

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

***For***

***PJM Generation Interconnection Request  
Queue Position AC1-064***

***Route 16 34.5 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

Ingenco Wholesale Power, L.L.C. (“Interconnection Customer”) has proposed an uprate to prior queue projects G51\_W63 and I14 consisting of a generating facility located at Mountain View Reclamation Landfill, 9446 Letzburg Road, Greencastle in Franklin County, Pennsylvania. This facility is composed of 48 reciprocating Detroit Diesel engines fueled by a combination of landfill gas and diesel (approximately 94% landfill gas and 6% diesel). Each engine can produce up to 330kW - 350kW, but typically operate at about 285kW output.

The increased capability associated with queue position AC1-064 is achieved through efficiencies that maximizes the utilization of existing plant equipment. This project will share the same POI and land (Location site) with prior queue positions G51\_W63 and I14. The following shows the MFO and Capacity Interconnection Rights (CIR) history for this Point of Interconnection with PJM:

- G51\_W63 requested and received 9.9 MW Energy (MFO) and 9.9 MW CIR;
- I14 requested an increase of 4.1 MW Energy and 4.1 MW CIR;
- Both projects combined, G51\_W63 and I14, would have a total capability of 14.0 MW Energy (MFO) and 14.0 MW CIR.  
PJM generation performance monitor recognizes only 13.9 MW (MFO) and 13.9 MW CIRs as of the date of issuing this feasibility study report;
- AC1-064 requested an increase of 1.1 MW Energy (MFO) and 0.0 MW CIR; and

- All three projects combined, G51\_W63, I14, and AC1-064, will have a total capability of 15.0 MW Energy (MFO) and 13.9 MW CIRs.

The following chart summarizes the above and provides links to the reports and studies published on PJM website:

PJM Queue Position	Requested MW Energy	Requested MWs Capacity	MFO	CIRs	PJM website link
G51_W63	9.9	9.9	9.9	9.9	<i>Impact Study:</i> <a href="http://www.pjm.com/pub/planning/project-queues/impact_studies/g51_w63_imp.pdf">http://www.pjm.com/pub/planning/project-queues/impact_studies/g51_w63_imp.pdf</a> ISA: <a href="http://www.pjm.com/pub/planning/project-queues/isa/g51_w63_isa.pdf">http://www.pjm.com/pub/planning/project-queues/isa/g51_w63_isa.pdf</a>
i14	4.1	4.1	14.0	14.0	<i>Impact Study:</i> <a href="http://www.pjm.com/pub/planning/project-queues/impact_studies/i14_imp.pdf">http://www.pjm.com/pub/planning/project-queues/impact_studies/i14_imp.pdf</a> ISA: <a href="http://www.pjm.com/pub/planning/project-queues/isa/i14_isa.pdf">http://www.pjm.com/pub/planning/project-queues/isa/i14_isa.pdf</a>
<b>PJM generation performance monitor recognizes only 13.9 MW (MFO) and 13.9 MW CIRs effective issuing date of this feasibility study report.</b>					
AC1-064	1.1	15.0	15.0	15.0	

The proposed in-service date for the AC1-064 project is 9-30-2017. Note that prior queue projects G51\_W63 and I14 are already in-service.

**This study does not imply a West Penn Power (“Transmission Owner”) commitment to this in-service date.**

### Point of Interconnection

AC1-064 will interconnect with the West Penn Power distribution system by tapping the Mercersburg – Milnor 34.5 kV line between the Upton Junction and Milnor substation. this is the same POI as prior queue projects G51\_W63 and I14. Please refer to the one line diagram in Appendix 2 for system configuration.

## Costs Summary and Transmission Owner Scope of Work

West Penn Power facilities and network upgrades required to support AC1-064 project are:

- (a) Attachment Facilities: \$0.0
- (b) Direct Connection Network Upgrades: \$ 0.0
- (c) Non-Direct Connection Network Upgrades:

Adjust remote end relaying and metering settings. Network Upgrade Number n5215; estimated cost: **\$12,700**.

