Facilities Study Report
For
Physical Interconnection of
PJM Generation Interconnection Request
Project ID AF2-050

"Bear Rock - Johnstown 230 kV"

Revision 0: December 2024

Introduction

This Facilities Study has been prepared in accordance with the PJM Open Access Transmission Tariff. The Transmission Owner (TO) is the Mid-Atlantic Interstate Transmission, LLC (MAIT).

A. Transmission Owner Facilities Study Summary

1. PROJECT DESCRIPTION

The Project Developer (PD) has proposed an uprate to a planned/existing solar Generating Facility located in, Cambria, Pennsylvania with a designated PJM Project ID of AF2-050.

This project is an increase to the AE2-224 project, and will share the same Point of Change in Ownership.

The AF2-050 project is a 50 MW uprate (30 MW Capacity uprate) to the previous project. The total installed facilities will have a capability of 150 MW with 90 MW of this output being recognized by PJM as Capacity.

2. POINT OF INTERCONNECTION (POI)

The Generating Facility will interconnect with the MAIT transmission system as an uprate to AE2-224 via a direct connection to the AE2-224 interconnection substation (Fiddlers Green).

The proposed generation interconnection is shown on the single line diagram in Attachment #1.

3. POINT OF CHANGE IN OWNERSHIP

The Point in Change of Ownership will be located at the first dead-end structure inside the Fiddlers Green 230 kV substation where developer's line terminates as shown on the single line diagram in Attachment #1.

4. SCOPE OF PROJECT DEVELOPER INTERCONNECTION FACILITIES

None.

B. Transmission Owner Facilities Study Results

The following is a description of the planned Transmission Owner facilities for the physical interconnection of the proposed AF2-050 project to MAIT transmission system. These facilities shall be designed according to FirstEnergy Applicable Technical Requirements and Standards. Once built, MAIT will own, operate, and maintain these Facilities.

1. TRANSMISSION OWNER INTERCONNECTION FACILITIES:

1.1 Energize and integrate generator interconnection facilities to the transmission system.

- Relay and Controls Scope of Work
  - Integrate generator interconnection facilities protection and controls to the transmission system.
- Ancillary Scope of Work
  - Project Management
    - Project management will be required for this asset.
  - Revenue Metering
    - None
  - Testing & Commissioning
    - Support as Required

2. STAND ALONE NETWORK UPGRADES

None

3. NETWORK UPGRADES

3.1 Bear Rock Substation

Modify relay settings.

- Ancillary Scope of Work
  - Project Management
    - Project management will be required for this asset.
  - Testing and Commissioning

        - Testing and commissioning services as required for revised relay settings.

3.2 Johnstown Substation

Modify relay settings.

- Ancillary Scope of Work
    - Project Management
        - Project management will be required for this asset.
    - Testing and Commissioning
        - Testing and commissioning services as required for revised relay settings.

3.3 Fiddlers Green Substation

Modify relay settings.

- Ancillary Scope of Work
    - Project Management
        - Project management will be required for this asset.
    - Testing and Commissioning
        - Testing and commissioning services as required for revised relay settings.

4. OTHER SCOPE OF WORK

None

5. MILESTONE SCHEDULE FOR COMPLETION OF [TO] WORK

Facilities outlined in this report are estimated to take 10 months to construct, from the time the Generation Interconnection Agreement is fully executed. This schedule is may be impacted by the ability to obtain outages to test the proposed facilities.

Description	Start Month	Finish Month
Preliminary Engineering	1	2

Detailed Engineering	2	9
Siting, Permitting & Real Estate	N/A	N/A
Equipment Delivery	N/A	N/A
Construction	N/A	N/A
Testing and Commissioning	9	10

6. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

6.1 Cost Estimate Assumptions:

- The cost estimates provided in this report were developed as of July 31, 2024, based upon current market conditions. Hence, they are subject to significant changes in the event that project implementation is delayed. Notwithstanding the cost estimates from this report being used in the Generator Interconnection Agreement for the related project, MAIT reserves the right to re-evaluate and provide a more accurate cost estimate during the implementation phase of the project. In accordance with section 217 of the Open Access Transmission Tariff, the Project Developer will be responsible for 100 percent of the actual costs of the facilities required to accommodate its Interconnection Request.
- MAIT reserves the right to charge the Project Developer operation and maintenance expenses to maintain the Project Developer attachment facilities, including metering facilities, owned by MAIT. These costs will be specified in the Generator Interconnection Agreement.

