Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request

Project ID AH1-196

Prairie 345 kV

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 ComEd.

This Facility Study was performed to satisfy the Phase 2 Facility Study requirement of the PJM Tariff. The Facility Study is intended to provide scope, cost and schedule estimates for the project as currently defined and approved for Phase 2 study. In the event project changes are made during DP2 that impact this report, updates will be provided as part of the Phase 3 report. Following execution of the project's final agreement, this report will not be updated to account for other changes made as part of the agreements modification clause and instead the scope change process will be followed.

A. Transmission Owner Facilities Study Summary

1. PROJECT DESCRIPTION

The Project Developer (PD) has proposed a solar uprate to an existing solar Generating Facility located in McHenry County, Illinois, with a designated PJM Project ID of AH1-196.

This project is an increase to the existing AF2-349 project, and will share the same Point of Change in Ownership.

The AH1-196 project is a 150 MW uprate (90 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 ComEd transmission system via a direct connection into the TSS 971 Prarie 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 of the TSS 971 Prairie subtation 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:

- One (1) 3-Phase Main Power Transformer (MPT) – 109/145/181 MVA ONAN/ONAF/ONAF2. 345kV Y-grounded primary, 34.5kV Y-grounded secondary with a 13.8kV delta tertiary. The Z% = 8.41% on a 109 MVA base. X/R = 38 (high side to low side)
- Two (2) 138kV circuit breakers

- Three (3) 138kV disconnect switches
- Three (3) metering CTs and three (3) metering CCVTs, or a combination unit, meters, and associated equipment to meter the line.
- One (1) 138kV line to connect to Generator lead line, L.97103, which connects to the Point of Interconnection (POI).
- Install one (1) pair of fiber jumper cables from the revenue metering unit to available fiber ports on the Aurora Energy Center Fiber Distribution Panel
- GIC Project Developer to provide transformer test reports for 345kV-34.5kV step up transformers, for ComEd short circuit modeling. Test reports to include %Z Impedance and load loss.
- At AH1-196 collector station, in general, GIC to follow section 6.1 (Design F) of the latest version of ComEd Interconnection Guidelines for Generators at Transmission Level (Rev 2: Effective 12/16/2021).
    - New gas circuit breakers to auto trip and isolate for critical gas level.
    - New Tie Line terminal relay types to be the same as ComEd terminal relays. This includes relay firmware versions.
        - Ensure all new relay contributions and trips are rewired to CTs on new L97103 345KV circuit breaker being installed downstream of the new Pleasant Grove Solar II tie point.
    - 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. Examples include lines, transformers (include percent impedance and load loss), wind turbines, and inverters.
    - Project Developer to include over/under frequency and voltage protection at wind/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 DA will be required and must be pre-scheduled at least 90 days in advance.
- New Gas Circuit breaker control for loss of SF6 gas condition should be as follows (see Engineering practice EP-5206-E):
    - For an open 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.

- 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.
- 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 fault current for an existing BES bus. Setting changes may be required per the outcome of this coordination study.
- The Project Developer will install shunt reactive compensation as required.

B. Transmission Owner Facilities Study Results

The following is a description of the planned Transmission Owner facilities for the physical interconnection of the proposed AH1-196 project to ComEd transmission system. These facilities shall be designed according to ComEd Applicable Technical Requirements and Standards. Once built, ComEd will own, operate, and maintain these Facilities.

1. TRANSMISSION OWNER INTERCONNECTION FACILITIES:

The ComEd Interconnection Facilities will include, but not be limited to, the following which are existing at TSS 971 Prairie for L.97103 and shall be verified for the addition of the AH1-196:

- A 345kV dead-end structure and foundation within the fence of the Project Developer's facility, to terminate the Project Developer's generator lead line.
- Line conductor from the dead-end structure to the bus position in the switchyard of the Project Developer's Osagrove Flats facility.
- One (1) Motor Operated Disconnect (MOD) switch.
- Three (3) metering CTs, three (3) metering CCVTs, meters, and associated equipment to meter L.97103.
- Three (3) surge arrestors
- Foundation and structures

2. STAND ALONE NETWORK UPGRADES

3. NETWORK UPGRADES

Expanding existing ComEd substation:

TSS 971 Prairie Upgrade

The existing substation, TSS 971 Prairie 345kV, will be upgraded to interconnect the project with the ComEd transmission system.

