PJM Generator Interconnection
Queue #P27
Winchester 34.5 kV (13 MW)

System Impact Study

April 2007

DOCS#: 399731-V2

General

Waste Management Renewable Energy LLC is proposing to construct a landfill gas generating facility at the Bethel Landfill in Hampton, Virginia. The new generating facility was studie assuming the incorporation of eight Caterpillar G3520 reciprocating engines for a total of 13 MW of capacity. The originally proposed in service date for the new generating facility was 12/31/06. The #P27 project was studied as an injection of 13 MW into Winchester 34.5kV substation.

Direct Connection Requirements

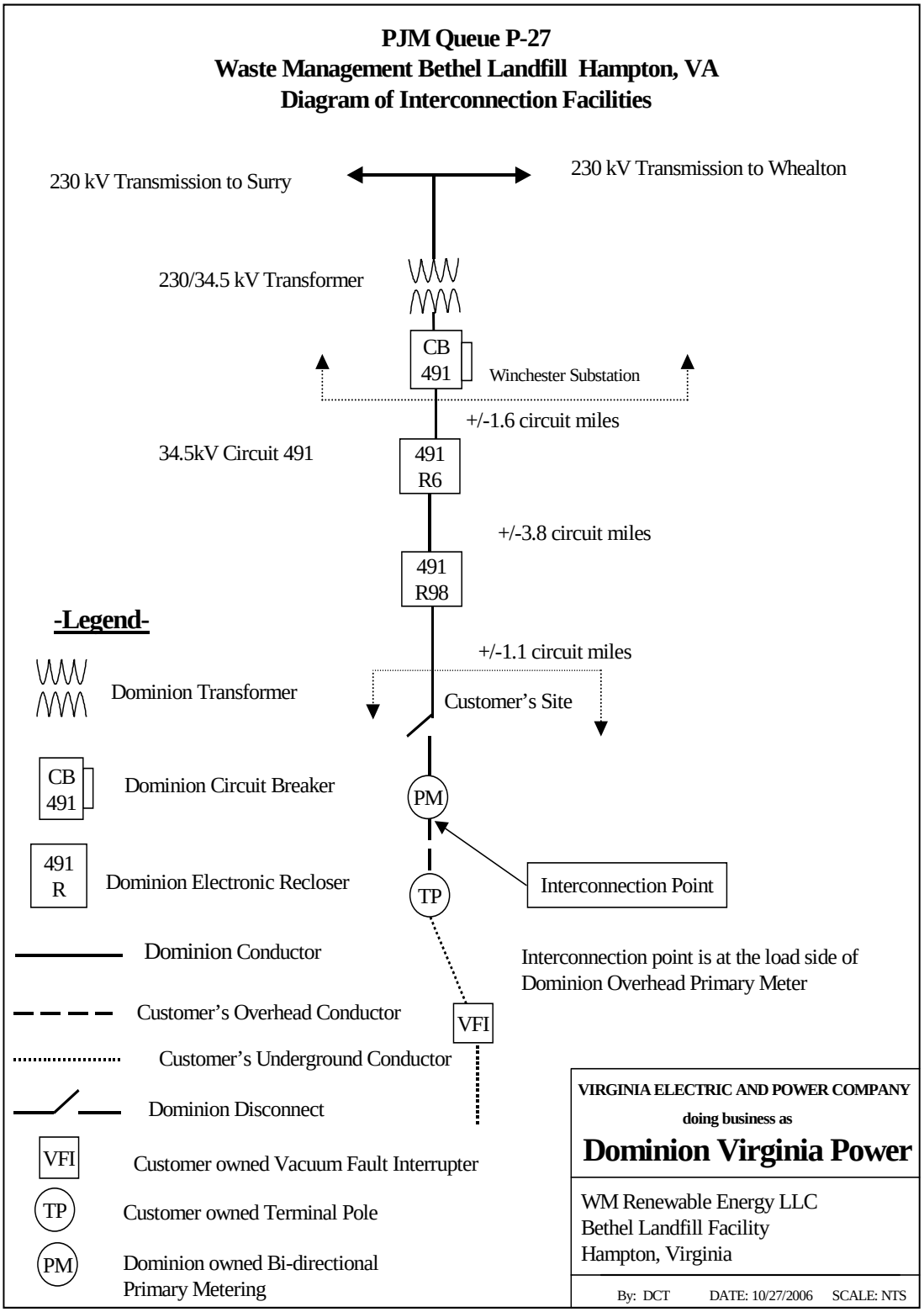
New System Facilities

Facilities that will be built new to accommodate the interconnection include a 720 feet overhead 34.5 kV distribution line extension, a disconnect device, bi-directional primary voltage (34.5 kV) metering equipment and a terminal pole and 240 feet of 1000 kcm aluminum underground conductor to the line side of the customer's Vacuum Fault Interrupter. Although the facilities beyond the primary meter will be built and provided by DVP, upon completion of the project they will become the property of the Interconnection Customer and the Point of Interconnection will be the load side terminals of the DVP owned primary meter. The cost of the line extension and primary metering is estimated to be **$86,120**.

Interconnection Customer is responsible for ensuring that revenue metering and real time telemetry data is in conformance with PJM Manuals 01 and 14D for a Capacity Resource.

A one-line of the distribution facilities is shown in Figure 1 below (page 2):

Figure 1



Dominion Virginia Power Distribution System Impacts

The #P27 project was studied as an injection of 13 mW (16 mVA) into Dominion Virginia Power's (DVP) Winchester Substation 34.5 kV Circuit 491. Impacts to the DVP distribution system are as follows:

System Reinforcements and Modifications

Modifications to the DVP distribution system to accommodate 16 mVA of generation capacity injected into DVP's 34.5 kV Circuit 491 from Winchester substation will include reconductoring of 1.1 miles of overhead 3 phase 34.5 kV distribution line from 1/0 aluminum conductor to 477 kcm aluminum conductor and replacement of 350 feet of underground 1/0 aluminum conductor with 1000 kcm aluminum conductor for capacity. The replacement of a line fuse device with a 3 phase electronic line recloser will be required to accommodate a transfer trip scheme and for proper coordination of upline protective devices. Installation of transfer trip capability from 2 line reclosers and the substation circuit breaker to the customer's main generator breaker and relay work in the substation will be required for system protection coordination. The cost of the system upgrades is estimated to be **$387,220**.

