PJM Generator Interconnection Request
Queue #U4-008
South Central Power 69kV
Feasibility/Impact Study

535146
April 2009

Version 2
June 2009

U4-008 South Central Power 69kV Feasibility/Impact Study Report

General

Waste Management proposes to install PJM Project #U4-008, a 6.4 MW generating facility, consisting of 8 Caterpillar 3516 generator sets, connecting to South Central Power's distribution system located in Perry County, Ohio, which connects to the American Electric Power (AEP) Thornville – New Lexington 69 kV transmission line. The projected in-service date is scheduled for September, 2009 for six of the generator sets. The final two generator sets will be installed at a later date

The intent of the Impact study is to determine system reinforcements and associated costs and construction time estimates required to facilitate the addition of the new generating plant to the transmission system. The reinforcements include the direct connection of the generator to the system and any network upgrades necessary to maintain the reliability of the transmission system.

Direct Connection

U4-008 proposes to install a generating facility of 6.4 MW of landfill gas generation, to be connected to South Central Power's distribution system. South Central Power's substation is located at Perry County, Ohio and is connected to the Thornville - New Lexington (Zanesville) AEP 69 kV transmission line. South Central Power's 69 kV transmission line carries power to SCP's Sheridan Substation 6.4 miles away. The electric load is a combination of the loads on the Somerset and Sheridan Substations. Both substations have 69/12.5 kV step down transformers and distribution lines from both substations delivering power to retail customers in Perry County and eastern Fairfield County. The Waste Management landfill is served from Sheridan Substation with a 12.5 kV circuit, which extends 13.5 miles.

The AEP construction scope includes:

1. **New Lexington** remote end – Installation of transfer trip equipment to match AEP's South Fultonham and SCP's Somerset stations. (Network Upgrade #n1194)
    1. (1) 69 kV tuner
    2. transfer trip equipment (This will include any auxiliary relays necessary to incorporate the new transfer trip sets into the existing line relaying schemes.)
    3. expenses for mobilization
    4. resource hours for AEP's crews and engineers
    5. extra P&C work due to rewiring existing panels in control house (limited space)

    Estimated Cost (2009 Dollars): **$72,800**

2. **South Fultonham** remote end – Installation of transfer trip equipment to match AEP's New Lexington and SCP's Somerset stations. (Network Upgrade #n1195)
    1. transfer trip equipment (This will include any auxiliary relays necessary to incorporate the new transfer trip sets into the existing line relaying schemes.)

2. expenses for mobilization
3. resource hours for AEP's crews and engineers

Estimated Cost (2009 Dollars): **$60,900**

3. **Somerset** metering
    1. metering panel
    2. (2) ION-8600 meters
    3. (1) positron device
    4. construction expenses
    5. resource hours for metering, engineering, RTU, telecom

Estimated Cost (2009 Dollars): **$120,700**

AEP engineering and design work (provide standard drawings, check drawings, P&C commissioning) at Somerset station.

6. SCP will be responsible for providing control house, dc service, circuit breaker, three CTs, three PTs, transfer trip receive equipment (one CCVT, one wave trap, one line tuner, two transfer trip sets), associated structures, foundations and miscellaneous connectors. SCP will install their own backup relay (e.g., SEL-287V) which can sense phase undervoltage and ground overvoltage conditions, and SCP will install their own breaker control relay at Somerset for reclosing and check synchronizing.
7. SCP agrees with the stipulation that the IPP's generation will be taken off-line when the bypass switch around the Somerset circuit breaker is closed.

Estimated Cost (2009 Dollars): **$77,800**

(Network Upgrade # n1196)

Total Somerset Estimate Cost (2009 Dollars) **$198,500**

Network Upgrade # n1136

Total Somerset Estimate Cost (2009 Dollars) **$198,500**

Total Attachment Facilities Cost: **$332,200**

* It will take 7 months after obtaining a signed agreement to construct the facilities as outlined above.

