PJM Generator Interconnection U2-054 Weissport 2.6 MW Feasibility / Impact Study

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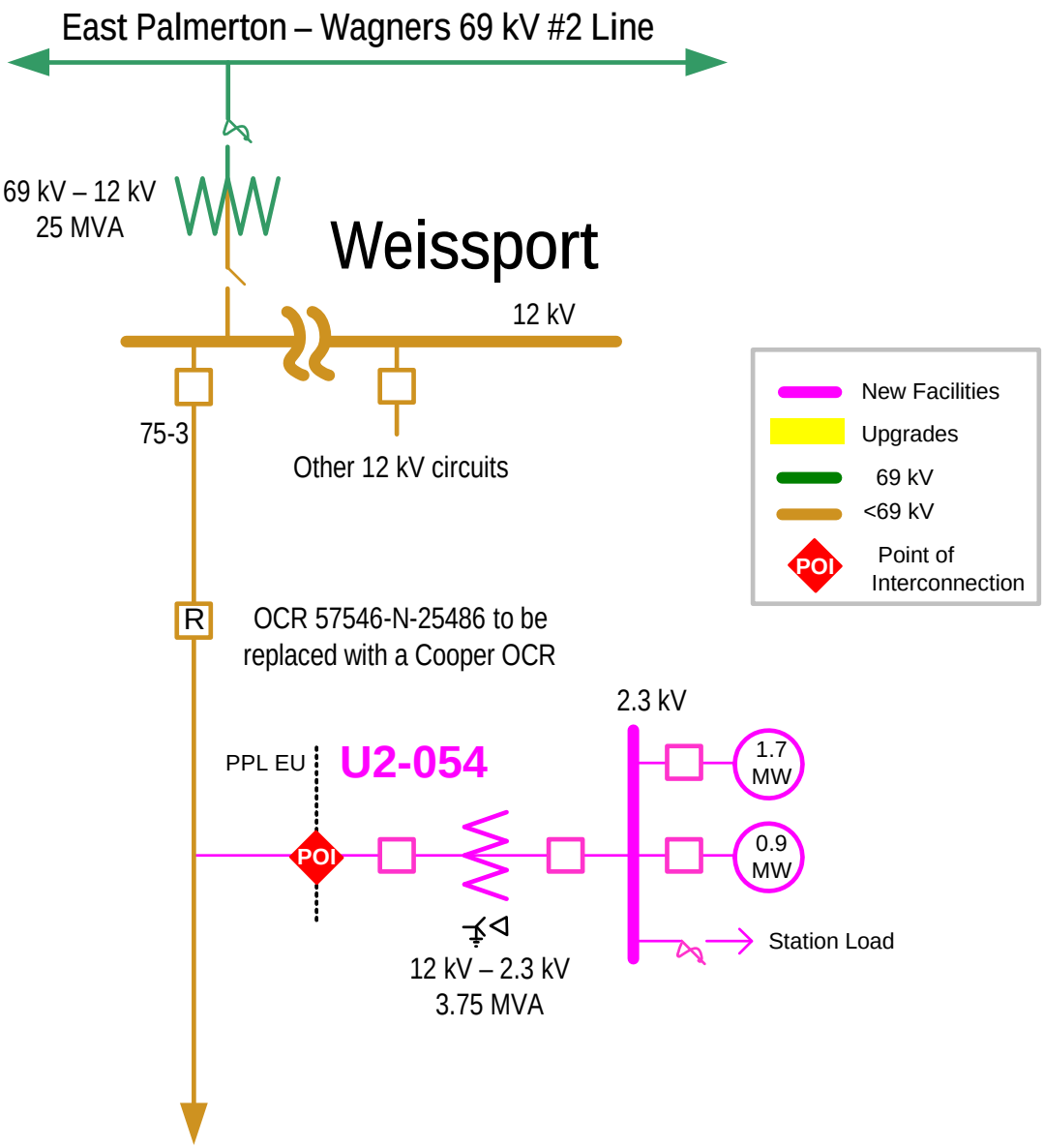
General

Queue U2-054 is a Borough of Lehighton request to interconnect 2.6 MW of hydro generation, consisting of one 1.7 MW unit and one 0.9 MW unit, to be located at Beltzville Dam near Lehighton, Pennsylvania. Queue U2-054 proposed an in-service date of August 2011. This study does not imply commitment to this in-service date.

Direct Connection

The U2-054 generation project can be connected to the Weissport 12 kV circuit #75-3 as shown on the one line diagram below.



Queue U2-054 Interconnection Customer (Borough of Lehighton) Scope of Work

1. Queue U2-054 Interconnection Customer is responsible for design, construction and costs for all facilities associated with the U2-054 generating station on the Interconnection Customer side of the POI (Point of Interconnection) on the one line diagram on page 2.

2. Metering and telemetering requirements for PJM:

   The Interconnection Customer will be required to install the equipment necessary to provide revenue metering (KWH, KVARH) and real time data (KW, KVAR) for the Interconnection Customer's generating resource. See PJM Manuals M-01 and M-14B, and the PJM Tariff.

   Metering for PJM revenue and real time metering of the generator will be at the (POI) Point of Interconnection to PPL EU's 12 kV Weissport #75-3 line. This metered value is the net of generator output and generator ancillary load which is acceptable for this size unit.

