# Generation Interconnection

# Feasibility Study Report

# for

# Queue Project AF2-435

# WAUGH CHAPEL 115 KV

# 33 MW Capacity / 55 MW Energy

July 2020

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## 1 Introduction

This Feasibility 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 BGE.

## 2 Preface

The intent of the feasibility 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.

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 Feasibility 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.

## 3 General

The Interconnection Customer (IC) has proposed a Solar generating facility located in Anne Arundel County, Maryland. The installed facilities will have a total capability of 55 MW with 33 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is September 01, 2023. This study does not imply a TO commitment to this in-service date.

| Queue Number | AF2-435 |
|---|---|
| Project Name | WAUGH CHAPEL 115 KV |
| State | Maryland |
| County | Anne Arundel |
| Transmission Owner | BGE |
| MFO | 55 |
| MWE | 55 |
| MWC | 33 |
| Fuel | Solar |
| Basecase Study Year | 2023 |

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 Point of Interconnection

AF2-435 will interconnect with the BGE transmission system via one of the following options:

Option 1: via the Waugh Chapel 115 kV substation. The physical Point of Interconnection will be located on the customer side of a motor operated disconnect to be owned and operated by BGE.

Option 2: via the Waugh Chapel 230 kV substation.

## 5 Cost Summary

The AF2-435 project will be responsible for the following costs:

| Description | Total Cost |
|---|---|
| Total Physical Interconnection Costs | $ 6,375,000 |
| Total System Network Upgrade Costs | $ 0 |
| Total Costs | $ 6,375,000 |

This cost excludes CIAC Tax Gross-Up charges.

Cost allocations for any System Upgrades will be provided in the System Impact Study Report.

# 6 Transmission Owner Scope of Work

AF2-435 will interconnect with the BGE transmission system at BGE's Waugh Chapel 115kV substation. The existing 115kV breaker and half configuration at Waugh Chapel can be expanded to accept an additional circuit position. The physical Point of Interconnection will be located on the customer side of a motor operated disconnect to be owned and operated by BGE.

The total physical interconnection costs is given in the table below. These costs do not include CIAC Tax Gross-up.

| Description | Total Cost |
|---|---|
| Attachment Facility Costs | $ 5,250,000 |
| Direct Connection Network Upgrade | $ 0 |
| Non-Direct Connection Network Upgrades | $ 1,125,000 |
| Total Physical Interconnection Costs | $ 6,375,000 |

## 6.1 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 |
|---|---|
| Dead End Structure, Motor Operated Disconnect | $ 1,000,000 |
| Two UG Termination Structures | $ 750,000 |
| 115kV Underground Transmission Cable | $ 3,500,000 |
| Total Attachment Facility Costs | $ 5,250,000 |

## 6.2 Direct Connection Cost Estimate

None

## 6.3 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 |
|---|---|
| 115kV Circuit Breaker | $ 1,000,000 |
| Relay Installation/Modifications | $ 125,000 |
| Total Non-Direct Connection Facility Costs | $ 1,125,000 |

# 7 Schedule

Based on the extent of the BGE Attachment and Non-Direct Connection work required to support the AF2-435 generation project, it is expected to take approximately 18-24-months from the date of a fully executed Interconnection Construction Service Agreement to complete the installation.

# 8 Interconnection Customer Requirements

The Interconnection Customer (IC) is responsible for all design and construction related to activities on their side of the Point of Interconnection. Site preparation, including grading and an access road, as necessary, is assumed to be by the IC. Route selection, line design, and right-of way acquisition of the direct connect facilities is not included in this report and is the responsibility of the IC. The Interconnection Customer will be responsible for future O & M costs associated with the direct connect facilities.

Protective relaying and metering design and installation must comply with BGE's applicable standards. The IC is also required to provide revenue metering and real-time telemetering data to PJM in conformance with the requirements contained in PJM Manuals M-01 and M-14 and the PJM Tariff. BGE will require the capability to remotely trip the generator from its System Operations facility.

It is the IC's responsibility to send the data that both PJM and BGE require directly to PJM. The IC will grant permission for PJM to send BGE the following telemetry that the IC sends to PJM: real time MW, MVAR, volts, amperes, generator status, interval MWH and MVARH, and generator breaker position.

The IC is responsible for coordinating with BGE to ensure the revenue metering equipment is capable of being remotely interrogated by BGE's Automated Meter Reading system.

# 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:

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

## 9.3 BGE Requirements

The Interconnection Customer will be required to comply with all BGE Revenue Metering Requirements for Generation Interconnection Customers as outlined in the link below. The Revenue Metering Requirements may be found within the BGE "Exelon Utilities Transmission Facility Interconnection Requirements" document located at the following link:

https://www.pjm.com/-/media/planning/plan-standards/private-ce/exelon-utilities-transmission-facility-interconnection-requirements.ashx?la=en

All Revenue Metering shall have ability to connect to BGE's Automated Meter Reading (AMR) system. Metering equipment shall be reviewed and approved for prior to purchase to ensure compatibility with AMR System. Interconnection customer will be required to make provisions for a POTS (plain old telephone service) line within approximately three feet of each metering position to facilitate Automated Meter Reading and data collection. Alternatives to a POTS line must be reviewed and approved by BGE to ensure compatibility with AMR System.

Depending on IC's final meter plan, BGE may require BGE owned check meters at or near the IC's revenue meter locations. The need for check meters will be determined during final engineering.

## 10 Summer Peak - Load Flow Analysis - Primary POI

The Queue Project AF2-435 was evaluated as a 55.0 MW (Capacity 33.0 MW) injection at the **Waugh Chapel 115 kV substation** in the BGE area. Project AF2-435 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-435 was studied with a commercial probability of 53.0 %. 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

## 11 Short Circuit Analysis - Primary POI

To be performed during the System Impact Study for the selected POI.

## 12 Summer Peak - Load Flow Analysis - Secondary POI

The Queue Project AF2-435 was evaluated as a 55.0 MW (Capacity 33.0 MW) injection at the **Waugh Chapel 230 kV substation** in the BGE area. Project AF2-435 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-435 was studied with a commercial probability of 53.0 %. 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