Generation Interconnection Facilities Study Report

For

PJM Generation Interconnection Request Queue Positions AF1-007

“Indian River 230kV”

May 2023

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A. Transmission Owner Facilities Study Summary

1. Description of Project

US Wind, Inc, the Interconnection Customer (IC), has proposed a 7.3 MW Energy (1.9 MW Capacity) uprate to their prior queue project AB1-056 offshore wind generating facility to be located in Sussex County, Delaware. The proposed facilities will have an aggregate generating capability of 255.1 MW (66.3 MW Capacity). PJM studied AF1-007 as an injection into the Delmarva Power & Light Company (DPL) transmission system at the Indian River 230kV Substation and evaluated it for compliance with reliability criteria for summer peak conditions in 2023. The planned in-service date is December 31, 2025.

This proposed uprate is to be installed behind the breaker position in the IC's substation established under queue project AB1-056 (Attachment #1).

2. Amendments to the System Impact Study or System Impact Study Results

The scope of the project as stated in the System Impact Study, dated August 2020, has remained unchanged.

3. Interconnection Customer's Milestone Schedule

The planned in-service date (ISD) is December 31, 2025. DPL's portion of this project will be complete upon receipt of a fully executed interconnection agreement.

4. Customer's Scope of Work

The IC assumes full responsibility for all design and construction related to activities on their side of the Point of Interconnection (POI). Site preparation, including clearing, grading and an access road, as necessary, is assumed to be performed by the IC. Route selection, line design, and right-of-way acquisition for the IC's facilities are not included in this report and are the responsibility of the IC. All protective relaying and metering design and installation must comply with DPL's applicable standards. The IC is also required to provide revenue metering and real-time telemetering data to PJM in conformance with the requirements contained in PJM Manuals M-01 and M-14 and the PJM Tariff.

DPL Interconnection Customer Scope of Direct Connection Work Requirements:
Note: The following requirements and responsibilities are to be satisfied under the scope of work for AB1-056. They have been included below for reference.

- This report was developed under the assumption that an IC circuit breaker is located within 500 feet of the DPL substation to facilitate the relay protection scheme between DPL and the IC at the Point of Interconnection (POI). If the IC circuit breaker cannot be located within 500 feet of the DPL substation, then DPL would need to re-engineer (design) the protection scheme

Special Operating Requirements

1. DPL will require the capability to remotely disconnect the generator from the grid by communication from its System Operations facility. Such disconnection may be facilitated by a generator breaker or other method depending upon the specific circumstances and the evaluation by DPL.

2. DPL reserves the right to charge the Interconnection Customer operation and maintenance expenses to maintain the Interconnection Customer attachment facilities, including metering and telecommunications facilities, owned by DPL.

The proposed interconnection will be required to satisfy the requirements outlined in DPL's "Technical Considerations Covering Parallel Operations of Customer Owned Generation" document for units greater than 1 MW. DPL's system protection group will need to receive the proposed settings and associated schemes for review to ensure compliance with this standard.

Step-up Transformer Requirements

If the IC elects to use a step-up transformer with a delta high side winding, additional measures are required in order to prevent Temporary-Over-Voltage (TOV) during abnormal conditions. Three phase voltage sensing must be installed on the high side (230 kV) of the generator's transformer. PT's cannot be installed on lower voltage bus. This requirement can be avoided by using a grounded-wye/grounded-wye step-up transformer.

Inverter Requirements

For the safety and reliability of the Transmission System, the Interconnection Customer shall design a non-synchronous generation facility with the ability to maintain a power factor of at least 0.95 leading to 0.95 lagging measured at the Point of Interconnection (POI).

5. Description of Facilities Included in the Facilities Study (DPL's Scope of Work)

Substation Interconnection Estimate

Scope: DPL has no direct connection scope as part of the AF1-007 interconnection.

Major Equipment Included in Estimate: N/A

Substation Estimate Assumptions:

This project will utilize the communications facilities installed under AB1-056. No independent fiber will be required.

Required Relaying:

DPL reserves the right to review the electrical protection design and relay settings for interconnecting customer facilities to ensure that the protective relaying equipment will be compatible with that installed at the remote substation. DPL personnel must be present at the time of commissioning to witness proper function of the protection scheme and related coordination. At a minimum, DPL will need to review and potentially update settings at Indian River Substation.

Transmission Line Estimate

Scope: DPL has no direct connection scope as part of the AF1-007 interconnection.

