# Generation Interconnection

# System Impact Study Report

# for

# Queue Project AF1-045

# CEDARVILLE-FORD 138 KV

# 31.3 MW Capacity / 52.2 MW Energy

August, 2020

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# 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 DEOK

# 2 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.

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.

## 3 General

Project AF1-045 is a request by Clermont County Solar Project, LLC (Interconnection Customer) that proposes a 52.2 MW MFO increase using battery storage to PJM queue project AE2-318, which is a solar farm to be built near Hawley Road, Clermont County, Ohio. Please refer to the facilities location map in Attachment 1.

The proposed in-service date for this project is December 01, 2023. This study does not imply a Duke Energy commitment to this in-service date.

The objective of this System Impact Study is to determine budgetary cost estimates and approximate construction timelines for identified transmission facilities required to connect the proposed generating facilities to the ITO transmission system. These reinforcements include the Attachment Facilities, Local Upgrades, and Network Upgrades required for maintaining the reliability of the ITO transmission system.

| | |
|---|---|
| **Queue Number** | **AF1-045** |
| **Project Name** | CEDARVILLE-FORD 138 KV |
| **State** | Ohio |
| **County** | Clermont |
| **Transmission Owner** | DEOK |
| **MFO** | 152.2 |
| **MWE** | 52.2 |
| **MWC** | 31.3 |
| **Fuel** | Storage |
| **Basecase Study Year** | 2023 |

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

AF1-045 will interconnect with the Duke Energy transmission system by direct injection into a new 138 kV substation bus located on the feeder between the AF1-315 and Cedarville substations. The new substation will have a three-breaker ring bus configuration. The Point of Interconnection is located where Duke Energy's overhead line from the new substation terminates to the Interconnection Customer's pole mounted switch, approximately 25 feet outside the new substation fence; please refer to the single-line diagram in Attachment 2. Please note that since AF1-045 is an addition to AE2-318, the three-breaker ring bus station mentioned above is constructed in project AE2-318. Should AE2-318 drop from the PJM queue, AF1-045 would be responsible for construction of this three-breaker ring bus.

## 5 Cost Summary

The AF1-045 project will be responsible for the following costs:

| Description | Total Cost |
|---|---|
| **Attachment Facilities** | $0 |
| **Direct Connection Network Upgrade** | $0 |
| **Non Direct Connection Network Upgrades** | $0 |
| **Allocation for New System Upgrades*** | $0 |
| **Contribution to Previously Identified Upgrades*** | $0 |
| **Total Costs** | **$0** |

*As your project progress through the study process, as things withdraw, then this may result in changes to your cost allocation.

This total 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.

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.

# 6 Transmission Owner Scope of Work

## 6.1 Attachment Facilities

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 |
|---|---|
| None. Attachment facilities are being constructed in PJM queue project AE2-318 | $0 |
| **Total Attachment Facility Costs** | **$0** |

## 6.2 Direct Connection Cost Estimate

The total preliminary cost estimate for the Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

| Description | Total Cost |
|---|---|
| None. Attachment facilities are being constructed in PJM queue project AE2-318 | $0 |
| **Total Direct Connection Facility Costs** | **$0** |

## 6.3 Non-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 |
|---|---|
| None. | $0 |
| **Total Non-Direct Connection Facility Costs** | **$0** |

Duke Energy facilities and network upgrades costs required to support the AF1-045 project are listed below. Please note this is a class 5 estimate, with a band range of (-50% to +100 %). It is also assumed there will be no issues obtaining Transmission Line easement for station power.

(a) Attachment Facilities: $ 0 (None)

(b) Direct Connection Network Upgrades: $ 0 (None)

(c) Non-Direct Connection Network Upgrades: $ 0 (None)

(d) Direct Connection Local Upgrades: $ 0 (None)

(e) Non-Direct Connection Local Upgrades: $ 0 (None)

(f) Option to Build Upgrades: $ 0 (None)

***Estimated Total Costs (a) to (f):*** .....$ 0 (None)

NOTE: CIAC Tax Gross Up charges will be charged to the project if it does not meet the eligibility requirements of IRS Notice 88-129.

## 7 Incremental Capacity Transfer Rights (ICTRs)

None.

## 8 Schedule

The estimated time to complete this work is approximately 29 months from a signed ISA and CSA. This assumes no issues getting a PJM outage on the line or adjacent line on tower and no major interruptions for weather.

## 9 Interconnection Customer Requirements

Interconnection Customer will be required to procure and provide land for the new substation. The land will be ceded to Duke Energy prior to construction of the new substation. The land must be near the Ford Batavia - Cedarville 138 kV feeder path and have direct access to publicly maintained roadway. The land shall be environmentally permitted, graded and ready for construction. Final size and location is to be approved by Duke Energy.

Interconnection Customer will be required to engineer, procure, and construct the connecting circuit from the Interconnection Customer's substation to the Point of Interconnection. This includes, but is not limited to, a pole and switch to be installed approximately 25 feet outside the new substation fence.

Interconnection Customer will be responsible for meeting all criteria as specified in the applicable sections of the "Duke Energy Midwest transmission systems Facility Connection Requirements" document, Version 7, effective October 31, 2018, which can be found under this link:

http://www.pjm.com/~/media/planning/plan-standards/deok/deok-facility-connection-requirements.ashx.

# 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 DEOK Requirements

The Interconnection Customer will be required to comply with all Duke Energy revenue metering requirements for generation interconnection customers. The revenue metering requirements may be found within the "Duke Energy Midwest transmission systems Facility Connection Requirements" document, Version 7, effective October 31, 2018.

