

***Generation Interconnection
Combined Feasibility and System
Impact Study Report***

For

***PJM Generation Interconnection Request
Queue Position AC1-183***

Ontelaunee 230 kV

March 2017

Preface

The intent of the Combined Feasibility and 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.

In some instances an Interconnection Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, 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, if any, is included in the System Impact Study.

The Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. Interconnection Customer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs associated with them will be addressed when seeking an Interconnection Agreement as outlined below. Interconnection Customer will also be responsible for providing and installing metering equipment in compliance with applicable PJM and Transmission Owner standards.

General

Ontelaunee Power Operating Company LLC (“Interconnection Customer”) has proposed an *uprate* to prior queue projects A18 and AA1-043 consisting of 2 x 1 natural gas generation facility located at 5115 Pottsville Pike in Ontelaunee, PA. The increased capability associated with queue position AC1-183 is achieved through implementation of a new duct burner system that is increasing the BTU injection into steam. In addition, this project will share the same POI and land (Location site) with prior queue positions A18/AA1-043.

- A18 requested originally 557 MW MFO and 557 MW Capacity Interconnection Rights (CIR).
- AA2-043 requested an uprate of 34.1 MW MFO and 34.1 MW CIR.

Both projects combined, i.e. A18 and AA2-043 requested a total of 591.1 MW MFO and 591.1 MW CIR. *PJM recognizes only 541.5 MW CIRs for both projects based on current operating performance test results reported to PJM in summer 2016. For more details on “Rules and Procedures for Determination of Generating Capability” please refer to PJM Manual 21 under this link:* <http://www.pjm.com/~media/documents/manuals/m21.ashx> .

- AC1-183 requested an uprate of 12.0 MW Energy and 12.0 MW CIR. The combined capability of all three projects A18, AA2-043 and AC1-183 will be 603.1 MW (MFO) and 553.1 MW CIRs. The stated value of CIRs (i.e. 553.1 MW) includes 541.5 MW of previously recognized Interconnection Capacity Rights of prior queue projects (i.e. A18 and AA2-043) and 12.0 MW CIR associated with this new Queue Request AC1-183.

The following chart summarizes above MFO requests and their associated CIRs history:

Queue	Status	Requested Energy [MW]	Requested Capacity Rights (CIR) [MW]	Maximum Facility Output (MFO) [MW]	Actual Total Capacity Interconnection Rights (CIR) [MW]
A18	In-Service (online)	557	557	557	557
AA1-042	Withdrawn	0	52.5	557	557
AA1-043	Active study phase	34.1	34.1	591.1	591.1 (Requested) 541.1 (Actual)
AC1-183	Active study phase	12.0	12.0	603.1	553.1

The proposed in-service date for the AC1-183 project is 6-1-2019. **This study does not imply a Mid-Atlantic Interstate Transmission, LLC (“Transmission Owner” or “MAIT”) commitment to this in-service date.**

Point of Interconnection

AC1-183 will interconnect with the MAIT transmission system through the same POI of prior projects A18/AA1-043. Please refer to the single-line diagram in Appendix 2 for system configuration.

Costs Summary and Transmission Owner Scope of Work

MAIT facilities and network upgrades required to support AC1-183 project are:

- (a) Attachment Facilities: \$ 0.0
- (b) Direct Connection Network Upgrades:
 - Adjust remote end relaying and metering settings;
estimated costs: \$ 12,700.
- (c) Non-Direct Connection Network Upgrades:
- (d) Direct Connection Local Upgrades: \$ 0.0
- (e) Non-Direct Connection Local Upgrades: \$ 0.0
- (f) Option to Build Upgrades: \$ 0.0

Estimated Total Costs (a) to (f): **\$ 12,700**

NOTE: Above Dollar amounts are net, no taxes included. The CIAC Tax Gross Up charges will be added to above amounts if this project does not meet the eligibility requirements of IRS Notice 88-129.

Interconnection Customer Requirements

In addition to MAIT facilities, Interconnection Customer may also be responsible for meeting all criteria as specified in the applicable sections of the FirstEnergy "Requirements for Transmission Connected Facilities" document, effective 10-3-2016, which can be found under this link: <http://www.pjm.com/~media/planning/plan-standards/private-fe/fcr-facilities-connection-requirements.ashx>, including:

1. The purchase and installation of the minimum required FirstEnergy generation interconnection relaying and control facilities. This includes over/under voltage protection, over/under frequency protection, and zero sequence voltage protection relays.
2. The purchase and installation of supervisory control and data acquisition (SCADA) equipment to provide information in a compatible format to the FirstEnergy Transmission System Control Center.
3. The establishment of dedicated communication circuits for SCADA report to the FirstEnergy Transmission System Control Center.
4. A compliance with the FirstEnergy and PJM generator power factor and voltage control requirements.
5. Ontelaunee Power Operating Company LLC will be responsible for meeting all FirstEnergy criteria as defined in the FirstEnergy Requirements for Transmission Connected Facilities document referenced above. FirstEnergy requires that a power factor range of 0.95 leading (absorbing Vars) to 0.90 lagging (producing Vars) must be met at the generator terminals for the existing 591.1 MW (MFO) and a power factor range of 1.0 (Unity) to 0.90 lagging (producing Vars) must be met at the generator terminals for the uprate of 12.0 MW. An analysis of the generator reactive capability will be performed by the Interconnection Customer and provided to FirstEnergy, along with the D Curve for the generating facility, to verify that the unit is capable of meeting the power factor requirements stated above.

