Generation Interconnection

Facilities Study Report

For

Queue Project AD1-101

Continental 69 kV

Putnam County, Ohio

49.9 MW Energy / 18.96 MW Capacity

December 2021

1 Facilities Study Summary

1.1 Project Description

The Interconnection Customer (IC), Blue Harvest Solar Park LLC, proposes to install PJM project AD1-101, a 49.9 MW (18.96 MW Capacity) Solar generating facility in Putnam County, Ohio (Figure 2). The point of interconnection for the generating facility will be a direct connection to the Continental 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 (IC) has requested the following schedule dates:

Receive back feed power from AEP: 12/5/2022

Generation Commercial Operation Date: 01/31/2023

1.4 AEP's Scope of Work to Facilitate Interconnection

- AEP's Continental 69 kV Station will be expanded by adding a new box bay on the north side of the station, shifting the capacitor bank further north from its current location and installing one (1) new 69 kV circuit breaker on the east side of the new box bay.
- Associated protection and control equipment, line risers, switches, jumpers, SCADA, and 69 kV revenue metering will also be installed at the Continental 69 kV Station. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.
- AEP will extend two (2) new consecutive spans of 69 kV transmission line for the generation lead going to the AD1-101 site. The two spans of generation lead will connect to the existing circuit breaker on the east side of the southern box bay. AEP will use the existing AEP Structure #242 for the first structure of the Attachment Line outside of the Continental 69 kV Station fence. AEP will build and own the second new structure in the Attachment Line. The AEP and AD1-101 transmission line conductors will attach to this second structure, constituting the POI.
- Two fiber connections are required along the attachment line. AEP will extend the fiber-optic cables from the Continental 69 kV control house to the points of transition. The Interconnection Customer will be responsible for the fiber work on the IPP side of the points of transition.

- To eliminate the need for Attachment Line circuit crossings, AEP will install two new transmission line structures to reterminate the Continental-Mark Center 69 kV circuit into the east side of the new northerly box bay, connecting to a new circuit breaker.
- To eliminate the need for Attachment Line circuit crossings, AEP will install one new transmission line structure to reterminate the Continental-Kalida 69 kV circuit into the east side of the middle box bay re-using the existing circuit breaker in that position).

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

- AEP will expand the Continental 69 kV Station by installing a new box bay on the north side of the station, shifting the capacitor bank and associated circuit switcher further north from its current location and installing one (1) new 69 kV circuit breaker on the east side of the new box bay. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.
- AEP will install associated line protection and control equipment, line risers, switches, jumpers, and SCADA at the Continental 69 kV Station.
- AEP will review the protection and control settings at the Continental 69 kV Station and adjust as needed.
- AEP will perform a protection and controls checkout including end-to-end testing.
- To eliminate the need for Attachment Line circuit crossings, AEP will install two new transmission line structures to reterminate the Continental-Mark Center 69 kV circuit into the east side of the new northerly box bay connecting to a new circuit breaker.
- To eliminate the need for Attachment Line circuit crossings, AEP will install one new transmission line structure to reterminate the Continental-Kalida 69 kV circuit into the east side of the middle box bay (re-using the existing circuit breaker in that position).

1.5.3 Attachment Facilities Work

- AEP will extend two (2) new consecutive spans of 69 kV transmission line for the generation lead going to the AD1-101 site. The two spans of generation lead will connect to the existing circuit breaker on the east side of the southern box bay. AEP will use the existing AEP Structure #242 for the first structure of the Attachment Line outside of the Continental 69 kV Station fence. AEP will build and own the second new structure in the Attachment Line. The AEP and AD1-101 transmission line conductors will attach to this second structure, constituting the POI. Two fiber connections are required along the attachment line. AEP will extend the fiber-optic cables from the Continental 69 kV control house to the points of transition. The Interconnection Customer will be responsible for the fiber work on the IPP side of the points of transition.
- AEP will install 69 kV revenue metering at the Continental 69 kV Station.

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	$917,925.00
Direct Connection Facilities	$0.00
Non-Direct Connection Facilities	$1,680,051.00
Network Upgrade Facilities	$
Total Cost	$2,597,976.00

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:

Standard Process

Task	Dates
Engineering Start	Q4 2021
Material Ordered	Q1 2022
Construction Start (Grading & Below Grade)	Q3 2022
Construction Start (Above Grade)	Q3 2022
Outage Requests Made By	Q1 2022
Outage (Structure Foundations)	Q3 2022
Outage (Cut-in & Testing)	Q4 2022
Ready For Back Feed (TO In-Service Date)	12/5/2022

Assumptions

- **ISA and ICSA executed by 01/14/2022**
- **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.**
- **System conditions must allow scheduled outages to occur.**
- **All transmission outages are subject to PJM and AEP Operations outage scheduling requirements.**
- **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 Continental 69 kV Station and any required testing outages**
- **Continental-Mark Center and Continental-Kalida 69 kV terminations at the Continental 69 kV Station will be relocated and a total of 3 structures will be installed to eliminate line crossings. A 4th structure will serve as the POI for the customer. One existing structure (#242) will be repurposed to be the first structure in the Attachment Line circuit outside of the station fence.**
- **Estimate assumes new service customer will obtain required easements**
- **Distribution underbuild in the area has not been evaluated for potential impacts**
- **Assume existing survey and geotech data can be used**
- **Construction permitting, if required, is not included.**
- **Assume cap bank will not require CT's**

2 Transmission Owner Facilities Study Results

2.1 Transmission Lines - New

- AEP will extend two (2) new consecutive spans of 69 kV transmission line for the generation lead going to the AD1-101 site. The two spans of generation lead will connect to the existing circuit breaker on the east side of the lower box bay. AEP will use the existing AEP Structure #242 for the first structure of the Attachment Line outside of the Continental 69 kV Station fence. AEP will build and own the second new structure in the Attachment Line. The AEP and AD1-101 transmission line conductors will attach to this second structure, constituting the POI.
- To eliminate the need for Attachment Line circuit crossings, AEP will install two new transmission line structures to reterminate the Continental-Mark Center 69 kV circuit into the east side of the new northerly box bay connecting to a new circuit breaker.
- To eliminate the need for Attachment Line circuit crossings, AEP will install one new transmission line structure to reterminate the Continental-Kalida 69 kV circuit into the east side of the middle box bay (re-using the existing circuit breaker in that position).

