

***PJM Generation Interconnection Request
Queue Y1-012
Sanborn 36kV
Feasibility/ System Impact Study***

707505v5
October 2012

Preface

The intent of this System Impact Study is to determine a plan, with 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.

The PJM Reliability Planning Process utilizes PJM planning criteria, NERC Planning Standards, NERC Regional Council planning criteria, and the individual Transmission Owner FERC filed planning criteria. In all cases, PJM applies the most conservative of all applicable planning criteria when identifying reliability problems and determining the need for system upgrades on the PJM system. The application of the NERC Planning Standards is adapted to the specific needs of the PJM system.

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. All facilities required for interconnection of a generation interconnection project must be designed in compliance with the technical specifications (on PJM web site) for the appropriate Transmission Owner.

After the System Impact Study Agreement is executed and prior to execution of the Interconnection Service Agreement, an Interconnection Customer may modify its project to reduce the electrical output (MW) (in the case of a Generation Interconnection Request) of the proposed project by up to the larger of 20 percent of the capability considered in the System Impact Study or 50 MW.

The System Impact 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

WM Renewable Energy, L.L.C (Interconnection Customer) is proposing a 6.48MW Capacity landfill gas project interconnected to The Illuminating Company (ATSI) transmission system and located in Ashtabula County, OH. Geneva Landfill is approximately 8.0 electrical miles from the Sanborn Substation. ATSI is a FirstEnergy (FE) company. The proposed in-service date for this project is **October 30, 2012** and is currently under review.

Facilities to Accommodate the Interconnection

Scope of Direct Connection Work

The Y1-012 project is proposing a 6.48MW Capacity landfill gas project and will be tapping the R-14-Sanborn-G-X 36kV sub-transmission circuit fed from the Sanborn 36kV substation (See **Figure 1** below). The tap will be located approximately 1.6 miles to the north, along the Norfolk Southern Railroad tracks north of S. Ridge Road. The Point of Interconnection will be located at the point where the line tap connects to the generation facility manual disconnect. A fully rated fault interrupting circuit breaker owned by the developer is required on the high side of the GSU, between the manual disconnect and the GSU to protect the developer's facilities. The Illuminating Company requires a disconnect at the primary metering point that is accessible and lockable by Illuminating Company employees.

To accommodate this interconnection, the following facilities/upgrades need to be completed:

- All 36kV single circuit extension line work from the N&S at Myers Road South to approximate identified location for the generating station, including the wye-broken delta ground detection proximate to the station structure, supervision, project management, and engineering. ATSI is requiring the developer to provide a material lay down area and reporting point for line construction personnel. The material lay down area may require site security items such as fencing and stoning, dusk-to-dawn lighting, conex boxes, etc. The needs will be specified at the time of final design and cost determination.
- Relay and control work at the Sanborn substation including upgrading the relaying on the 36kV R-14-SN line at Sanborn substation, replacing existing relaying with SEL-311 (primary), SEL-351 (back-up), and SEL-501 (breaker failure) relays, installing radio antenna and cable, and installing a new RFL-9745 to transmit the 36kV breaker status, bus protection operation, breaker failure operation and other conditions at Sanborn substation. This work done by ATSI assumes that the GE IBox TRU and lease telephone line to the IBox are supplied and installed by the developer, as well as the router. Relay setpoint calculations for Sanborn substation protection and testing of the direct transfer trip equipment for interconnection protection will be required.
- Replacement of the existing R-14-SN 36kV sectionalizer with a new 36kV recloser, including associated communication equipment.

The total cost of all of these upgrades is approximately **\$1,614,484** and will require about **7 months** to complete from fully executed Interconnection Service Agreement. The breakdown of the cost estimate is supplied below in **Table 1**.

The Interconnection Customer is responsible for meeting all criteria as specified in the applicable sections of the “FirstEnergy Requirements for Transmission Connected Facilities” document.

The Interconnection Customer is responsible for constructing all of the facilities on the Interconnection Customer’s side of the Point of Interconnection except for revenue metering.

The Interconnection Customer is solely responsible for protecting its own equipment against electrical faults or other disturbances on the FE system that could damage its equipment.

Direct Connection Cost Estimate

The total preliminary cost estimate for Direct Connection work performed by ATSI is **\$1,614,484**. This estimate consists of:

Description	Total Cost
36kV Line Tap (PJM Network Upgrade Number #N3331)	\$1,342,494
Relay and DTT hardware, communications, and SCADA (PJM Network Upgrade Number #N3332)	\$237,000
Replace R-14-SN 36kV sectionalizer with recloser and install associated communication equipment (PJM Network Upgrade Number #N3333)	\$34,990
Total	\$1,614,484

Table 1. Direct Connection Cost Estimate

FE provided these cost estimates and proposed schedule with the following assumptions:

- *Obtaining necessary line outages*
- *No equipment delivery, environmental or regulatory delays*
- *No permitting or real estate delays*
- *No extreme weather*
- *No force majeure*
- *No redeployment of work crews related to a force majeure event*
- *Availability of external construction crews for installation*