6.2 Schedule Assumptions:

- MAIT's ability to support this schedule also depends on the feasibility of taking the required outages to support construction. Outages that are determined to negatively impact system reliability or cause congestion may be delayed or denied, at any time, even if they are submitted on time based on the Outage Submittal Rules in section 4.2.1 of PJM Manual 03. This includes, but is not limited to, outages requested between the months of June and September, as well as January and March, which typically get denied due to summer and winter peak conditions. Therefore, the construction schedule will be adjusted as needed to accommodate any outage restrictions that have been identified by MAIT or the Transmission Provider.

7. REVENUE METERING REQUIREMENTS

All revenue metering needed for this interconnection project must meet the metering requirements stated in Appendix 2, section 8 of the AE2-224/AF2-050 GIA, and in PJM Manuals M01 and M14D. The details of applicable revenue metering requirements are given in the 'FirstEnergy Corporation Requirements for Transmission Connected Facilities' posted on the PJM website.

The revenue metering will be owned and maintained by the Project Developer.

The revenue metering system (particularly the revenue metering current transformers) shall be designed to accurately meter the light loads that will occur when the facility is not generating power and only back-feeding station service from the Transmission Owner. This may require the use of high accuracy extended range current transformers.

The revenue metering CTs and VTs shall be located on the transmission voltage side of the Project Developer's step-up transformer, on the generation side of the fault-interrupting device, and within the local zone of fault protection for the facility.

Transmission Owner will obtain real-time, site-specific, generation data from PJM, via the required communication link from Project Developer to PJM. Transmission Owner will work with PJM and Project Developer to ensure the generation data provided to PJM meets Transmission Owner's requirements.

Communications for transmission line protection between the new interconnection substation, and Project Developer's generation (collector) substation, will be via fiber optics (see "Telecommunication Facilities" section above).

