Via DocuSign

July 30, 2019

GPPT LLC
215 Executive Drive,
Morristown, New Jersey 08057

Dear Mr. Skoultchi,

RE: AE2-055 "Boalsburg-Shingletown 46 kV" - Feasibility Study Report and System Impact Study Agreement

Enclosed is a report documenting the results of the AE2-055 "Boalsburg-Shingletown 46 kV" Feasibility Study. The results of this study are predicated on a 2022 transmission system based upon PJM's best assumptions at the present time for load growth and connection of proposed new generation additions.

Feasibility Studies are performed to provide an Interconnection Customer with preliminarily estimated reinforcement costs and information concerning attachment facilities and network upgrades. Since the analysis inherently has to include assumptions for future system conditions, the results should be used in this context. The costs and associated timing described in the enclosed report are based upon estimates given to PJM by the affected Transmission Owner(s). The costs are your responsibility as the project developer. More comprehensive estimates will be developed upon execution of a System Impact Study Agreement in accordance with Part VI of the PJM Tariff.

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. In some instances a project may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g., another interconnection project, may also contribute to the need for the same network reinforcement. 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 System 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. In addition, the Feasibility Study estimates do not include any the costs associated with engineering and

constructing the equipment and facilities on the developer's side of the point of interconnection. These costs are the responsibility of the project developer.

The costs associated with the study are being tabulated and you will receive a final statement/invoice electronically from PJM detailing your balance within 120 days.

Please be advised that all modeling will be completed consistent with Manual 3A. Market settlements cannot begin until these steps have been complete.

Note that Tariff 212.5 milestones require that you have all site permits, water and fuel agreements and associated right of way, and a memorandum of understanding for major equipment at the time you return your executed Interconnection Service Agreement (ISA). It is your responsibility to ensure these requirements are met and if they cannot be met at the time of the return of the ISA, you must demonstrate your due diligence and propose dates when those milestones will be met.

Pursuant to Section 204.3 of the PJM Tariff, attached is a System Impact Study Agreement for your consideration. The Agreement must be executed via DocuSign within thirty days (by close of business on **Friday, August 30, 2019**) to maintain the project's position in the queue. At the same time, a study deposit in the amount of **$16,000** must be received by PJM by this date. **As the scope of the System Impact Study, PJM and FirstEnergy will be working on your Combined Feasibility/System Impact Study report and Wholesale Market Participation Agreement (WMPA) targeted for delivery by October 31, 2019.**

Please review and execute the Impact Study Agreement as specified in DocuSign. Required with the signed agreement, per Section 3 of the enclosed System Impact Study Agreement is a deposit of **$16,000**, 10% of which is non-refundable. Any unused non-refundable deposit monies shall be returned to the Interconnection Customer upon Initial Operation.

Please send the required study deposit to:

Jeannette Mittan
PJM Interconnection, L.L.C.
2750 Monroe Blvd.
Audubon, PA 19403

The following information is provided for wire transfers:

Bank: PNC Bank, NA, New Jersey
ABA Number: 031-207-607
Account Number: 8013589826

Please e-mail PJM at SystemPlanning.Admin@pjm.com with the project name, queue number, date and amount of wire.

In addition to the executed System Impact Study Agreement and deposit, you are responsible to ensure that all queue requests that you may have in the PJM queue are in good financial standing and that you meet the requirements of Tariff 204.3. Failure to meet the requirements of Tariff 204.3 or have your accounts in good standing will result in your project to be withdrawn from the queue. It is your responsibility to meet these requirements.

Costs for the Feasibility Study are being tabulated and you will receive an invoice in the near future. If you wish to discuss the Feasibility Study report or the Impact Study Agreement in more detail, please call me at 610-666-4561 and or email me at Lisa.Krizenoskas@pjm.com.

Sincerely,

Lisa Krizenoskas

Lisa Krizenoskas
Sr. Engineer
PJM Interconnection Projects

Generation Interconnection

Feasibility Study Report

for

Queue Project AE2-055

SHINGLETOWN-BOALSBURG 46 KV

12 MW Capacity / 20 MW Energy

July, 2019

Table of Contents

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 GPPT, LLC, the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is West Penn Power.

