



# **Generation Interconnection**

## **Feasibility Study Report**

**for**

**Queue Project AF1-007**

**INDIAN RIVER 230 KV I**

**1.9 MW Capacity / 7.3 MW Energy**

January, 2020

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## 1 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.

PJM utilizes manufacturer models to ensure the performance of turbines is properly captured during the simulations performed for stability verification and, where applicable, for compliance with low voltage ride through requirements. Turbine manufacturers provide such models to their customers. The list of manufacturer models PJM has already validated is contained in Attachment B of Manual 14G. Manufacturer models may be updated from time to time, for various reasons such as to reflect changes to the control systems or to more accurately represent the capabilities turbines and controls which are currently available in the field. Additionally, as new turbine models are developed, turbine manufacturers provide such new models which must be used in the conduct of these studies. PJM needs adequate time to evaluate the new models in order to reduce delays to the System Impact Study process timeline for the Interconnection Customer as well as other Interconnection Customers in the study group. Therefore, PJM will require that any Interconnection Customer with a new manufacturer model must supply that model to PJM, along with a \$10,000 fully refundable deposit, no later than three (3) months prior to the starting date of the System Impact Study (See Section 4.3 for starting dates) for the Interconnection Request which shall specify the use of the new model. The Interconnection Customer will be required to submit a completed dynamic model study request form (Attachment B-1 of Manual 14G) in order to document the request for the study.

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.

## 2 General

The Interconnection Customer (IC), has proposed an uprate to an existing Offshore Wind generating facility located in Sussex County, DE. This project requests an uprate of 7.3 MW with 1.9 MW of this output being recognized by PJM as Capacity. The installed facilities will have a total capability of 255.1 MW with 66.3 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is October 1, 2021. This study does not imply a TO commitment to this in-service date.

<b>Queue Number</b>	<b>AF1-007</b>
<b>Project Name</b>	INDIAN RIVER 230 KV I
<b>State</b>	Delaware
<b>County</b>	Sussex
<b>Transmission Owner</b>	DPL
<b>MFO</b>	255.1
<b>MWE</b>	7.3
<b>MWC</b>	1.9
<b>Fuel</b>	Offshore Wind
<b>Basecase Study Year</b>	2023

## 2.1 Point of Interconnection

AF1-007 will interconnect with the DPL transmission system at the Indian River 230 kV substation.

## 2.2 Cost Summary

The AF1-007 project will be responsible for the following costs associated with the physical interconnection of the project:

Description	Total Cost
Attachment Facilities	\$0
Direct Connection Network Upgrade	\$0
Non Direct Connection Network Upgrades	\$0
<b>Total Costs</b>	<b>\$0</b>

DPL reserves the right to reassess issues presented in this document and, upon appropriate justification, submit additional costs related to the AF1-007 project.

In addition, the AF1-007 project may be responsible for a contribution to the following costs associated with network upgrades:

Description	Total Cost
System Upgrades	\$0

### **3 Transmission Owner Scope of Work**

No additional work is needed to accommodate this interconnection.

#### **3.1 Interconnection Customer Scope of Direct Connection Work**

The IC is responsible for all design and construction related to activities on their side of the Point of Interconnection. Site preparation, including grading and an access road, as necessary, is assumed to be by the IC. Route selection, line design, and right-of-way acquisition of the direct connect facilities is not included in this report and is the responsibility of the IC. 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.

#### **3.2 DPL Interconnection Customer Scope of Direct Connection Work Requirements:**

DPL requires 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).

### **4 Attachment Facilities**

The total preliminary cost estimate for the Attachment work is given in the table below. These costs do not include CIAC Tax Gross-up.

None.

### **5 Direct Connection Cost Estimate**

The total preliminary cost estimate for the Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

None.

### **6 Non-Direct Connection Cost Estimate**

The total preliminary cost estimate for the Non-Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

None.

## 7 Interconnection Customer Requirements

### 7.1 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.
3. Interconnection Customer shall design its non-synchronous generation facility with the ability to maintain a power factor between 0.95 leading and 0.95 lagging measured at the generator terminals.

## 8 Revenue Metering and SCADA Requirements

### 8.1 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.

### 8.2 DPL Requirements

#### 8.2.1 Required Relaying and Communications

Relaying and communications will be established as part of the previous queue project. No additional work would be required.

#### 8.2.2 Metering

Metering will be established as part of the previous queue project. No additional work would be required.

## 9 Network Impacts

The Queue Project AF1-007 was evaluated as a 7.3 MW (Capacity 1.9 MW) injection as an uprate to an existing project at the Indian River 230 kV substation in the DPL area. Project AF1-007 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-007 was studied with a commercial probability of 53%. Potential network impacts were as follows:

# Summer Peak Load Flow

## 10 Generation Deliverability

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

None

## 11 Multiple Facility Contingency

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

None

## 12 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

## 13 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

## 14 System Reinforcements

None

# Short Circuit

## 15 Short Circuit

The following Breakers are overduty:

None.