Major Equipment Included in Estimate: N/A

6. Harmonic Study

DPL to perform a harmonic study to establish a harmonic profile of the interconnecting substation to assist the Interconnection Customer in development of harmonic filters to meet IEEE Standard 519 allowable limits. This study includes installation of measurement equipment at the Indian River substation on the 230kV bus along with initial monitoring for a 13-month time period from the commencement date. DPL shall provide an electronic or written data and/or report of the results to PJM and the Interconnection Customer.

Estimated cost: $400k

DPL may continue to monitor harmonic in one-year increments at expense of the IC for a period of at least one year after the in-service date of the project to ensure no adverse impacts are caused by the Interconnection Customer Facility.

7. Total Cost of Transmission Owner Facilities Included in the Facilities Study

Item	*Total Cost*
Non-Direct Connection Facilities	$0.00
Direct Connection Facilities	$0.00
Attachment Facilities	$0.00
Other Work (Harmonic Study)	$400,000.00
Total Cost	**$400,000.00**

8. Summary of the Schedule for Completion of Work for the Facilities Study

N/A

B. Transmission Owner Facilities Study Results

This section describes facilities identified to be installed (attachment facilities), replaced, and/or upgraded (upgrade facilities) by DPL to accommodate the project. During detailed design and analysis other components may be identified for installation or replacement due to this interconnection.

1. Transmission Lines –New

No direct connect scope

2. Transmission Lines – Upgrade

No direct connect scope.

3. New Substation/Switchyard Facilities

No direct connect scope.

4. Substation/Switchyard Facility Upgrades

No direct connect scope.

5. Telecommunications Facilities – Upgrades

No direct connect scope.

6. Metering & Communications

A three-phase 230 kV revenue metering point will be established within the IC's facility at the POI under the related queue project AB1-056. No additional metering infrastructure is required to be installed for AF1-007. This location must provide appropriate access to a metering vehicle for periodic maintenance and testing and must be approved by DPL.

The IC will provide 120V power to the metering cabinet. It is critical that the IC also provides 120 VAC uninterruptible power to the primary meter installed by Transmission Owner. DPL will program and install two solid state multi-function meters (Primary & Backup) for each of the new metering positions. A separate source with individual breaker will be required for each primary meter. Each meter will be equipped with load profile, telemetry, and DNP outputs. The IC will be provided with one (1) meter DNP output. DPL will supply a wireless modem for MV90 interrogation. In the event that a wireless modem is unable to reliably communicate, the IC will be required to make provisions for equivalent technology approved by DPL within approximately three feet of the DPL metering position to facilitate remote interrogation and data collection.

DPL's revenue meters will be the official meters and must be the source for reporting generation output to PJM. The IC is responsible for installing telemetry equipment necessary to obtain the revenue meter data and submitting the data to PJM.

It is the IC's responsibility to send the data that PJM and DPL require directly to PJM. The IC will grant permission for PJM to send DPL the following telemetry that the IC sends to PJM: real time MW, MVAR, volts, amperes, generator status, and interval MWH and MVARH.

7. Environmental, Real Estate and Permitting

Permitting and Real Estate

All work to accommodate the interconnection of PJM Queue AF1-007 is dependent upon the IC obtaining all necessary permits. Moreover, the IC shall be responsible for acquiring all necessary real property rights and acquisitions, including but not limited to: rights of way, easements, and fee simple, in a form approved by DPL. Any setbacks in obtaining the necessary real property rights, acquisitions and permits required for this interconnection may delay the construction schedule.

Environmental

This estimate assumes that all the applicable permitting will be obtained for the generating facility by the IC.

8. Summary of Results of Study

Non- Direct Connection Facilities	$ 0.00
Attachment Facilities	$ 0.00

Generation projects meeting IRS "Safe Harbor" provisions generally do not incur "CIAC" (Contribution in Aid to Construction), a tax collected by the utility for the state or federal government. DPL does not expect to collect CIAC for this project. If for any reason, "CIAC" would be required for this project, it would be the responsibility of the party owning the generator to pay this cost.

9. Schedules and Assumptions

DPL's portion of this project will be complete upon receipt of a fully executed interconnection agreement. A commercial operation schedule will need to be supplied by the IC in order to verify the ISD.

It shall be noted that the construction of this project is contingent on the completion of the IC's previous queue project "AB1-056". If AB1-056 were to withdraw, AF1-007 will inherit all scope and costs included in the AB1-056 Facilities Study Report.

Attachment #1