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 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.

3 General

The Interconnection Customer (IC) has proposed a Solar generating facility located in Centre County, Harris Township, Pennsylvania. The installed facilities will have a total capability of 20 MW with 12 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is 03/31/2020. This study does not imply a TO commitment to this in-service date.

Queue Number	**AE2-055**
Project Name	SHINGLETOWN-BOALSBURG 46 KV
Interconnection Customer	GPPT, LLC
State	Pennsylvania
County	Centre
Transmission Owner	West Penn Power - APS
MFO	20
MWE	20
MWC	12
Fuel	Solar
Basecase Study Year	2022

3.1 Point of Interconnection

The interconnection of the project at the Primary POI will be accomplished by tapping the Shingletown - Boalsburg 46 kV line and constructing a one span tap. The transmission line tap will be located approximately 1.5 miles from Shingletown substation. The IC will be responsible for acquiring all easements, properties, and permits that may be required to construct both the new interconnection line tap and the associated attachment facilities.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AE2-055 generation project to connect to the FirstEnergy ("FE") transmission system. Attachment 2 provides the proposed location for the point of interconnection. IC will be responsible for constructing all of the facilities on its side of the POI, including the attachment facilities which connect the generator to the FE transmission system's direct connection facilities.

3.2 Cost Summary

The AE2-055 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$ 22,034
Direct Connection Network Upgrade	$ 44,066
Non Direct Connection Network Upgrades	$ 0
Total Costs	**$ 66,100**

In addition, the AE2-055 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	**$ 0**

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

The costs provided above exclude the Contribution in Aid of Construction ("CIAC") Federal Income Tax Gross Up charge. If, at a future date, it is determined that the CIAC Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

The Feasibility Study is used to make a preliminary determination of the type and scope of Attachment Facilities, Local Upgrades, and Network Upgrades that will be necessary to accommodate the Interconnection Request and to provide the Interconnection Customer a preliminary estimate of the time that will be required to construct any necessary facilities and upgrades and the Interconnection Customer's cost responsibility. The System Impact Study provides refined and comprehensive estimates of cost responsibility and construction lead times for new facilities and system upgrades. Facilities Studies will include, commensurate with the

degree of engineering specificity as provided in the Facilities Study Agreement, good faith estimates of the cost, determined in accordance with Section 217 of the Tariff,

(a) to be charged to each affected New Service Customer for the Facilities and System Upgrades that are necessary to accommodate this queue project;

(b) the time required to complete detailed design and construction of the facilities and upgrades; and

(c) a description of any site-specific environmental issues or requirements that could reasonably be anticipated to affect the cost or time required to complete construction of such facilities and upgrades.

The required Attachment Facilities and Direct and Non-Direct Connection work for the interconnection of the AE2-055 generation project to the FE Transmission System is detailed in the following sections. The associated one-line with the generation project Attachment Facilities and the Primary Direct and Non-Direct Connection facilities are shown in Attachment 1.

4 Transmission Owner Scope of Work

The interconnection of the project at the Primary POI will be accomplished by tapping the Shingletown - Boalsburg 46 kV line and constructing a one span tap. The transmission line tap will be located approximately 1.5 miles from Shingletown substation. The IC will be responsible for acquiring all easements, properties, and permits that may be required to construct both the new interconnection line tap and the associated attachment facilities.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AE2-055 generation project to connect to the FirstEnergy ("FE") transmission system. Attachment 2 provides the proposed location for the point of interconnection. IC will be responsible for constructing all of the facilities on its side of the POI, including the attachment facilities which connect the generator to the FE transmission system's direct connection facilities.

5 Attachment Facilities

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

Description	Total Cost
Install 46 kV Tap Switch and Provide Revenue Meter Package	$ 22,034
Total Direct Connection Facility Costs	**$ 22,034**

6 Direct Connection Cost Estimate

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

Description	Total Cost
Tap the Shingletown – Boalsburg 46 kV Line and Install 2-46 kV Line Switches	$ 44,066
Total Attachment Facility Costs	**$ 44,066**

7 Non-Direct Connection Cost Estimate

There is no Non-Direct Connection scope of work required for this interconnection.

