PJM Generator Interconnection #G45 Richmond 575MW Feasibility Study

February 2002

DMS# 167402

Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, 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.

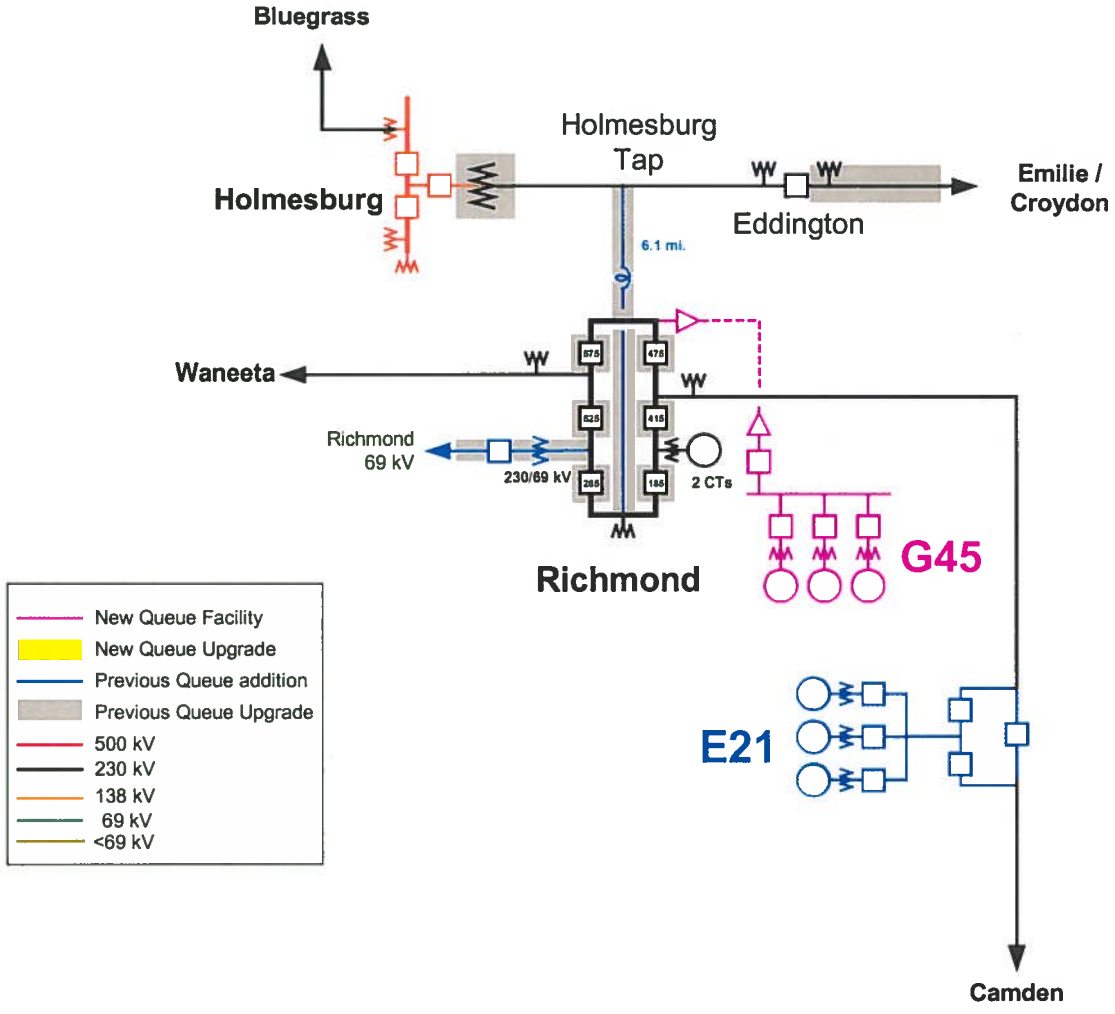
The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

General

Generator Interconnection Request #G45 is a Sempra Energy Resources 575MW (summer capacity) generation project consisting of a 2x1(two combustion turbine generators, and one steam turbine generator) combined cycle installation. The new generation will be located close to PECO's Richmond substation at a site with the address 3150 Orthodox Street, Philadelphia, PA. Project #G45 is scheduled for commercial operation by June 2005.

Direct Connection

Project #G45 can be connected to the Richmond 230V substation as shown on the one line diagram below.