- (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 net amounts are in 2016 Dollars. Contribution in Aid of Construction (CIAC) Federal Income Tax Gross Up charge 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 the West Penn Power 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 a fully rated circuit breaker on the high side of the AC1-064 step-up transformer.
2. The purchase and installation of a lockable switch at the point of interconnection. This switch must be accessible by First Energy.
3. 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.
4. The purchase and installation of a 34.5 kV interconnection metering instrument transformer. West Penn Power will provide the ratio and accuracy specifications based on the customer load and generation levels.
5. The purchase and installation of a revenue class meter for each unit to measure the power delivered in compliance with the FirstEnergy standards.
6. 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. The RTU, the communications channel and all related equipment will be furnished and maintained by Ingenco Wholesale Power, L.L.C. . The RTU must communicate with the FirstEnergy EMS via DNP 3.0 protocol.
7. The establishment of dedicated communication circuits for SCADA report to the FirstEnergy Transmission System Control Center.
8. A compliance with the FirstEnergy and PJM generator power factor and voltage control requirements.
9. The execution of a back-up service agreement to serve the customer load supplied from the Route 16 34.5 kV substation when the units are out-of-service.
10. Compliance Issues: The IC must also meet all PJM, ReliabilityFirst and NERC reliability criteria and operating procedures required for standards compliance. For example, the Interconnection Customer 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 FirstEnergy system.
11. Reactive Power Requirements: The increase of 1.1 MW to the Customer Facility associated with AC1-064 project shall be designed with the ability to maintain a power factor of at least 1.0 (unity) to 0.90 lagging (supplying VARs) measured at the Point of Interconnection. As part of the System Impact Study, FirstEnergy will evaluate the ability

of the plant's machines to meet these reactive power requirements. The Interconnection Customer must provide a reactive capability curve (D-curve) for each machine in order for FirstEnergy to perform this analysis.

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/private-firstenergy.aspx>

## **Network Impacts**

The Queue Project AC1-064 was evaluated as a 1.1 MW (Capacity 1.1 MW) injection at the Route16 34.5kV substation in the APS area. Project AC1-064 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC1-064 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:**

Not required.

**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.

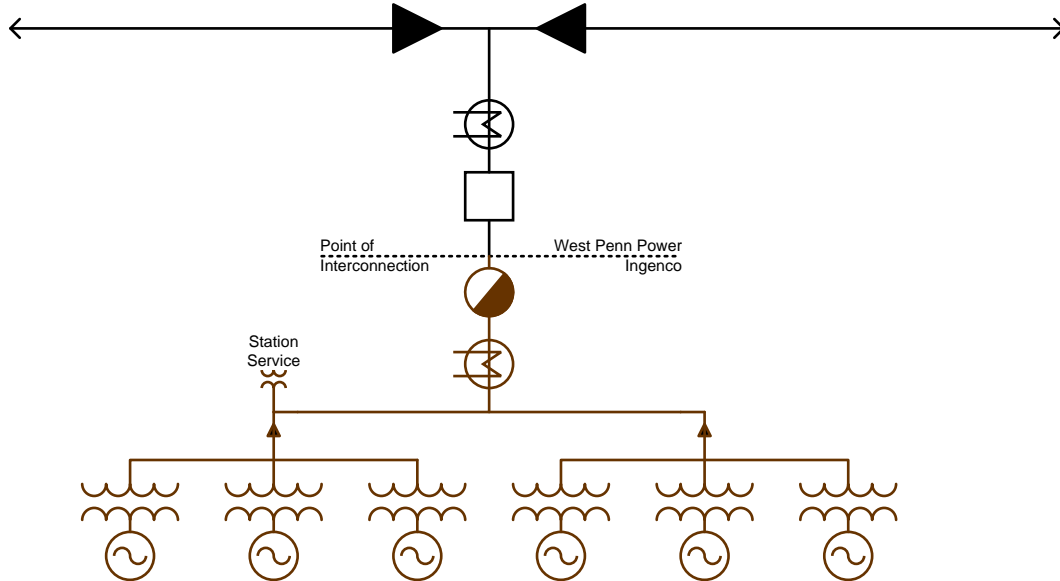
**Appendix 1**  
**Facility Location**  
**PJM Queue Position: AC1-064**



## Appendix 2

### Interconnection One-Line Diagram

PJM Queue Position: AC1-064



### Ingenco Wholesale Power, LLC

Reciprocating Engine Generation – Landfill Gas/Diesel

Maximum Facility Output:  
15 MW