8 Schedule

Based on the scope of work for the Attachment Facilities and the Direct and Non-Direct Connection facilities, it is expected to take a minimum of 10 months after the signing of an Interconnection Construction Service Agreement to complete the installation. This includes the requirement for the IC to make a preliminary payment that compensates FE for the first three months of the engineering design work that is related to the construction of the interconnection substation. This assumes that there will be no environmental issues with any of the new properties associated with this project, that there will be no delays in acquiring the necessary permits for implementing the defined direct connection and network upgrades, and that all transmission system outages will be allowed when requested.

The schedule for the required Network Impact Reinforcements will be more clearly identified in future study phases. The estimate elapsed time to complete each of the required reinforcements is identified in the "System Reinforcements" section of the report.

9 Transmission Owner Analysis

FE performed an analysis of its underlying transmission <100 kV system. The AE2-055 project did not contribute to any overloads on the FE transmission <100 kV system.

10 Interconnection Customer Requirements

10.1 System Protection

The IC must design its Customer Facilities in accordance with all applicable standards, including the standards in FE's "Requirements for Transmission Connected Facilities" document located at:

http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx

Preliminary Protection requirements will be provided as part of the Facilities Study. Detailed Protection Requirements will be provided once the project enters the construction phase.

The IC has requested a non-standard GSU transformer winding configuration. This transformer is in violation of section 14.2.6 of FE's "Requirements for Transmission Connected Facilities" document and will not be accepted. The GSU transformer must have a grounded wye connection on the high (utility) side and a delta connection on the low (generator) side.

10.2 Compliance Issues and Interconnection Customer Requirements

The proposed Customer Facilities must be designed in accordance with FE's "Requirements for Transmission Connected Facilities" document located at:

http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx. In particular, the IC is responsible for the following:

1. The purchase and installation of a fully rated 34.5 kV circuit breaker to protect the AE2-055 generator lead line. A single circuit breaker must be used to protect this line; if the project has several GSU transformers, the individual GSU transformer breakers cannot be used to protect this line.

2. The purchase and installation of the minimum required FE generation interconnection relaying and control facilities. This includes over/under voltage protection, over/under frequency protection, and zero sequence voltage protection relays.

3. The purchase and installation of supervisory control and data acquisition ("SCADA") equipment to provide information in a compatible format to the FE Transmission System Control Center.

4. Compliance with the FE and PJM generator power factor and voltage control requirements.

5. The execution of a back-up service agreement to serve the customer load supplied from the AE2-055 generation project metering point when the units are out-of-service. This assumes the intent of the IC is to net the generation with the load.

The IC will also be required to meet all PJM, ReliabilityFirst, and NERC reliability criteria and operating procedures for standards compliance. For example, the IC will need to properly locate and report the over and under voltage and over and under frequency system protection elements for its units as well as the

submission of the generator model and protection data required to satisfy the PJM and ReliabilityFirst audits. Failure to comply with these requirements may result in a disconnection of service if the violation is found to compromise the reliability of the FE system.

10.3 Power Factor Requirements

The IC shall design its non-synchronous Customer Facility with the ability to maintain a power factor of at least 0.95 leading (absorbing VARs) to 0.95 lagging (supplying VARs) measured at the high-side of the facility substation transformer(s) connected to the FE transmission system.

11 Revenue Metering and SCADA Requirements

11.1 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.

11.1.1 Meteorological Data Reporting Requirement

The solar generation facility shall provide the Transmission Provider with site-specific meteorological data including:

- Temperature (degrees Fahrenheit)
- Atmospheric pressure (hectopascals)
- Irradiance
- Forced outage data

11.2 FE Requirements

The IC will be required to comply with all FE revenue metering requirements for generation interconnection customers which can be found in FE's "Requirements for Transmission Connected Facilities" document located at: http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx

12 Network Impacts

The Queue Project AE2-055 was evaluated as a 20 MW (Capacity 12 MW) injection tapping the Boalsburg – Shingletown 46kV in the West Penn Power (APS) area. Project AE2-055 was evaluated for compliance with

applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-055 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Load Flow

