Generation Interconnection
Facilities Study Report
For
Queue Project AC1-167
Mark Center 69 kV
Defiance County, Ohio
49.9 MW Energy / 33.6 MW Capacity

March 2022

1 Facilities Study Summary

1.1 Project Description

The Interconnection Customer, Hamel Renewables, LLC, proposes to install PJM project AC1-167, a 49.9 MW (33.6 MW Capacity) Solar generating facility in Defiance County, Ohio (Figure 2). The point of interconnection for the generating facility was requested to be a direct connection to the Mark Center 69 kV Station. Mark Center 69 kV is planned to be rebuilt in the clear. The new point of interconnection station name is Platter Creek 69 kV Station (Figures 1a and 1b).

1.2 Amendments/Changes to the Impact Study Report

Mark Center 69 kV Station is a 1950s vintage station. A majority of the equipment there is relatively old, being of pre-1980s vintage, and is in need of rehabilitation. Supplemental Project (S2650.1) is planned to rebuild the station in the clear immediately to the east of the existing Mark Center 69 kV Station in a breaker and a half configuration, but operated as a four (4) breaker ring bus. The in-service date is planned to be 03/31/2023. This Facility Study for PJM Project AC1-167 studied the addition of the generator to the rebuilt Mark Center 69 kV Station (renamed Platter Creek 69 kV Station).

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: 10/01/2021

Generation Commercial Operation Date: 12/01/2021

Acknowledgement 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 Platter Creek 69 kV Station will be expanded by installing one (1) new 69 kV circuit breaker with a planned rating of 3000 A continuous, 40 kA, 3 cycles.
- Associated protection and control equipment, line risers, switches, jumpers, SCADA, and 69 kV revenue metering will also be installed at the Platter Creek 69 kV Station. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.

- AEP will extend one span of 69 kV transmission line for the generation lead going to the AC1-167 site. AEP will build and own the first transmission line structure (single pole dead end) on the north side of the station outside of the Platter Creek 69 kV Station fence to which the AEP and AC1-167 transmission line conductors will attach.
- Two (2) fiber-optic cable connections are required for redundant direct fiber relaying. AEP will extend the two (2) 96 ct. ADLT underground fiber-optic cables from the Platter Creek 69 kV Station control house to the demarcation points. The Interconnection Customer will be responsible for the fiber work on the IPP side of the demarcation points.
- AEP will perform a protection and controls checkout including end-to-end testing.

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 install one (1) additional 3000 A continuous, 40 kA, 3 cycle 69 kV circuit breaker and one (1) line connection point for AC1-167 at the Platter Creek 69 kV Station.
- AEP will install associated line protection and control equipment, line risers, switches, jumpers, and SCADA at the Platter Creek 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.

1.5.3 Attachment Facilities Work

- Two (2) fiber-optic cable connections are required for redundant direct fiber relaying. AEP will extend the two (2) 96 ct. ADLT underground fiber-optic cables from the Platter Creek 69 kV Station control house to the demarcation points. The Interconnection Customer will be responsible for the fiber work on the IPP side of the demarcation points.
- AEP will install redundant 69 kV revenue metering at the Platter Creek 69 kV Station.
- AEP will extend one span of 69 kV transmission line for the generation lead going to the AC1-167 site. AEP will build and own the first transmission line structure (single pole dead end) on the north side of the station outside of the Platter Creek 69 kV Station fence to which the AEP and AC1-167 transmission line conductors will attach.

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	$692,440.00
Direct Connection Facilities	$0.00
Non-Direct Connection Facilities	$682,662.99
Network Upgrade Facilities	$0.00
Total Cost	$1,375,102.99

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

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

Activity	Dates (See Notes)
Engineering Start	Day 1*
Material Ordering	Starts Day 60
Construction (Grading & Below Grade)	Starts Day 356
Construction (Above Grade)	Starts Day 416
Outage Requests Made By	Day 144
Outage (Structure Foundations)**	Starts Day 356
Outage (Cut-in & Testing)**	Starts Day 515
Ready For Back Feed (Interconnected Transmission Owner In Service Date)	Day 545

*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 Interconnected Transmission Owner outage scheduling requirements.
- Significant scope of work changes will impact the schedule.

