PJM Generator Interconnection Request
Queue #O01
Letort 12.47kV
Feasibility/Impact Study Report

May 2005
DMS# 317967

Letort (O01) Feasibility/Impact Study

General

The Frey Farm Landfill is located in Manor Township, Lancaster County near Conestoga, Pennsylvania. Frey Farm proposes to install 3.2 MW of generation comprised of two 1.6 MW methane fired synchronous generators. Considering existing load at this customer facility, approximately 2.8 MW of generation will be delivered to the PPL EU system when the generation-facility is at peak load. The approximate 12.47 kV feeder tap location is located near pole grid coordinates 36554-S-23026. The customer has requested an in-service date of December 31, 2005.

The intent of the feasibility/impact study is to determine cost and construction time estimates of system reinforcements required to facilitate the addition of the new generating plant to the PJM system. The reinforcements include the direct connection of the generator to the system and any network upgrades necessary to maintain the reliability of the PPL EU system. Metering equipment and costs will be determined in the future and are therefore not included in this feasibility study.

Direct Connection

The generation will be interconnected to the distribution system as shown in Figure 1. The nearest distribution facility to the proposed generation is an existing 12.47 kV three-phase distribution line. No known 12.47 kV line reinforcements are required for connection at this time.

The following relay and control upgrades will be required at Letort substation in order to accommodate the generation:

1. Direct Transfer Trip (phone line based)
2. Voltage Check and Synch check relay functions
3. Modification to the Letort SCADA due to reverse power flow on this line

Direct transfer trip will be required between the 12.47 kV circuit breaker at Letort and the generator to avoid islanding the generation on PPL EU load. Also, a voltage check & synch check relay is required to supervise reclosing of the 12.47 kV circuit breaker.

The PPL EU SCADA (at Letort) is designed on the premise that power flow is always OUT of the substation. The installation of generation greater then the load will cause this to reverse. Additional SCADA transducers as well as programming are required to obtain correct indication for this situation.

The cost for the distribution rebuild and the relay and control modifications at Letort is estimated to be $240,000. To engineer and complete the above modifications under normal working conditions, PPL will require 10 months from the time that the ISA agreement is executed and PPL receives authorization to proceed from PJM.

Consequently, the requested in service date is in jeopardy. Please see the "Remarks" section at the end of this document for additional information.

This estimate does not include any metering costs or the required inter-tie protection equipment and PPL EU SCADA that must be installed at the customer's location. Refer to the PPL interconnection requirements located at the PJM wesite. PPL considers the customer a "Type 2" generator.

The customer will be required to install the following equipment at the site:

- Phone line based Direct Transfer Trip equipment (matching PPL EU equipment). This is not the preferred equipment, as the generator has not determined if a suitable location for the antenna to support a radio based DTT can be found. If so, the radio based DTT is preferred, and a suitable structure for the antenna or phone line based DTT equipment is required. A site survey will be required to determine if the radio-based equipment can be used.

- Inter-tie protective relaying (Beckwith M-3520 preferred). Note that failure of the microprocessor-based relay will block all protective relaying. For this reason, we request a second relay be installed. If only one relay is installed, failure of the relay will require isolation of the generation from the PPL EU system.

- CTs and PTs for the above relays

- PPL EU SCADA remote Terminal Unit. PPL EU will supply suitable drawings and a material list for the generator to provide this equipment. The current PPL EU design uses commercially available PLC equipment, with the software provided by PPL EU.

- Metering equipment arrangements at the generators and at the point of contact/interconnection will be determined and PPL EU will identify costs after sufficient one-lines, switchgear and system operating detail have been developed and reviewed.

- Phone lines for the above DTT and SCADA. Please note protective relay grade phone circuits are special, and may take 3 to 6 months to obtain.

- Suitable protection for the above phone lines, based on IEEE 487-2000.

Remarks:

- Based on preliminary information, if a suitable location can be found for the antenna, the radio based DTT communication is expected to function properly at this location. However, a detailed line-of-sight survey will be completed to confirm this if the customer chooses to proceed to the Impact Study phase of the project.

- As mentioned above, the customer's requested in-service date of 12/31/05 will be difficult to achieve. In order to have any chance of meeting the requested date, the following must occur as soon as possible:

    1. The IPP must sign the ISA and PJM must authorize PPL to proceed with actual engineering and physical construction.

    2. The IPP must accept the increased cost obligation of funding engineering and construction overtime to meet a compressed work schedule. The estimated overtime amount could be 150% of the above-identified cost.

Network Impacts

The **#O01 project was studied as a net injection of 2.9 MW** into the Letort 12.5 kV substation. Project # O01 was evaluated for compliance with reliability criteria for summer peak conditions in 2008. Potential network impacts were as follows:

Generator Deliverability
Not required.

Multiple Facility Contingency – Tower Line Outages (MAAC Criteria IIC)
No identified problems.

Short Circuit
No identified problems.

New System Reinforcements
No network upgrades are required for the interconnection of 2.9 MW of generation at Frey Farm Landfill to the Letort 12.5 kV substation.

Contribution to Previously Identified System Reinforcements
None.

Figure 1 - Queue #O01 – Letort 69-12kV