Local Impacts

The impact of the proposed generating facility on the AEP System was assessed for adherence with applicable reliability criteria. AEP planning criteria require that the transmission system meet performance criteria in accordance with the AEP

Normal System (2012 Summer Conditions)

- No problems identified.

Single Contingency (2012 Summer Conditions)

- No problems identified.

Multiple Contingency (2012 Summer Conditions)

- No problems identified.

Short Circuit Analysis

- No problems identified.

Local Upgrades

- None

Network Impacts

The Queue U4-008 Project was studied as a 6.4 MW (Capacity) injection at the Somerset 69 kV facility. The project was evaluated for compliance with reliability criteria for summer peak conditions in 2013. Potential network impacts were as follows:

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

No Problems were identified.

Multiple Facility Contingency
(Double Circuit Tower Line contingencies only for the full energy output. Stuck breaker and bus fault contingencies will be performed for the Impact Study)

No Problems were identified

Short Circuit
Not required since there is no change to the unit parameters.

Stability
Not required for projects under 30MW unless a stability problem is expected.

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)

None

New System Reinforcements

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

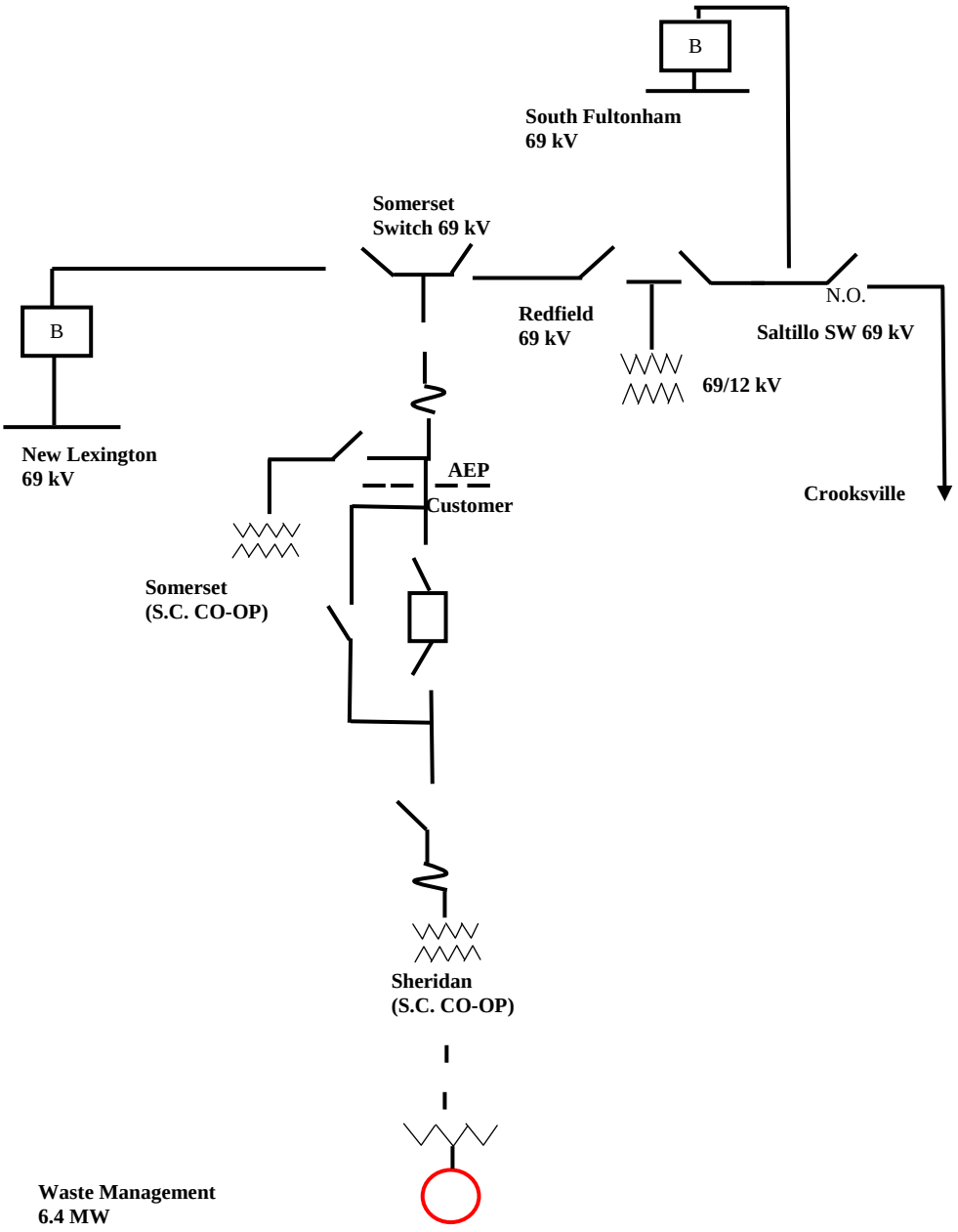
None

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)

None`

Figure 1: Simplified Diagram of the U4-008 6.4 MW generation interconnection.



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Direct Connection

U4-008 proposes to install a generating facility of 6.4 MW of landfill gas generation, to be connected to South Central Power's distribution system. South Central Power's substation is located at Perry County, Ohio and is connected to the Thornville - New Lexington (Zanesville) AEP 69 kV transmission line. South Central Power's 69 kV transmission line carries power to SCP's Sheridan Substation 6.4 miles away. The electric load is a combination of the loads on the Somerset and Sheridan Substations. Both substations have 69/12.5 kV step down transformers and distribution lines from both substations delivering power to retail customers in Perry County and eastern Fairfield County. The Waste Management landfill is served from Sheridan Substation with a 12.5 kV circuit, which extends 13.5 miles.

The AEP construction scope includes:

1. **New Lexington** remote end - Line relaying work to match AEP's South Fultonham and SCP's Somerset stations. New Lexington 69 kV relay upgrades to match the relay at the generator. Network Upgrade # n1134.
    1. (3) 69 kV CCVTs with new foundations and steel structures
    2. (1) 1200 A line trap
    3. (1) 69 kV tuner
    4. carrier equipment with new standard relay panel
    5. expenses for mobilization, crushed stone, loading/unloading materials, portable safety grounds, manlift
    6. resource hours for AEP's crews and engineers
    7. extra P&C work due to rewiring existing panels in control house (limited space)

    Estimated Cost (2009 Dollars): **$294,900**

2. **South Fultonham** remote end - Line relaying work to match AEP's New Lexington and SCP's Somerset stations. South Fultonham 69 kV relay upgrades to match the relay at the generator. Network Upgrade # n1135
    1. (3) 69 kV CCVTs with new foundations and steel structures
    2. (1) 1200 A line trap
    3. (1) 69 kV tuner
    4. carrier equipment with new standard relay panel
    5. expenses for mobilization, crushed stone, loading/unloading materials, portable safety grounds, manlift
    6. resource hours for AEP's crews and engineers

    Estimated Cost (2009 Dollars): **$291,000**

3. **Somerset** metering
    1. metering panel
    2. (2) ION-8600 meters
    3. (1) positron device
    4. construction expenses
    5. resource hours for metering, engineering, RTU, telecom

    Estimated Cost (2009 Dollars): **$120,700**

    AEP engineering and design work (provide standard drawings, check drawings, P&C commissioning) at Somerset station. SCP will be responsible for providing control house, dc service, circuit breaker, three CTs, three PTs, two CCVTs, two line traps, two line tuners, associated structures, foundations and miscellaneous connectors.
    Estimated Cost (2009 Dollars): **$77,800**

    Network Upgrade # n1136

    Total Somerset Estimate Cost (2009 Dollars) **$198,500**

Total Attachment Facilities Cost: **$784,400**

* It will take 7 months after obtaining a signed agreement to construct the facilities as outlined above.

Local Impacts

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Single Contingency (2012 Summer Conditions)

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Multiple Contingency (2012 Summer Conditions)

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Short Circuit Analysis

- No problems identified.

Local Upgrades

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