# *PJM Generation Interconnection Request*
# *Queue X2-049*
# *South Reading – Birdsboro 69kV*
# *Feasibility/ System Impact Study*

672344v2
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## Preface

The intent of this System Impact Study is to determine a plan, with 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.

The PJM Reliability Planning Process utilizes PJM planning criteria, NERC Planning Standards, NERC Regional Council planning criteria, and the individual Transmission Owner FERC filed planning criteria. In all cases, PJM applies the most conservative of all applicable planning criteria when identifying reliability problems and determining the need for system upgrades on the PJM system. The application of the NERC Planning Standards is adapted to the specific needs of the PJM system.

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. All facilities required for interconnection of a generation interconnection project must be designed in compliance with the technical specifications (on PJM web site) for the appropriate Transmission Owner.

After the System Impact Study Agreement is executed and prior to execution of the Interconnection Service Agreement, an Interconnection Customer may modify its project to reduce the electrical output (MW) (in the case of a Generation Interconnection Request) of the proposed project by up to the larger of 20 percent of the capability considered in the System Impact Study or 50 MW.

The System Impact 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.

## General

The Interconnection Customer is proposing a 3.2MW Capacity uprate to an existing 6.4MW landfill gas project interconnected to the Metopolitan Edison (MetEd) transmission system and located in Berks County, PA. This will bring the total project to 9.4MW. MetEd is a FirstEnergy (FE) company. The proposed in-service date for this project is March 1, 2012 and is currently under review.

This Generation Interconnection Feasibility Study provides analysis results to aid the Interconnection Customer in assessing the practicality and cost of incorporating the facility into the PJM system.

# Facilities to Accommodate the Interconnection

## Scope of Direct Connection Work

The X2-049 project is a 3.2MW Capacity uprate to an existing landfill gas facility interconnected at the S. Reading – Birdsboro 69kV line approximately 1.3 miles from the Birdsboro substation. Due to the uprate of project X2-049, some protection system modifications may have to be made by MetEd.

The Interconnection Customer is responsible for meeting all criteria as specified in the applicable sections of the "FirstEnergy Requirements for Transmission Connected Facilities" document.

The Interconnection Customer is responsible for constructing all of the facilities on the Interconnection Customer's side of the Point of Interconnection.

This project will be required to maintain a power factor between 0.95 leading (absorbing MVARs) and 0.90 lagging (producing MVARs) as required from the prior existing ISA.

## Direct Connection Cost Estimate

The total preliminary cost estimate for Direct Connection work performed by MetEd is $**0**.

## Non-Direct Connection Cost Estimate

The total preliminary cost estimate for Non-Direct Connection work performed by MetEd is $**19,400**. This estimate consists of:

| Description | Total Cost |
|---|---|
| Potential protection system modifications | $19,400 |

*Note: Tax gross-ups are not included in the upgrade costs. However, add 33.51% if tax gross-ups are applicable.*

## Revenue Metering and SCADA Requirements

**For PJM**: The Interconnection Customer will install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for Interconnection Customer's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Section 24.1 to 24.2.

**For MetEd:** The Interconnection Customer will be required to comply with all FE 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:
www.firstenergycorp.com/feconnect
www.pjm.com/planning/design-engineering/to-tech-standards.aspx

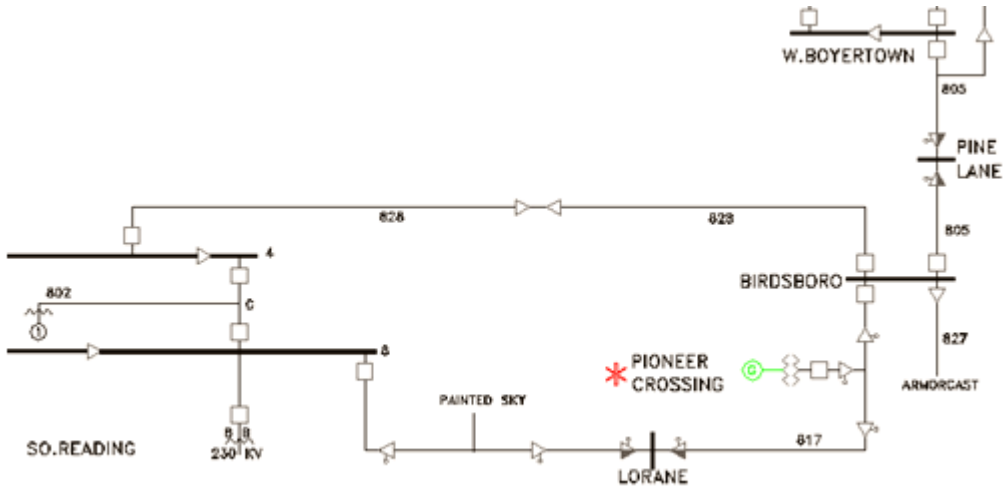


**Figure 1. One Line Diagram**

## Network Impacts

The X2-049 project was studied as a 3.2MW Capacity injection into the MetEd area at the Q59 69kV substation. Project X2-049 was evaluated for compliance with reliability criteria for summer peak conditions in 2015.

Potential network impacts were as follows:

### Generator Deliverability

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

No violations were identified.

### Multiple Facility Contingency

*(Double Circuit Tower Line, Stuck breaker and Bus Fault contingencies for the full energy output)*

No violations were identified.

### Short Circuit

*(Summary of impacted circuit breakers)*

PJM has completed the short circuit analysis of the X2-049 queue project S.Reading-Birdsboro. One option was considered during this study: the option was a tap of the S.Reading and Birdsboro 69 kV line. No new breakers were found to be over-duty in the METED transmission area.

### Contribution to Previously Identified Overloads

*(X2-049 contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)*

No violations were identified.

### New System Reinforcements

*(Upgrades required to mitigate reliability criteria violations, I.e. "Network Impacts", initially caused by the addition of this project's generation.)*

Not required.

### Contribution to Previously Identified System Reinforcements

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

Not required.

**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.*

*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.*

As a result of the aggregate energy resources in the area, no violations were identified.