Generation Interconnection

Facilities Study Report

for

Queue Project AE2-315

YANKEE TAP 69 KV

23.5 MW Capacity / 23.5 MW Energy

March 2022

Contents

1 Preface

The intent of the Facility Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation 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: (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. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM website) 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 users, 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 Facility Study estimates attempt to identify the estimated 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.

2 General

The Interconnection Customer (IC) has proposed an uprate to an existing Natural Gas generating facility located in Centerville, Ohio. This project requests an increase to the NQ-153 project's installed capability of existing 23.5 of uprate MW with 23.5 of uprate MW of this output being recognized by PJM as Capacity. The installed facilities will have a total capability of 124 MW with 124 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is June 1, 2020. **This study does not imply a TO commitment to this in-service date.**

Queue Number	**AE2-315**
Project Name	YANKEE TAP 69 KV
Interconnection Customer	Yankee Street, LLC
State	Ohio
County	Montgomery
Transmission Owner	Dayton
MFO	124
MWE	23.5
MWC	23.5
Fuel	Natural Gas
Basecase Study Year	2022

2.1 Point of Interconnection

AE2-315 will interconnect with the Dayton transmission system as an uprate to the existing Yankee Facility at the Yankee 69kV substation.

2.2 Cost Summary

The AE2-315 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$0
Direct Connection Network Upgrade	$0
Non-Direct Connection Network Upgrades	$15,000
Total Costs	**$15,000**

In addition, the AE2-315 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	**$0**

Cost allocations for these upgrades will be provided in the System Impact Study Report.

3 Transmission Owner Facilities Study Summary

3.1 Description of the Project

The Interconnection Customer (IC) has proposed an uprate to an existing Natural Gas generating facility located in Centerville, Ohio. This project requests an increase to the NQ-153 project's installed capability of existing 23.5 of uprate MW with 23.5 of uprate MW of this output being recognized by PJM as Capacity. The installed facilities will have a total capability of 124 MW with 124 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is June 1, 2020. **This study does not imply a TO commitment to this in-service date.**

3.2 Point of Interconnection (POI)

AE2-315 will interconnect with the Dayton transmission system as an uprate to the existing Yankee Facility at the Yankee 69kV substation.

3.3 Amendments to the Original System Impact Study Results

The original AE2-315 System Impact Study report was issued in February 2020 and there have been no changes since. Please note that the stability study identified a reactive deficiency that needs to be addressed per the ISA, Specifications Section 1(d).

Stability Analysis Results

The reactive power assessment identified deficiencies. Additional capacitive (lagging) reactive power, estimated at 7.5 MVAR is required to fulfill the power factor requirement.

3.4 Interconnection Customer's Submitted Milestone Schedule

The IC's proposed Commercial Operation Date (COD) for the generation facility is June 1, 2020

It is expected to take a minimum of 6 months from the date of a fully executed Interconnection Construction Service Agreement for DP&L to complete all required engineering, construction, and associated activities.

3.5 Scope of Customer's Work

The Interconnection Customer (IC) will uprate 23.5MW capacity to the existing 100.5MW in the existing Natural Gas generating facility in Yankee Street Substation, located in Centerville, Ohio. The IC will be responsible for paying all expenses to meet the Dayton Protection Requirements and other upgrades required by this project. The DP&L Protection Requirements are outlined in **Attachment 4.**

3.6 Description of facilities Included in the facilities Study

There is no Attachment Facilities work required for this project.

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	$0
Total Attachment Facility Costs	**$0**

3.7 Direct Connection Cost Estimate

There is no Direct Connection scope of work required for this project.

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	$0
Total Direct Connection Facility Costs	**$0**

3.8 Non-Direct Connection Cost Estimate

The substation non-direct connection cost estimate for the AE2-315 project is approximately $15000. Relaying will need to be evaluated for settings changes at Yankee Substation to facilitate the interconnection of the new generation.

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
Protection System Evaluation at Yankee Substation	$15,000
Total Non-Direct Connection Facility Costs	**$15,000**

3.9 Total Costs of Transmission Owner Facilities included in Facilities Study

Description	Total Cost
Attachment Facilities	$0
Direct Connection Network Upgrade	$0
Non-Direct Connection Network Upgrades	$15,000
Total Costs	**$15,000**

The costs given in this report show the estimates without state or federal tax. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 88-129. If applicable, the tax shown in the rightmost column above would be applied. The IC will be responsible for the actual cost of all implementing all work identified in the table above.

