

PJM Generator Interconnection  
*U2-084 Dickerson 230-kV*  
*600 MW Capacity*  
Feasibility Study

October 2008  
DMS #510063v1

## **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**

The Queue Project U2-084 was studied as a 600MW Capacity injection at Dickerson 230 kV substation in the PEPCO area. Project U2-084 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)*

1. **(PEPCO/PEPCO)** The DICKERSN-STATIONH 230kV line loads from 72.10% to 103.66% (DC power flow) of its emergency rating (680MVA)

for the tower line outage (3PEPCO). This project contributes approximately 214.7MW to cause this thermal violation.

**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)*

2. **(PEPCO/PEPCO)** The BML029-BML 138 230/138kV transformer loads from 101.51% to 105.85% (DC power flow) of its emergency rating (210MVA) for the tower line outage (3PEPCO). This project contributes approximately 9.1MW to the thermal violation.

**Short Circuit**

*(Summary form of Cost allocation for breakers will be inserted here if any)*

The following table shows the percentage over duty contribution from U2-082 and U2-084:

Project	Station D	Station D (Siemens)	Station D (West)	Station H
Pre-Project	87.3%	86.7%	86.7%	110.4%
U2-082	+12.8%	+12.7%	+12.7%	+14.6%*
U2-084	+18.9%*	+18.7%	+18.7%	+20.8%*

\* Contribute to breaker over duty condition caused by previous project(s).

3. This project causes over duty conditions on Dickerson D Siemens-Allis 230 kV breakers (2).
4. This project causes over duty conditions to a Dickerson D Westinghouse 230 kV breaker (1).
5. This project contributes to the over duty conditions on Dickerson Station D 230kV breakers (11).
6. This project also contributes significantly to the existing over duty condition on the 230kV breakers at Dickerson Station H (13).

**New System Reinforcements**

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

1. Upgrade two Dickerson Station D and Dickerson Station H 230 kV circuits: Terminal equipment at Station D and Station H needs to be upgraded: The estimated cost to upgrade the terminal equipment is approximately \$1.0M.

2. Replace Bells Mill 230/138 kV transformer to higher MVA: The estimated cost to replace the existing 230/138kV transformer rated 150 MVA to the next rating of 280 MVA is approximately \$10.4M.
3. Replace two (2) Siemens-Allis 230kV breakers at the Dickerson Station D with 80 ka breakers for a cost of approximately \$3.0M. 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 63 ka breakers to 80 ka breakers. The replacements are estimated to take 6 months to complete.
4. Replace one (1) Westinghouse 230kV breakers at the Dickerson Station D with 80 ka breaker for a cost of approximately \$1.5M. 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 63 ka breakers to 80 ka breaker. The replacements are estimated to take 6 months to complete.

#### **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)*

Short circuit analysis indicates that U2-084 contributes to the over duty of a total of thirteen (13) Dickerson Station H 230 kV breakers:

5. Replace eleven (11) 230kV breakers at the Dickerson Station D with 80 ka breakers for a cost of approximately \$16.5M. Note, one breaker is owned by Mirant. 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 63 ka breakers to 80 ka breakers. The replacements are estimated to take 2 years to complete.
6. Replace thirteen (13) 230kV breakers rated at 63 kA at the Dickerson Station H with 80 ka breakers for a cost of approximately \$19.5M and 2 years to complete.
7. The addition of U2-084 over-duties the 23 breakers at the Chalk Point 230kV substation above the 80 kA rating. At this time, 230kV breakers are not available above 80 kA. As a result other alternative at the Chalk Point 230kV substation need to be evaluated and no cost are available at this time. Since this will be more time consuming, these alternatives will be evaluated in Impact Study assuming that this project proceeds to the next stage.

Figure 1