Operating Restrictions

Winchester Circuit 491 can be interconnected with other distribution circuits during abnormal and/or emergency conditions. Under these abnormal and/or emergency conditions the required transfer trip protection scheme will not be available. As a result, under these conditions DVP will require the Interconnection Customer to take their generation off line.

Additional Information

Interconnection Customer provided and maintained data circuit phone lines will be required to provide a transfer trip signal from the 2 line reclosers, 491 R6 and 491 R98, and Circuit Breaker 491 in Winchester Substation to the Interconnection Customer's generator breaker. The Interconnection Customer must make arrangements to receive the transfer trip signal at their isolation device.

The cost estimate anticipates DVP will provide the meter of record and a check meter. DVP's metering will have the ability to provide an output signal for the Interconnection Customer's use to provide real-time metering data to PJM if so desired. The Interconnection Customer must make arrangements with DVP to receive this signal. The Interconnection Customer will provide a telephone line at the primary meter pole location for DVP's check meter and a data line to the Meter of Record if provided by DVP.

The Interconnection Customer is advised of the potential for severe transformer overloading that may arise during a primary system disturbance due to the customer's grounded wye/delta transformer configuration that will be established when DVP supplies station service to the Interconnection Customer.

Five months of lead-time should be allowed for procurement of materials and construction of this project.

Network Impacts - PJM

P27 was studied as an injection into Winchester 34.5kV substation. Project #P27 was evaluated for compliance with reliability criteria for summer peak conditions in 2010. Potential network impacts are as follows:

Generator Deliverability
No problem identified.

Multiple Facility Contingency
No problem identified.

Contribution to Previously Identified Overloads
None

Contribution to Previously Identified System Reinforcements
None

Short Circuit
None

Stability Analysis
None