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 Continental 69 kV Station by installing a new box bay on the north side of the station, shifting the capacitor bank and associated circuit switcher further north from its current location and installing one (1) new 69 kV circuit breaker on the east side of the new box bay. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.
- AEP will install associated line protection and control equipment, line risers, switches, jumpers, and SCADA at the Continental 69 kV Station.
- AEP will review the protection and control settings at the Continental 69 kV Station and adjust as needed.

2.5 Metering & Communications

Standard 69 kV metering will be installed at the Continental 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 fiber connections are required along the attachment line. AEP will extend the fiber-optic cables from the Continental 69 kV control house to the points of transition. The Interconnection Customer will be responsible for the fiber work on the IPP side of the points of transition.

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 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 Continental 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

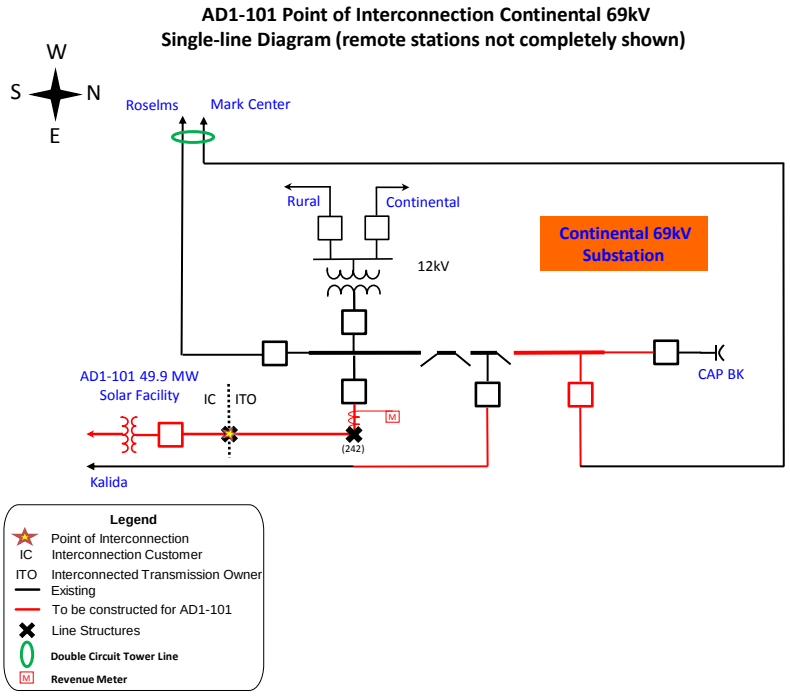
2.8 Summary of Results of Study

Task	Network Upgrade Number	Engineering	Material	Construction	Other	TOTAL
Modify/expand the existing Continental 69 kV Station	**n7490**	$240,776.33	$298,350.33	$396,341.33	$108,302.00	$1,043,769.99
69 kV Revenue Metering	**n7489**	$53,789.00	$74,882.00	$76,039.00	$32,875.00	$237,585.00
Gen-tie Fiber protection at Continental 69 kV Station	**n7489**	$14,708.00	$21,823.00	$70,180.00	$16,256.00	$122,967.00
Reconfigure structures and conductors on the Continental – Kalida and Continental – Mark Center 69 kV lines	**n7490**	$118,385.00	$185,005.00	$218,036.00	$114,855.00	$636,281.00
First two spans and structures outside the Continental 69 kV Station	**N7489**	$64,913.33	$176,545.33	$234,344.33	$81,570.00	$557,372.99
TOTAL		$492,571.66	$756,605.66	$994,940.66	$353,858.00	**$2,597,975.98**

2.9 Information Required for Interconnection Service Agreement

Description	DCF Facility	NUF Facility	ATF Facility	TOTAL
Direct Material	$0.00	$483,355.33	$273,250.33	$756,605.66
Direct Labor	$0.00	$973,538.66	$513,973.66	$1,487,512.32
Indirect Material	$0.00	$74,448.83	$45,616.28	$120,065.11
Indirect Labor	$0.00	$148,708.17	$85,084.72	$233,792.89
TOTAL	$0.00	$1,680,050.99	$917,924.99	**$2,597,975.98**

Figure 1: Point of Interconnection One-Line Diagram



The Point of Interconnection ('POI') is at the second structure in the generation lead circuit south of the Continental 69 kV Station fence. AEP will own the two (2) consecutive spans from the Continental 69 kV Station to the second AEP constructed and owned dead end structure, including the associated jumpers. The Interconnection Customer (IC), Blue Harvest Solar Park LLC, will own the opposite span connecting to the POI structure along with the remainder of the 69 kV generator lead line and associated remaining structures back to the AD1-101 generation collector station.

Figure 2: Point of Interconnection Map