



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

Original Proposal

- 5600 SF Power Plant
- Siloxane Treatment
- Space for 3rd Genset
- Hot Water Pipeline to WWTF
- Class A Thermal Sludge Drying at WWTF
- \$11,000,000

Negotiated Scope

- 4800 SF Power Plant
- No Gas Pretreatment
- Provisions for Third Genset Retained
- No Class A Biosolids Processing Included
- \$8,500,000

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



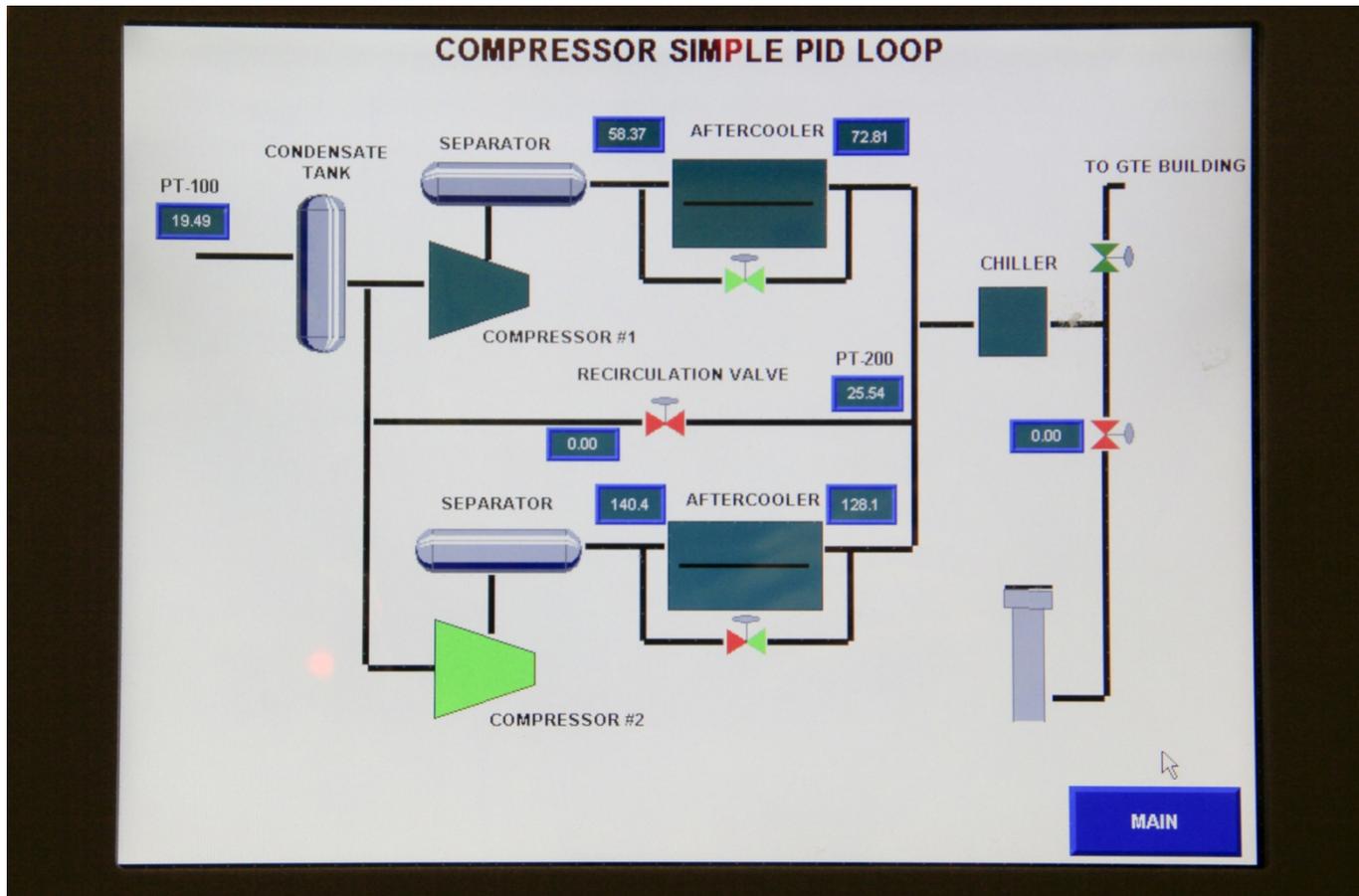
Single Screw Compressor – Basis of Design



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 Comingled 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

