Generation Interconnection

Feasibility Study Report

for

Queue Project AG1-236

LANESVILLE-BROKAW 345 KV

26 MW Capacity / 200 MW Energy

January 2021

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1 Introduction

This Feasibility Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 36.2, as well as the Feasibility Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is ComEd.

2 Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. Cost allocation rules for network upgrades can be found in PJM Manual 14A, Attachment B. The possibility of sharing the reinforcement costs with other projects may be identified in the feasibility study, but the actual allocation will be deferred until the impact study is performed.

The Interconnection Customer seeking to interconnect a wind or solar generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

An Interconnection Customer with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

The conduct of light load analysis as required under the PJM planning process is not performed during the Generation Interconnection Feasibility Study phase of the PJM study process. Additional reinforcement requirements for this Interconnection Request may be defined during the conduct of the light load analysis which shall be performed following execution of the System Impact Study agreement.

3 General

The Interconnection Customer (IC) has proposed an uprate to a planned wind generating facility located in Logan, Illinois. This project is an increase to the Interconnection Customer's AC1-053 project, which will share the same point of interconnection. The AG1-236 queue position is a 200 MW uprate (26 MW Capacity uprate) to the previous project. The total installed facilities will have a capability of 400 MW with 52 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this uprate project is December 31, 2024. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-236
Project Name	LANESVILLE-BROKAW 345 KV
State	Illinois
County	Logan
Transmission Owner	ComEd
MFO	400
MWE	200
MWC	26
Fuel	Wind
Basecase Study Year	2024

Any new service customers who can feasibly be commercially operable prior to June 1st of the basecase study year are required to request interim deliverability analysis.

4 Point of Interconnection

Queue Position AG1-236 proposes to connect 'Logan County Wind II' with 200 MW wind generation at TSS 926 Logan Wind Farm to be built under PJM queue AC1-053. The proposed addition will increase output of TSS 926 from 200 MW to 400 MW. The proposed addition is behind the Point-of-Interconnection between ComEd and TSS 926, as shown in the one-line diagram.

5 Cost Summary

The AG1-236 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$ 250,000
Total System Network Upgrade Costs	$ 0
Total Costs	**$ 250,000**

This cost excludes a Federal Income Tax Gross Up charges. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 2016-36, 2016-25 I.R.B. (6/20/2016). If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

Cost allocations for any System Upgrades will be provided in the System Impact Study Report.

6 Transmission Owner Scope of Work

6.1 Attachment Facilities

To accommodate interconnection of AG1-236; the relaying, SCADA, Communication and metering between TSS 926 and TSS 987 Beason would be reviewed and upgraded if needed. The preliminary cost estimate for the Attachment Facilities is estimated at $ 250,000. ComEd would take approximately 18-months to review and possibly upgrade the relaying, SCADA, Communication and metering after the ISA / ICSA are signed.

The total physical interconnection costs is given in the table below:

Description	Total Cost
Attachment Facilities	$ 250,000
Total Physical Interconnection Costs	**$ 250,000**

7 Schedule

See Section 6.

8 Transmission Owner Analysis

See Section 6.

9 Interconnection Customer Requirements

The Interconnection Customer is responsible for all design and construction related activities on the Interconnection Customer's side of the Point of Interconnection.

10 Revenue Metering and SCADA Requirements

10.1 PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Section 8 of Attachment O.

10.2 Meteorological Data Reporting Requirements

The wind generation facility shall provide the Transmission Provider with site-specific meteorological data including:

- Wind speed (meters/second) - (Required)
- Wind direction (decimal degrees from true north) - (Required)
- Ambient air temperature (Fahrenheit) - (Required)
- Air Pressure (Hectopascals) - (Required)
- Humidity (Percent) (Accepted, not required)

10.3 Interconnected Transmission Owner Requirements

The IC will be required to comply with all Interconnected Transmission Owner's revenue metering requirements for generation interconnection customers located at the following link:

ComEd interconnection requirements can be found at https://www.pjm.com/planning/design-engineering/to-tech-standards/private-comed.aspx

11 Summer Peak - Load Flow Analysis

The Queue Project AG1-236 was evaluated as a 200.0 MW (Capacity 26.0 MW) injection as an uprate to AC1-053 tapping the Brokaw to Lanesville 345 kV line in the ComEd area. Project AG1-236 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-236 was studied with a commercial probability of 53%. Potential network impacts were as follows:

11.1 Generation Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

11.2 Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

11.3 Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

None

11.4 Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC| DC	MW IMPACT
16841591 8	270668	BLUEMOUND; B	345.0	CE	270852	PONTIAC ; B	345.0	CE	1	COMED_P1-2_345-L8001___-S	operation	1528.0	124.94	127.05	DC	32.26
16841584 2	270704	LORETTO ; B	345.0	CE	939400	AE1-172 TAP	345.0	CE	1	COMED_P1-2_345-L8014__R-S-C	operation	1528.0	176.73	180.13	DC	51.94
16841584 4	270704	LORETTO ; B	345.0	CE	939400	AE1-172 TAP	345.0	CE	1	Base Case	operation	1364.0	133.84	136.53	DC	36.74
16841618 3	270717	DRESDEN ; R	345.0	CE	270697	COLLINS ; R	345.0	CE	1	COMED_P1-2_345-L1223_TR-S	operation	1528.0	115.34	115.51	DC	15.47
16841599 3	270796	KINCAID ; B	345.0	CE	347955	7AUSTIN	345.0	AMIL	1	COMED_P1-2_345-L2105___-S-D	operation	1319.0	119.49	123.87	DC	57.81
16841617 1	270796	KINCAID ; B	345.0	CE	348856	7LATHAM	345.0	AMIL	1	COMED_P1-2_345-L18806_R-S-C	operation	1434.0	108.12	111.28	DC	52.2
16841596 8	270819	MCLEAN ; R	345.0	CE	270853	PONTIAC ; R	345.0	CE	1	COMED_P1-2_345-L8002___-S	operation	1819.0	138.09	141.31	DC	58.6
16841597 0	270819	MCLEAN ; R	345.0	CE	270853	PONTIAC ; R	345.0	CE	1	Base Case	operation	1679.0	110.53	113.64	DC	52.32
16841585 2	270852	PONTIAC ; B	345.0	CE	270704	LORETTO ; B	345.0	CE	1	COMED_P1-2_345-L8014__R-S-C	operation	1528.0	164.56	167.96	DC	51.98
16841585 4	270852	PONTIAC ; B	345.0	CE	270704	LORETTO ; B	345.0	CE	1	Base Case	operation	1364.0	122.22	124.91	DC	36.79
16841588 9	270853	PONTIAC ; R	345.0	CE	964580	AG1-321 TAP	345.0	CE	1	COMED_P1-2_345-L11212_B-S-B	operation	1656.0	153.83	156.68	DC	47.07
16841589 1	270853	PONTIAC ; R	345.0	CE	964580	AG1-321 TAP	345.0	CE	1	Base Case	operation	1334.0	110.26	112.32	DC	27.48
16841611 08	348847	7BROKAW	345.0	AMIL	270819	MCLEAN ; R	345.0	CE	1	COMED_P1-2_345-L8002___-S	operation	1793.0	108.26	111.53	DC	58.66
16963998 4	934720	AD1-100 TAP	345.0	CE	270926	WILTON ; B	345.0	CE	1	934725 AD1-100 JNT 345 934730 AD1-100 TAP 345 1	operation	1528.0	153.54	155.55	DC	30.76
16963998 6	934720	AD1-100 TAP	345.0	CE	270926	WILTON ; B	345.0	CE	1	Base Case	operation	1364.0	138.9	139.5	DC	18.23
16963992 9	935000	AD1-133 TAP	345.0	CE	270717	DRESDEN ; R	345.0	CE	1	COMED_P1-2_345-L11212_B-S-B	operation	1656.0	166.02	168.86	DC	47.07

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC| DC	MW IMPACT
169639931	935000	AD1-133 TAP	345.0	CE	270717	DRESDEN ; R	345.0	CE	1	Base Case	operation	1334.0	123.39	125.45	DC	27.48
169640255	936770	AD2-100 TAP	345.0	CE	944220	AF1-090 TAP	345.0	CE	1	EXT_P12:345:AMIL::AUSTIN:PANA:1	operation	1201.0	101.98	104.98	DC	35.84
169639893	939400	AE1-172 TAP	345.0	CE	934720	AD1-100 TAP	345.0	CE	1	COMED_P1-2_345-L8014__R-S-C	operation	1528.0	194.46	197.86	DC	51.94
169639895	939400	AE1-172 TAP	345.0	CE	934720	AD1-100 TAP	345.0	CE	1	Base Case	operation	1364.0	151.16	153.86	DC	36.74
169640197	944220	AF1-090 TAP	345.0	CE	347945	7PANA	345.0	AMIL	1	COMED_P1-2_345-L2106___-S	operation	1201.0	108.04	111.92	DC	46.54
169935577	964580	AG1-321 TAP	345.0	CE	935000	AD1-133 TAP	345.0	CE	1	COMED_P1-2_345-L11212_B-S-B	operation	1656.0	153.78	156.63	DC	47.07
169935579	964580	AG1-321 TAP	345.0	CE	935000	AD1-133 TAP	345.0	CE	1	Base Case	operation	1334.0	110.29	112.35	DC	27.48

