

***Combined Feasibility/System Impact Study  
Report***

***PJM Generation Interconnection Request  
Queue Position #U4-041  
Valley 13.2kV  
(Valley Delivery Point)  
2MW***

April 2009

## **Preface**

The intent of the Generation Interconnection Feasibility Study and the System Impact Study is to determine a plan, with cost and construction time estimates, to connect the subject Generation Interconnection Request 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 Request must be designed to meet the technical specifications (located on the PJM web site: Located at: <http://www.pjm.com/planning/design-engineering/to-tech-standards.aspx>) 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 study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities unless noted in the report. The project Interconnection Customer is responsible for acquiring any necessary right of way and real estate, as well as applying for and obtaining construction permits unless prior agreement by interested parties allows for other arrangements. For properties currently owned by Transmission Owners, some costs may be included in the study.

## **Cost and Timing Estimates**

The estimates in this report do not include tax gross-up.

While the information in this transmittal is reasonable for the scope of work defined, it should, however, be noted that the cost figures and time estimates are conceptual in nature at this stage, as an engineering team has not been assigned to the project. Any change to the scope of work will require that the estimates be revisited. The costs are a best estimate, but the Interconnection Customer will be charged for actual costs. Any under-runs or over-runs will be reconciled at the conclusion of the project.

## **General**

Allegheny Electric Cooperative, Inc. has proposed the installation of a 2 MW generator at the existing 13.2 kV Valley Delivery Point. The project is proposed to be in service by the 1st quarter of 2011. The Queue Position #U4-041 project was studied as an injection of 2.0 MW at the existing Valley Deliver Point on the Orrtanna Substation 00763-4 circuit.

The proposed upgrade must be designed in accordance with the FirstEnergy “Requirements for Transmission Connected Facilities” document.

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

The Interconnection Customer is responsible for specifying appropriate equipment and facilities such that the parallel generation is compatible with the FirstEnergy Transmission System. The Interconnection Customer is also responsible for meeting any applicable federal, state, and local codes. It is also the Interconnection Customer’s responsibility to obtain any needed right-of-way between the plant site and FirstEnergy’s facilities.

FirstEnergy may complete detailed relay coordination studies to identify off-site relay setting changes required due to this generation interconnection during subsequent studies of this project. This may result in additional individual relay replacements being required. These relay replacements will be done at the cost of the Interconnection Customer.

## **Metering**

The Interconnection Customer will be required to maintain metering and telemetry equipment to provide revenue metering and real-time telemetry data to PJM and the Transmission Owner. The PJM requirements for this equipment are listed in Appendix 2, section 8 of Attachment O to the PJM Tariff, as well as PJM Manuals 01 and 14D. Transmission Owner requirements are listed in Attachment A to this report.

## **Direct Connection Facilities**

It is proposed that the project be connected at the present 13.2 kV Valley Delivery Point (typical one-line drawing is shown in Figure 1).

The Interconnection Customer is responsible for constructing all of the facilities on its side of the point of interconnection. The Interconnection Customer will also be responsible for remote relay and control work at Orrtanna substation that is required due to connecting the generation facility.

The proposed interconnection facilities must be designed in accordance with the FirstEnergy “Requirements for Transmission Connected Facilities” document as applicable and must meet IEEE 1547.

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

The interconnection point will require the installation of a breaker or recloser between the generator and First Energy’s 13.2 kV line.

Direct Transfer Trip (DTT) using a Interconnection Customer provided communications channel is required from any substation that may feed the generator. The type of communication channel shall be specified and/or approved by FirstEnergy. Currently, the generator would be fed from 00763-4 Circuit (13.2 kV) from First Energy’s Orrtanna Substation. Distance from Orrtanna Substation to Delivery Point: 0.7 miles. The cost estimates provided assume that DTT will be from Orrtanna substation. If the generator agrees to be disconnected from the 13.2 kV system while the Valley Delivery Point is fed from an alternate source, then DTT is not required from the other alternate sources.

If, in the future, upstream protection is added by First Energy, the Interconnection Customer will be responsible for the cost to add Direct Transfer Trip on any new devices.