3.10 Summary of Milestone Schedules for Completion of Work Included in Facilities Study:

A proposed six **(6)-month** schedule for Dayton's non-direct transmission work is estimated to complete engineering, construction and the associated activities listed above starting one month from the date of a fully executed Interconnection Construction Service Agreement. This includes the requirement for the Interconnection Customer to make a preliminary payment to Dayton which funds the construction of the Non-Direct Connection facilities. It assumes that there will be no environmental or permitting issues to implement the Non-Direct Connection upgrades for this project and that all system outages will be allowed when requested.

3.11 Back-up Service Agreement

The execution of a back-up retail service agreement with the TO will be necessary to serve the customer load supplied from the AD2-031 interconnection point when the units are out-of-service. This assumes the intent of the IC is to net the generation with the load.

General Assumptions/Qualifiers

The accomplishment of the work on the TO system to support the estimated costs and proposed schedule is dependent on the following:

- Obtaining the necessary transmission line/equipment outages if needed to perform P&C settings changes. Transmission outages are typically not granted from June to September and are discouraged during extreme winter conditions. PJM and Dayton TSO require 6 to 12-month notice for greater than 5-day and 30-day outages respectively.
- IC provides location and orientation of their attachment facilities.
- No extreme weather.
- No force majeure.

4 Transmission Owner Facilities Study Results

4.1 Transmission Lines – New

None

4.2 Transmission Line – Upgrades

None

4.3 New Substation/Substation Facilities

None

4.4 Upgrades to Substation / Substation Facilities

Protection system changes at Yankee 69kV

4.5 Metering & Communications

4.5.1 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 Sections 24.1 and 24.2.

IC will be responsible for designing, furnishing and installing Supervisory Control and Data Acquisition (SCADA) RTU equipment in its generation substation, and for obtaining the telecommunication circuits and data transfer from the RTU to the Transmission Owner Data Center.

4.6 Transmission Owner (Dayton) Requirements

The Interconnection Customer will be required to comply with all Dayton Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the Dayton Power & Light Co. "Requirements for the Connection of Facilities to the Dayton Power & Light Co. Transmission System" document located at the following link:

http://www.pjm.com/~/media/planning/plan-standards/private-dayton/dayton-facilities-connection-requirements.ashx

4.7 Environmental, Real Estate and Permitting Issues

IC will be responsible for acquiring all rights-of-way, easements, properties, vegetation clearing, environmental, state siting approvals, and municipal permits that may be required to construct all attachment facilities, up to the POI shown in the one-line diagram in Attachment 1. The IC will be responsible for the costs incurred to obtain the necessary environmental and other permits necessary to construct the non-direct and direct connect facilities.

4.8 Information Required for Interconnection Service Agreement

The following table summarizes the total estimated costs according to FERC criteria. The estimated costs are in **2020 dollars.** The taxes are a CIAC (Contribution in Aid of Construction) Federal Income Tax Gross Up charge. This tax may or may not be charged based on whether this project meets eligibility requirements of IRS Notice 88-129. This tax is not included in the table below:

