PJM Generator Interconnection
#AC1-033 Midland Wind Farm
Facilities Study Report
TSS 74 Kewanee
Revision 1

May 2022

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A. FACILITIES STUDY INTRODUCTION

1. PROJECT DESCRIPTION

The Interconnection Customer (IC) has proposed the construction and interconnection of TSS 910 Midland Wind Farm, consisting of 100.8 MW of wind generation. This proposed wind farm generation facility will be located near Henry County, Illinois, will interconnect with ComEd transmission system and consist of forty-eight (48) 2.1 MW Gamesa G114 wind turbines.

The Midland Wind farm generation facility will be interconnected to the 138kV bus 1 at TSS 74 Kewanee via construction of new interconnection line L91018 with one (1) 138kV breaker positioned in a line breaker configuration (TSS 74 Kewanee substation).

This facility study reflects the preliminary route provided and any changes to that route will affect the cost and schedule

AMENDMENTS TO THE IMPACT STUDY DATA OR IMPACT STUDY RESULTS

1.1 Facility Name and In-Service Date

The Customer's facility name is TSS 910 Midland Wind Farm. The proposed in-service date is 480 days after ISA and ICSA are fully executed. ComEd will work with the IC in good faith to accelerate the schedule in an attempt to meet this date.

2. INTERCONNECTION CUSTOMER SCHEDULE MIDLAND WIND FARM

The below schedule provides estimated days, which is based upon the assumption that a CPCN (Certificate of Public Convenience and Necessity), from the ICC (Illinois Commerce Commission) will not be required:

Description	**Schedule**
Notice to Proceed (ISA and CSA signed with security deposit)	Day 1
Construction complete and ready for testing	Day 450*
Testing complete and Back feed Power available	Day 480*
Facility Commercial Operation Date	Day 480*

*These dates assume IC has approval from all appropriate parties.

3. SCOPE OF WORK BY INTERCONNECTION CUSTOMER (IC)

3.1 The IC is responsible for construction of the 100.8 MW wind generating facility, which includes the following: (AC1-033 SCOPE)

3.1.1 One (1) Step-up transformer 138kV-34.5kV (grounded wye).

3.1.2 One (1) 138 kV circuit breaker.

3.1.3 One (1) 138 kV motor operated disconnect switch.

3.1.4 Six (6) 34.5kV circuit breakers.

3.1.5 One (1) 34.5kV motor operated disconnect switch.

3.1.6 Forty-eight (48) 2.1 MW wind turbines.

3.1.7 One (1) 138kV line (L91018) terminating at TSS 74 Kewanee (distance of 11 miles)

3.1.8 One (1) 138kV combined instrument transformer.

3.2 The IC will purchase the real estate to accommodate the expansion and construction of TSS 74 Kewanee substation.

3.3 The IC will be responsible for cost to purchase real estate and obtain the necessary right-of-way/easements for this project, including for TSS 74 Kewanee substation and transmission tie in.

3.4 The IC 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.

3.5 IC will be responsible for installation and ownership of single mode fiber between TSS 910 Midland Wind Farm and TSS 74 Kewanee. Fiber connection between stations should include two physically diverse routes.

4. DESCRIPTION OF FACILITIES INCLUDED IN THE FACILITIES STUDY AT CUSTOMER EXPENSE

4.1 TSS 74 Kewanee Attachment Facilities

4.1.1 ComEd will be responsible for performing design, procurement and construction to expand 138kV TSS 74 Kewanee substation with one (1) 138kV circuit breaker and expansion of existing site footprint and 138kV bus.

4.1.2 ComEd will be responsible for performing the design, procurement and construction to install line protection, bus protection, breaker protection and communication systems.

4.1.3 ComEd will be responsible to obtain and install fiber jumpers inside the control building for the line protection from the fiber distribution panel (FDP) to the relays.

4.1.4 ComEd will be responsible for expanding the site grading, lightning protection, fencing, ground grid and cable trench.

4.1.5 The existing battery and charger can support the addition of this work

4.1.6 ComEd Relay and Protection Engineering will review all customer relay protection design drawings and relay settings for TSS 910 Midland Wind Farm.

