Transmission Interconnection Combined Feasibility/System Impact Study Report

For

PJM Transmission Interconnection Request Queue Position AD2-084

"Cardiff 230 kV"

August 2018

Preface

The intent of the Combined Feasibility/System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate Transmission Owner.

Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The Interconnection Customer may be 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.

General

Anbaric Development Partners, LLC, the Interconnection Customer (IC), has proposed a 0 MW Energy, 0 MW Capacity AC offshore wind transmission system designed to inject offshore wind energy, developed and operated by others, into the Cardiff 230 kV Substation. Major equipment includes an AC offshore transformer platform, 230/66 kV transformers, protection and control equipment, shunt reactors, and a 230 kV submarine cable delivery system to the Cardiff Substation. The facility is located in the Atlantic Ocean off the coast of New Jersey at coordinates; Latitude: 39.4280000, Longitude: -74.6200000. PJM studied AD2-084 as a 0 MW injection into the Atlantic City Electric system at the Cardiff 230 kV. The planned in-service date, as requested in the Attachment S application is December 31, 2025.

Point of Interconnection

The Interconnection Customer requested a Point of Interconnection at the Atlantic City Electric Company's Cardiff 230 kV Substation.

Direct Connection Requirements

Transmission Owner Scope of Work

Substation Interconnection Estimate

Scope: At Cardiff Substation, establish a 230 kV terminal at the open position for the proposed transmission interconnection request AD2-084.

Estimate: $1,000,000
Construction Time: 24-36 months

Major Equipment Included in Estimate:

- Power Circuit Breaker, 230 kV, 3 cycle Qty. 1
- Disconnect Switch, 230 kV Motor Operated Device Qty. 3

- Double 1590 ACSR (325') Qty. 1
- Insulators, 230 kV Qty. 3
- Disconnect Switch Stand, Low, 230 kV, Steel Qty. 1
- Relay Panel, Transmission Line, FL/BU (20") Qty. 1
- Control Panel, 230 kV Circuit Breaker (10") Qty. 1
- Take-off structure, 230 kV Qty. 2
- 230 kV Lightning Arresters Qty. 3
- 230 kV Lightning Arresters Stands Qty. 3

Estimate Assumptions:

- Room in Control Enclosure for New Relay Panel.
- Fiber optic cable necessary is 1,000 linear feet.
- Land purchase for the substation is not included.

Additional Operating Requirements

1. ACE 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 ACE.

2. ACE 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 ACE.

Interconnection Customer Scope of Work

The Interconnection Customer (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 PHI'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.

The interconnection customer will purchase and install all metering instrument transformers as well as construct a metering structure per PHI's specifications. The secondary wiring connections at the instrument transformers will be completed by the interconnection customer's contractors and inspected by PHI, while the secondary wiring work at the metering enclosure will be completed by PHI's Meter technicians. The metering control cable and meter cabinets will be supplied by PHI and installed by the interconnection customer's contractors. PHI's meter technicians will program and

install two solid state multi-function meters (Primary & Backup) for the new metering position. Each meter will be equipped with load profile, telemetry, and form-c pulse outputs. The ownership of metering equipment purchased or installed by the IC shall be transferred to the Transmission Owner at Commercial Operation, unless the IC asserts its right to install, own and operate the metering system.

- ACE requires that an IC circuit breaker is located within 500 feet of the ACE substation to facilitate the relay protection scheme between ACE and the IC at the Point of Interconnection (POI).

Summer Peak Analysis - 2021

Transmission Network Impacts

Potential transmission network impacts are as follows:

Generator Deliverability

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

None

Multiple Facility Contingency

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

None

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

Summer Peak Load Flow Analysis Reinforcements

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

None

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

None

Steady-State Voltage Requirements
To be determined in later study phases.

Short Circuit

None

Stability and Reactive Power Requirement
To be determined in later study phases.

Delivery of Energy Portion of Interconnection Request
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.
Only the most severely overloaded conditions are listed. 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 will study all overload conditions associated with the overloaded element(s) identified.

None

Light Load Analysis - 2021
Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).