Phase 2 Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request

Project ID AF2-335

"Delaware - Royerton 138 kV"

December 2024

Introduction

This Facilities Study has been prepared in accordance with the PJM Open Access Transmission Tariff Part VII, and, if applicable, 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. Additional work will be performed by Indiana Michigan Power Company, to be abbreviated in the remainder of this report as IMPCo.

A. Transmission Owner Facilities Study Summary

1. PROJECT DESCRIPTION

The Project Developer has proposed a Solar Generating Facility located in Delaware County, Indiana with designated PJM project ID AF2-335. The installed facilities for AF2-335/AF2-370 will have a total Maximum Facility Output (MFO) of 100 MW with 80 MW of this output being recognized by PJM as Capacity.

2. POINTS OF INTERCONNECTION AND CHANGE IN OWNERSHIP

The Generating Facility will interconnect with the American Electric Power (AEP) transmission system via a newly constructed IMTCo owned 138 kV station (name TBD) tapping the Delaware - Royerton 138 kV line, approximately 4.3 miles from Delaware 138 kV Station and 2.3 miles from Royerton 138 kV Station.

The Point of Interconnection (POI) is the point where the risers connect the generation lead circuit to the IMTCo 138 kV station line termination point. The Point of Change in Ownership (PCO) will be located at the first structure in the generation lead circuit outside of the proposed IMTCo 138 kV Station fence. IMTCo will own the span from the proposed IMTCo 138 kV Station to the AEP constructed and owned dead end PCO structure, including the jumpers. The Project Developer will own the other span connecting to the PCO structure, along with the remainder of the 138 kV generation lead transmission line and associated structures back to the AF2-335 generation collector substation.

The construction of the new interconnection substation will split the existing Delaware - Royerton 138 kV circuit into two lines on the transmission system.

The proposed generation interconnection is shown on the single line diagram in Attachment #1. The AF2-370 project is an uprate to the Project Developer's AF2-335 project and will share the same Point of Change in Ownership (PCO).

3. 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.

B. Transmission Owner Facilities Study Results

The following is a description of the Transmission Owner facilities required for physical interconnection of the proposed AF2-335 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 (NEW) (Stand Alone Network Upgrade)

IMTCo will construct a new 138 kV ring bus station, initially populated with three (3) circuit breakers, expandable to four (4) circuit breakers. This typical arrangement is planned to be designed to accommodate at least 3000A of continuous current. The station will be constructed to the south of the West Del - Royerton 138 kV Circuit to interconnect the project with the AEP transmission system. **Major equipment is expected to include:**

- Three (3) 138 kV 3000 A 40 kA circuit breakers with associated control relaying.
- Seven (7) 3000A breaker disconnect switches.
- Three (3) line disconnect motorized switches with associated control relaying.
- Two (2) single phase station service voltage transformers.
- Six (6) single phase coupling capacitor voltage transformers (CCVT), three (3) each for the Delaware and Royerton 138 kV line exits.
- Two (2) H-Frame line exit structures, one (1) each for the line exits to the Delaware and Royerton 138 kV Stations.
- One (1) 16' x 27' Drop-In Control Module (DICM).
- A dual, fiber-based Integrated Communications Optical Network Multiplexor (ICON MUX) current differential protective relaying scheme for the line to the Royerton 138 kV Station.
- A dual, fiber-based Integrated Communications Optical Network Multiplexor (ICON MUX) current differential protective relaying scheme for the line to the Delaware 138 kV Station.
- Associated conductors (buswork, ground grid, jumpers), telecom terminal equipment, insulators, arresters, foundations, and structures.

The civil work required to develop a site that accommodates the installation of the above station includes grading of a 270' x 240' pad.

2. TRANSMISSION LINE TIE-IN

- IMPCo will install two (2) new steel, single circuit, single pole dead end structures on concrete piers with anchor bolt cages along the existing West Del - Royerton 138 kV Circuit, one (1) additional steel, single circuit, single pole, running angle structure along the perimeter of the

proposed AF2-335 138 kV station, and three (3) spans of ACSR 1033.5 (Curlew) transmission line conductor with 7#8 Alumoweld shield wire, cutting in the proposed AF2-335 138 kV station in an in-and-out arrangement.

