



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

Solar Turbines

A Caterpillar Company

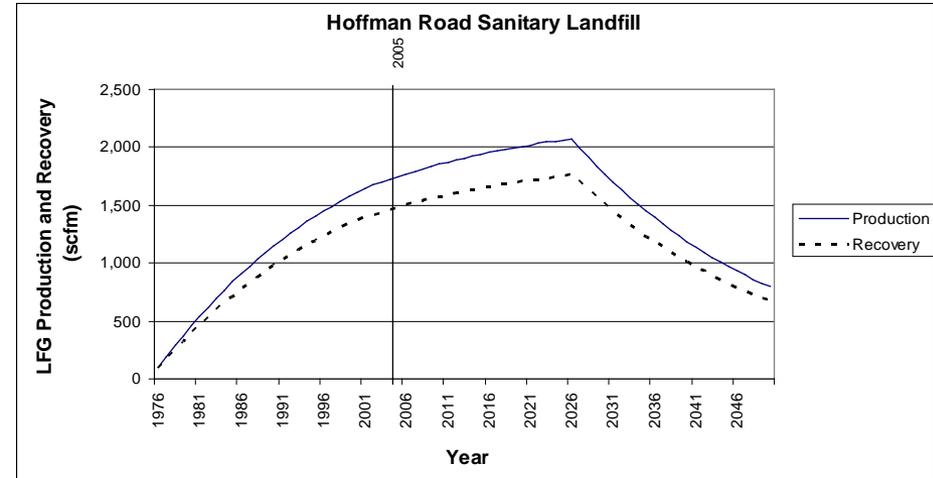
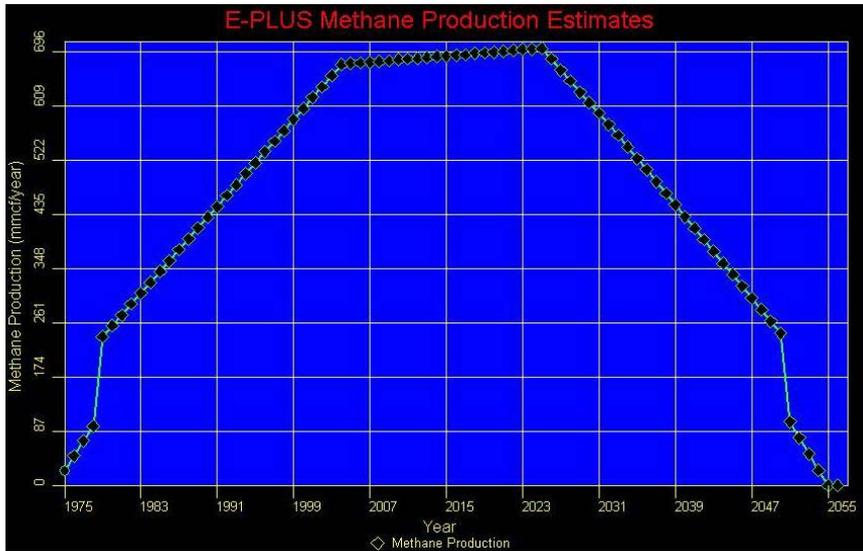


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LMOP Landfill Methane Outreach Program E-Plus & LandGEM LFG Projection Curves



U.S. Environmental Protection Agency



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
34,166.29 thousand tons avoided total during the project

CO2 Equivalent: 23,916.41 thousand tons avoided/year, averaged over the life of the project
717,492.19 thousand tons avoided total during the project

Max. LFG Flow from 1975 to 2057	1,405 mmcf/yr
Max. CH4 Flow from 1975 to 2057	703 mmcf/yr
Avg. LFG Flow from 1975 to 2057	941 mmcf/yr
Avg. CH4 Flow from 1975 to 2057	471 mmcf/yr
Max. LFG Flow Project Life 2007 to 2037	1,405 mmcf/yr
Max. CH4 Flow Project Life 2007 to 2037	703 mmcf/yr
Avg. LFG Flow Project Life 2007 to 2037	1,269 mmcf/yr
Avg. CH4 Flow Project Life 2007 to 2037	634 mmcf/yr



Combined Cycle Cogeneration Facility

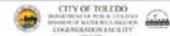
10 MW Landfill and Digester Gas Biogas Cogeneration