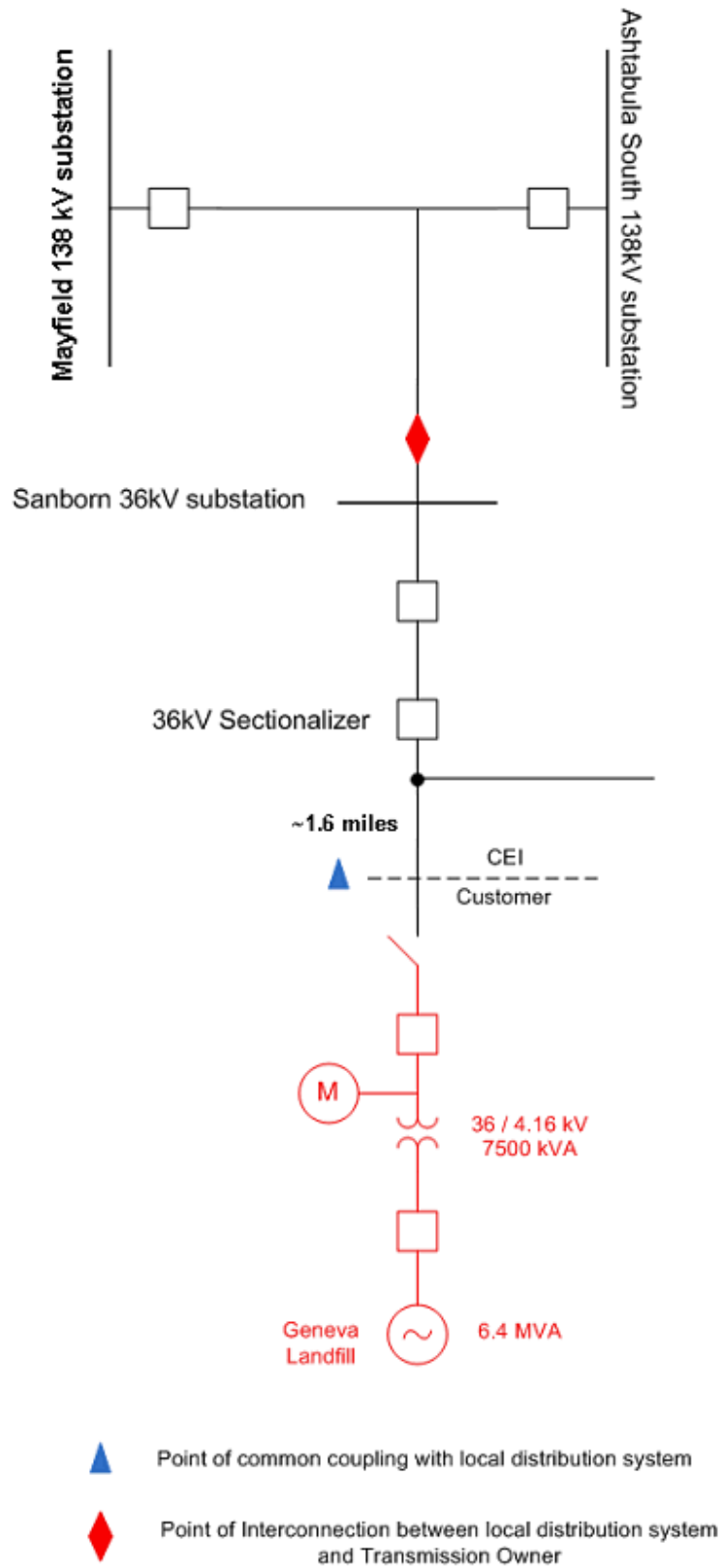


Figure 1. One Line Diagram

Revenue Metering and SCADA Requirements

For PJM: The necessary equipment must be installed to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for Interconnection Customer's generating Resource. See PJM Manuals M-01 and M-14D.

For ATSI: The Interconnection Customer will be required to comply with all FE Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "FirstEnergy Requirements for Transmission Connected Facilities" document located at the following links:
www.firstenergycorp.com/feconnect
www.pjm.com/planning/design-engineering/to-tech-standards.aspx

Network Impacts

The Y1-012 project was studied as a 6.5MW Capacity injection into the ATSI area at the Sanborn 34.5kV substation. Project Y1-012 was evaluated for compliance with reliability criteria for summer peak conditions in 2015.

Potential network impacts were as follows:

Generator Deliverability

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

No violations were identified.

Multiple Facility Contingency

(Double Circuit Tower Line, Stuck breaker and Bus Fault contingencies for the full energy output)

No violations were identified.

Short Circuit

(Summary of impacted circuit breakers)

PJM has completed the short circuit analysis of the Y1-012 queue project **GENEVA**. One option was considered during this study: the option was a connection to SANBORN 34.5 kV line. No new breakers were found to be over-duty in the ATSI transmission area.

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)

No violations were identified.

New System Reinforcements

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

Not required.

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contributions to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study.)

Not required.

Delivery of Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

As a result of the aggregate energy resources in the area, no violations were identified.