PJM Generator Interconnection Request
Rockwood 25 kV
Feasibility Study Report
Queue #L11

Revised 8-26-04
June, 2004
DMS # 269018-v2

Preface

This revision provides a corrected summary paragraph under Network Impacts. The previous version incorrectly included a summary for a different project.
The intent of the Feasibility Study is to determine a plan, with "ball park" 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 facility upgrades needed to connect the generator to the PJM network, and **(2) Network Upgrades**, which are facility additions or upgrades to existing facilities, which are needed to maintain the reliability of the PJM system.

In some instances, the interconnecting generator 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 System 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 generation facilities. The project developer is responsible for the rights-of-way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

General

Kings Mountain Corporation has proposed a 9.9 MW generating facility to be installed in Somerset County, Pennsylvania near the community of Normalville. Kings Mountain will interconnect with Allegheny Power (AP) at the Mill Run 25 kV station. The generating facilities will consist of 7-1.5 MW[1] wind turbines. The project is intended to be an "energy-only" resource (with the ability to provide 20% capacity per PJM rules). The proposed in-service date for the project is January 1, 2005.

[1] The original request was for 6-1.5 MW wind turbine and one 0.9 turbine. The study was run with 7-1.5MW turbines. This difference does not have any significant effect on the results of this Feasibility Study, but should be reconciled at the time of the System Impact Study.

The estimated total cost to complete all the required facilities, including an expansion at the Mill Run Station, is $ 1,351,000 in 2005 dollars. This estimate does not include any tax gross-up. Completion of the work herein described will enable the interconnection customer (Kings Mountain Corporation) to install and operate a new generating facility in Allegheny Power's Pleasant Valley Service Center.

The figures above do not include construction of the 25 kV line required to interconnect the customer's proposed new generating facilities with the Allegheny Power system grid. Route selection, line design, right of way acquisition and construction of these lines will be entirely the responsibility of the interconnection customer. The ultimate configuration will affect the short circuit results and to a lesser degree the load flow results.

While the information in this transmittal is reasonable for the scope of work defined, it should be noted that the cost figures are conceptual in nature at this stage, as an engineering team has not been assigned to the project. Obviously, any change to the scope of work would require that the estimates be revisited.

Direct Connection

Substation – expand Mill Run Substation to 3 breaker ring-bus configuration with 25 kV meter and associated facilities.

Estimated cost - **$675,000** in 2005 dollars.

The project will be connected to the Allegheny Power Mill Run 25 kV station as depicted in Figure No. 1. The scope of work and estimated cost for individual project segments is as follows:

Costs:
Feasibility study cost estimates include the engineering and expansion of the Mill Run 25 kV switching station to connect the proposed Freedom Energy wind turbine generators to the AP system. Also included is an area relaying review and the specification and review of the interconnection relaying to be installed by the developer. It is further assumed that the developer will acquire a suitable site (for expansion) at the Mill Run Station (Pleasant Valley Service Center) which will be at no cost to Allegheny Power. Major equipment in the new station will include two line dead end structures, two 25 kV circuit breakers, associated 25 kV air switches and 25 kV interconnection metering.

This estimate does not include any tax gross up.

The standard lead time for this type of project, assuming that property purchase is not required, is 12 months after authorization to proceed is received by Allegheny Power. Note that the date indicated on the sketch includes some assumptions about the length of