The above requirements are in addition to any metering required by PJM.

Revenue Metering and SCADA Requirements

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 Sections 24.1 and 24.2.

FirstEnergy Requirements

The Interconnection Customer will be required to comply with all FirstEnergy Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "FirstEnergy Requirements for Transmission Connected Facilities" document located at the following links:

<http://www.firstenergycorp.com/feconnect>

<http://www.pjm.com/planning/design-engineering/to-tech-standards.aspx>

Schedule

Based on the scope of the attachment facilities, direct and non-direct system upgrades, it is expected to take six (6) months from the date of a fully executed Interconnection Construction Service Agreement to complete the installation. This includes a full payment for the work that is related to this interconnection project. It also assumes that the Interconnection Customer will provide the property for the Project direct connection facilities and all right-of-way, permits, easements, etc. that will be needed. A further assumption is 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 facilities and that transmission system outages will be possible when requested.

Network Impacts

The Queue Project AC1-183 was evaluated as a 12.0 MW (Capacity 12.0 MW) uprate to the AA1-043 project at the Ontelaunee substation in the MAIT area. Project AC1-183 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC1-183 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Summer Peak Analysis - 2020

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.

Steady-State Voltage Requirements:

None.

Short Circuit:

None.

Affected System Analysis & Mitigation

NYISO Impacts:

None.

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.

Not Applicable.

Light Load Analysis – 2020:

None.

System Reinforcements

Short Circuit: None.

Stability and Reactive Power Requirement:

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):

None.

Light Load Load Flow Analysis Reinforcements:

New System Reinforcements:

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

None

Contribution to Previously Identified System Reinforcements:

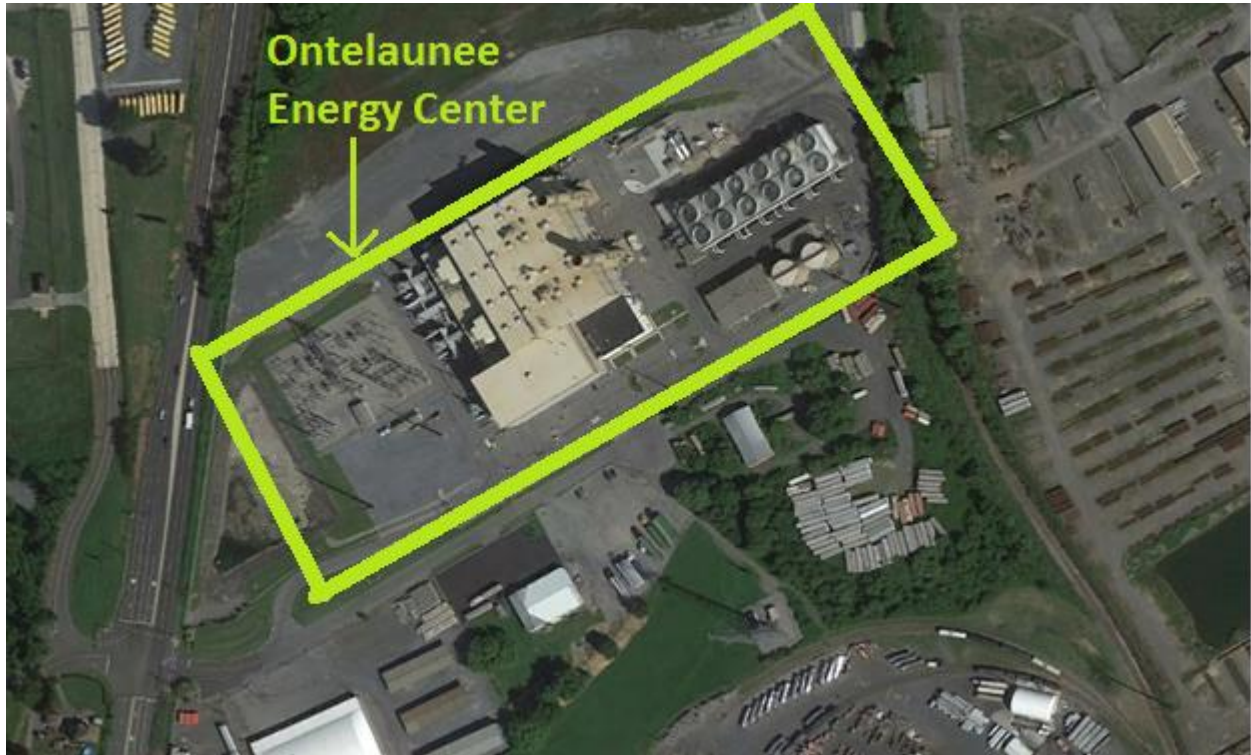
(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study):

None

Appendix 1

Facility Location

PJM Queue Position: AC1-183



Appendix 2

Interconnection One-Line Diagram

PJM Queue Position: AC1-183

