Generation Interconnection

Facilities Study Report

For

Queue Project AD2-014

Steubenville 69 kV

Jefferson County, Ohio

49.5 MW Energy / 20.79 MW Capacity

April 2022

1 Facilities Study Summary

1.1 Project Description

The Interconnection Customer (IC), Steubenville Solar LLC, proposes to install PJM project AD2-014, a 49.5 MW (20.79 MW Capacity) Solar generating facility in Jefferson County, Ohio (Figure 2). The Point of Interconnection (POI) for the generating facility will be a direct connection to the Steubenville 69 kV Station.

1.2 Amendments/Changes to the Impact Study Report

No significant amendments/changes noted.

1.3 Interconnection Customer Schedule

PJM and AEP understand that the Interconnection Customer has requested the following schedule dates:

Receive back feed power from AEP: May 2022

Generation Commercial Operation Date: October 2022

Acknowledgment of the Interconnection Customer's requested back feed and commercial operation dates does not imply AEP's commitment to or guarantee of these dates.

1.4 AEP's Scope of Work to Facilitate Interconnection

- AEP's Steubenville 69 kV Station will be expanded by installing one (1) new 69 kV circuit breaker to connect the AD2-014 generation.
- To provide proper protection functionality for the Steubenville 138/69 kV Station following the installation of the AD2-014 generation, one (1) additional 69 kV circuit breaker will be installed on the 69 kV side of the Steubenville 138/69/12 kV autotransformer.
- Associated protection and control equipment, line risers, switches, jumpers, SCADA, and 69 kV revenue metering will also be installed at the Steubenville 69 kV Station. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements. AEP will perform a protection and controls checkout including end-to-end testing.
- AEP will expand the station fence approximately 15 feet southeast towards County Road 26. To accomplish the expansion, existing Distribution and Telecommunications facilities will be moved.
- AEP will extend one span of 69 kV transmission line for the generation lead going to the AD2-014 site. AEP will build and own the first transmission line dead end structure, located southeast of the Steubenville 69 kV Station, between the new fence and County Road 26. The AD2-014 transmission line generation lead conductors will attach to the opposite side of the structure.
- Two (2) diverse fiber-optic paths are required to the AD2-014 collector station. AEP will extend two (2) fiber-optic cables from the Steubenville 69 kV control house to the POI. The Interconnection Customer will be responsible for the fiber work on the IPP side of the POI.

1.5 Description of Transmission Owner Facilities Included in the Facilities Study

1.5.1 Direct Connection Work

- No Direct Connection work will be required for this project.

1.5.2 Non-Direct Connection Work

- To provide proper protection functionality for the Steubenville 138/69 kV Station following the addition of the AD2-014 generation, AEP will install one (1) additional 69 kV circuit breaker on the 69 kV side of the Steubenville 138/69/12 kV transformer.
- AEP will install associated line protection and control equipment, line risers, switches, jumpers, and SCADA at the Steubenville 69 kV Station. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements. AEP will perform a protection and controls checkout including end-to-end testing.
- AEP will expand the station fence approximately 15 feet southeast towards County Road 26. To accomplish the expansion, existing Distribution and Telecommunications facilities will be moved.

1.5.3 Attachment Facilities Work

- AEP will install one (1) additional 69 kV circuit breaker and one line connection for AD2-014 at the Steubenville 69 kV Station
- AEP will install associated line protection and control equipment, line risers, switches and jumpers, and SCADA at the Steubenville 69 kV Station. AEP will perform a protection and controls checkout including end-to-end testing.
- Two (2) diverse fiber-optic paths are required to the AD2-014 collector station. AEP will extend two (2) fiber-optic cables from the Steubenville 69 kV control house to the POI. The Interconnection Customer will be responsible for the fiber work on the IPP side of the POI.
- AEP will install 69 kV revenue metering at the Steubenville 69 kV Station.
- AEP will extend one span of 69 kV transmission line for the generation lead going to the AD2-014 site. AEP will build and own the first transmission line dead end structure, located southeast of the new Steubenville 69 kV Station fence, between the new fence and County Road 26. The AD2-014 transmission line generation lead conductors will attach to the opposite side of the structure.

1.5.4 Network Upgrade Work

Due to system overloads found during the PJM studies, the following network reinforcements are required:

- None

1.6 Total Cost of Transmission Owner Facilities Included in the Facilities Study:

Attachment Facilities	$1,568,630.49
Direct Connection Facilities	$0.00
Non-Direct Connection Facilities	$373,023.01
Network Upgrade Facilities	$0.00
Total Cost	$1,941,653.50

The estimates do not include the impact that delays in obtaining ROW, permits, or other approvals may have.