Assumptions

- **ISA and ICSA executed by 3/31/2022**
- **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 Platter Creek 69 kV Station and any required testing outages.**

- **IPP construction will be coordinated with the Platter Creek 69 kV Station construction (PJM Supplemental Project S2650.1 - Mark Center 69 kV Rebuild Project. Platter Creek is presently projected to be completed 3/31/2023. However, Supplemental Project schedules are subject to budget constraints as well as other "normal" schedule risks (siting, weather, outage availability, etc.)**
- **Slippage by the customer / developer in executing the ISA and ICSA agreement 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 availability has the potential to shift by weeks or months depending on conditions at the time of the fully executed agreement.**
- **P&C coordination with the IPP developer will be required throughout the project. Functional scope requires that the IPP install compatible line relaying protection panels at the AC1-167 Collector Station using AEP standards to ensure satisfactory relay coordination and adequate line protection.**

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 AC1-167 site. AEP will build and own the first single pole dead end transmission line structure on the north side of the station outside of the Platter Creek 69 kV Station fence to which the AEP and AC1-167 transmission line conductors will attach.

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 Platter Creek 69 kV Station to facilitate the connection of the generation lead going to the PJM project AC1-167. To accomplish this, one (1) additional 69 kV circuit breaker will be installed with a planned rating of 3000 A continuous, 40 kA, 3 cycles.

- Installation of associated protection and control equipment, line risers, switches, jumpers, SCADA, and 69 kV revenue metering will be required at the Platter Creek 69 kV Station. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.
- Protective relay settings for the remainder of the Platter Creek 69 kV Station will be reviewed and updated (as needed) to account for the addition of the AC1-167 generation source.

2.5 Metering & Communications

Standard 69 kV metering will be installed at the Platter Creek 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) fiber-optic cable connections are required for redundant direct fiber relaying. AEP will extend the two (2) 96 ct. ADLT underground fiber-optic cables from the Platter Creek 69 kV Station control house to the demarcation points. The Interconnection Customer will be responsible for the fiber work on the IPP side of the demarcation points.

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 Platter Creek 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 Platter Creek 69 kV Station to add an additional circuit breaker	**N7992**	$124,525.33	$269,173.33	$161,848.33	$127,116.00	$682,662.99
First span and dead end monopole structure outside the Platter Creek 69 kV Station	**N7991**	$31,909.33	$71,963.33	$160,975.33	$43,962.00	$308,809.99
69 kV Revenue Metering	**N7991**	$51,987.00	$97,197.00	$46,915.00	$50,456.00	$246,555.00
Dual fiber extensions from Platter Creek to designated demarcation points to support gen-tie direct fiber relaying with AC1-167 Collector Station	**N7991**	$14,119.67	$23,271.67	$70,246.67	$29,437.00	$137,075.01
TOTAL		$222,541.33	$461,605.33	$439,985.33	$250,971.00	**$1,375,102.99**

2.9 Information Required for Interconnection Service Agreement

Description	DCF Facility	NUF Facility	ATF Facility	TOTAL
Direct Material	$0.00	$269,173.33	$192,432.00	$461,605.33
Direct Labor	$0.00	$286,373.66	$376,153.00	$662,526.66
Indirect Material	$0.00	$61,590.18	$43,318.18	$104,908.36
Indirect Labor	$0.00	$65,525.82	$80,536.82	$146,062.64
TOTAL	$0.00	$682,662.99	$692,440.00	**$1,375,102.99**

Figure 1a: Point of Interconnection One-Line Diagram

(Existing Mark Center 69 kV Station)