11.5 System Reinforcements - Summer Peak Load Flow

None

11.6 Contingency Descriptions

Contingency Name	Contingency Definition
COMED_P1-2_345-L11212_B-S-B	CONTINGENCY 'COMED_P1-2_345-L11212_B-S-B' / CONTINGENCY # 198 TRIP BRANCH FROM BUS 934720 TO BUS 939400 CKT 1 / AD1-100 TAP 345 AE1-172 TAP 345 END
934725 AD1-100 JNT 345 934730 AD1-100 TAP 345 1	CONTINGENCY '934725 AD1-100 JNT 345 934730 AD1-100 TAP 345 1' OPEN BRANCH FROM BUS 934725 TO BUS 934730 CKT 1 END
COMED_P1-2_345-L8001___-S	CONTINGENCY 'COMED_P1-2_345-L8001___-S' / CONTINGENCY # 542 TRIP BRANCH FROM BUS 270853 TO BUS 270819 CKT 1 / PONTIAC ; R 345 MCLEAN ; R 345 END
EXT_P12:345:AMIL::AUSTIN:PANA:1	CONTINGENCY 'EXT_P12:345:AMIL::AUSTIN:PANA:1' / 10111 OPEN BRANCH FROM BUS 347945 TO BUS 347955 CKT 1 / 347945 7PANA 345 347955 7AUSTIN 345 1 END

Contingency Name	Contingency Definition
COMED_P1-2_345-L2105___-S-D	CONTINGENCY 'COMED_P1-2_345-L2105___-S-D' / CONTINGENCY # 441 TRIP BRANCH FROM BUS 944220 TO BUS 347945 CKT 1 / AF1-090 TAP ; R 345 7PANA 345 END
Base Case	
COMED_P1-2_345-L1223_TR-S	CONTINGENCY 'COMED_P1-2_345-L1223_TR-S' / CONTINGENCY # 264 TRIP BRANCH FROM BUS 270717 TO BUS 270731 CKT 1 / DRESDEN ; R 345 ELECT JCT;4R 345 TRIP BRANCH FROM BUS 275180 TO BUS 270717 CKT 1 / DRESDEN ;3M 138 DRESDEN ; R 345 TRIP BRANCH FROM BUS 275180 TO BUS 271336 CKT 1 / DRESDEN ;3M 138 DRESDEN ; B 138 TRIP BRANCH FROM BUS 275180 TO BUS 275280 CKT 1 / DRESDEN ;3M 138 DRESDEN ;3C 34.5 END
COMED_P1-2_345-L2106___-S	CONTINGENCY 'COMED_P1-2_345-L2106___-S' / CONTINGENCY # 442 TRIP BRANCH FROM BUS 270796 TO BUS 347955 CKT 1 / KINCAID ; B 345 AUSTIN 345 END
COMED_P1-2_345-L8014__R-S-C	CONTINGENCY 'COMED_P1-2_345-L8014__R-S-C' / CONTINGENCY # 545 TRIP BRANCH FROM BUS 935000 TO BUS 270717 CKT 1 / AD1-133 TAP 345 DRESDEN ; R 345 END
COMED_P1-2_345-L18806_R-S-C	CONTINGENCY 'COMED_P1-2_345-L18806_R-S-C' / CONTINGENCY # 424 TRIP BRANCH FROM BUS 924260 TO BUS 348847 CKT 1 / AB2-070 TAP 345 7BROKAW T1 345 END
COMED_P1-2_345-L8002___-S	CONTINGENCY 'COMED_P1-2_345-L8002___-S' / CONTINGENCY # 543 TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1 / PONTIAC ; B 345 BLUEMOUND; B 345 END

12 Short Circuit Analysis

No breakers were identified as overdutied.

13 Affected Systems

13.1 MISO

MISO Impacts to be determined during later study phases (as applicable).

Attachment 1: One Line Diagram