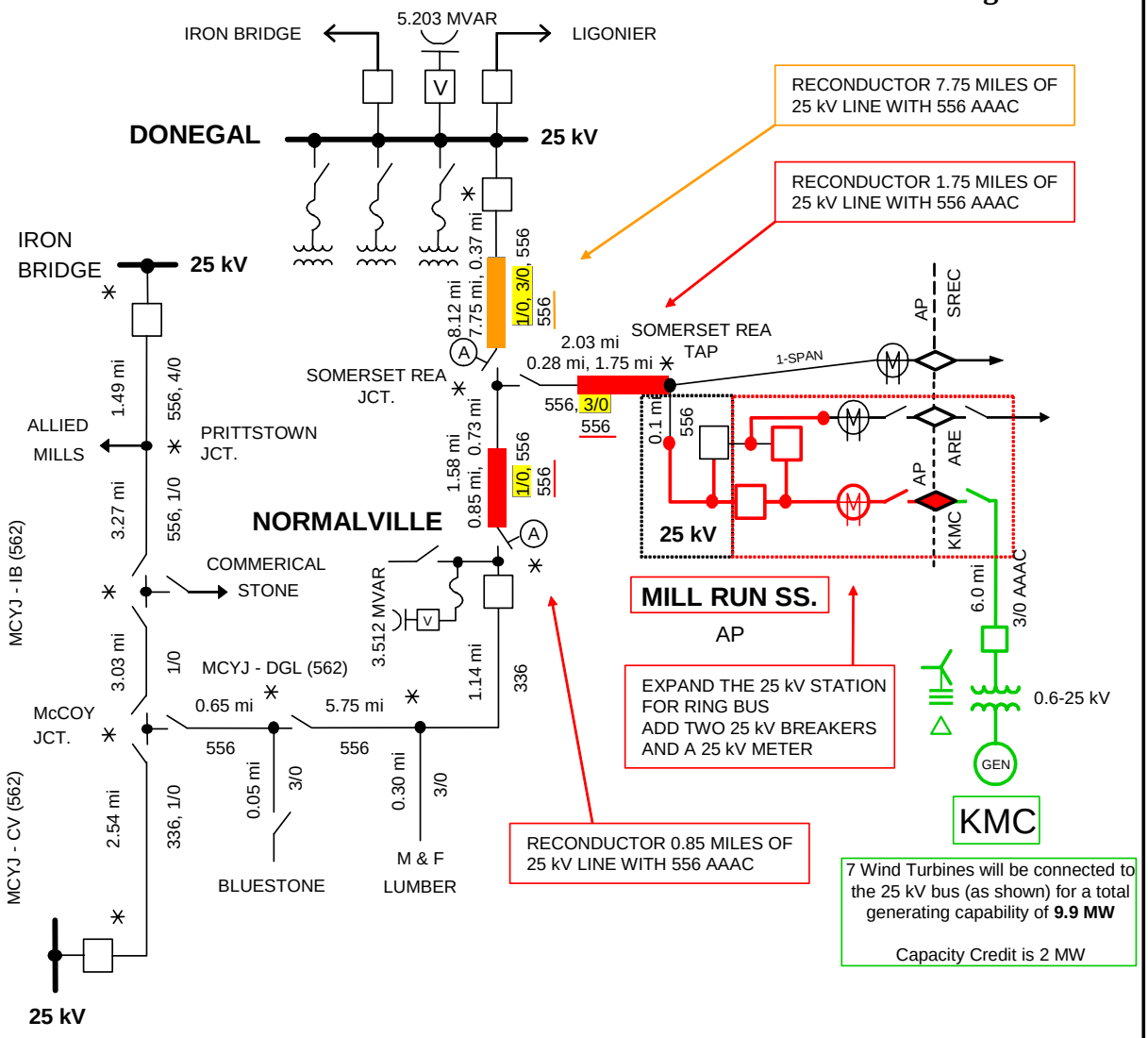
the process (i.e., System Impact Study, Facilities Study, time used before signing of Agreements, etc. This date will be fine tuned as the process continues.

The following assumptions were made in making the above cost estimate:

1. There are no environmental issues associated with the expansion of the switching station.
2. The 25 kV line outages required can be obtained when requested. This is of some concern since the 25 kV Mill Run line is radial.
3. The switching station property will be provided by the developer at no cost to AP
4. The site including access road will be graded by the developer to AP specifications and subject to approval by the designated AP representative.

A reasonable effort was made to include all anticipated project costs, however the developer will be responsible for all project costs, which may more or less than this good faith estimate.

Figure No. 1



SOURCE R. B. WASILOWSKI	**Allegheny Power** PLAN	DRAWN 6-9-04 P. L. ZAWELENSKY
CAD FILE Kings Mtn.ppt	**KINGS MOUNTAIN STATION PROVIDE INTERCONNECTION FACILITIES FOR KINGS MOUNTAIN CORPORATION NON-UTILITY GENERATION PLEASANT VALLEY SERVICE CENTER**	CHKD
REVIEWED		SCALE NS
APPROVED DATE		AUTHORIZATION

PLAN NUMBER

REV

Network Impacts

The **#L11 project was studied as a total of 9.9 MW** injection into the Mill Run 25 kV Station. Twenty percent (20% or about 2 MW) of the project was studied as a capacity injection and 80% (about 8 MW) was studied as energy-only injection. Project # L11 was evaluated for compliance with reliability criteria for summer peak conditions in 2007. Potential network impacts were as follows:

Normal System (ECAR Standard 1)

Segments (totaling 2.6 miles) of the Normalville-Somerset REA Jct. and the Somerset REA Jct. -Somerset REA tap 25 kV line overload for base conditions.