13 Generation Deliverability

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

None

14 Multiple Facility Contingency

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

None

15 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

16 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

17 System Reinforcements

None

Affected Systems

18 Affected Systems

18.1 LG&E

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

18.2 MISO

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

18.3 TVA

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

18.4 Duke Energy Progress

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

18.5 NYISO

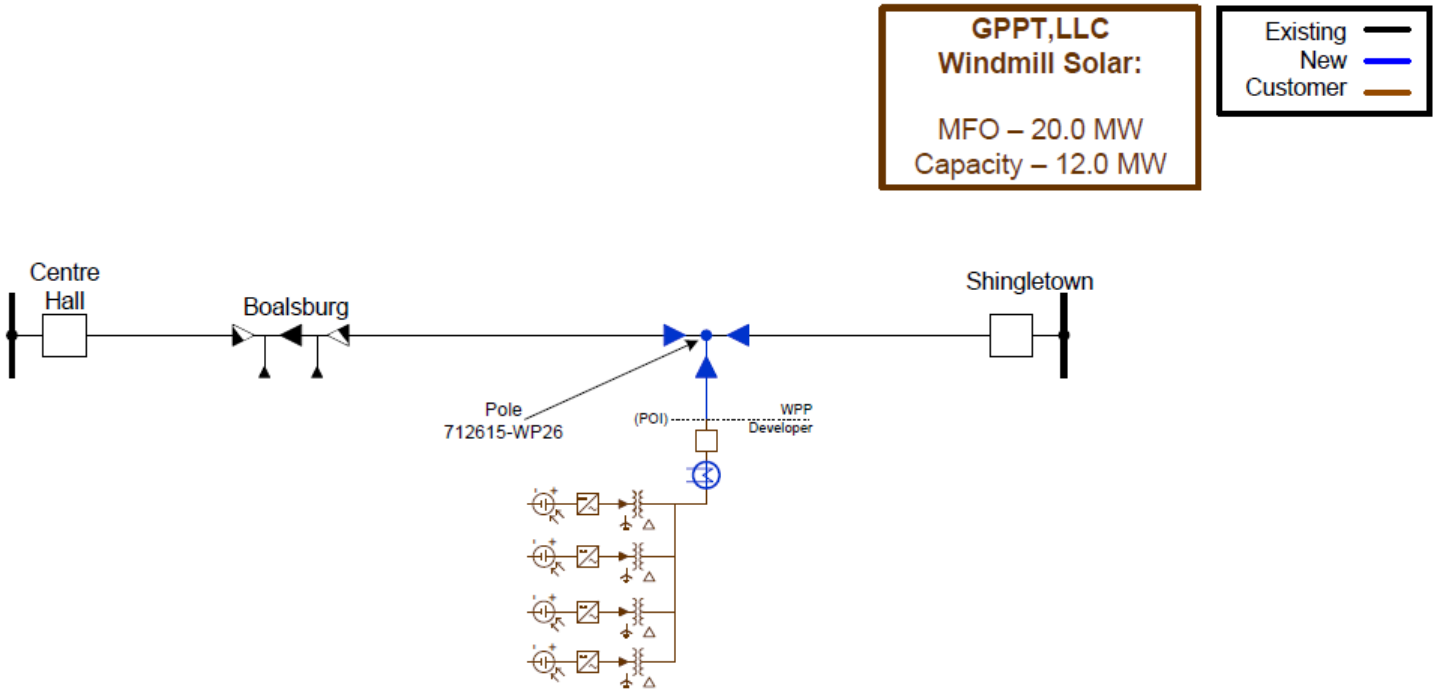
NYISO Impacts to be determined during later study phases (as applicable).

Short Circuit

19 Short Circuit

The following Breakers are overduty: None

Attachment 1 – One Line



AE2-055 Direct Connect:

- Tap the Shingletown – Center Hall 46 kV Line at Pole 712615-WP26
- Install 2 – 46 kV Line Switches
- Install 46 kV Tap Switch
- Provide 46 kV Revenue Meter Package

Attachment 2 – Project Location