4.2 TSS 74 Kewanee Non-Direct Connection Facilities (N8073)

4.2.1 Relaying Upgrades at Kewanee Substation to accommodate the AC1-033 interconnection.

5. TOTAL COSTS OF TRANSMISSION OWNER FACILITIES INCLUDE IN FACILITIES STUDY

NETWORK #	SITE LOCATION	TOTAL PROJECT COST	STUDY SECTION	TYPE
N/A	TSS 74 Kewanee	$3,267,553	B 2.1.1	**Attachment Facilities**
N8073	TSS 74 Kewanee	$602,637	B 2.1.2	**Non-Direct Connection**
	Gross Up Tax	$514,044		
	TOTAL COST	$4,384,234		

6. SUMMARY OF MILESTONE SCHEDULES FOR COMPLETION OF WORK INCLUDED IN FACILITY STUDY

The below Milestone Schedule is based on the Interconnection Services Agreement and the Construction Services Agreement (if applicable) to be executed. The schedules are based upon the assumption that the CPCN from the ICC will not be required. The exact Milestone Schedule will be negotiated and determined upon the execution of Construction Services Agreement. The Milestone schedule dates are dependent on the IC design deliverables and are subject to change.

Description	**Schedule**
Notice to Proceed (ISA and CSA signed with security deposit)	Day 1
Construction complete and ready for testing	Day 450*
Testing complete and Back feed Power available	Day 480*
Facility Commercial Operation Date	Day 480*

*These dates assume IC has approval from all appropriate parties.

B. TRANSMISSION OWNER (COMED) FACILITIES STUDY RESULTS

1. NEW SUBSTATION / SWITCHYARD FACILITIES

1.1 TSS 910 Midland Wind Farm

IC will design, construct, and test the new substation TSS 910 Midland Wind Farm having the following equipment (per ComEd Interconnection Guideline):

1.1.1 ComEd Relay and Protection Engineering will review all customer relay protection design drawings and relay settings.

1.1.2 Customer equipment impedance and test data must be provided to ComEd Relay and Protection Engineering for all lines, transformers, and generators.

1.1.3 A SCADA interface over fiber must be included to provide ComEd with customer BES (Bulk Electric System) equipment status. This will be done through serial protocol between TSS 74 Kewanee and TSS 910 Midland Wind Farm.

1.1.4 The System 1 and System 2 communication system shall be designed per ComEd fiber requirements. The System 1 and System 2 fiber connections from TSS 74 Kewanee to TSS 910 Midland Wind Farm are two different single mode fiber cables that are routed in physically diverse paths. At a minimum, 48 single mode fibers will be required for each cable.

1.1.5 The IC will be responsible for the maintenance of the two (2) single mode 48-count fiber paths between TSS 74 Kewanee to TSS 910 Midland Wind Farm, including all terminations in the fiber distribution panels (FDP's). ComEd will own the maintenance for the fiber jumpers from the FDP to the relay panels at TSS 74 Kewanee.

1.1.6 Witness testing by ComEd is required.

1.1.7 Protective relaying for 138kV L91018 will consist of:

- 87L-1 SEL-411L System 1 current differential scheme over fiber
- 87L-2 SEL-311L-1 System 2 current differential scheme over fiber

1.1.8 For the 138kV circuit breaker:

- Breaker failure protection: install one SEL-451 relay (or equivalent) for breaker failure protection, manual close operation and auto reclose function. Auto trip and isolate for critical gas level.
- Breaker monitoring: install one SEL-2411 relay (or equivalent) for breaker monitoring. Install local FDP and fiber to the building.

  ComEd will review proposed SEL equipment by the IC which will be subject to ComEd acceptance.

1.1.9 Additional Relay Notes

- Dual transformer protection and site protection must be compliant with NERC & PJM requirements.
- Line side CTs for new circuit breaker shall be connected to the system 1 and system 2 87T relays
- IC to include over/under frequency and voltage protection at wind farm collector bus.
- 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

1.1.10 For any new equipment connected to the Bulk Electric System, rated at 100kV or above, ComEd requires the associated primary and secondary protective schemes to have a minimum redundant; connected CTs, PT secondary control circuits, auxiliary trip relays, and circuit breaker trip coils.

2. UPGRADES TO EXISTING SUBSTATION / SWITCHYARD FACILITIES AT CUSTOMER EXPENSE

2.1 TSS 74 Kewanee

ComEd will be responsible for performing the design, procurement, construction and testing of the following modifications to TSS 74 Kewanee:

2.1.1 Attachment Facility

2.1.1.1 Install two (2) 138kV motor operated disconnect switches, both sides of L91018 circuit breaker.

2.1.1.2 One (1) 138kV line dead end structure with testing to check proper phase and identification is correct. Testing to check proper phase and identification is correct for new L91018 landing at 138kV line dead end structure. Testing to check proper phase and identification is correct for relocated L91018 landing at 138kV line dead end structure.

