

Phase 2 Facilities Study Report
For
Physical Interconnection of
PJM Generation Interconnection Request
Project Identifier AG1-433
"Keystone - Desoto 345kV"

Introduction

This Facilities Study has been prepared in accordance with the PJM Open Access Transmission Tariff, as well as the Application and Studies Agreement between the Project Developer and PJM Interconnection, LLC (PJM or Transmission Provider (TP)). The Transmission Owner (TO) is AEP Indiana Michigan Transmission Company Inc. to be abbreviated in the remainder of this report as IMTCo.

A. Transmission Owner Facilities Study Summary

1. PROJECT DESCRIPTION

The Project Developer (PD) has proposed an uprate to a planned Wind Generating Facility located in Blackford County, IN with a designated PJM Project ID of AG1-433.

The AG1-433 project is a 100 MW Wind uprate (17.6 MW Capacity uprate) to the AF2-388 project. The AG1-433 project will connect to the American Electric Power (AEP) Proposed AF1-119 345 kV Station. The total installed facilities will have a capability of 300 MW with 52.8 MW of this output being recognized by PJM as Capacity.

2. POINTS OF INTERCONNECTION AND CHANGE IN OWNERSHIP

The Point of Interconnection (POI) is the point where the risers connect the generation lead circuit to the proposed AF1-119 345 kV Station line termination point. The AG1-433 project is an uprate to the Project Developer's AF2-388 project and will share the same Point of Change in Ownership (PCO).

3. AMENDMENTS TO THE IMPACT STUDY DATA OR IMPACT STUDY RESULTS

The POI has changed from a new station cut into the Keystone – Desoto 345 kV Circuit to a proposed 345 kV station to be built by the AF1-119 Project Developer. Consequently, the transmission owner scope of work has changed from the construction of a new 345 kV three circuit breaker ring-bus station to the addition a single breaker within the proposed AF1-119 345 kV Station.

4. SCOPE OF PROJECT DEVELOPER INTERCONNECTION FACILITIES

The Project Developer will design, build, own, operate, and maintain the Project Developer Interconnection Facilities on the Project Developer's side of the Point of Change in Ownership (PCO). This includes, but is not limited to:

- Main Power Transformer(s) (MPT(s)).
- Circuit breakers and associated equipment located between the high side of the MPT(s) and the Point of Change in Ownership.
- Generation lead line conductors from the Generating Facility to the Point of Change in Ownership.
- Protective relays and associated equipment for the generation lead.
- Telecommunications Equipment including Supervisory Control and Data Acquisition (SCADA) to comply with the TO's Applicable Technical Requirements and Standards.
- **Installation of the submetering equipment described below in section B.3.**

- **Instrument transformers required to provide revenue quality metering and settlement between the AG1-433 project and any previous/originating projects interconnecting behind the same Point of Change in Ownership.**
- **Additional communications cable connections required between the below-proposed ethernet switch (to be installed at the AG1-433 project collector station) and the primary router (either installed or to be installed at the originating project collector station) for metering data transport.**

B. Transmission Owner Facilities Study Results

The following is a description of the Transmission Owner facilities required for physical interconnection of the proposed AF2-388 project to the AEP transmission system. These facilities shall be designed according to AEP standards. Once built, AEP will own, operate, and maintain these Facilities.

1. INTERCONNECTION SUBSTATION (EXISTING)

IMTCo will upgrade the proposed AF1-119 345 kV Station for interconnection of PJM queue project AF2-388 by installing one (1) new circuit breaker and associated equipment. **Major equipment is expected to include:**

- Installation of one (1) new 5000A 63 kA 345 kV circuit breaker and associated control relaying.
- Installation of two (2) new 3000 A breaker disconnect switches.
- Installation of three (3) single-phase Surge Arresters on the generation lead to the proposed AF2-388 collector station.
- Associated buswork, bus supports, jumpers, insulators, grounding, SCADA (Supervisory Control and Data Acquisition) connectivity, structures, and foundations.
- IMTCo will review and revise (as necessary) the protective relay settings at the proposed AF1-119 345 kV Station to account for the additional generation.

2. TRANSMISSION LINE TIE-IN

No Transmission Line Tie-In work will be required for this project.

3. TRANSMISSION OWNER INTERCONNECTION FACILITIES:

The IMTCo Interconnection Facilities for the AF2-388 project are expected to include but are not limited to the following:

- Installation of one (1) new A-Frame take off structure for the generation lead.
- Extension of two (2) underground 48 count all dielectric loose tube (ADLT) fiber optic cables from the proposed AF1-119 345 kV station control house to fiber demarcation splice boxes to support direct fiber relaying between the proposed AF1-119 345 kV and Project Developer's collector stations. The Project Developer will be responsible for the fiber extension from the splice boxes to the collector station.
- Installation of a standard revenue metering package, including three (3) single phase current transformers (CT), three (3) single phase coupling capacitor voltage transformers (CCVT),

associated structures and foundations, one (1) ethernet switch, and one (1) DICM-installed metering panel, for the generation lead circuit at the proposed AF1-119 345 kV station.

- Installation of one (1) new 150 ft. custom steel pole, single circuit dead end structure on a concrete foundation with anchor bolt cages.
- Installation of one (1) new span of Aluminum Conductor Steel Reinforced (ACSR) 2-bundled 954 54/7 (Cardinal) transmission line conductor with Guinea 159 ACSR 12-7 shield wire for the generation lead circuit exiting the proposed AF1-119 345 kV station.
- Dual, direct fiber-based current differential relays for the generation lead circuit.
- Review and revision (as necessary) of the protective relay settings for the remainder of the proposed AF1-119 345 kV Station.
- IMTCo will procure one (1) metering panel with two (2) primary meters and one (1) ethernet switch to be installed in the AG1-433 Project Developer's collector station.
- IMTCo will procure one (1) connected grid router (CGR) to be installed in the Project Developer's originating project collector station.