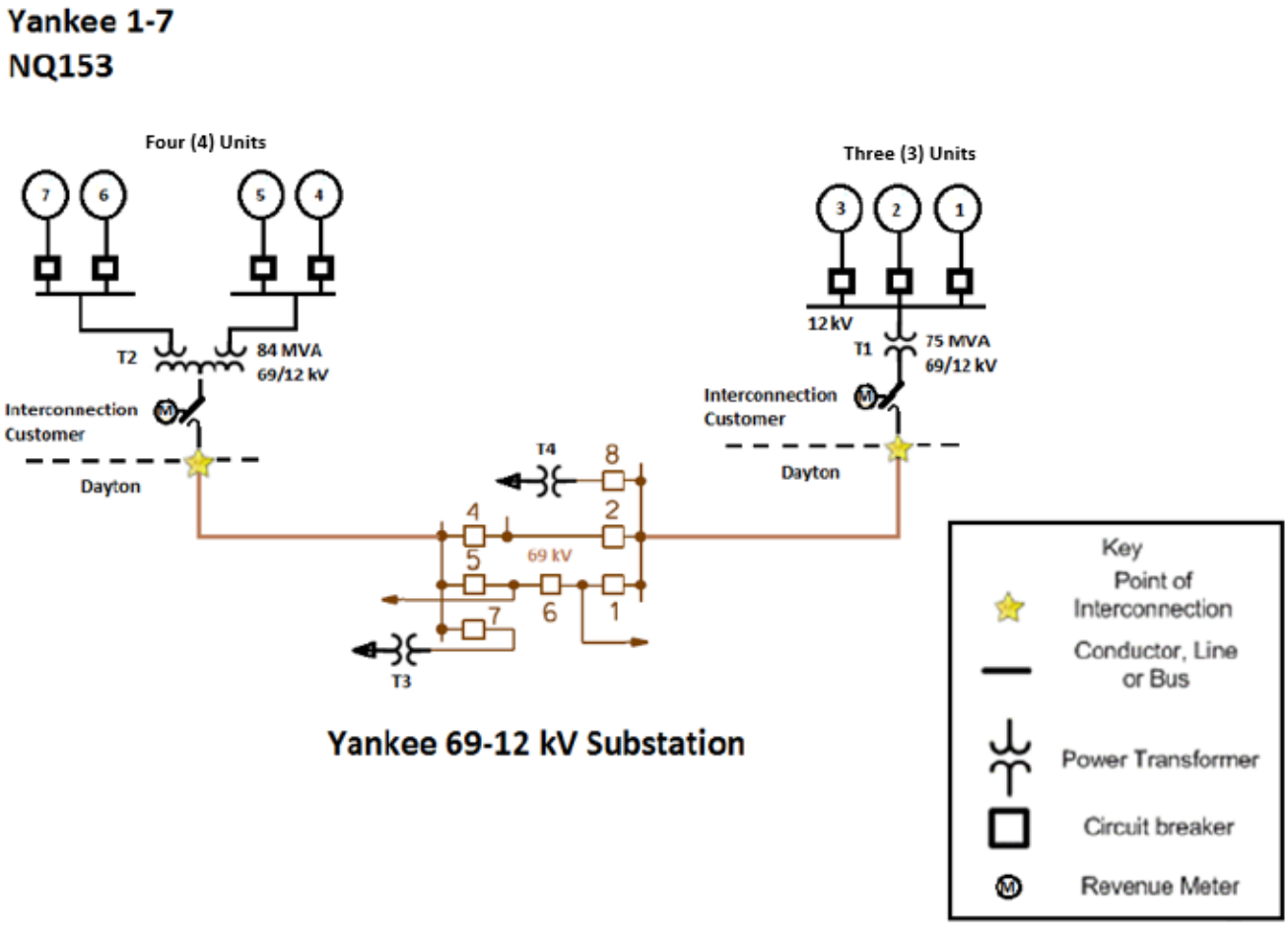
Description	Direct Labor	Direct Material	Indirect Labor	Indirect Materials
Attachment Facilities				
Direct Connection Network Upgrades				
Non-Direct Connection Network Upgrades				
Protection system changes at Yankee sub.	$ 7,500		$ 7,500	
New Network Upgrades				
Contribution to Previously Identified System Upgrades				
Total	**$ 7,500**		**$ 7,500**	

4.9 Schedule

Based on the extent of the Dayton primary Non-Direct Connection upgrades required to support the AE2-315 uprate project, it is expected to take a minimum of **6 months** from the date of a fully executed Interconnection Construction Service Agreement to complete the protection system review subject to market conditions and vendor lead times. This includes the requirement for the Interconnection Customer to make a preliminary payment to Dayton which funds the construction of the Non-Direct Connection facilities. It assumes that there will be no environmental or permitting issues to implement the Non-Direct Connection upgrades for this project and that all system outages will be allowed when requested.

Attachment 1 – One Line

AE2-315 Project



Yankee 69-12 kV Substation

Attachment 2.
PJM Queue #AE2-315
Site Plan Drawing [PJM]

Attachment 3.

PJM Queue #AE2-315

Dayton Generation Connection Requirements

The Dayton Power and Light Company (DP&L) has prepared this Facilities Connection Requirements document to ensure compliance with North American Electric Reliability Council (NERC) Reliability Standards and applicable Regional Reliability Organization, sub regional, Power Pool, and individual Transmission Owner planning criteria and facility connection requirements in compliance to NERC Standard FAC-001-2. These connection requirements apply to all generation facilities, transmission facilities, and end-users connecting to the DP&L transmission system. Detailed information outlining DP&L interconnection requirements can be reviewed utilizing the following link:

https://www.pjm.com/-/media/planning/plan-standards/private-dayton/dayton-facilities-connection-requirements.ashx?la=en

Attachment 4.
PJM Queue #AE2-315
System Relay and Protection Requirements

The Interconnection Customer will be required to comply with all Dayton System Relay and Protection Requirements. The System Relay and Protection Requirements may be found within the Dayton Power & Light Co. "Requirements for the Connection of Facilities to the Dayton Power & Light Co. Transmission System" document located at the following link:

Specifically reference the "System Protection and Coordination" section which can be found on pages 8-10.

https://www.pjm.com/-/media/planning/plan-standards/private-dayton/dayton-facilities-connection-requirements.ashx?la=en

System Protection and Coordination.