Below are conceptual estimates for the engineering/construction associated with Direct Connection requirements.

Item	Description	Conceptual Cost Estimate
1	RTU programming for connection to the First Energy SCADA	\$10,000
2	Relay and control work at Orrtanna Substation to provide DTT equipment (assumed telephone based).	\$ 136,000
4	RTU and communication	N/A Interconnection Customer cost.

Conceptual Estimate:

\$146,000

Estimated Lead Time:

1.0 year from signed IA

Notes:

Detailed Engineering & Construction Estimates TBD via Facility Study

The above estimates do not include 1) tax gross-up, 2) engineering and field activities for design review and commissioning of the Interconnection Customer’s facilities.

Figure 1 provides a typical conceptual one-line of the direct connection facilities.

Preliminary Protection Requirements:

In addition to the standard First Energy requirements, Direct Transfer Trip is required, to be initiated by tripping of the 76382 breaker at Orrtanna Substation.

### **Network Impacts**

The Queue Position #U4-041 project was studied as total injection of 2.0 MW into the Orrtanna 00763-4 13.2 kV circuit (For PJM, this project was studied as a 2MW injection at the Orrtanna 115kV substation). Queue Position #U4-041 was evaluated for compliance with reliability criteria for summer peak conditions in 2013. Potential network impacts were as follows:

### **Generator Deliverability**

No problems were identified

### **Multiple Facility Contingency**

No problems were identified

### **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 identified

### **Short Circuit**

No problems identified

Fault Duty with the generator off:

3-phase 5,095 amps

L-G 4,170 amps

### **Protection Requirements**

Based on the generator specifications provided, no other protection modifications are required on First Energy equipment.

### **Voltage Requirements**

Power factor of the generator must be limited to unity.

### **Cost Allocation**

Queue Position #U4-041 project will be responsible for 100% of the connection costs estimated at \$146,000. There were no system reinforcements identified to accommodate interconnection of the project.

### **Summary**

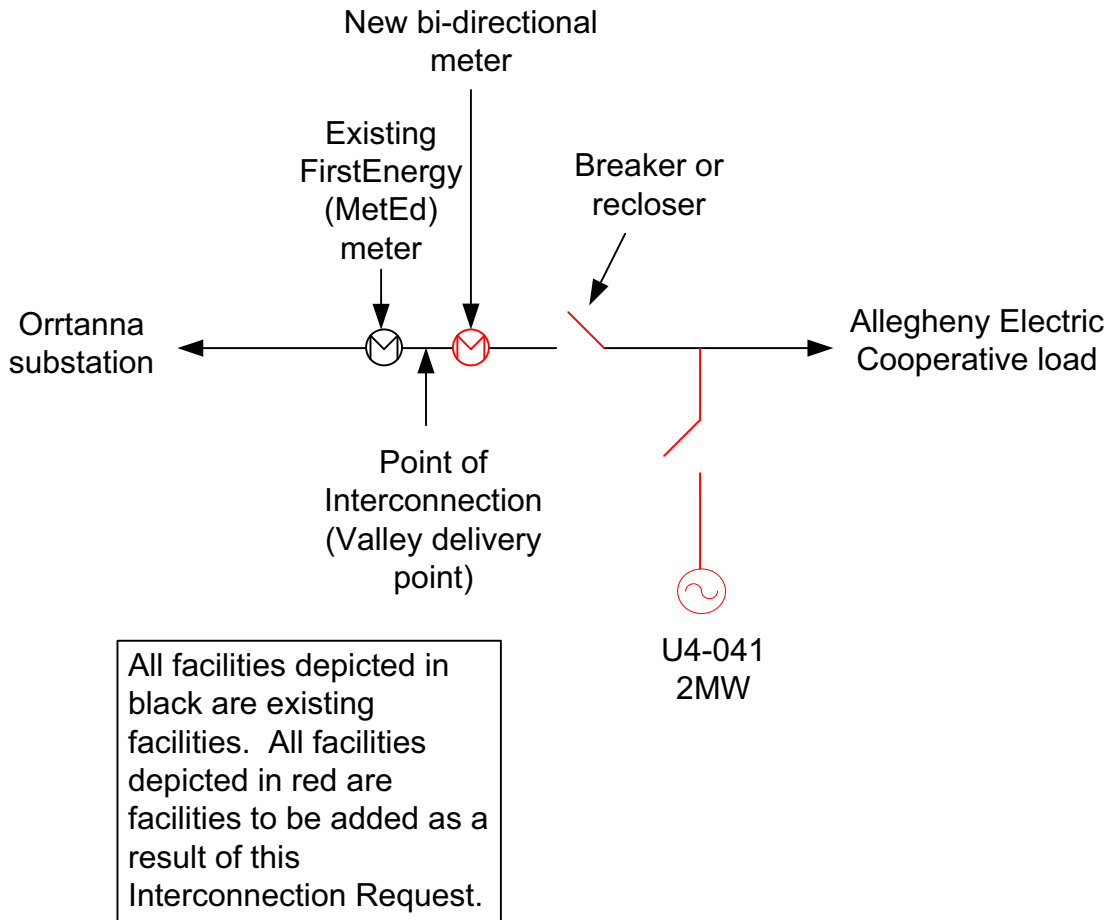
Conceptual estimates are provided under the assumption that the point of interconnection would be the existing 13.2 kV Valley delivery point.