3. TRANSMISSION OWNER INTERCONNECTION FACILITIES:

The IMTCo Interconnection Facilities will include but are not limited to:

- Installation of one (1) new steel, single circuit, single pole dead end structure and one span of ACSR 1033.5 (Curlew) transmission line conductor with 7#8 Alumoweld shield wire for the generation lead circuit extending from the proposed AF2-335 138 kV station.
- Extension of two (2) underground 48 count all dielectric loose tube (ADLT) fiber optic cables from the proposed AF2-335 138 kV station control house to fiber demarcation splice boxes to support direct fiber relaying between the proposed AF2-335 138 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 voltage transformers (VT), associated structures and foundations, one (1) ethernet switch, and one (1) DICM-installed metering panel, for the generation lead circuit at the proposed AF2-335 138 kV station.
- Three (3) single phase CCVT's for the line exits to the AF2-335 collector station.
- One (1) H-Frame line exit dead end structure for the generation lead.
- Dual direct fiber current differential relays for the generation lead.

4. UPGRADE TO NEIGHBORING STATIONS

To support the AF2-335 generator IMTCo will perform the following actions at neighboring stations:

4.1 At the Delaware 138 kV Station

- Reconfigure the existing ICON.
- Install one (1) new Small Form-Factor Pluggable (SFP) transceiver.
- Review and revise (as needed) the protective relay settings.

4.2 At the Royerton 138 kV Station

- Reconfigure the existing ICON.
- Install one (1) new SFP transceiver.
- Review and revise (as needed) the protective relay settings.

5. INSTALLATION OF FIBER CABLE CIRCUITS

The below fiber cable installations are required to accommodate SCADA connectivity and fiber-based relaying between the proposed AF2-335, Delaware, and Royerton 138 kV Stations.

- IMTCo will install one (1) All Dielectric Loose Tube (ADLT) fiber optic cable station exit transition and 0.5 miles of 96 ct ADLT fiber optic cable in new underground ROW terminating at a new splice on existing AEP fiber cable.

- IMTCo will install one (1) ADLT station exit transition, 0.3 miles of 96 ct ADLT cable installed in new underground ROW, and 0.3 miles of All Dielectric Loose Tube (ADSS) fiber cable on existing distribution structures terminating at a new splice on an existing AEP fiber cable.

7. MILESTONE SCHEDULES FOR COMPLETION OF AEP WORK

7.1 STANDARD OPTION:

Activity	Number of Days (See Notes)
Project Engagement*	1
Engineering Start	70
Material Ordering	112
Construction (Grading & Below Grade)	569
Construction (Above Grade)	629
Outage Requests Made By	344
Outage (Structure Foundations)**	709
Outage (Cut-in & Testing)**	760
Ready For Back Feed (ITO In-Service Date)	790

***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 26 months to complete. Given this construction timeline, timeline for the phase 3 study, and a typical period for agreement processing, AEP can support a backfeed date of October 15, 2027, 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.

7.2 OPTION TO BUILD:

Activity	Dates (See Notes)
Project Engagement*	1
Engineering Start	70
Material Ordering	140
Construction (Grading & Below Grade)	540
Construction (Above Grade)	570
Outage Requests Made By	275
Outage (Structure Foundations)**	590
Outage (Cut-in & Testing)**	640
Ready For Back Feed (ITO In-Service Date)	670

***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.**
****Coordination with the Project Developer will be required 90 days prior to the start of this task.**

The above schedule is based on typical AEP construction timelines, long lead material availability, and common outage constraints. The facilities related to the cut-in and remote end stations outlined in this report, as constructed by AEP, are estimated to take 22 months to complete. Given this construction timeline, timeline for the phase 3 study, and a typical period for agreement processing, AEP can support a backfeed date of October 15, 2027, subject to change during the tariff defined Final Agreement Negotiation Phase. The Project Developer is expected to have the interconnection facilities, including the interconnection station, ready to accept backfeed by the business day prior.