8. LAND REQUIREMENTS FOR INTERCONNECTION SUBSTATION

None

9. ENVIRONMENTAL AND PERMITING

None

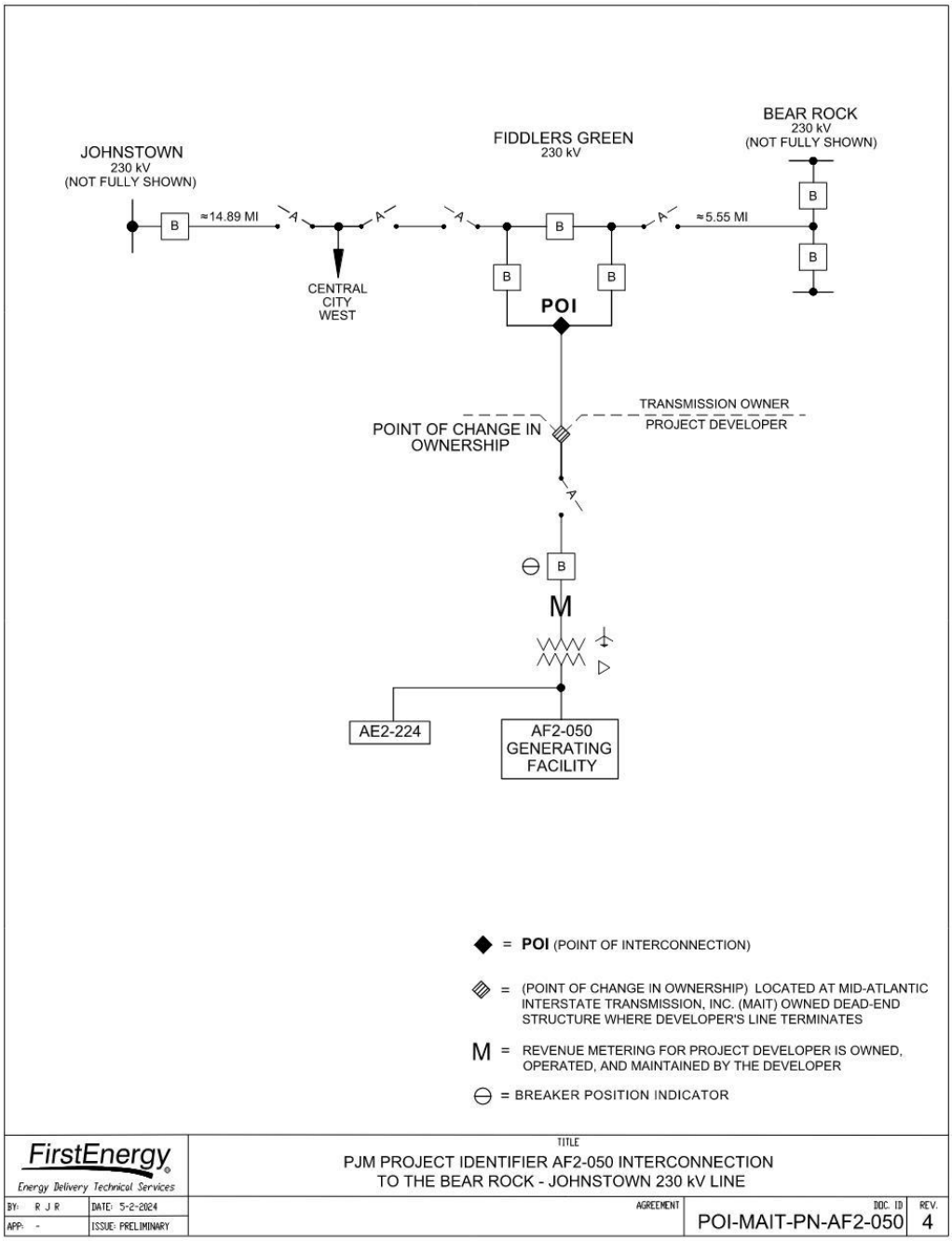
C. APPENDICES

Attachment #1: Single line Diagram for the Physical Interconnection

Attachment #2: Substation General Arrangement

Attachment #3: Protection Study

Attachment #1: Single line Diagram for the Physical Interconnection



Attachment #2: Substation General Arrangement

Not Applicable

Attachment #3: Protection Study

Preliminary Transmission Protection Scope

AF2-050 Bear Rock-Johnstown 230 kV

Following is the protection requirements information (Facility Study Stage only) for the AF2-050 solar generation project. This project is an expansion to the newly constructed AE2-224 project and will be connected to the generators 34.5kV bus. These protection requirements assume that the new AF2-050 generation will connect behind the existing GSU Transformer for AE2-224.

Short Circuit Analysis

Fault values at the Maple Hill Solar (AE2-224) 230kV bus without AF2-050:

Three phase = 9,958 A
Single line to ground = 10,090 A
Z1 = 0.00285 + j 0.02583 per unit
Z0 = 0.00401 + j 0.02451 per unit

Impedances are given in per unit on a 100 MVA and 230kV base. The fault currents provided are bolted, symmetrical values for normal system conditions, using the FE short circuit case. Future increases in fault currents are possible and it is the Developer's responsibility to upgrade its equipment and/or protective equipment coordination when necessary.

Fiddlers Green Substation

Fiddlers Green: Maple Hill Solar 230kV line exit – Review and revise relay settings.

Fiddlers Green: Bear Rock Substation 230kV line exit – Review and revise relay settings.

Fiddlers Green: Johnstown Substation 230kV line exit – Review and revise relay settings.

Bear Rock Substation

Bear Rock: Fiddlers Green Substation 230kV line exit – Review and revise relay settings.

Johnstown Substation

Johnstown: Fiddlers Green Substation 230kV line exit – Review and revise relay settings.