

Based on the scope of work for the interconnection facilities, it is expected to take a minimum of **14 months** after the signing of an Interconnection Construction Service Agreement (or "Interconnection Agreement" if non-FERC) and construction kickoff call to complete the installation of the physical connection work.

This duration does not include time for the IC to obtain necessary permits, easement, and approvals for Interconnection Facilities. The developer must obtain these approvals prior to PSE&G installation. PSE&G's schedule assumes reasonable efforts will be made by the Interconnection Customer to meet the proposed schedule, consequently delays to the Interconnection Customer's activities may lead to delays/changes to the PSEG's schedule as well.

## 10 Interconnection Customer Requirements

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

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

## 11 Revenue Metering and SCADA Requirements

### 11.1 PJM Requirements

The Interconnected Transmission Owner 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.

### 11.2 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)

### 11.3 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/

## 12 Summer Peak Analysis

The Queue Project AG1-080 was evaluated as a 19.9 MW (Capacity 10.70 MW) injection tapping the Delair to State Street 69 kV line in the PSEG area. Project AG1-080 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-080 was studied with a commercial probability of 100.0 %. Potential network impacts were as follows:

### 12.1 Generation Deliverability

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

None

### 12.2 Multiple Facility Contingency

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

None

### 12.3 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

### 12.4 Steady-State Voltage Requirements

None

### 12.5 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

### 12.6 System Reinforcements

None

## 13 Light Load Analysis

The Queue Project AG1-080 was evaluated as a 19.9 MW injection tapping the Delair to State Street 69 kV Line in the PSEG area. Project AG1-080 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-080 was studied with a commercial probability of 100.0 %. Potential network impacts were as follows:

### 13.1 Light Load Deliverability

(Single or N-1 contingencies)

None

### 13.2 Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies)

None

### 13.3 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

### 13.4 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

### 13.5 System Reinforcements

None

## 14 Short Circuit Analysis

The following Breakers are overdutied

None

### 14.1 System Reinforcements - Short Circuit

None

## 15 Stability and Reactive Power

(Summary of the VAR requirements based upon the results of the dynamic studies)

Not Required

## 16 Affected Systems

None

## 17 Attachment 1: One Line Diagram