1.7 Summary of Schedule Milestones for Completion of Transmission Owner Work Included in Facilities Study:

Typical Schedule for Scope Indicated (Actual schedule to be determined at PJM Project kick off meeting)

Task	Dates (See Notes)
Project Start	**Day 1***
Engineering	**Starts** Day 1*
Material Ordering	Starts Day 60
Construction (Grading & Below Grade)	Starts Day 180
Construction (Above Grade)	Starts Day 270
Outage Requests Made By	Day 125
Outage (Structure Foundations)**	Starts Day 337
Outage (Cut-in & Testing)**	Starts Day 496
Ready For Back Feed (TO In-Service Date)	Day 526

*Day 1 will be determined at the PJM kick off meeting.
**Scheduled Outages are contingent upon outage availability. Longer duration outages are not available during peak load periods.

Notes Regarding the Schedule

- **All transmission outages are subject to PJM and AEP Operations outage scheduling requirements.**
- **Significant scope of work changes will impact the schedule.**

Scope Assumptions

- **Estimates provided are based on a table top process without the benefit of the results of site specific engineering studies (e.g., soil borings, environmental survey, ground grid, etc.), unless otherwise provided by the Interconnection Customer.**
- **P&C coordination with the Interconnection Customer will be needed throughout the project. IPP to install AEP-compatible line relaying protection panel at IPP station using AEP standards to ensure relaying coordination and adequate line protection. Design team to ensure firmware at IPP terminal matches the approved firmware at the AEP terminal. Failure to accept cost of matching line relay panel may change scoping.**

- **Slippage by the customer / developer in executing the ISA and ICSA agreements does not equate to a "day for day" slippage in the scheduled back feed and in service dates. Depending on the time of year, planned outages, neighboring projects and maintenance of the grid, outage availably has the potential to shift by weeks or months depending on conditions at the time of the fully executed agreement.**
- **The Interconnection Customer will provide any required additional easements to all facilities and structures.**
- **The Interconnection Customer will have their construction and required checkout completed prior to the start of the interconnection to the Steubenville 69 kV Station and any required testing outages.**
- **Developer will be responsible for any tree clearing outside of AEP property and AEP will cut trees on AEP property.**

2 Transmission Owner Facilities Study Results

2.1 Transmission Lines - New

- AEP will extend one span of 69 kV transmission line for the generation lead going to the AD2-014 site. AEP will build and own the first transmission line dead end structure, located southeast of the new Steubenville 69 kV station fence, between the new fence and County Road 26. The AD2-014 transmission line generator lead conductors will attach to the opposite side of the structure.

2.2 Transmission Line - Upgrades

- No transmission line upgrades will be required for this project.

2.3 Station Facilities - New

- No new station facilities will be required for this project.

2.4 Station Facilities - Upgrades

- AEP will expand the existing Steubenville 69 kV station to facilitate the connection of the generation lead going to the PJM project AD2-014. To accomplish this, one (1) additional circuit breaker will be installed.
- To provide proper protection functionality for the Steubenville 138/69 kV Station following the addition of the AD2-104 generation, one (1) additional 69 kV circuit breaker will be installed on the 69 kV side of the Steubenville 138/69/12 kV autotransformer.
- Installation of associated protection and control equipment, line risers, switches, jumpers, SCADA, and 69 kV revenue metering will be required at the proposed 69 kV station. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.
- AEP will perform a protection and controls checkout including end-to-end testing.
- AEP will expand the station fence approximately 15 feet southeast towards County Road 26. To accomplish the expansion, Distribution and Telecommunications facilities will be moved.

2.5 Metering & Communications

Standard 69 kV metering will be installed at the Steubenville 69 kV station. A standard station communication scheme will be used. All metering equipment shall meet the requirements as specified by AEP in the 'AEP Metering and Telemetering Requirements for AEP Transmission Customers' document (SS-490011). Communication requirements are published in the 'AEP SCADA RTU Requirements at Transmission Interconnection Facilities' (SS-500000).

Two (2) diverse fiber-optic paths are required to the AD2-014 collector station. AEP will extend two (2) fiber-optic cables from the Steubenville 69 kV control house to the POI. The Interconnection Customer will be responsible for the fiber work on the IPP side of the POI.

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement must be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. The metering work described above and the associated cost estimates indicated below do not include any potential work or cost to address metering requirements of the local service provider. It is the responsibility of the developer to contact the local service provider to obtain a local service agreement. This is required prior to energization.

2.6 Environmental, Real Estate, and Permitting Issues

The Interconnection customer is expected to obtain, at its cost, all necessary permits and provisions for the IPP station connecting to the Steubenville 69 kV Station.