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 obtain, at its cost, all necessary provisions for the AEP direct connection facilities.
- The Project Developer will provide a site acceptable to AEP (for transfer in Fee Simple) and any required easements for the proposed AF2-335 138 kV station and associated line work to enable access to 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 AF2-335 138 kV station and any required testing outages.
- Line crossing agreement will be needed for the Desoto – Deer Creek – Delaware Line to connect the generation lead to the project developer collector station.

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 AF2-335 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.

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.

8.4 OPTION TO BUILD ASSUMPTIONS:

- The Project Developer will use firms from the AEP approved list that have experience in the transmission region where the POI is located.
- The Project Developer follows the requirements specified in "Independent Power Producers Option to Build Guidelines", available at:

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

9. METERING REQUIREMENTS

All metering needed for this interconnection project must meet the metering requirements stated in Appendix 2, section 8 of the AF2-335 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.

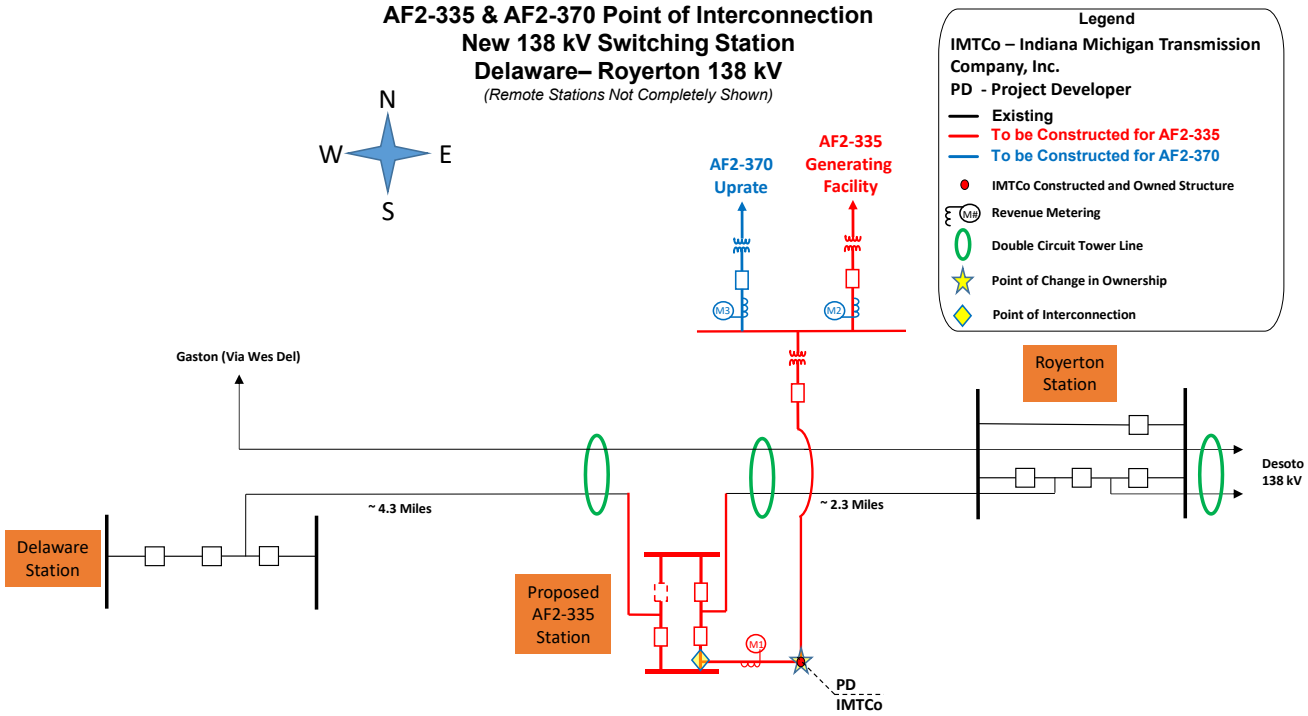
The land footprint required for a typical 138 kV interconnection station is 350' x 200', not accounting for additional retention/detention ponds that may be required. This area is subject to change as result of the detailed engineering processes that take place after interconnection agreement execution.

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



Attachment #2: POI Map