PJM Generator Interconnection
U2-083 Chalk Point 230-kV
400 MW Capacity
Feasibility Study

October 2008
DMS #509959v1

Introduction

This Feasibility Study has been prepared in accordance with the PJM Open Access Transmission Tariff, §36.2, as well as the Feasibility Study Agreement between Interconnection Customer (IC) and PJM Interconnection, LLC (PJM) (Transmission Provider).

Preface

The intent of the feasibility study is to determine a plan, with preliminary cost and construction time estimates, to connect the subject generation interconnection project 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 project must be designed to meet the technical specifications 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 possibility of sharing the reinforcement costs with other projects may be identified in the feasibility study, but the actual allocation will be deferred until the impact study is performed.

The Feasibility 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.

Potential Network Impacts

PJM Queue Project U2-083 was studied as a 400MW Capacity injection at Chalk Point 230 kV substation in the PEPCO area. Project U2-081 was evaluated for compliance with reliability criteria for summer peak conditions in 2012. Potential network impacts were as follows:

Generator Deliverability

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

None.

Multiple Facility Contingency

(Double Circuit Tower Line, Line with Failed Breaker and Bus Fault contingencies for the full energy output)

None.

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)

1. (PEPCO/PEPCO) The CHALK230-OAKGV230 230kV line loads from 100.61% to 108.62% (DC power flow) of its normal rating (559MVA) for non-contingency condition. This project contributes approximately 44.8MW to the thermal violation.

2. (PEPCO/PEPCO) The CHALK230-OAKGV230 230kV line loads from 100.61% to 108.62% (DC power flow) of its normal rating (559MVA) for non-contingency condition. This project contributes approximately 44.8MW to the thermal violation.

3. (PEPCO/PEPCO) The CHALK230-OAKGV230 230kV line loads from 111.54% to 119.16% (DC power flow) of its emergency rating (680MVA) for the single line contingency outage (PJM1D). This project contributes approximately 51.8MW to the thermal violation.

4. (PEPCO/PEPCO) The CHALK230-OAKGV230 230kV line loads from 111.54% to 119.16% (DC power flow) of its emergency rating (680MVA) for the single line contingency outage (PJM1D). This project contributes approximately 51.8MW to the thermal violation.

5. (PEPCO/PEPCO) The OAKGV054-BOWIE044 230kV line loads from 107.09% to 113.92% (DC power flow) of its emergency rating (730MVA) for the tower line outage (7PEPCO_WITH_T133A). This project contributes approximately 49.8MW to the thermal violation.

6. (PEPCO/PEPCO) The OAKGV053-BOWIE043 230kV line loads from 106.91% to 113.73% (DC power flow) of its emergency rating (730MVA) for the tower line outage (5PEPCO_WITH_T133A). This project contributes approximately 49.8MW to the thermal violation.

7. (PEPCO/PEPCO) The OAKGV230-BOWIE045 230kV line loads from 105.64% to 110.85% (DC power flow) of its emergency rating (730MVA) for the tower line outage (5PEPCO_WITH_T133B). This project contributes approximately 38.0MW to the thermal violation.

8. (PEPCO/PEPCO) The BOWIE045-BURT2314 230kV line loads from 105.54% to 110.75% (DC power flow) of its emergency rating (730MVA) for the tower line outage (5PEPCO_WITH_T133B). This project contributes approximately 38.0MW to the thermal violation.

9. (PEPCO/PEPCO) The BOWIE042-BURT2334 230kV line loads from 105.47% to 110.69% (DC power flow) of its emergency rating (730MVA) for

the tower line outage (7PEPCO_WITH_T133B). This project contributes approximately 38.1MW to the thermal violation.

Short Circuit

The following table shows the results of the short circuit analysis for both U2-081 and U2-083 as percentage increases to the duty of the breakers. At Chalk Point either project could be constructed with the network upgrade described in 11 below. However, both projects cannot be constructed. If both projects were constructed, the combined over duty would exceed the capability of the replacement 80kA breakers. 80kA is the maximum size breaker for any 230/500/765 kV application. If it is desired for both projects to move forward, an alternate solution, requiring significant reconfiguration, would need to be designed during the System Impact Study. If only one project moved forward, either would require upgrades to Morgantown breakers.

Short Circuit Summary Table

	Affected PEPCO Substations		
Project	Chalk Point	Oak Grove	Morgantown
Pre-Project	106.0%	110.7%	99.5%
U2-081	+20.0%	+2.3%	+1.3%
U2-083	+19.9%	+2.0%	+1.6%
Combined	+39.9%	+4.3%	+2.9%

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

None.

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)
(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

1. Upgrade two Chalk Point - Bowie 230kV circuits with ACCR feeder wire at approximately $47M ($23.5M per circuit; 33.5 miles). Construction time period approximately 2 years.

2. Same as 1.

3. Upgrade two Chalk Point – Oak Grove 230kV circuits with ACCR feeder wire at approximately $30M ($15M per circuit, 22 miles). Construction time period approximately 2 years

4. Same as 3.

5. Upgrade three Oak Grove - Bowie 230kV circuits using ACCR conductor: $24M ($8M for each circuit, approximately 11.5 miles); estimated time to construct is approximately 2 years.

6. Same as 5.

7. Same as 5.

8. Upgrade two Bowie - Burtonsville 230kV circuits using ACCR conductor: $16M ($8M for each circuit, approximately 11 miles); estimated time to construct is approximately 2 years.

9. Same as 8.

Short circuit analysis indicates that U2-083 contributes to the overduty of a total of thirty-nine PEPCO 230 kV breakers:

10. Replace (16) 230kV breakers at the Morgantown 230kV substation with 63 ka breakers for a cost of approximately $24M. Please note that this cost does not include changes to the bus structures, insulators, disconnect switches and ground grid that maybe required from replacing the 50 ka breakers to 63 ka breakers.

11. Twenty-three (23) breakers at Chalk Point 230 kV substation are overdutied and will require replacement by 80 kA breakers (Network Upgrade numbers n0772 to n0794). Four of the 230 kV breakers at Chalk Point are owned by Mirant. The cost to replace each of the 23 breakers at Chalk Point (Network Upgrade numbers n0772 to n0794) to 80 ka breakers is $2.0 million. The total cost the breakers is $46,000,000.

With Pepco's present capabilities, Pepco estimates the number of breakers that can be changed out in one year is approximately eight. (Work in Spring and Fall only), therefore the replacement of 39 breakers will take approximately 4-5 years.

Figure 1