- Install one pair of serial fiber connections for each Project Developer RTU data exchange to be coordinated with ComEd SCADA Engineering:
    - Breaker statuses
    - MW, MVAR, MWh and voltage values
- Install one pair of serial fiber conenections for the ComEd-owned revenue metering unit

Installation of fiber cable circuits

AH1-196 assumes the dual Single Mode Fiber cables, owned and maintained by Project Developers, are already in place for System 1 and System 2 Relays for 345kV L97103 between TSS 971 Prairie and Pleasant Grove Solar (AF2-349). It is also assumed that the dual Single Mode fiber cables have sufficient spare ports for the additional metering equipment installed during AH1-196.

4. OTHER SCOPE OF WORK

This section is not applicable.

5. MILESTONE SCHEDULE FOR COMPLETION OF ComEd WORK

Facilities outlined in this report are estimated to take 12 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
Execution	7	12

6. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

- It is assumed that the equipment installed during project AF2-349 including Generator lead

line, Single Mode fiber cable, revenue metering CTs/CCVTs located at the ComEd side of 345kV L.97103 is sufficiently rated for the additional load installed during AH1-196.

- It is assumed that the completion of TSS 971 Prairie as a part of AF2-349 additionally includes the relay and protection upgrades required at remote end stations TSS 156 Cherry Valley and TSS 138 Silver Lake for 345kV lines L.15616 and L.97104, respectively.
- This cost estimates assume that work will be performed during normal weekdays and with no overtime. Transmission line outages for construction have not been identified, but generally are available from September to May. These outages are controlled by PJM.
- Costs are based on 2026 rates and do not reflect a potential increase in Labor or Material costs after 2026.
- ComEd cost estimate is valid for six (6) months after Facilities Study release by PJM.
- The Project Developer will be responsible to request and bear the cost for relocation of existing transmission or distribution lines (including structures and other facilities) that may be required for transmission line crossings, the transport of any large equipment, such as turbines, rotors, turbine structures, cranes, etc. Formal submittal of this request to ComEd's TSO for ultimate review by PJM can be made 7 months prior to back feed request date.
- There will be no foundations installed during this project.
- All upgrades to facilities included in this document will be required to meet latest ComEd standards.
- Upgrades are subject to change based on detailed design development.
- ComEd will complete pre-design and post construction survey for the transmission and substation upgrades, as required. This includes, but is not limited to, the LIDAR survey and video imaging for transmission lines. Costs associated with this are at the expense of the Project Developer. Pre-design survey must be completed prior to detailed engineering.
- This Facilities Study is time dependent. If the project is not into construction within one year of the issuance, the study will be void and the project re-studied, requiring the completion of a new Facilities Study.
- It is assumed that ComEd facilities included in this document will not require a sound study.

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 AH1-196 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.

The revenue metering will be installed on the ComEd side of the Point of Change in Ownership, owned and maintained by ComEd.

- 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/PT shall be installed, at Project Developer's expense, at the interconnection substation on ComEd side of the Point of Change in Ownership.
- ComEd shall own, operate, maintain, inspect, and test all the metering equipment as set forth in 'Testing of Metering Equipment' section of the PJM Tariff, at the Project Developer'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, at the Project Developer's expense.
- 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 the 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 CHARGE METER 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.
    - Battery Charge Meter including Current Transformer/Potential Transformer (CT/PT) at the output terminal of the battery storage facility to measure power inflow from transmission system to charge the battery storage facility.
    - Fiber cable to provide communication link to transmit Battery Charge Meter data to the ComEd SCADA system.

8. LAND REQUIREMENTS FOR INTERCONNECTION SUBSTATION

No additional easements, access rights, or temporary or permanent real property rights or acquisitions were identified as required for network upgrades to the ComEd system or for the project to interconnect at this location within this study. However, as further needs are assessed in detailed engineering, design and/or construction activities, if it is determined that there is a need for easements, access rights, or temporary or permanent real property rights or acquisitions, the developer is fully responsible for the costs to acquire these required land rights. Also, as necessary, the schedule will be adjusted accordingly to account for the necessary time to obtain these required land rights. All easements, access rights, or temporary or permanent real property rights or acquisitions shall comply with all ComEd requirements as detailed in "ComEd Interconnection Guidelines" and "ComEd Guidelines on Land requirements for Interconnection Substations".

