Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request
Project ID AE2-173

McLean 345kV

December 2024

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 Commonwealth Edison

A. Transmission Owner Facilities Study Summary

1. PROJECT DESCRIPTION

The Project Developer (PD) has proposed a Storage uprate to the planned Solar Generating Facility (AE1-205) located in, McLean County, IL with a designated PJM Project ID of AE2-173.

This project is an increase to the AE1-205 project, and will share the same Point of Change in Ownership as AB2-047.

The AE2-173 project is a 50MW uprate (50MW Capacity uprate) to the previous project. The total installed facilities will have a capability of 250MW with 134MW of this output being recognized by PJM as Capacity.

AE1-205 and AE2-173 will share Interconnection Facilities with AB2-047, resulting in a combined output of 500 MW at the Point of Interconnection. The below table includes the MFO and CIR values for the queue numbers sharing the Point of Interconnection at TSS 92 Mclean.

	MFO	CIR
AB2-047	250	32.5
AE1-205	200	84
AE2-173	50	50

2. POINT OF INTERCONNECTION (POI)

The Generating Facility will interconnect with the Commonwealth Edison transmission system via a direct connection into the TSS 92 McLean 345kV substation.

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 TSS 92 McLean fence line.

4. SCOPE OF PROJECT DEVELOPER INTERCONNECTION FACILITIES

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

4.1. The PD is responsible for construction of the additional 52.2MW of storage. The PD is also responsible for one (1) 34kV circuit breaker and two (2) 34kV disconnects. An additional metering CT will also be required. This CT will be owned by ComEd.

4.2. At AE2-173 McLean 345kV, in general, Project Developer relaying, etc. to follow section 6.1 (Design F) of latest version of ComEd interconnections guidelines (for

Generators at Transmission level) Rev2 Effective date 12/16/21, with the following project specific notes (where applicable):

- New 345kV gas circuit breakers to auto trip and isolate for critical gas level
- New 345kV Tie Line terminal relay types to be the same as ComEd terminal relays. This includes relay firmware versions
- ComEd Protection and Control Engineering must review all Project Developer relay protection design drawings and relay settings.
- Project Developer equipment impedance and/or test data must be provided to ComEd Protection and Control Engineering to model in a short circuit program.
- Project Developer to include over/under frequency and voltage protection at solar farm collector bus. Suggested settings will be provided by ComEd. Under-frequency settings are to comply with MAIN Guide 1B.
- Dual bus protection for 34.5kV bus.
- Dual TRFM protection and site protection must be compliant with NERC & PJM requirements.
- Metering is required to be installed per ComEd & PJM standards.
- SCADA interface to ComEd will be required.
- Witness testing by ComEd or a Designated Authority will be required and must be pre-scheduled at least 90 days in advance.

4.3. Project Developer to provide transformer test reports for 345kV - 34.5kV step up transformers, for ComEd short circuit modeling. Test reports must include %Z impedance and load loss.

4.4. For any new equipment connected to the BES (Bulk Electric System rated at 100kV or above) the associated primary/System 1 and secondary/System 2 protective schemes to have a minimum redundant:

- Connected CTs (where available)
- PT secondary (where available)
- DC control circuits
- Auxiliary trip relays
- Circuit breaker trip coils (where available)
- Communication circuitry

4.5 The PD will be responsible to purchase real estate or obtain the necessary right-of-way easement to install the 345kV transmission line to TSS 92 McLean substation.

4.6 New Gas Circuit breaker control for loss of SF6 gas condition should be as follows (see Engineering practice EP-5206E and relay specifications):

- For an open SF6 circuit breaker, when SF6 gas drops to the critical level, the close circuit of breaker shall be opened, and motor operated disconnects on both sides of CB shall be opened
- For a closed SF6 gas circuit breaker, when SF6 gas drops to the critical level, the circuit breaker shall be opened, and motor operated disconnects on both sides of CB shall be opened and the close of the circuit breaker shall be opened.

4.7 All changes to topology, including generation, must be modeled during the Phase 1

study for PRC-027 compliance. A protection system coordination study is required for new BES buses or when there is a 15% (or greater) change in the fault current for an existing BES bus. Settings changes may be required per the outcome of this coordination study.

