Generation Interconnection

Feasibility Study Report

for

Queue Project AF1-109

PLEASANT VALLEY 230 KV

20 MW Capacity / 20 MW Energy

January 2020

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.

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2 General

The Interconnection Customer (IC) has proposed a Solar and Battery Storage generating facility located in Mercer County, New Jersey. AF1-109 will consist of 5 MW of solar generation and a 20 MW (200 MWh) battery energy storage system. The project will have a maximum delivered output at the Point of Interconnection of 20 MW. The installed facilities will have a total capability of 20 MW with 20 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is June 1, 2020. **This study does not imply a TO commitment to this in-service date.**

Queue Number	**AF1-109**
Project Name	PLEASANT VALLEY 230 KV
State	New Jersey
County	Mercer
Transmission Owner	PSEG
MFO	20
MWE	20
MWC	20
Fuel	Solar; Storage
Basecase Study Year	2023

2.1 Point of Interconnection

AF1-109 will interconnect with the PSEG transmission system at the Pleasant Valley 230 kV substation.

2.2 Cost Summary

The AF1-109 project will be responsible for the following costs for the physical interconnection of the project:

Description	Total Cost
Attachment Facilities	$1,300,000
Direct Connection Network Upgrade	$0
Non Direct Connection Network Upgrades	$6,000,000
Total Costs	$7,300,000

In addition, the AF1-109 project may be responsible for a contribution to the following costs for any Network Upgrades identified in this report:

Description	Total Cost
System Upgrades	$0

Cost allocations for these upgrades will be provided in the System Impact Study Report.

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3 Transmission Owner Scope of Work

3.1 Attachment Facilities

The following Attachment Facilities are required for the AF1-109 interconnection:

- Install a new A-frame structure and associated conductor to from the Point of Interconnection to a new bus position at the Pleasant Valley 230kV Substation.
- Provide relays and revenue grade metering.

The total preliminary cost estimate for the Attachment work is **$1,300,000**. These costs do not include CIAC Tax Gross-up.

3.2 Direct Connection Cost Estimate

None

3.3 Non-Direct Connection Cost Estimate

The following Non-Direct Connection scope of work is required for the AF1-109 interconnection:

- Install one (1) 230kV breaker, associated bus and disconnect switches on southeastern end of station to create a new bus position and reconfigure the station to a 4 breaker ring bus.
- Install one (1) 230kV breaker, associated bus and disconnect switches on northwestern end of station to create a new bus position and reconfigure the station to a 4 breaker ring bus.
- Expand the station fence on 3 sides.

The total preliminary cost estimate for the Non-Direct Connection work is **$6,000,000**. These costs do not include CIAC Tax Gross

4 Revenue Metering and SCADA Requirements

4.1 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.

4.2 PSEG Requirements

The Interconnection Customer will be required to comply with all PSE&G Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "Information and Requirements for Electric Service" document located at the following links:

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http://www.pseg.com/business/builders/new_service/before/
http://www.pjm.com/planning/design-engineering/to-tech-standards.aspx

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5 Network Impacts

The Queue Project AF1-109 was evaluated as a 20.0 MW (Capacity 20.0 MW) injection at the **Pleasant Valley 230 kV** substation in the PSEG area. Project AF1-109 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-109 was studied with a commercial probability of 0.53. Potential network impacts were as follows:

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Summer Peak Load Flow

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6 Generation Deliverability

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

None

7 Multiple Facility Contingency

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

None

8 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

9 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

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Affected Systems

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10 Affected Systems

10.1 LG&E

LG&E Impacts to be determined during later study phases (as applicable).

10.2 MISO

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

10.3 TVA

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

10.4 Duke Energy Progress

Duke Energy Progress Impacts to be determined during later study phases (as applicable).

10.5 NYISO

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

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Short Circuit

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11 Short Circuit

The following Breakers are over duty:

None

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