PJM Generator Interconnection Request
Queue #H23
Bear Creek 69 kV
Feasibility Study Report

September 2002
DMS# 184852

Confidential

Bear Creek 69 kV Feasibility Study

General

The interconnection customer (IC) has proposed a 10 MW increase (project H23) in the generating facility proposed as project E6 in the PJM Generator Interconnection Queue consisting of an additional 5 to 7 wind turbines. The turbines are to be installed in Bear Creek Township, Luzerne County, Pennsylvania. The proposed service date for the additional generation is prior to December 31, 2002.

The intent of the feasibility study is to determine ballpark 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 PJM system.

Direct Connection

The direct connection facilities described below for project E6 are of sufficient capability to permit the additional 10MW.

Transmission Portion: Construct a short two span tap from the Bear Creek 69kv Tap at structure 54138N39394 to Global Wind Harvest's (GWH) dead-end structure. Install one new structure at grid 54149N39403. The work includes line route siting and securing of the necessary right-of-way along the proposed line route.

Substation Portion: At PPL EU's Jenkins 230/69kv substation, install Direct Transfer Trip (DTT) protective equipment and make the necessary modifications to the Plymouth and River #1 control circuits to allow for the connection of Global Wind Harvest Generation. In addition, modify the reclosing circuits at four distribution stations due to the potential of self-excitation by the GWH generation.

Changes from the Impact Study Report

Transmission work: The Impact Study cost for the required transmission work was quoted as $296,000. With the completed final design, the cost figure has been reduced to $130,000. The reduction in cost is primarily due to the following reasons:

1) Replacement of the existing wood tap pole with a steel pole on a concrete foundation will not be required.

2) Reframing of two adjacent structures from suspension to tension in order to accommodate the GWH tap will not be required.

Substation work: No changes from the Impact Study.

Scope of PPL Electric Utilities Corp. Work

- **Direct Connection Work – Transmission:** This work includes siting, R/W acquisition, design/construction of a two span 69kV tap from the PPL Bear Creek Tap to the GWH dead-end structure. Since the two span 69kv tap can not accommodate a disconnect switch, GWH is expected to install a load sectionalizing air break switch on their dead-end structure that is capable of de-energizing their transformer. Specifically, from pole 54138N39394, install a 109 foot span of 3-556.5 ACSR phase conductors and 3/8 inch high strength steel overhead ground wire to new steel structure 54149N39403. From this new steel pole, install a 56 foot span of 3-556.5 ACSR phase conductors and 3/8 inch high strength steel overhead ground wire to Global Wind Harvest's dead end structure**.**

- Cost Estimate: **$130,000**

The estimated total costs, including applicable federal and PA sales tax, are **$174,500.**

- **Direct Connection Work – Substation:** This work includes installation of the RFL type 9745 DTT equipment, installation of synchrocheck facilities and telephone circuit protection equipment. **Note that the generation project developer will be responsible for securing the protective relay grade phone circuit for the DTT facilities.** Specifically, the following changes will be required:

    1. Provide Direct Transfer Trip (DTT) facilities between GWH and PPL EU's Jenkins substation. This equipment will provide the primary trip from PPL EU to GWH, and a blocking signal for PPL reclosing should GWH not isolate from the PPL EU system.
    2. Modify the controls of the two 69 kV lines out of Jenkins 230/69 kV substation, Plymouth (normal source) and River #1 (alternate source) 69 kV breakers to include line voltage check, and synchronization check functions.
    3. Provisions will be made to transfer the DTT signals between the Plymouth and River #1 breakers depending upon which line is serving GWH.
    4. Modify the control schemes at the Georgetown, River, East Mountain and Wright distribution stations that interconnect the Plymouth or River #1 circuits to the remainder of the PPL EU system by installing synchronism check relays and interlocks on the 12kv transformer breakers.

- Cost Estimate – **$203,000**

The estimated total costs, including applicable federal and PA sales tax, are **$275,728**

The total cost for the direct connection is estimated to be **$450,228**.

In order to eliminate significant voltage deviation, the IPP would need to operate at or near unity power factor (studies show that the IPP would need to absorb 2 to 3 mvar from the system).

Figure #1

Network Impacts

The Bear Creek **#H23 project was studied as 10 MW Energy** increase to the E06 project at Bear Creek 69 kV substation. Project # H23 was evaluated for compliance with reliability criteria for summer peak conditions in 2006. 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

None

Contribution to Previously Identified System Reinforcements

None.