The #G45 direct connection plan, shown above, will require the construction of the following facilities:

• #G45 UG cable connection to Richmond sub (0.5 mi. double 230kV HPOPT cable)	$ 4,000,000
• 230kV Terminations – 2 sets	$ 500,000
• Oil Pumping Plant	$ 250,000
• Richmond Substation; Establish a line position (ancilary equipment, protective relaying, etc.) between existing CBs 475 & 575	$ 375,000
Total Direct Connection Cost	**$5,125,000**

Note: Right-of-way for new UG circuit is not included in above cost estimate. Cost estimate includes a 40% CIAC tax gross-up.

Estimated time for construction is **24 months**.

#G45 Interconnection Customer is responsible for construction of the generator collector bus, generator step-up transformers, and all related generating station facilities.

Network Impacts

The Richmond #G45 project was studied as 575 MW capacity injection into the Richmond 230kV substation. Project #G45 was evaluated for compliance with reliability criteria for summer peak conditions in 2006. Potential network impacts were as follows:

Generator Deliverability

1. The Richmond – Waneeta 230 kV circuit is overloaded for several contingencies, the worst is 119% of the emergency rating (1258 MVA) for the outage of the Camden – E21 230 kV circuit. The G45 project contributes approximately 459 MW to the loading on this circuit.
2. The Holmesburg 230/138 kV transformer is contingency overloaded at 128% of the emergency rating (451 MVA) for the outage of the Richmond - Waneeta 230 kV circuit. The G45 project contributes approximately 80 MW to the loading on this circuit.
3. The Holmesburg – Holmesburg Tap 230 kV circuit is contingency overloaded at 107% of the emergency rating (538 MVA) for the outage of the Richmond – Waneeta 230 kV circuit. The G45 project contributes approximately 80 MW to the loading on this circuit.
4. The Holmesburg – Bluegrass 138 kV circuit is contingency overloaded at 119% of the emergency rating (323 MVA) for the outage of the Richmond – Waneeta 230 kV circuit. The G45 project contributes approximately 77 MW to the loading on this circuit.

5. The Bluegrass – Fox Chase 138 kV circuit is contingency overloaded at 116% of the emergency rating (250 MVA) for the outage of the Richmond – Waneeta 230 kV circuit. The G45 project contributes approximately 56 MW to the loading on this circuit.
6. The Camden – E21 230 kV circuit is contingency overloaded at 107% of the emergency rating (892 MVA) for the outage of the Richmond – Waneeta 230 kV circuit. The G45 project contributes approximately 303 MW to the loading on this circuit.
7. The Graceton – B48 230 kV circuit is contingency overloaded at 103% of the emergency rating (637 MVA) for the outage of the Conastone – Peach Bottom 500 kV circuit. The G45 project contributes approximately 32 MW to the loading on this circuit.

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

Short Circuit
Short circuit analysis was not performed due to the magnitude of reinforcements required to eliminate the identified overloads. Any required breaker replacements are not expected to materially alter the total network reinforcement cost.