Single Contingency (ECAR Standard 2)

- No identified problems.
- It is assumed that the generator will be shut down for the loss of the Somerset REA Jct.– Somerset REA Tap 25 kV line thus eliminating islanding issues.
- If generator reliability is an issue, there is a thermal overload on 7.75 miles of the Somerset REA Jct.-Donegal 25 kV which would have to be reconductored. This reconductoring is optional for energy-only projects.

Multiple Facility Contingencies (i.e. Tower Line Outages) ECAR Standard 3)

No identified problems.

Second Contingency (ECAR Standard 5)

Not run.

Generator Deliverability:

No identified problems.

Stability (ECAR Document No. 1)

Not run.

Short Circuit Study:

No breaker replacements required for interconnection.

New System Reinforcements (Upgrades):

No identified problems other than the previously noted reconductoring.

Contribution to Previously Identified System Reinforcements;

None. Note that cost allocation percentages are not provided as part of the Feasibility Study analysis, however, cost allocation will be provided during the Impact Study evaluations.

System Upgrades:

The study was performed viewing the facility as a 9.9 MW energy-only resource and as a 2 MW capacity resource/7.9 MW energy resource.

9.9 MW Energy Only Resource:

Base Case conditions (**must be corrected**)
Replace 1.75 miles of 3/0 AAAC 6/1 conductor on the Somerset REA Jct.-Somerset REA Tap 25 kV line section with 556 AAC or thermal equivalent. An overload occurs for base case conditions.

Replace 0.85 miles of 1/0 CU 7 conductor on the Normalville-Somerset REA Jct. 25 kV line section with 556 AAC or thermal equivalent. An overload occurs for base case conditions.

Contingency Conditions (**may be corrected if developer wishes greater reliability**)
When the Normalville-Bluestone 25 kV line section is outaged the Donegal-Somerset REA Jct 25 kV line section becomes overloaded exceeding the 6-hour rating of the line by 23% when the project is generating at full output (9.9 MW). This first contingency overload will occur if the generation is in excess of 5 MW. There are other line section outages which produce overloads of lesser magnitude. The overloads can be mitigated with the replacement of 7.75 miles of conductor (1/0 and 3/0) in the Donegal-Somerset REA Jct. 25 kV line section with 556 AAC or thermal equivalent.

When the Donegal-Somerset REA Jct 25 kV line section is outaged the Connellsville-McCoy Jct 25 kV line section exceeds the continuous rating but does not exceed the 6-hour rating of the line.

2 MW Capacity Resource/ 7.0 MW Energy Resource:

There were no thermal overloads as a result of normal operation or first contingency outages attributed to the project with a 2 MW "capacity" output. There are line segment outages that produce flows in excess of the continuous ratings. Maintenance outage of these segments could require reduced output from the project. This issue will be refined in the System Impact Study.

Note. If the capacitor at Donegal is on when King's Mountain has low generation there is a possibility of high voltages in the area. This issue will be addressed in the System Impact Study.

Direct Access Charge

There will typically be a monthly usage charge for the use of the subtransmission from the point of interconnection to the 138 kV transmission system. Details of this matter will be addressed in the System Impact Study.

Costs for System Reinforcements

Subtransmission Lines:

Reconductor segments of Normalville - Somerset REA Jct. and Somerset REA Jct. – Mill Run 25 kV lines (total 2.6 miles).

Estimated cost - **$170,000** in 2005 dollars (required)

Reconductor segments of Somerset Jct. – Donegal 25 kV line (total 7.75 miles).

Estimated cost - **$506,000** in 2005 dollars (optional)

Fault Information

No breaker replacements required for interconnection.

Listed below is the positive and zero sequence source equivalent impedance at the Mill Run site with the interconnection point OPEN.

Positive: (0.21748 + j0.65156)
Zero: (0.90072 + j4.32483)

Below are the Impedances used for the GSU's and Generators.

GSU:

7 transformers
0.6 – 25.0 kV
Z = 10% (1.75 MVA)

Generator:

7 units 1.4 MW each
X"d = 0.15 p.u. (2 MVA)