4. UPGRADE TO NEIGHBORING STATIONS

No Upgrades will be required at Neighboring AEP Stations.

5. INSTALLATION OF FIBER CABLE CIRCUITS

No new fiber circuits to facilitate communication with existing AEP equipment will be required for this interconnection.

7. MILESTONE SCHEDULES FOR COMPLETION OF AEP WORK

7.1 STANDARD OPTION:

<u>Activity</u>	<u>Number of Days (See Notes)</u>
Project Engagement*	1
Engineering Start	70
Material Ordering	112
Construction (Grading & Below Grade)	457
Construction (Above Grade)	547
Outage Requests Made By	400
Outage (Structure Foundations)**	832
Outage (Cut-in & Testing)**	882
Ready For Back Feed (ITO In-Service Date)	912

***Day 1 will be determined at the PJM construction project kick off meeting.**

****Scheduled Outages are contingent upon outage availability. Longer duration outages are not available during peak load periods.**

The above schedule is based on typical AEP construction timelines, long lead material availability, and common outage constraints. The facilities outlined in this report, as constructed by AEP, are estimated to take 30 months to complete. Given this construction timeline, the agreement backfeed date for the AF1-119 project, and a typical period for agreement processing, AEP can support a backfeed date of February 7, 2028, subject to change during the tariff defined Final Agreement Negotiation Phase. The Project Developer is expected to have the interconnection facilities constructed and ready to accept backfeed by the business day prior to the final negotiated backfeed date.

8. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

Note - Any materials purchased, or design decisions made by the Project Developer (relative to any facilities to be owned by AEP) prior to coordination with and approval by the executing AEP team (pursuant to an Engineering and Procurement or Generation Interconnection Agreement) are at the developer's risk and may not meet the specifications required for interconnection with the AEP transmission system.

8.1 SCOPE ASSUMPTIONS:

- Equipment specifications (Breaker ratings, conductor size, etc.) are a result of the desktop functional scoping process observed while conducting this facilities study. These specifications are subject to change based on the results of the detailed scoping efforts that will take place post-interconnection or engineering and procurement agreements.
- Protection and Control (P&C) coordination with the Project Developer will be needed throughout the project. The Project Developer will be required to install an AEP-compatible line relaying protection panel at the collector substation using AEP standards to ensure relay coordination and adequate line protection. The AEP design team will ensure that the firmware at the collector station terminal matches the approved firmware at the AEP terminal. Failure to accept the cost of a matching line relay protection panel may change scoping.
- Scopes 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 Project Developer.
- The Project Developer will provide any required additional easements for all facilities and structures.
- The Project Developer will have their construction and required checkout completed prior to the start of the interconnection to the proposed AF1-119 345 kV Station and any required testing outages.
- This scope is dependent on construction of the proposed AF1-119 station. Any change in the scope for AF1-119 may result in changes to this scope.

8.2 SCHEDULE ASSUMPTIONS:

- All transmission outages are subject to PJM and AEP Operations outage scheduling requirements.
- Significant scope of work changes will impact the schedule.
- The above schedule reflects only the work required to interconnect the AF2-388 project. The schedules regarding network upgrades associated with this project, if any, are detailed in the documentation related to the specific network upgrade.
- Slippage by the Project Developer in executing the Generation Interconnection Agreement (GIA) 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.
- The given backfeed date assumes that construction for the AF1-119 project will be completed within the agreed upon timeline. Any change to the timeline for the A1-119 project may result in a change in the backfeed date for the AF2-388 project.

8.3 ESTIMATE 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 Project Developer.

9. METERING REQUIREMENTS

All metering needed for this interconnection project must meet the metering requirements stated in Appendix 2, section 8 of the AF2-388 GIA, and in PJM Manuals M01 and M14D. The details of applicable metering requirements are provided in the "Connection Requirements for the AEP Transmission System" document, found at:

<https://www.aep.com/requiredpostings/AEPTransmissionStudies>

The primary and backup metering will be installed on the Transmission Owner side of the Point of Change in Ownership and will be owned and maintained by the Transmission Owner.

Any additional generation proposed behind an originating project's PCO that differs in either fuel type or corporate entity from the originating project will require the installation of additional submetering for both the originating project and the uprate for the purpose of settlement. Submetering will require additional space within the originating project's facilities. The meters, routers, Ethernet to fiber converters, and telecom switch will be procured and owned by AEP. The revenue quality instrument transformers, fiber-optic cable connecting the submeters, and any other additional hardware for the required submetering will be procured, installed, owned, and maintained by the Project Developer.

10. LAND REQUIREMENTS FOR INTERCONNECTION SUBSTATION

Land requirements for the Interconnection Substation needed for this interconnection project must meet the requirements in the <https://www.aep.com/requiredpostings/AEPTransmissionStudies> posted on AEP website.

11. ENVIRONMENTAL AND PERMITTING

The Project Developer is expected to obtain, at its cost, all necessary permits and provisions for the facilities to be constructed for this interconnection. AEP requires that the standards provided in the "Standards and Expectations for Siting, Real Estate, Right-Of-Way, and Environmental Permitting for Transmission Interconnection Projects", found at:

<https://www.aep.com/requiredpostings/AEPTransmissionStudies> be adhered to for all facilities interconnecting with the AEP transmission system.

C APPENDICES

Attachment #1: Single line Diagram for the Physical Interconnection