- 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



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SOUTHEAST VIEW
(Option 1)



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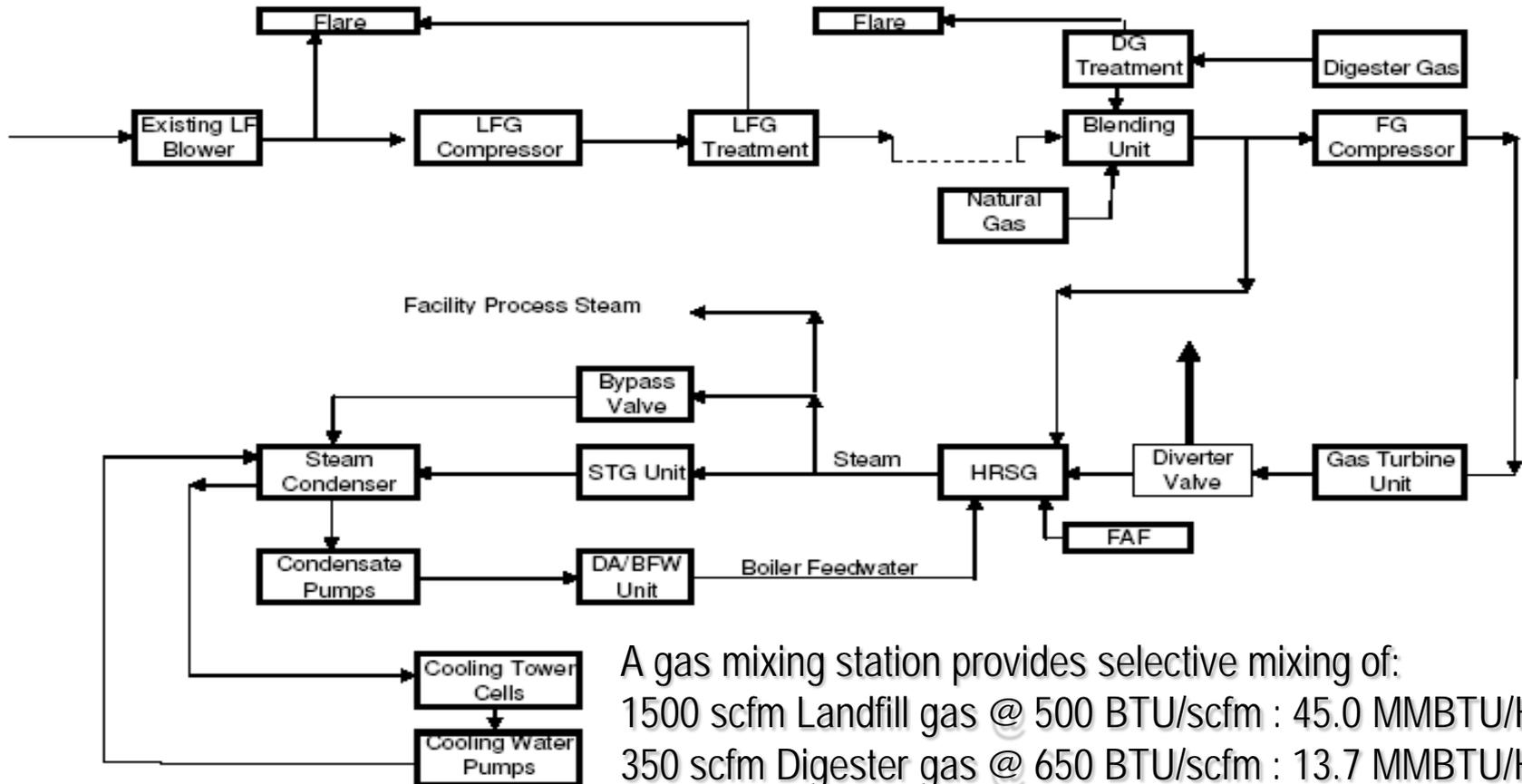
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NORTHEAST VIEW
(Option 1)



