Generation Interconnection

Feasibility Study Report

for

Queue Project AF2-226

“KATYDID ROAD 345 KV”

July 2020

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 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.

3 General

The Interconnection Customer (IC), has proposed a storage generating facility located in Lasalle County, Illinois. AF2-226 will utilize the same Point of Interconnection as prior queue project O22. The installed facilities will have a total capability of 50 MW with 20 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is October 31, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-226
Project Name	KATYDID ROAD 345 KV
State	Illinois
County	LaSalle
Transmission Owner	ComEd
MFO	50
MWE	50
MWC	20
Fuel	Storage
Basecase Study Year	2023

A new service customer with a generating facility that could be commercially operable prior to June 1st of the basecase study year is required to request an interim deliverability analysis from PJM.

4 Point of Interconnection

Queue Position AF2-226 proposes to add 50 MW battery storage to Top Crop I Wind Farm TSS 985 built under PJM queue O22.

5 Cost Summary

The AF2-226 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$200,000
Total System Network Upgrade Costs	$9,700,000
Total Costs	$9,900,000

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 88-129. 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

Attachment Facilities

To accommodate interconnection of AF2-226; the relaying, SCADA, communication, and metering between Top Crop I Wind Farm TSS 985 and Katydid Road TSS 196 would be reviewed and upgraded if needed.

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

Description	Total Cost
Relaying, SCADA, communication, and metering between Top Crop I Wind Farm TSS 985 and Katydid Road TSS 196 would be reviewed and upgraded if needed.	$200,000
Total Physical Interconnection Costs	$200,000

7 Schedule

ComEd would take approximately 18-months to review and possibly upgrade the relaying, SCADA, Communication and metering after the ISA / ICSA are signed.

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 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

To the extent that these Applicable Technical Requirements and Standards may conflict with the terms and conditions of the Tariff, the Tariff shall control.

11 Summer Peak - Load Flow Analysis

The Queue Project AF2-226 was evaluated as a 50.0 MW (Capacity 20.0 MW) injection at the Katydid 345 kV substation in the ComEd area. Project AF2-226 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-226 was studied with a commercial probability of 53.0 %. 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)

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
96415744	270855	POWERTON ; R	345.0	CE	349662	7TAZEWELL	345.0	AMIL	1	COMED_P7_345-L19601_B-S_+_345-L9801__R-S_FSA	tower	1489.0	165.96	168.44	DC	36.83

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.

None

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
96415744	1	POWERTON ; R 345.0 kV - 7TAZEWELL 345.0 kV Ckt 1	**CE_NUN_0304 (900) : ComEd 345kV L0304 SSTE rating is 1512 MVA. The post contingency flow for this event exceeds the rating therefore an upgrade is required. The upgrade will be to mitigate the sag on the line and replace a 345kV disconnect switch. A preliminary estimate for this work is $9.7M with an estimated construction timeline of 30 months. Upon completion of this upgrade the new ratings will be 1679/2058/2107/2280/2622 MVA (SN/SLTE/SSTE/SLD/ALDR).** **Project Type : FAC** **Cost : $9,700,000** **Time Estimate : 30.0 Months** **NonPJMArea: The external (i.e. Non-PJM) Transmission Owner, AMIL, will not evaluate this violation until the impact study phase.**	$9,700,000
			TOTAL COST	**$9,700,000**

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

11.6 Flow Gate Details

The following indices contain additional information about each facility presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. The intent of the indices is to provide more details on which projects/generators have contributions to the flowgate in question. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the indices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the indices. Although this information is not used "as is" for cost allocation purposes, it can be used to gage the impact of other projects/generators. It should be noted the project/generator MW contributions presented in the body of the report are Full MW Impact contributions which are also noted in the indices column named "Full MW Impact", whereas the loading percentages reported in the body of the report, take into consideration the PJM Generator Deliverability Test rules such as commercial probability of each project as well as the ramping impact of "Adder" contributions. The MW Impact found and used in the analysis is shown in the indices column named "Gendeliv MW Impact".