2.7 System Modeling and Operating Requirements

In addition to the IPP modeling requirements imposed by PJM as part of the Generation Interconnection process, the following system modeling parameters are required to be supplied by the Interconnection Customer to AEP:

- Modeling parameters are required as outlined in the 'Connection Requirements for the AEP Transmission System.' These requirements can be accessed at: https://aep.com/requiredpostings/AEPTransmissionStudies

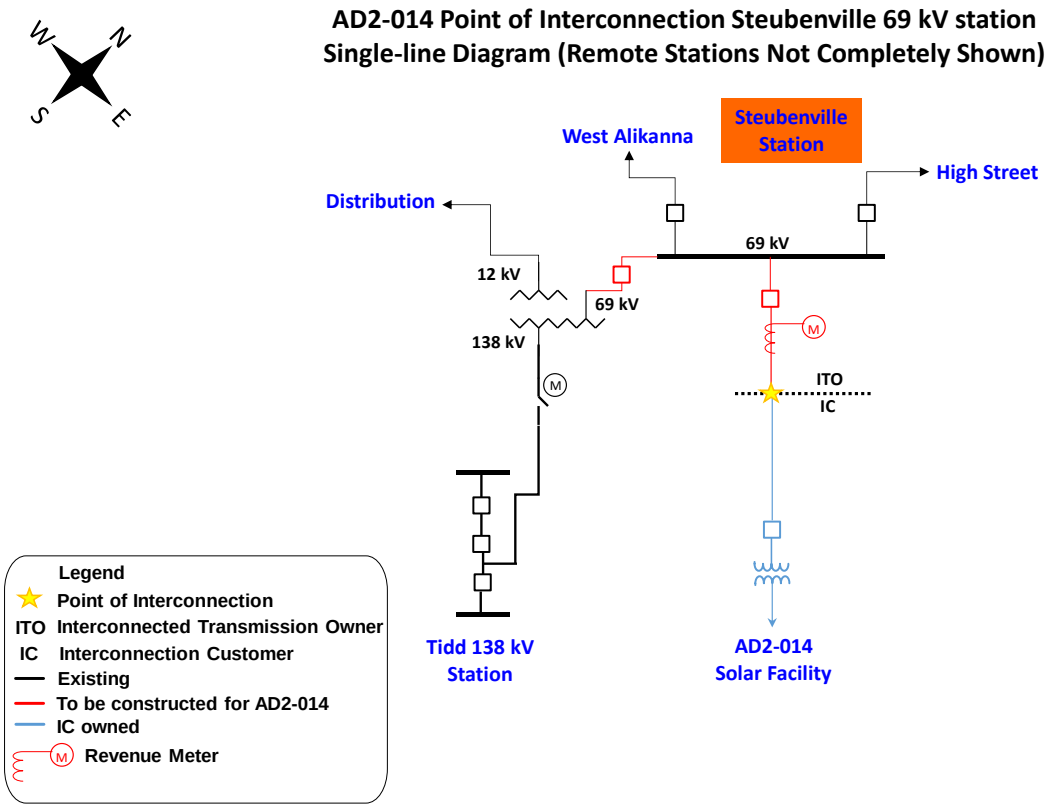
2.8 Summary of Results of Study

Task	Network Upgrade Number	Engineering	Material	Construction	Other	TOTAL
Install 69 kV Metering and 69 kV gen-tie breaker and move the station fence	**N8059.1**	$81,415.25	$201,536.50	$336,660.00	$131,196.00	$750,807.75
Install 69 kV Revenue Metering	**N8059.1**	$53,260.25	$91,876.50	$92,758.00	$41,634.00	$279,258.75
Add Transformer breaker to the Steubenville 69kV Substation	**N8059.2**	$64,587.67	$132,807.67	$91,761.67	$83,866.00	$373,023.01
Install One Dead End Structure, & One (1) Span of Conductor from the Steubenville 69 kV Station to the Point of Interconnection	**N8059.1**	$83,178.00	$71,259.00	$126,502.00	$69,020.00	$349,959.00
Install Two (2) Fiber-Optic Paths from the Steubenville 69 kV Station to the Point of Interconnection	**N8059.1**	$17,247.33	$28,475.33	$111,266.33	$31,346.00	$188,334.99
TOTAL		$299,688.50	$525,955.00	$758,948.00	$357,062.00	**$1,941,653.50**

2.9 Information Required for Interconnection Service Agreement

Description	DCF Facility	NUF Facility	ATF Facility	TOTAL
Direct Material	$0.00	$132,807.67	$393,147.33	$525,955.00
Direct Labor	$0.00	$156,349.34	$902,287.16	$1,058,636.50
Indirect Material	$0.00	$38,519.03	$81,944.77	$120,463.80
Indirect Labor	$0.00	$45,346.97	$191,251.23	$236,598.20
TOTAL	$0.00	$373,023.01	$1,568,630.49	**$1,941,653.50**

Figure 1: Point of Interconnection One-Line Diagram



The Point of Interconnection ('POI') is at the first structure in the generator lead line southeast of the Steubenville 69 kV station fence. AEP will own the first span from the Steubenville 69 kV station to the first AEP constructed and owned dead end structure, including the associated jumpers. The Interconnection Customer (IC), Steubenville Solar LLC, will own the opposite span connecting to the POI structure, along with remainder of the 69 kV generator lead line and associated structures back to the AD2-014 generation collector station.

Figure 2: Point of Interconnection Map