## 11 Summer Peak Analysis

The Queue Project AF1-045 was evaluated as a 52.2 MW (Capacity 31.3 MW) injection as an uprate to AE2-318 tapping the Ford to Cedarville 138 kV line in the DEOK area. Project AF1-045 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-045 was studied with a commercial probability of 100.0 %. 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 Steady-State Voltage Requirements

None

### 11.5 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

## 11.6 System Reinforcements

| ID | Idx | Facility | Upgrade Description | Cost | Cost Allocated to AF1-045 | Upgrade Number |
|---|---|---|---|---|---|---|
| | | | **TOTAL COST** | **$0** | **$0** | |

Note : For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

## 12 Light Load Analysis

The Queue Project AF1-045 was evaluated as a 52.3 MW (Capacity 31.3 MW) injection as an uprate to AE2-318 tapping the Ford to Cedarville 138 kV line in the DEOK area. Project AF1-045 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-045 was studied with a commercial probability of 100.0 %. Potential network impacts were as follows:

### 12.1 Light Load Deliverability

(Single or N-1 contingencies)

None.

### 12.2 Multiple Facility Contingency

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

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

To be determined.

### 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

| ID | Idx | Facility | Upgrade Description | Cost | Cost Allocated to AF1-045 | Upgrade Number |
|---|---|---|---|---|---|---|
| | | | | $0 | $0 | |

Note : For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

## 13 Short Circuit Analysis

The following Breakers are overdutied

None.

## 14 Stability and Reactive Power

To be determined in the Facilities Study Phase

## 15 Affected Systems

### 15.1 MISO

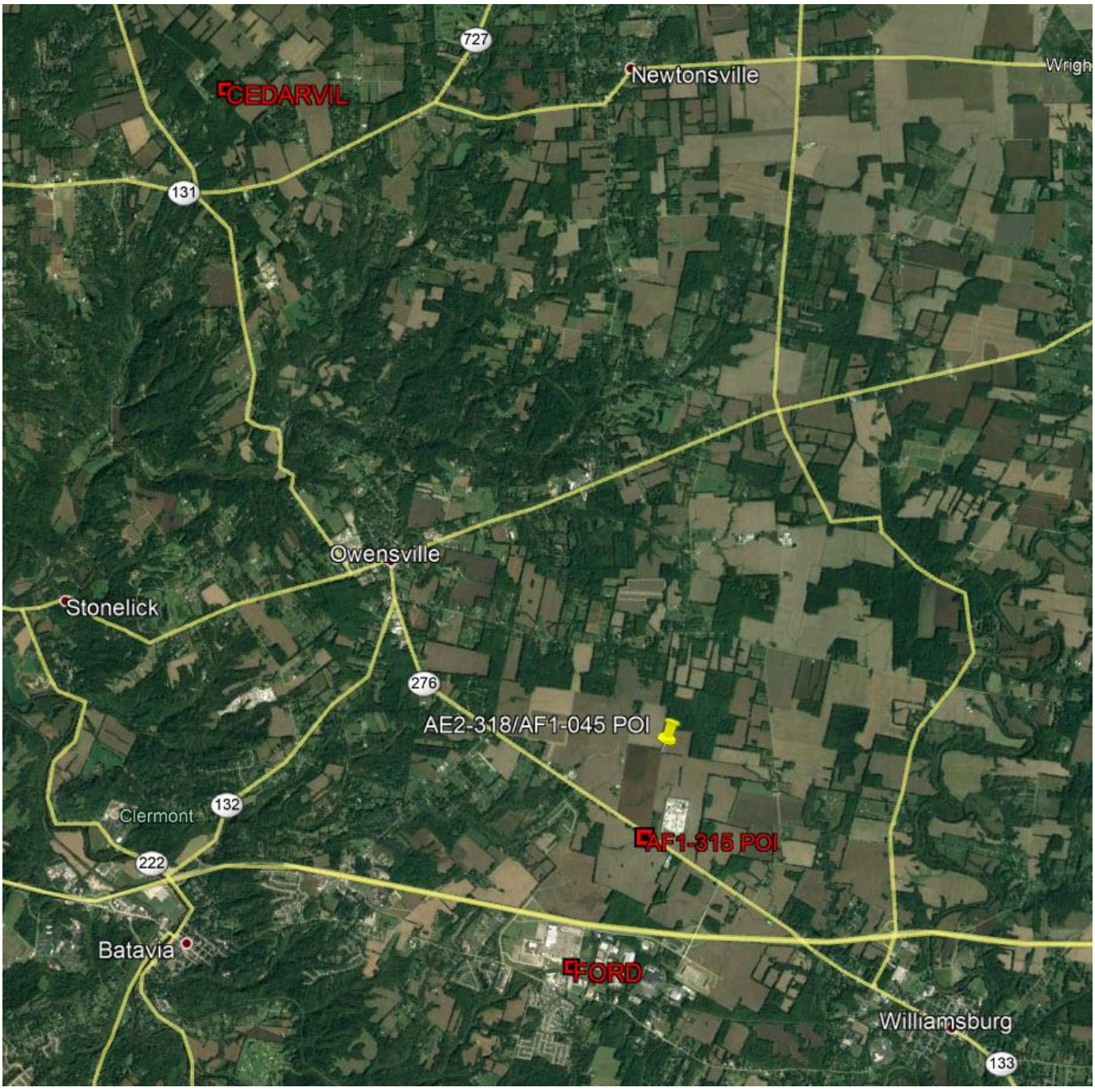
MISO Impacts to be determined during later study phases (as applicable).

### 15.2 LG&E

LG&E Impacts to be determined during later study phases (as applicable).

## 16 Attachment 1: Facility Location

**PJM Queue Position: AF1-045**



## 17 Attachment 2: One-Line Diagram

### PJM Queue Position: AF1-045