The City of Toledo, OH
Landfill Gas & Digester Gas
Combined Cycle Cogeneration Facility

IMPROVEMENT 53
The Landfill & Digester Gas Cogeneration system consists of:

Fuel transmission and supply of the Hoffman Road landfill gas and Bay View WWTP digester gas, including gas cleaning and mixing.

Electrical combined cycle cogeneration consisting of a combustion gas turbine and heat recovery steam generator, (HRSG), with a minimum design load capability of 10MW. (Excess heat produced by the system used for local building heating and other plant facilities.)

Building additions at the Bay View WWTP and Hoffman Road Landfill.
Environmental Benefits Analysis

Annual Average Environmental Benefits From Recovering the Landfill Gas:

- **Methane Emissions:** 1,138.88 thousand tons avoided/year, averaged over the life of the project
- **CO2 Equivalent:** 23,916.41 thousand tons avoided/year, averaged over the life of the project

- **34,166.29 thousand tons avoided total during the project**
- **717,492.19 thousand tons avoided total during the project**

| Max. LFG Flow from 1975 to 2057 | 1,405 mcm/yr |
| Max. CH4 Flow from 1975 to 2057 | 703 mcm/yr  |
| Avg. LFG Flow from 1975 to 2057 | 541 mcm/yr  |
| Avg. CH4 Flow from 1975 to 2057 | 471 mcm/yr  |
| Max. LFG Flow Project Life 2007 to 2037 | 1,405 mcm/yr |
| Max. CH4 Flow Project Life 2007 to 2037 | 703 mcm/yr  |
| Avg. LFG Flow Project Life 2007 to 2037 | 1,269 mcm/yr |
| Avg. CH4 Flow Project Life 2007 to 2037 | 634 mcm/yr  |
Combined Cycle Cogeneration Facility

10 MW Landfill and Digester Gas Biogas Cogeneration

- 10 MW, 4160VAC Rated Generation
- 2 Mile LFG Pipeline, 5KV Feeder, and Fiber Optic Tie
- Landfill and Digester Gas Treatment Equipment
- Facility Building Additions
- High and Low Pressure Gas Compressors
- LFG/DG -NG Gas Mixing Station
- Combustion Turbine & Generator (CT)
- Heat Recovery Steam Generator (HRSG & BMS)
- Steam Turbine & Generator (ST)
- Feed Water System (DA/BFW)
- Condenser and Cooling Towers
- Paralleling Switchgear & Control
- Facility PLC/HMI Control System
- Facility MCC's & Low Voltage Switchgear
- Black Start Generation & Island Operation
A gas mixing station provides selective mixing of:

1500 scfm Landfill gas @ 500 BTU/scfm : 45.0 MMBTU/Hr
350 scfm Digester gas @ 650 BTU/scfm : 13.7 MMBTU/Hr
and Natural gas @ 1000 BTU/scfm
Combustion Turbine

Dual Gas Wide Wobbe Fuel Assembly
Dual Gas LBTU Wide Wobbe Injectors

FWD + AFT Manifolds
Fuel Injector
AFT Manifold
FWD Manifold
Combined Cycle Cogeneration Facility
Cogeneration Facility

North Elevation

South Elevation

East Elevation

West Elevation

ELEVATIONS (Option 1)
Cogeneration Facility

Commissioning...
Cogeneration Facility

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