11.6.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
96415744	270855	POWERTON ; R	CE	349662	7TAZEWELL	AMIL	1	COMED_P7_345-L19601_B-S_+_345-L9801__R-S_FSA	tower	1489.0	165.96	168.44	DC	36.83

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
274677	POWERTON ;5U	97.6817	50/50	97.6817
274678	POWERTON ;6U	97.9218	50/50	97.9218
274861	TOP CROP ;1U	2.5917	50/50	2.5917
274862	TOP CROP ;2U	5.0309	50/50	5.0309
274879	MINONK ;1U	3.0743	50/50	3.0743
290021	O50 E	71.2896	50/50	71.2896
293644	O22 E1	60.0992	50/50	60.0992
293645	O22 E2	116.6632	50/50	116.6632
918051	AA1-018 C OP	2.4835	50/50	2.4835
918052	AA1-018 E OP	96.3521	50/50	96.3521
934871	AD1-116 C	5.6113	50/50	5.6113
934872	AD1-116 E	9.1553	50/50	9.1553
936291	AD2-038 C O1	14.3963	50/50	14.3963
936292	AD2-038 E O1	96.3442	50/50	96.3442
938851	AE1-113 C	29.4070	50/50	29.4070
938852	AE1-113 E	104.2610	50/50	104.2610
939321	AE1-163 C O1	36.1752	50/50	36.1752
939322	AE1-163 E O1	222.2193	50/50	222.2193
942421	AE2-255 C O1	11.1390	50/50	11.1390
942422	AE2-255 E O1	33.4170	50/50	33.4170
942651	AE2-281 C O1	5.1679	50/50	5.1679
942652	AE2-281 E O1	31.7456	50/50	31.7456
957021	AF2-003 C O1	39.2745	50/50	39.2745
957022	AF2-003 E O1	183.8759	50/50	183.8759
958481	AF2-142 C	66.4497	50/50	66.4497
958482	AF2-142 E	44.2998	50/50	44.2998
958491	AF2-143 C	66.4443	50/50	66.4443
958492	AF2-143 E	44.2962	50/50	44.2962
959351	AF2-226 C	14.7302	50/50	14.7302
959352	AF2-226 E	22.0953	50/50	22.0953
960281	AF2-319 C	14.7302	50/50	14.7302
960282	AF2-319 E	22.0953	50/50	22.0953
WEC	WEC	0.0564	Confirmed LTF	0.0564
NEWTON	NEWTON	2.5745	Confirmed LTF	2.5745
FARMERCITY	FARMERCITY	0.2126	Confirmed LTF	0.2126
CALDERWOOD	CALDERWOOD	0.7758	Confirmed LTF	0.7758
NY	NY	0.4612	Confirmed LTF	0.4612
PRAIRIE	PRAIRIE	8.2733	Confirmed LTF	8.2733
O-066	O-066	5.6314	Confirmed LTF	5.6314
CHEOAH	CHEOAH	0.7773	Confirmed LTF	0.7773
EDWARDS	EDWARDS	5.4649	Confirmed LTF	5.4649

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
TILTON	TILTON	1.2203	Confirmed LTF	1.2203
G-007	G-007	0.8726	Confirmed LTF	0.8726
GIBSON	GIBSON	0.7868	Confirmed LTF	0.7868
BLUEG	BLUEG	1.9530	Confirmed LTF	1.9530
TRIMBLE	TRIMBLE	0.6110	Confirmed LTF	0.6110
CATAWBA	CATAWBA	0.4522	Confirmed LTF	0.4522

11.7 Queue Dependencies

The Queue Projects below are listed in one or more indices for the overloads identified in your report. These projects contribute to the loading of the overloaded facilities identified in your report. The percent overload of a facility and cost allocation you may have towards a particular reinforcement could vary depending on the action of these earlier projects. The status of each project at the time of the analysis is presented in the table. This list may change as earlier projects withdraw or modify their requests.

Queue Number	Project Name	Status
AA1-018	Powerton-Goodings Grove	In Service
AD1-116	Nevada 345 kV	Active
AD2-038	Powerton	Active
AE1-113	Mole Creek 345 kV	Active
AE1-163	Powerton-Nevada 345 kV	Active
AE2-255	Molecreek 345 kV	Active
AE2-281	Powerton-Nevada 345 kV	Active
AF2-003	Powerton-Mole Creek	Active
AF2-142	Nevada 345 kV	Active
AF2-143	Powerton-Nevada 345 kV	Active
AF2-226	Katydid Road 345 kV	Active
AF2-319	Katydid Road 345 kV	Active

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
COMED_P7_345-L19601_B-S_+_345-L9801__R-S_FSA	CONTINGENCY 'COMED_P7_345-L19601_B-S_+_345-L9801__R-S_FSA' TRIP BRANCH FROM BUS 270790 TO BUS 270770 CKT 1 / KATYD; B 345 GOODI;4B 345 TRIP BRANCH FROM BUS 918050 TO BUS 270769 CKT 1 / AA1-018 GOODINGS ;2R 345 END

12 Short Circuit Analysis

The following breakers are overdutied:

None

12.1 System Reinforcements - Short Circuit

NoneAffected Systems

12.2 MISO

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