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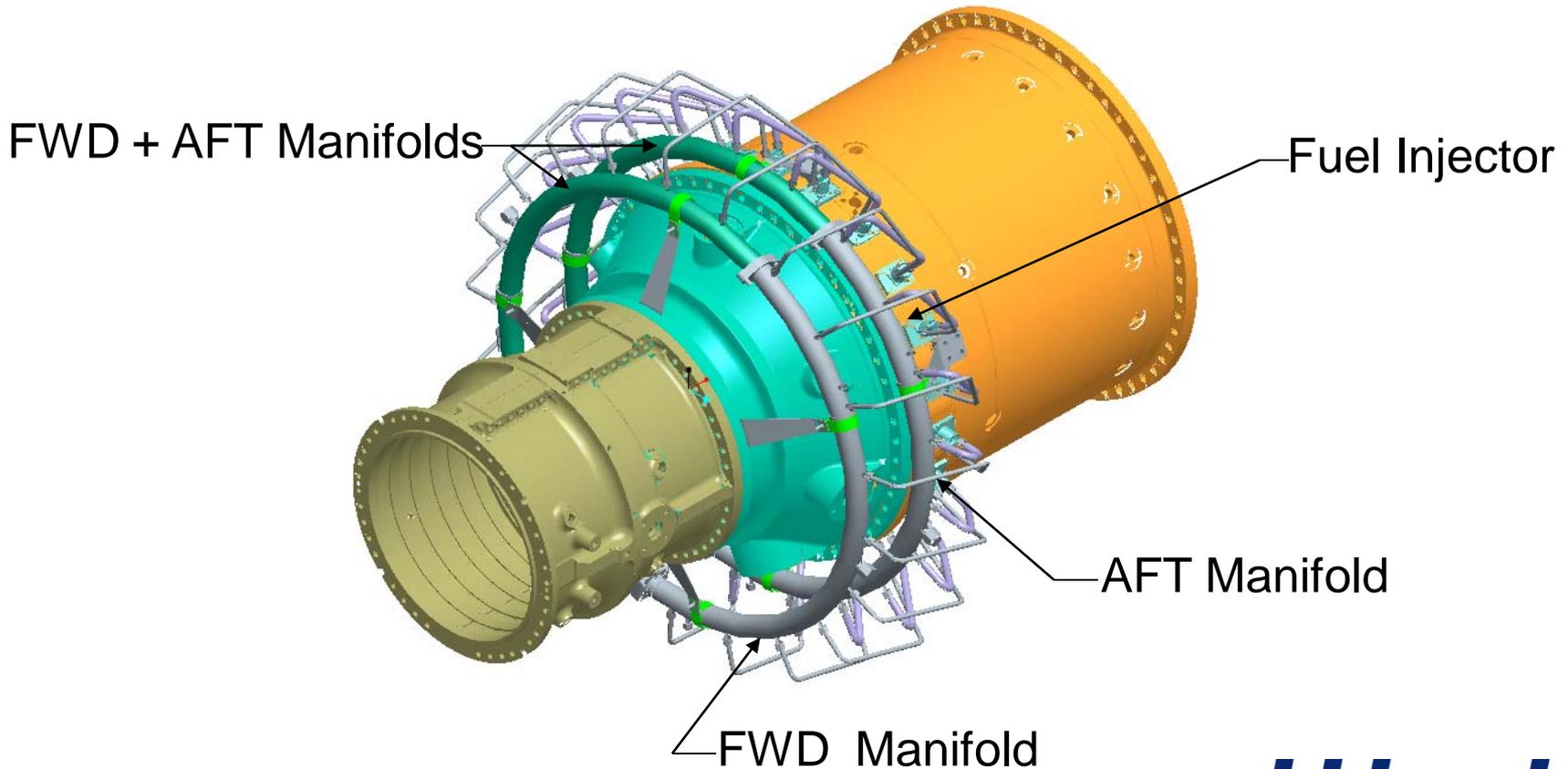
City of Toledo Improvement 53 Cogeneration Block Diagram



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

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



Cogeneration Facility



North Elevation



East Elevation



South Elevation



West Elevation



ELEVATIONS
(Option 1)



CITY OF TOLEDO
DEPARTMENT OF PUBLIC UTILITIES
DIVISION OF WATER RECLAMATION
COGENERATION FACILITY

JUNE 20, 2007



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Combustion Turbine



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Cogeneration Facility

Commissioning...



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