2.1.1.3 Three (3) combination CT/PT metering units for new 138kV L91018 to TSS 910 Midland Wind Farm.

2.1.1.4 Three (3) 138kV CCVT.

2.1.1.5 Three (3) 138kV surge arresters for 138kV L91018.

2.1.1.6 One (1) 138kV, 3000A, 63kA 2.0-cycle IP circuit breaker in. For the circuit breaker:

- Breaker failure protection: install one SEL-451 relay for breaker failure protection, sync check, manual close, SCADA close operation and auto reclose function.
- Breaker monitoring: install one SEL-2411 for breaker monitoring. Install local FDP and fiber to the building.

2.1.1.7 The long lead material includes the two (2) disconnect switches, one (1) dead end structure, three (3) combination CT/PT metering units, three (3) 138kV CCVTs, three (3) 138kv surge arresters, and one (1) 138kv Circuit Breaker

2.1.1.8 Foundations and structures for all new equipment.

2.1.1.9 Storm water evaluation for the site will need to be re-assessed for the expanded 138kV yard configuration.

2.1.1.10 The fence line may need to be adjusted based on the location of the new dead end structure. This will be determined at detailed engineering.

2.1.1.11 A survey will be required to determine the limits and grade for existing stone in the area of the new line. Any expansion to the current stone in the yard will meet EP-2027.

2.1.1.12 Expand existing ground grid and perform grounding study

2.1.2 Non-Direct Connection (N8073)

2.1.2.1 Install new 23" Fiber Distribution Panel with cable management system on existing Fiber Rack

2.1.2.2 Protective relaying for 138kV L91018 will consist of:

- 87L-1 SEL-411L system 1 current differential scheme over fiber

- 87L-2 SEL-311L-1 system 2 current differential scheme over fiber

2.1.2.3 One (1) Ruggedcom RST2228 master switch, two (2) Ruggedcom RST2228 aux switches, one (1) SEL-3350 RTAC are required for SCADA

3. TRANSMISSION LINES - NEW

3.1 IC will design, construct and own 138kV L91018 up to dead-end structure at TSS 74 Kewanee. For the purpose of coordination, IC will provide design drawings of their proposed generator lead line, 138kV L91018, to ComEd for review prior to construction.

4. METERING (as needed)

4.1 For PJM:

The IC shall install, own, operate, maintain, inspect, and test real-time telemetry 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 Disconnects, in conformance with the requirements listed in PJM Manuals M-01 and M-14D.

4.2 Metering for PJM and ComEd:

The Advanced Metering Infrastructure (AMI) Meter measures the energy consumption by the IC at transmission level. The Metering Equipment, including AMI Meter and CT/PT shall be installed at the Interconnection Substation on ComEd side of Point of Interconnection (POI), at IC's expense.

ComEd shall own, operate, maintain, inspect, and test the AMI Metering in accordance with ComEd Interconnection Guidelines at the IC's expense.

The Revenue Meter measures the wholesale energy output (Hourly compensated net MWH and Hourly compensated net MVARH) of the Customer Facility.

The Metering Equipment, including Revenue Meter and CT/PT, shall be installed at the IC's Collector Substation on IC side of the POI at high side of the step-up transformer.

The IC shall own, operate, maintain, inspect, and test the Revenue Meter in accordance with PJM tariffs at the IC's expense.

The Revenue Meter needs to be programmed to account for and include line loss between the collector substation and the POI (approx. 11 miles).

The Revenue Meter within collector substation shall meet PJM accuracy standards. IC shall provide ComEd the SCADA and measuring connectivity to the Revenue Meter per ComEd Interconnection Guidelines.

5. ENVIRONMENTAL, REAL ESTATE, AND PERMITING

5.1 IC will be responsible to obtain all environmental approvals and permitting required for the construction associated with TSS 910 Midland Wind Farm and L91018.

5.2 ComEd will be responsible for all environmental approvals and permitting required for the expansion of TSS 74 Kewanee. This includes any endangered species studies and monitoring, as required. Costs associated with this permitting are at the expense of the IC.

5.3 IC will be responsible for site restoration required for substation and transmission upgrades. This includes, but is not limited to road restoration/improvements, wetland restoration, and farm field restoration/crop damage. Costs associated with this are at the expense of the IC.

5.4 The IC will be responsible for the cost to purchase real estate or obtain the necessary right-of-way easement for all upgrades associated with this project. These associated upgrades are not included in the costs listed in this study.

5.5 IC will be responsible for remediation costs for locations found to have environmental contaminations and remediation. This may require contaminated soil disposal as well as lead paint removal for existing structure work.