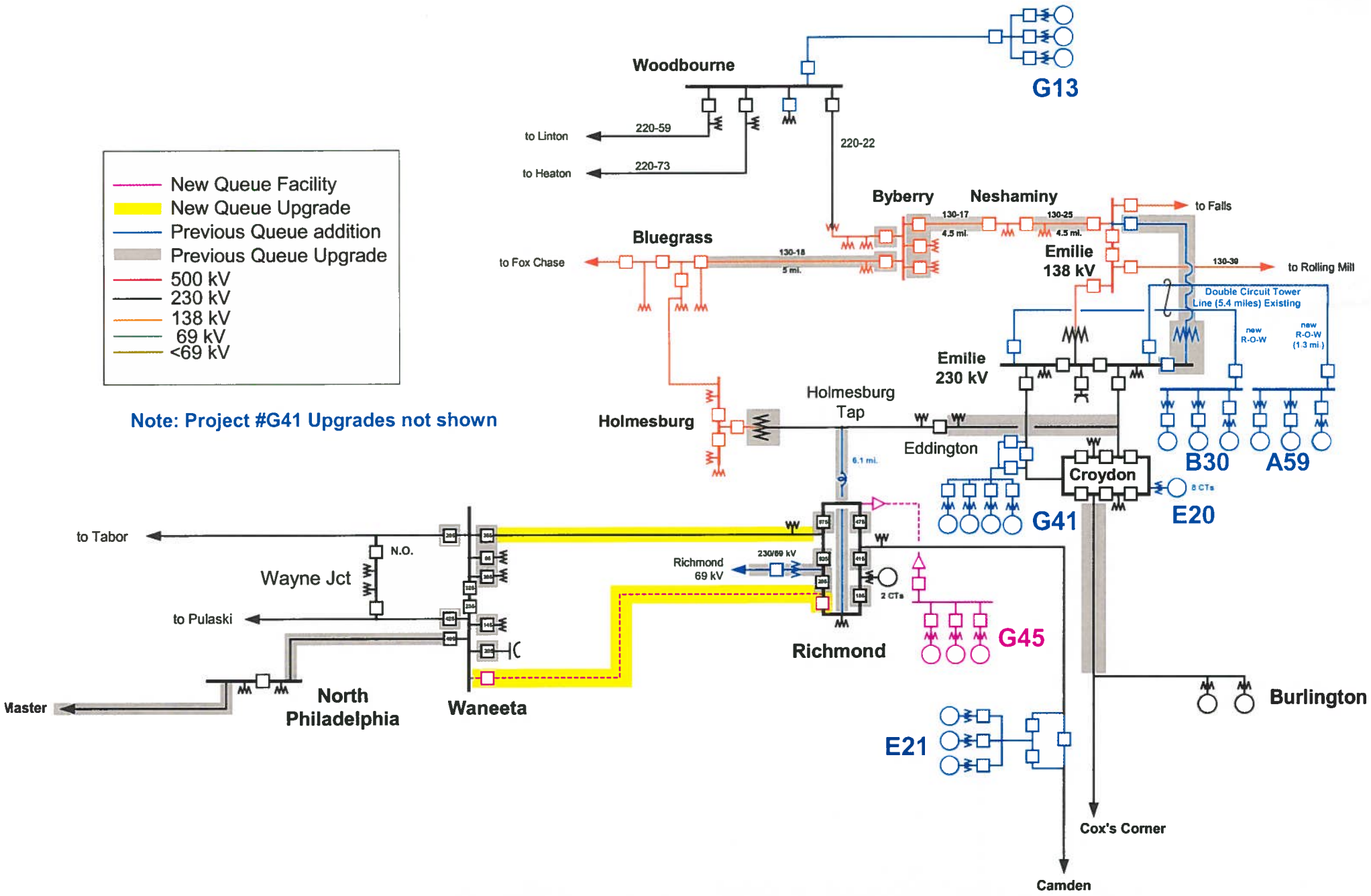
New System Reinforcements
Overloads 1, 2, 3, 4, 5, and 6 can be relieved by building a second 230 kV circuit from Richmond – Waneeta. The circuit will need to be underground with an estimated cost of $45 million and a 5 year lead time.

Overload 7 can be relieved by reconductoring the B48 to Graceton 230 kV circuit. The cost is estimated at $3 million with a 3 year lead time. Note: A lesser upgrade of this circuit had been identified for Queue #B48 – depending on the timing of uprades, a cost allocation with #B48 may apply.

Contribution to Previously Identified System Reinforcements
The G45 project will contribute to the cost of the following previously identified network reinforcements:

1. The project contributes approximately **459** MW to the Richmond – Waneeta 230 kV circuit overload. The overload can be eliminated by reconductoring the Richmond – Waneeta 230 kV circuit. The cost is estimated at $9 million and is expected to take 4 years to complete.

Cost allocation percentages are not provided as part of the Feasibility Study analysis, however, cost allocation will be provided at the conclusion of the Queue D, E, F & G Impact Study evaluations.


New Queue Facility
New Queue Upgrade
Previous Queue addition
Previous Queue Upgrade
500 kV
230 kV
138 kV
69 kV
<69 kV
Note: Project #G41 Upgrades not shown
Woodbourne
G13
to Linton
220-59
to Heaton
220-73
220-22
Byberry
Neshaminy
to Falls
130-17
130-25
4.5 mi.
4.5 mi.
Bluegrass
to Fox Chase
130-18
5 mi.
Emilie
138 kV
130-39
to Rolling Mill
Double Circuit Tower
Line (5.4 miles) Existing
new
R-O-W
new
R-O-W
(1.3 mi)
Emilie
230 kV
Holmesburg
Holmesburg
Tap
6.1 mi.
Eddington
Croydon
B30
A59
8 CTs
E20
G41
to Tabor
N.O.
Wayne Jct
to Pulaski
Richmond
69 kV
230/69 kV
2 CTs
G45
Richmond
Waneeta
North
Philadelphia
Master
Burlington
E21
Cox's Corner
Camden