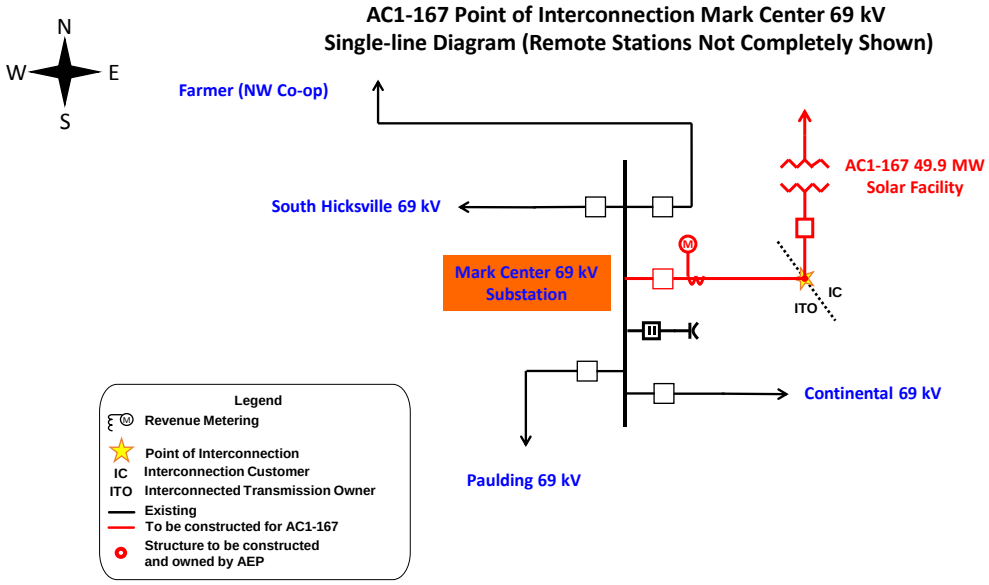
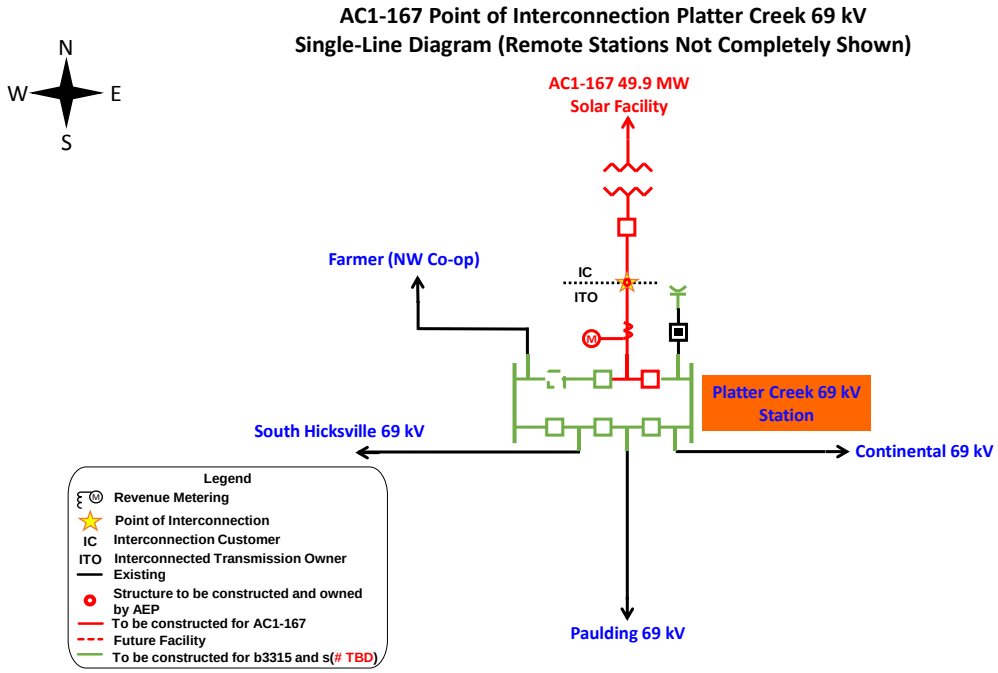


Figure 1b: Point of Interconnection One-Line Diagram

Proposed Platter Creek 69 kV Station



The Point of Interconnection (POI) is the first structure in the generation lead circuit outside of AEP's Platter Creek 69 kV Station fence. The Interconnected Transmission Owner (AEP) will own the first span from the Platter Creek 69 kV Station to the first AEP constructed and owned POI structure, including the jumpers. The Interconnection Customer, Hamel Renewables, LLC, will own the other span connecting to the POI structure, along with the remainder of the 69 kV generator lead line and associated structures back to the AC1-167 generation Collector Substation.

Figure 2: Point of Interconnection Map