LMOP 2012

City of Midland, Michigan
Combined Gas to Energy Facility
Project Background

- City of Midland owns and operates POTW and Landfill
- Beneficial reuse of Methane from both sources
- Limited Capital necessitated outside funding
- Stimulus funds were used to finance substantial portion of project
- City’s Landfill Engineer was retained as Program Manager
Project Organization

- City of Midland
  - Owner Operator
- CTI
  - Program Manager
- Christman
  - Design/Build Prime (Performance Bond)
  - General Contractor
- HR Green
  - Preliminary Design
  - Final Design
  - Major Equipment Procurement
  - SCADA Design
  - Commissioning/Start-up
Key Project Attributes

- Utilize Both Digester Gas from POTW and LFG from City’s Landfill
- Maximize Electrical Energy and Heat Recovery from the Facility
- Rehabbed Existing Pipeline to Combine Gas Sources
- Power Plant Located at POTW
- Electric Power Sold to Dow
- City Utilizing Waste Heat
## Re-design to Achieve Budget Goals

<table>
<thead>
<tr>
<th>Original Proposal</th>
<th>Negotiated Scope</th>
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<tbody>
<tr>
<td>• 5600 SF Power Plant</td>
<td>• 4800 SF Power Plant</td>
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<tr>
<td>• Siloxane Treatment</td>
<td>• No Gas Pretreatment</td>
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<tr>
<td>• Space for 3(^{rd}) Genset</td>
<td>• Provisions for Third Genset Retained</td>
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<tr>
<td>• Hot Water Pipeline to WWTF</td>
<td>• No Class A Biosolids Processing Included</td>
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<tr>
<td>• Class A Thermal Sludge Drying at WWTF</td>
<td>• $8,500,000</td>
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<td>• $11,000,000</td>
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Project Included Two Major Sites

Compressor Building
Mixed Municipal Solid Waste Landfill

Engine Generating Plant
Wastewater Treatment Facility
(Nearly 3 Miles Away)
Building Exterior Matched WWTF

Face Brick Matched
Adjacent Wastewater and
Water Treatment Plant
Structures
Leveraging Major Equipment Providers

- Align Technology and Supplier – Cost Competitive Solutions
  - Cleveland Brothers
  - Vilter Compressor
  - Shallbetter Switchgear
Single Screw Compressor – Basis of Design

LFG is Compressed and Chilled to Drop Out Moisture Prior to Conveyance Through a Three Mile Pipeline to the Engine Generator Building
Process Flow of LFG Compression
Two 200 HP Single Screw Compressors
Compression System at Digester
Gas to Energy Facility (CHP)

LFG and Digester Gas is Commingled at the Power Plant Site and Contains Approximately 56% Methane
3520C Unit Produces 1.6 MWs/Each

- Purchase Power Agreement (PPA) Negotiated with the Dow Corporation
- Green Power is Exported Through a Switchyard to Consumers Power Through Local Substation
WWTF Substation Facilitates Interconnect

Power is Sent to Combined WWTF and GTE Facility
Switchyard/Substation
Open Layout Provides Easy Access
Generator Room at GTE Building
Rooftop Air Supply and Exhaust

- Down Draft Mixed Flow Fans Provide Required Airflow for Engine Room
- Filters Housed in Canopy
SCADA System Integrates All Processes
SCADA System Provides Platform
Plant SCADA Enhances Operations
Combined Heat and Power (CHP)
Major CHP Components

- Heat Recovery Silencer, With Bypass Exhaust Silencer
- Heat Exchanger and Thermostatic Regulator Valve
Heat Recovery – Jacket Water/Exhaust

- Plant Efficiency is Increased With CHP
- Adds Revenue Stream
Recovered Heat Benefits

- Plant Efficiency is Increased with CHP
- Adds Revenue Stream
- Heat Recovery Used for:
  - Digesters
  - Class A Biosolids
  - Dehumidification at Water Plant
Plant Layout is Operations Friendly

- Bulk Fluid Storage
- Process Air for Tools
Questions?