5.6 It is assumed that all necessary permits will be obtained in a timely manner to allow engineering and construction to proceed according to the Milestone Schedule.

5.7 It is assumed that conveyance of property and rights will be obtained to support the PJM Transmission Outage Schedule.

5.8 It is assumed that the required Environmental Study will yield no impediments to the development of the site.

6. SUMMARY OF RESULTS OF STUDY

6.1 Cost Estimate

NETWORK #	SITE LOCATION	TOTAL PROJECT COST	STUDY SECTION	TYPE
N/A	TSS 74 Kewanee	$3,267,553	B 2.1.1	**Attachment Facilities**
N8073	TSS 74 Kewanee	$602,637	B 2.1.2	**Non-Direct Connection**
	Gross Up Tax	$514,044		
	TOTAL COST	$4,384,234		

Description	Schedule
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7. ASSUMPTIONS IN DEVELOPING COSTS AND SCHEDULES

7.1 ComEd estimate does not include costs of design and construction of TSS 910 Midland Wind Farm substation, and transmission in IC scope of work. ComEd estimated schedule is based on ISA/ICSA contract being executed by all parties.

7.2 This cost estimate assumes that all work will be performed during normal weekdays and with no overtime.

7.3 ComEd cost estimate is valid for one (1) year after Facilities Study release by PJM.

7.4 Transmission line outages for construction have not been identified, but generally are available from September to May. These outages are controlled by PJM.

7.5 Foundation design assumes typical soil conditions at locations and will be subject to change after soil boring tests.

7.6 The IC 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 backfeed request date.

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

7.8 This Facility Study (FS) 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 completion of a new FS.

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

7.10 Upgrades are subject to change based on detailed design development.

7.11 It is assumed that ComEd facilities included in this document will not require a sound study or flood mitigation.

7.12 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 IC. Pre-design survey must be completed prior to detailed engineering.

7.13 ComEd will complete geotechnical soil borings, resistivity study, and analysis for substation and transmission upgrades. Costs associated with this are at the expense of the IC.

7.14 This study is based on the 'System Impact Study Report for PJM Generation Interconnection Request Queue Position AC1-033 Kewanee 138kV per PJM impact study issued June 2021.

7.15 This document assumes that IC customer has completed, tested, and conveyed to ComEd the modified TSS 74 Kewanee substation (per ComEd guidelines) and transmission line tie-in up to the existing ComEd right of way to allow for the 138kv line energization and back feed.

7.16 Fiber is needed between TSS 74 Kewanee and TSS 910 Midland Wind Farm. It shall include two (2) separate 48-count fiber paths utilizing diverse fiber routes between TSS 74 Kewanee and TSS 910 Midland Wind Farm

7.17 This report does not include the evaluation of how Customer Facilities (including generator lead lines) may interfere with TO facilities outside the substation yard.

7.18 IC provide communication, coordination, and approval from Ameren to bring in gen-lead lines through Ameren lines into TSS 74 Kewanee.

8. INFORMATION REQUIRED FOR INTERCONNECTION SERVICE AGREEMENT (ISA)

8.1 The following cost estimate is a breakdown of the costs of the ComEd work for # AC1-033 project.

NETWORK #	SITE LOCATION	Direct Material	Indirect Material	Direct Labor	Indirect Labor	TOTAL PROJECT COST	Type
N/A	TSS 74 Kewanee	$780,733	$75,961	$1,902,793	$508,065	$3,267,553	Attachment Facilities
N8073	TSS 74 Kewanee	$179,747	$17,488	$319,967	$85,435	$602,637	Non-Direct Connection
	Gross Up Tax					$514,044	
	Total Cost					$4,384,234	

Note:

1. Carrying charges are anticipated to be zero.

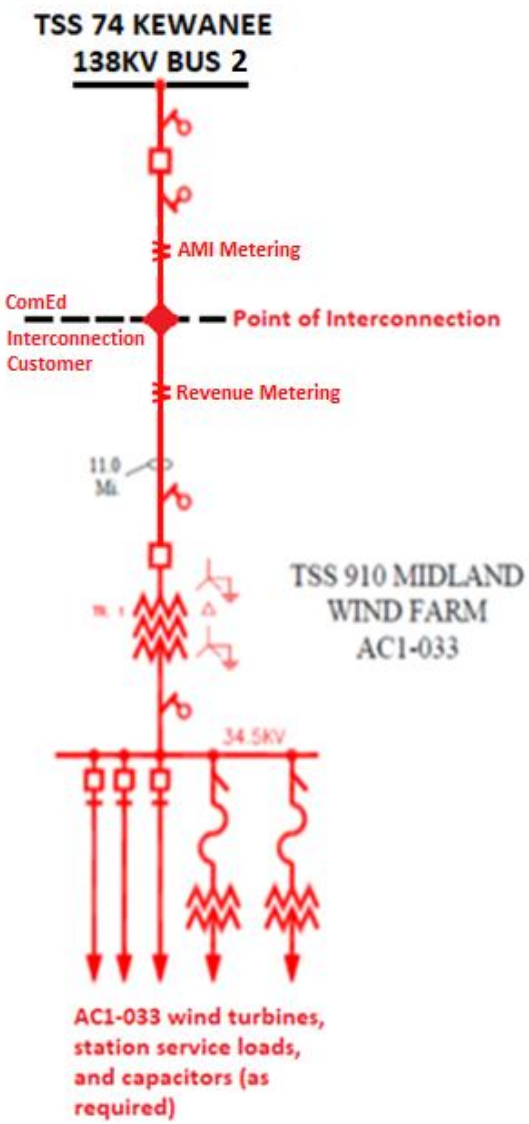
C. APPENDIX

Attachment #1: High Level Planning Diagram Depicting Interconnection Facilities and Points of Ownership/Demarcation

Attachment #2: One Line Diagram, TSS 74 Kewanee (attached separately)

Attachment #3: General Arrangement, TSS 74 Kewanee General Arrangement (attached separately)

Attachment #4: Real Estate Requirements (IC)



Attachment #1

High Level Planning Diagram Depicting Interconnection Facilities and Points of Ownership/Demarcation

Attachment #4 Real Estate Requirements (IC)

It is the IC's responsibility to purchase property, acquire rights, and obtain any required permits for the transmission, distribution, and or communication lines required to interconnect its generation. In addition, the IC will grant to ComEd such rights and interests as may be reasonably necessary to interconnect the generation facilities and associated network upgrades to the ComEd system. Real estate transactions will be determined by the type of interconnection configuration employed, which may include:

Conveyance of fee simple ownership to ComEd for a switchyard.

Conveyance of perpetual easements (exclusive and nonexclusive) associated with the switchyard including, but not limited to, access, drainage, and such overhead and underground facilities as ComEd may reasonably require for the construction, use, maintenance, and operation of the switchyard.

Conveyance and or acquisition of perpetual easements (exclusive and nonexclusive) and or other property rights for all purposes of interconnecting the generation facilities and associated network upgrades with the ComEd transmission, distribution and communication systems, including such overhead and underground electrical and related communications, transmission and distribution facilities.

In each of the three transaction scenarios outlined above, or any combination thereof, the IC will be responsible for executing and delivering all documentation requested by ComEd, which may include deeds, easements, purchase agreements, assignments, affidavits, certifications, statements and releases, and for providing a title policy, with the appropriate endorsements, covering the rights and interests conveyed.

ComEd will grant to the IC, subject to engineering review and approval, easement rights or consents, as applicable, for:

Perpendicular crossings of ComEd transmission / distribution right of way to accommodate facilities such as roadways and various utilities.

ComEd Scope

ComEd will provide the following:

Real estate forms of agreement, which incorporate terms and conditions that reflect ComEd's standard business practices.

Engineering review of proposed IC facilities that involve real estate and/or right of way in which ComEd has an interest.

IC Scope

It is imperative, when the IC is required by the scope of a project to provide information, that the deliverables itemized below be received by ComEd as soon as possible. This will facilitate a timely review and will allow ComEd to address the real estate aspects of the project in a timely manner.

The IC is responsible for providing the following:

The following current information covering all interests and rights to be conveyed to ComEd:

- Title Policy/Commitment.
- Copies of all recorded documents listed in above-mentioned Title Policy/Commitment.

- ALTA/ACSM Land Title Survey, which will include adjoining Exelon property, if applicable.
- Phase I Environmental Assessment Report (Phase 2 also if there is a fee conveyance to ComEd) and any other environmental reports, notifications and documents as required. IC to utilize only contractors approved by ComEd Environmental department for this work.
- Wetland Delineation reports. IC to utilize only contractors approved by ComEd Environmental department for this work
- Annexation Agreement(s), zoning changes or other governmental agreements or approvals entered into or proposed for the Project.
- All jurisdictional permits, such as special use and building permits, that have been issued for the project or copies of pending applications that relate to or affect property in which COMED has or will have a right or interest.
- Detailed civil engineering drawings showing the proposed site plan, layout, drainage, access and facilities.

Additional information may also be required, depending on specific project requirements. Requests for such information will be transmitted to the IC during project development.