Direct Transfer Trip (DTT) is required from any substation that may feed the generator. Currently, the generator would be fed from the Orrtanna substation and the cost estimates provided assume

that DTT will be from Orrtanna substation. If the generator agrees to be disconnected from the 13.2 kV system when fed from an alternate source, then DTT is not required from the other alternate sources.

An RTU is required at the generator site.

Figure #1



## Attachment A

### FirstEnergy Revenue Metering Requirements for Interconnection Customers

The Interconnection Customer shall install, own, operate, test and maintain the necessary revenue quality Metering Equipment. This includes current transformers, voltage transformers, mounting structures, wiring, meters, communication circuits, and associated devices. The Metering Equipment must meet the specifications listed in the FirstEnergy connection documents listed below:

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

The Metering Equipment shall be located at the generation facility on the high voltage side of the generator step-up transformers or facility main step-up transformer and/or station service power transformers. Power flows to and from the facility shall be compensated to the Point of Interconnection.

Metropolitan Edison Company will provide revenue quality Metering Equipment for a station service power supply at a generation facility if the supply is from the local Metropolitan Edison Company distribution system.

The revenue quality Metering Equipment shall be capable of collecting and storing bidirectional billing data. The billing data shall be stored in intervals specified by Metropolitan Edison Company, typically fifteen minutes or thirty minutes. The Interconnection Customer must provide Metropolitan Edison Company with remote access to the billing data in the Metering Equipment via a dedicated voice-grade analog telephone circuit. The Interconnection Customer shall provide Metropolitan Edison Company with contact information for the person or persons responsible for meter programming and Metering Equipment maintenance.

The Interconnection Customer shall consult with Metropolitan Edison Company regarding the revenue quality metering system design and provide the following information:

- Facility one line and revenue metering installation drawings (schematics, wiring diagrams, etc.)
- Estimated power flows to and from the facility at all revenue metering points
- Current transformer and voltage transformer specifications, including manufacturer, type, nameplate drawings, and certified accuracy test reports
- Revenue meter specifications including manufacturer, type, model number, and accuracy
- Revenue meter program information including but not limited to billing data recorder channel assignments, recorder pulse weights (Ke), and read-only password for access to interval data by the Metropolitan Edison Company billing data collection system (MV-90)
- Revenue meter telephone number
- Revenue meter loss compensation data (if applicable)

The Interconnection Customer shall provide Metropolitan Edison Company with prior notification of any modifications at the facility that will affect the revenue meter measurements, including substation reconfigurations and meter program changes.

The revenue metering system at each location shall be tested for accuracy by the Interconnection Customer once every two years. The Interconnection Customer shall give reasonable notice to Metropolitan Edison Company of the time when the testing is scheduled so that Metropolitan Edison Company may have representatives present. Metropolitan Edison Company shall have the right to audit the revenue metering equipment and/or related documents at any time. The Interconnection Customer shall be given a reasonable period of time to comply with any requests associated with an audit.