4.8 The PD is to provide two, physically diverse, Single Mode Fiber paths between TSS 92 McLean Interconnection Substation and TSS 913 Blooming Grove Wind Farm.

4.9 The PD will be responsible to request and bear the cost of any outages required on existing transmission or distribution lines that may be required for the transport of any large equipment, i.e. turbines, rotors, turbine structures, etc.

4.10 PD to provide limiting Transmission Facility ratings for their portion of 345kV L94805, in accordance with NERC FAC-008, FERC Order 881 and PJM Operational requirements for normal and emergency ratings from -55F to 130F in 5F increments.

4.11 Dual SCADA/AMI meter fitting at the output terminal of the battery storage system to measure the power flow to and from the ComEd transmission system. The dual SCADA/AMI meter and associated instrument transformers shall be sized to properly measure the wholesale power requirement for charging and discharging the battery storage system. The Project Developer shall provide appropriate telemetry from the dual SCADA/AMI meter to the ComEd SCADA system to provide meter data.

B. Transmission Owner Facilities Study Results

1. Project Description

Not Applicable

2. STAND ALONE NETWORK UPGRADES

Not Applicable

3. NETWORK UPGRADES

The Network Upgrades will include, but not be limited to, the following.

Review of L.91309 CT/PTs at TSS 92 McLean. Design, procurement and construction to upgrade to the Point of Interconnection metering CT/PTs within ComEd's TSS 92 McLean.

Relay Upgrades

N/A

4. OTHER SCOPE OF WORK

Not Applicable

5. MILESTONE SCHEDULE FOR COMPLETION OF TRANSMISSION OWNER WORK

Facilities outlined in this report are estimated to take 36 months to construct, from the time the Generation Interconnection Agreement is fully executed. This schedule is may be impacted by the timeline for procurement and installation of long lead items, the ability to obtain outages to construct and test the proposed facilities.

Description	Start month	Finish month
Detailed Design	1	6
Permitting	6	12
Construction	24	36

6. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

6.1 This study is based on the System Impact Report for PJM Generation Interconnection New Service Request Project AE2-173 McLean 345kV. The steady-state voltage study for stability analysis will be performed by PJM during the Facility Phase. The PJM study could identify upgrades to the ComEd system that would become part of this project's scope of work. It is assumed that all associated network upgrades, as listed in the above System Impact study, are complete prior to this New Service Request Project being placed in service.

6.2 The schedule is based on GIA contract being executed by all parties and the deposit received.

6.3 ComEd cost estimates assume that work will be performed during normal weekdays and with no overtime.

6.4 Transmission line outages for the tap construction have not been identified, but generally are available in spring (March to May) and fall (September to November). These outages are controlled by PJM.

6.5 The PD will be responsible to request and bearing the cost for relocation of existing transmission or distribution lines (including structures) that may be required for transmission line crossings, the transport of any large equipment, such as cranes, etc. The backfeed date identified in earlier sections is not yet approved. Formal submittal of this request to ComEd's TSO for ultimate review by PJM can be made 7 months prior to the back feed request date.

6.6 All upgrades to facilities included in this document will be required to meet the latest ComEd standards.

6.7 Upgrades are subject to change based on detailed design development

6.8 Costs are based on 2024 rates and do not reflect a potential increase in Labor or Material costs.

6.9 Project Developer to upload as-built drawings to ComEd drawing system (Meridian).

6.10 Single fiber routing has not been included in this study.

6.11 ComEd cost estimate is valid for six (6) months after Facilities Study release by PJM.

6.12 This study assumes that there will be no additional right-of-way and/or easement work required.

6.13 This Facilities Study is time-dependent. If the project is not into construction within one year of the issuance, the FS will be void and the project re-studied, requiring the completion of a new FS.

6.14 Both (1) all real property conveyed in fee to ComEd must be remediated to and (2) all real property to which real property rights are transferred to ComEd (as determined in ComEd's discretion) must be remediated to IEPA's Tiered Approach to Corrective Action.