   The PJM telemetry requirement applies only if this 2.6 MW Generation Resource participates in the PJM Capacity Market. The Interconnection Customer can use a relatively inexpensive Arcom director-based internet option as described in Attachment H, "Small Generator (10 MW and Below) Technical Requirements and Standards", to PJM Manual 14B available via the PJM website at http://www.pjm.com. The SCADA requirement for PJM will be coordinated with Kevin Komara of PJM. Kevin can be reached at (610) 666-4751 or komarak@pjm.com

Interconnected Transmission Owner (PPL EU) Scope of Work

The estimated total cost for PPL EU distribution system modifications, including relay and control modifications at Weissport, is **$720,000**. To engineer and complete the distribution modifications under normal working conditions, PPL EU will require **15 months** from the time that the Interconnection Customer executes an ICSA (Interconnection Construction Service Agreement) with PPL EU.

Note: Queue U2-054 Interconnection is non-jurisdictional under the FERC filed PJM OATT (Open Access Transmission Tariff) because it will be connected to a 12 kV distribution circuit previously not used for wholesale transactions and Queue U2-054 generation is not a QF (Qualified Facility) under PURPA which is not requiring its output to be purchased by the host state regulated utility at avoided cost. Therefore Queue U2-054 will be required to execute a two party IA with PPL EU to get interconnected and will be required to execute a PJM three party (Interconnection Customer, PPL EU and PJM) WMPA (Wholesale Market Participation Agreement) to sell its output in the PJM market.

Direct Connection Requirements

The following distribution upgrades will be required on the 12 kV Weissport #75-3 line in order to accommodate the generation:

1. Approximately 0.7 miles of three phase distribution line must be reconductored.
2. Approximately 0.3 miles of three phase distribution line must be extended to the customer's location.
3. OCR 57546-N-25486 must be replaced with a Cooper OCR with a form 6 electronic control, load-side voltage detection, and cell phone based communication.
4. OCR 57687-N-25219 must be moved to grid block 577-N-251.

The generation will be interconnected to the distribution system as shown on the one line diagram on page 2. The nearest distribution facility to the proposed generation is an existing three-phase 12 kV distribution line. Reinforcement of the 12 kV distribution system is required for this generator to connect.

The following relay and control upgrades will be required at Weissport 69/12 kV substation in order to accommodate the generation:

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

Direct transfer trip will be required between the 12 kV circuit breaker at Weissport substation and the generator to avoid islanding the generation on PPL load. Also, a voltage check & synch check relay is required to supervise reclosing of the 12kV circuit breaker.

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

The Interconnection Customer will be required to install the following equipment:

Provide bidirectional, direct transfer trip (DTT) facilities between the customer's substation, OCR 57546-N-25486 and PPL EU's Weissport Substation. The communications path will be via a 900 MHz, spread spectrum radio channel. This equipment will provide a primary trip signal from PPL EU to Queue U2-054 (Beltzville Dam Hydroelectric Plant) to clear the Interconnection Customer's generation from the PPL line whenever the PPL 12 kV Weissport Substation #75-3 line breaker is tripped. The same DTT equipment will be used to permit reclosing of the 12 kV Weissport #75-3 line breaker after the generation at Beltzville Dam Hydroelectric Plant is isolated from the PPL system. Based on preliminary information, we assume a suitable location can be found for an antenna for the radio based DTT communication. A field study must verify this. A detailed line-of-sight survey will be completed to confirm this if Queue U2-054

chooses to proceed. If direct line-of-sight is not available for the radio based communications additional costs will apply to use an alternative communications path.

PPL EU Applicable Standards Relative to Power Quality

If customers on the 12 kV Weissport #75-3 line begin to experience unacceptable voltage fluctuations due to the Beltzville Hydroelectric Plant's operations, the Borough of Lehighton will be required to take all necessary corrective action to mitigate the problem. To prevent violation of PPL EU's guidelines on unacceptable voltage fluctuations, about 0.7 miles of 12 kV distribution line must be reconductored and the generator must operate at a 0.98 leading power factor (generator consuming VARs). This is an engineering estimate using the data available at this time.

Network Impacts

The U2-054 project was studied as a 2.6 MW Energy and Capacity connection to the 12 kV Weissport #75-3 line. Project U2-054 was evaluated for compliance with reliability criteria for summer peak conditions in 2012. Potential network impacts were as follows:

NETWORK IMPACTS

Generator Deliverability

(Normal system, all facilities in-service, and Single or N-1 contingencies for the Capacity portion of the interconnection only)

No problems were identified.

Multiple Facility Contingency

(Double circuit towerline, stuck breaker and bus fault contingencies for the energy portion of the interconnection)

No problems were identified.

Short Circuit Analysis

No problems were identified.

Stability Analysis

Not required because of Queue U2-054's generation size and POI (Point of Interconnection).

Contribution to Previously Identified Overloads

(Queue U2-054 contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

No problems identified.

NETWORK UPGRADE REQUIREMENTS

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e."Network Impacts", initially caused by the addition of Queue U2-054 generation)

None required.

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by Queue U2-054)

None required.

POTENTIAL ISSUES

Delivery of the Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request with all earlier queues at their energy output. Any problems identified below may result in operational restrictions to the project under study or may cause operation restrictions to other PJM generation resources. The developer can proceed with network upgrades to eliminate the potential congestion at their discretion by submitting a Merchant Transmission Interconnection request now or in the future. **These are not required reliability upgrades.**

As a result of the aggregate energy resources in the area, the following potential congestion was identified:

None identified.