9. APPLICABLE TECHNICAL REQUIREMENTS AND STANDARDS

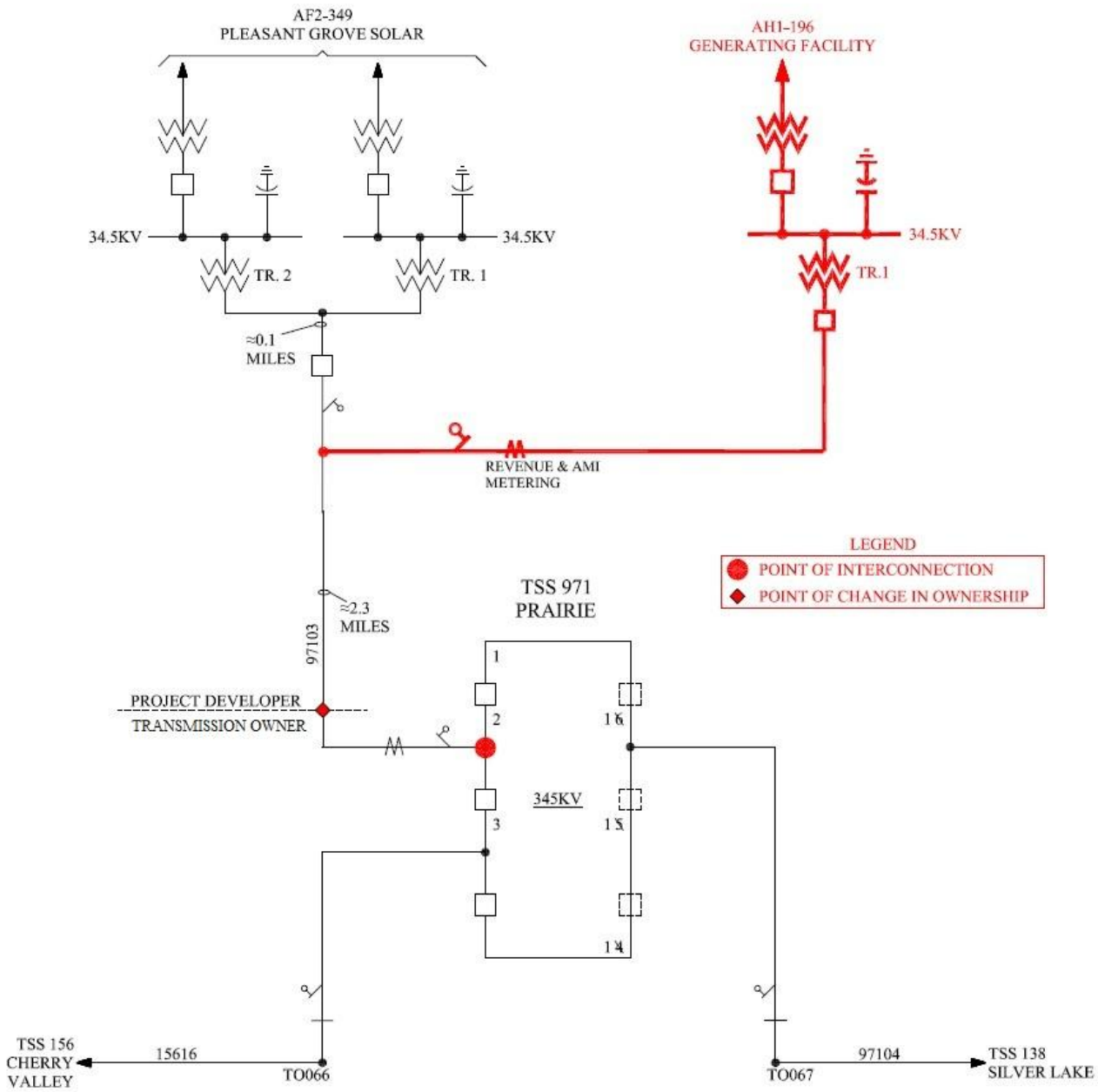
- ComEd Interconnection Guidelines (For Generators at Transmission Level), Rev. 2, Dated 12/16/2021
- ComEd Guidelines on Land Requirements for Interconnection Substations, Rev. 2, Dated January 2026

10. 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

Attachment #1: Single line Diagram for the Physical Interconnection


AF2-349
PLEASANT GROVE SOLAR
AH1-196
GENERATING FACILITY
34.5KV
34.5KV
34.5KV
TR. 2
TR. 1
TR.1
≈0.1
MILES
REVENUE & AMI
METERING
LEGEND
POINT OF INTERCONNECTION
POINT OF CHANGE IN OWNERSHIP
TSS 971
PRAIRIE
≈2.3
MILES
97103
PROJECT DEVELOPER
TRANSMISSION OWNER
1
2
16
345KV
3
15
14
TSS 156
CHERRY
VALLEY
15616
TO066
TO067
97104
TSS 138
SILVER LAKE