Generation facilities, transmission facilities, and end-user facilities connecting to the DP&L transmission system are responsible for determining that the proper protective equipment meet all applicable standards, is properly installed and coordinates with DP&L relaying. Protective relaying systems and associated communications systems for all facility interconnections shall be planned, designed, constructed, and maintained in accordance with applicable NERC, RF, and PJM standards. Utility grade protective relays and fault clearing systems are to be utilized on the interconnected power system. Utility grade relays are defined as follows:

- Meet ANSI/IEEE Standard C37.90, *Relays and Relay Systems Associated with Electric Power Apparatus*.
- Have relay test facilities to allow testing without unwiring or disassembling the relay.
- Have appropriate test plugs/switches for testing the operation of the relay.
- Have targets to indicate relay operation.

The Applicant must take responsibility for providing adequate system protection to its facilities and to DP&L facilities under any transmission operating condition, whether their facilities are in operation. Conditions may include but are not limited to:

Single phasing of supply

System faults.

Equipment failures.

Abnormal voltage or frequency.

Lightning and switching surges.

Excessive harmonic voltages and/or currents.

Excessive negative sequence voltages

Separation from DP&L. Synchronizing of generation to the DP&L system.

DP&L reserves the right to specify functional specifications and relay settings deemed necessary to avoid safety hazards or to prevent any disturbance, impairment or interference with DP&L's ability to serve other customers. The criteria for these functional specifications and settings will be based on existing DP&L protection practices. DP&L reserves the right to specify the type and manufacturer for these protective relays to ensure compatibility with existing relays. DP&L will make the specific recommendations and requirements for protection based on the individual substation location, voltage and configuration.

For generation facilities, the relay protection system may be part of a self-contained generation control package. Additional relay protection may be required if testing or operational problems are encountered with this self-contained generation control package. DP&L shall review the interface protection and/or the self-contained protection schemes included with the generation before the unit will be permitted to connect to the DP&L system. The following relay functions are required by the Applicant for protection of the DP&L system. Use of the transfer trip receiver is conditional as set forth below.

Relay	**Purpose**
Frequency	To detect under and over frequency operation and separate the customer's parallel generation.
Under/over voltage	To detect under and over voltage operation and cause separation of the customer's parallel generation.
Transfer Trip Receiver	To receive a trip signal from a DP&L transfer trip transmitter and separate the customer's parallel generation.

Ground Detector	To detect a ground fault on the DP&L or customer system and separate the customer's parallel generation.
Directional Power	To detect a reverse power flow condition and separate the customer's parallel generation.

The purpose of these relays is to detect the Generation Owner's energizing of a DP&L circuit that has been isolated from the DP&L system, by circuit breaker or other disconnect device operations or detect the generation operating at an abnormal voltage or frequency, or to detect a fault or abnormal condition on the DP&L system requiring the Generation Owner to separate their generation from the DP&L system. Output contacts of these relays shall directly energize the trip coil(s) of the generation breaker or an intermediate auxiliary tripping relay that directly energizes the breaker trip coil(s). The relaying system shall have a power source independent from the ac system or immune to ac system loss or disturbances (e.g., dc battery and charger) to assure proper operation of the protection scheme. Loss of this source shall cause removal of the generation from the DP&L system.

DP&L will specify settings for the generation's DP&L-required relays to ensure coordination between the generation protective equipment and the DP&L system relays. It is the Generation Owner's responsibility to determine that their internal protective equipment coordinates with the required DP&L protective equipment and is adequate to meet all applicable standards. DP&L reserves the right to modify relay settings when deemed necessary.

A transfer trip relaying system (or other not specified above) must be installed at the Generation Owner's expense if DP&L determines it is necessary to protect the Transmission System. The transfer trip relaying system shall consist of all transfer trip transmitters located at DP&L facilities, transfer trip receivers at the Generation Facility and the communication channels between the DP&L location(s) and the Generation Facility.

Also, the Interconnection Customer should be familiar with the PJM Protection System Standards which can be found at the link below.

http://www.pjm.com/-/media/documents/manuals/m07.ashx