



**Generation Interconnection
Feasibility Study Report
for
Queue Project AG1-517
OSAGE 138 KV
50 MW Capacity / 50 MW Energy**

January 2021

Table of Contents

| | | |
|------|--|----|
| 1 | Introduction..... | 3 |
| 2 | Preface..... | 3 |
| 3 | General | 5 |
| 4 | Point of Interconnection..... | 6 |
| 5 | Cost Summary | 6 |
| 6 | Transmission Owner Scope of Work | 7 |
| 7 | Schedule..... | 8 |
| 8 | Transmission Owner Analysis..... | 8 |
| 9 | Interconnection Customer Requirements..... | 8 |
| 9.1 | System Protection..... | 8 |
| 10 | Revenue Metering and SCADA Requirements | 8 |
| 10.1 | PJM Requirements | 8 |
| 10.2 | Interconnected Transmission Owner Requirements..... | 8 |
| 11 | Summer Peak - Load Flow Analysis | 10 |
| 11.1 | Generation Deliverability | 11 |
| 11.2 | Multiple Facility Contingency | 11 |
| 11.3 | Contribution to Previously Identified Overloads..... | 11 |
| 11.4 | Potential Congestion due to Local Energy Deliverability..... | 11 |
| 11.5 | System Reinforcements - Summer Peak Load Flow - Primary POI..... | 12 |
| 11.6 | Flow Gate Details..... | 13 |
| 11.7 | Queue Dependencies | 14 |
| 11.8 | Contingency Descriptions..... | 15 |
| 12 | Short Circuit Analysis..... | 16 |
| 13 | Affected Systems | 17 |
| 14 | Attachment 1: One Line Diagram | 18 |

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 ComEd.

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.

An Interconnection Customer with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.

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.

The conduct of light load analysis as required under the PJM planning process is not performed during the Generation Interconnection Feasibility Study phase of the PJM study process. Additional reinforcement requirements for this Interconnection Request may be defined during the conduct of the light load analysis which shall be performed following execution of the System Impact Study agreement.

3 General

The Interconnection Customer (IC) has proposed a Natural Gas generating facility located in in Monongalia, West Virginia. The installed facilities will have a total capability of 50 MW with 50 MW of this output being recognized by PJM as Capacity. The Capacity Interconnection Rights associated with this request are being transferred from the deactivated facility. The proposed in-service date for this uprate project is April 1, 2022. This study does not imply a TO commitment to this in-service date.

| | |
|----------------------------|----------------|
| Queue Number | AG1-517 |
| Project Name | CALUMET 138 KV |
| State | West Virginia |
| County | Monongalia |
| Transmission Owner | APS |
| MFO | 50 |
| MWE | 50 |
| MWC | 50 |
| Fuel | Natural Gas |
| 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 Point of Interconnection

AG1-517 will interconnect with the APS transmission system at the Osage 138 kV substation. The generation facility is already existing as well as the connection to the Osage 138 kV substation.

Attachment 1 shows a one-line diagram of the proposed primary Direct Connection facilities for the AG1-517 generation project to connect to the FirstEnergy (“FE”) Transmission System.

5 Cost Summary

The AG1-517 project will be responsible for the following costs:

| Description | Total Cost |
|---|------------|
| Total Physical Interconnection Costs | \$882,200 |
| Total System Network Upgrade Costs | \$0 |
| Total Costs | \$882,200 |

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.

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

6 Transmission Owner Scope of Work

AG1-517 will interconnect with the APS transmission system at the Osage 138 kV substation. The generation facility is already existing as well as the connection to the Osage 138 kV substation.

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

| Description | Total Cost |
|--|------------------|
| No attachment facilities—Facility already connected to Osage SS. | \$0 |
| Commission customer station and provide nameplates for interconnection | \$22,000 |
| Upgrade relaying at Osage. | \$860,000 |
| Total Physical Interconnection Costs | \$882,000 |

7 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 and construction kickoff call to complete the installation. This assumes that there will be no environmental issues with any of the new properties associated with this project, that there will be no delays in acquiring the necessary permits for implementing the defined work and that all system outages will be allowed when requested.

The schedule for the required Network Impact Reinforcements will be more clearly identified in future study phases. The estimated time to complete each of the required reinforcements is identified in the “System Reinforcements” section of the report.

8 Transmission Owner Analysis

FE performed an analysis of its underlying transmission <100 kV system. The AG1-517 project did not contribute to any overloads on the FE Transmission System.

9 Interconnection Customer Requirements

9.1 System Protection

The IC must design its Customer Facilities in accordance with all applicable standards, including the standards in FE’s “Requirements for Transmission Connected Facilities” document located at: <http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx>. Preliminary Protection requirements will be provided as part of the Facilities Study. Detailed Protection Requirements will be provided once the project enters the construction phase.

The IC shall design its solar-powered non-synchronous Customer Facility with the ability to maintain a power factor of at least 0.95 leading (absorbing VARs) to 0.95 lagging (supplying VARs) measured at the generator’s terminals.

10 Revenue Metering and SCADA Requirements

10.1 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.

10.2 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/>

11 Summer Peak - Load Flow Analysis

The Queue Project AG1-517 was evaluated as a 50.0 MW (Capacity 50.0 MW) injection claiming rights from the Southeast Chicago Energy Project at the Calumet 138 kV substation in the ComEd area. Project AG1-517 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-517 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

11.1 Generation Deliverability

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

None

11.2 Multiple Facility Contingency

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

None

11.3 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

11.4 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

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

None

11.6 Flow Gate Details

The following indices contain additional information about each facility presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. The intent of the indices is to provide more details on which projects/generators have contributions to the flowgate in question. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the indices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the indices. Although this information is not used "as is" for cost allocation purposes, it can be used to gage the impact of other projects/generators. It should be noted the project/generator MW contributions presented in the body of the report are Full MW Impact contributions which are also noted in the indices column named "Full MW Impact", whereas the loading percentages reported in the body of the report, take into consideration the PJM Generator Deliverability Test rules such as commercial probability of each project as well as the ramping impact of "Adder" contributions. The MW Impact found and used in the analysis is shown in the indices column named "Gendeliv MW Impact".

None

11.7 Queue Dependencies

The Queue Projects below are listed in one or more indices for the overloads identified in your report. These projects contribute to the loading of the overloaded facilities identified in your report. The percent overload of a facility and cost allocation you may have towards a particular reinforcement could vary depending on the action of these earlier projects. The status of each project at the time of the analysis is presented in the table. This list may change as earlier projects withdraw or modify their requests.

None

11.8 Contingency Descriptions

None

12 Short Circuit Analysis

The following Breakers are overdutied:

None

13 Affected Systems

1.1 NYISO

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

1.2 MISO

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

14 Attachment 1: One Line Diagram