6.15 This facilities study report (FSR) assumes that generator output and plant auxiliary power consumption can both be metered with revenue accuracy as described. The final revenue metering configuration and equipment will be confirmed, and may be revised, during detailed engineering following execution of the Generator Interconnection Agreement (GIA).

6.16 It is assumed that dual Single Mode Fiber cables, owned and maintained by Project Developer, are already in place for System 1 and System 2 Relays between TSS 92 McLean and TSS 948 Bright Stalk Wind for L94805 will also reach TSS 957 Bright Stalk Wind II.

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 AE2-173 GIA, and in PJM Manuals M01 and M14D. The details of applicable revenue metering requirements are given in the 'ComEd Interconnection Guidelines" posted on PJM website.

REVENUE METERING FOR PJM AND COMED:

The revenue meter measures the wholesale energy output (Hourly compensated net MWH and Hourly compensated net MVARH) of the Generating Facility.

The metering equipment, including revenue meter and CT's and PT's are not sufficient and shall be replaced, at PD's expense, at the interconnection substation on ComEd side of the Point of Interconnection.

ComEd shall own, operate, maintain, inspect, and test all the metering equipment as set forth in 'Testing of Metering Equipment' section of this Interconnection Service Agreement, at the PD's expense.

- REAL-TIME METERING FOR PJM
    - The Project Developer shall install, own, operate, maintain, inspect, and test real-time metering equipment to measure and transmit directly to PJM the real time MW, MVAR, voltage and status of electrical equipment such as circuit breakers and Motor Operated Disconnect switches, in conformance with the requirements listed in PJM Manuals M-01 and M-14D.
- RETAIL METERING FOR COMED
    - The AMI Meter measures the energy consumption by the Project Developer at transmission level and hence shall be designed to measure low MW flow.
    - The metering equipment including AMI Meter and CT/PT shall be installed at the interconnection substation on ComEd side of POI, at the Project Developer's expense.

- ComEd shall own, operate, maintain, inspect, and test all the metering equipment as set forth in the 'ComEd Interconnection Guidelines'.

- BATTERY TERMINAL AMI METERING FOR COMED
  - FERC Order 841 designates inflow to charge battery storage facility as wholesale power. To separately measure the power inflow to charge the battery and bill it at wholesale rate, the Project Developer needs to install the following equipment.
    - Advanced Metering Infrastructure (AMI) equipment including AMI Meter and Current Transformer/Potential Transformer (CT/PT) at the output terminal of the battery storage facility to measure power flow from transmission system to charge the battery storage facility.
    - Fiber cable to provide communication link to transmit AMI meter data to the ComEd SCADA system.

8. LAND REQUIREMENTS FOR INTERCONNECTION SUBSTATION

Upon completion of the construction and installation of the interconnection substation, the tie-line, access road, stormwater detention facility and related improvements and facilities, and the satisfactory completion of testing of the interconnection substation acceptable to ComEd, the Project Developer shall transfer all the Property Rights and Permits to ComEd, at no cost or expense to ComEd, pursuant to documentation that is acceptable to ComEd, including (without limitation) the Property Transfer Documents in fee simple.
All real property conveyed in fee to ComEd must be remediated to and all real property to which real property rights are transferred to ComEd (as determined in ComEd's discretion) must be remediated to IEPA's Tiered Approach to Corrective Action Objectives (TACO) Tier 1 residential remediation standards.

9. **ENVIRONMENTAL AND PERMITING**

No environmental concerns and/or permitting requirements were identified as needed by this study. However, should detailed engineering and design and/or construction activities identify the need for an environmental study and/or permit requirements, the developer is fully responsible for the costs related to any environmental study, any actions to address the identified environmental impacts and the permits. Also, the schedule will be adjusted accordingly to account for the necessary time to perform the environmental study, address the identified environmental impacts and to obtain the permits, if applicable. All environmental studies, actions to address environmental impacts and permit actions shall comply with all ComEd requirements as detailed in "ComEd Environmental Requirements for Third Party Developers", and with all local, city, county, state, and federal requirements.

C. APPENDICES

1) Attachment #1: One Line Diagram

Attachment #1:

One Line Diagram