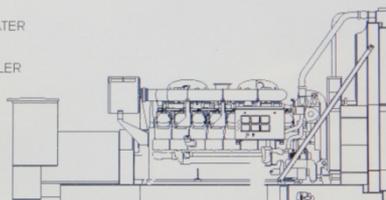


SCADA System Integrates All Processes



GENERATOR 2

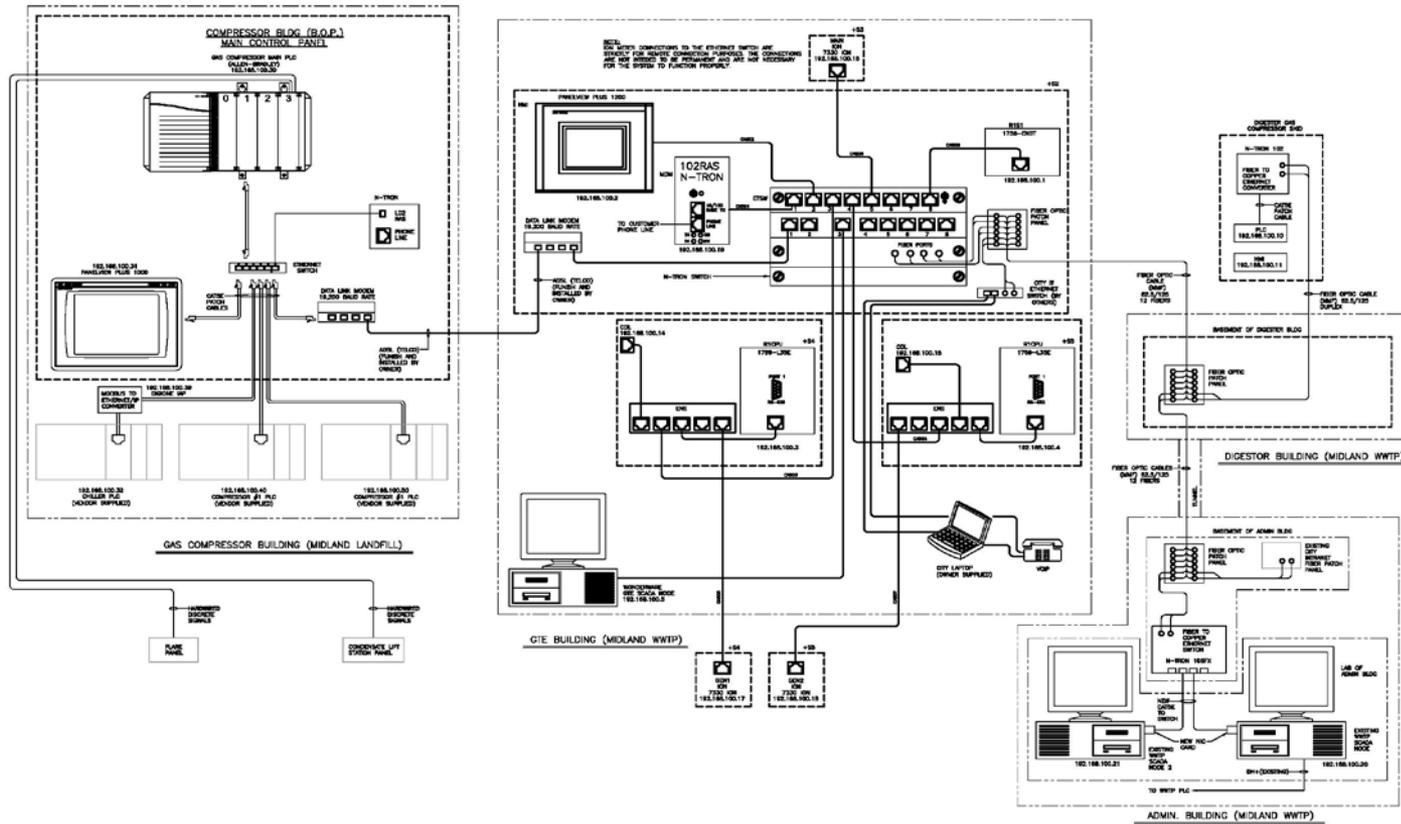
0	KW	KILOWATTS	RAD FAN IN AUTO	EMCP IN AUTO	AVR ALARM	DSLCL ALARM	LOW COOLANT TEMP	
0	HZ	FREQUENCY	OVERCRANK	OVERSPEED	LOW OIL PRESSURE	HIGH COOLANT TEMP	EMCP FAIL	
0	V	VOLTAGE	RAD FAN FAULT	RAD FAN VIBRATION	LOW OIL PRESSURE	HIGH COOLANT TEMP	LOW OIL LEVEL	
0	A	CURRENT	LOW J. WATER LEVEL	LOW AFTERCOOLER LEVEL				

59	deg F	JACKET WATER		START
65	deg F	AFTERCOOLER		STOP

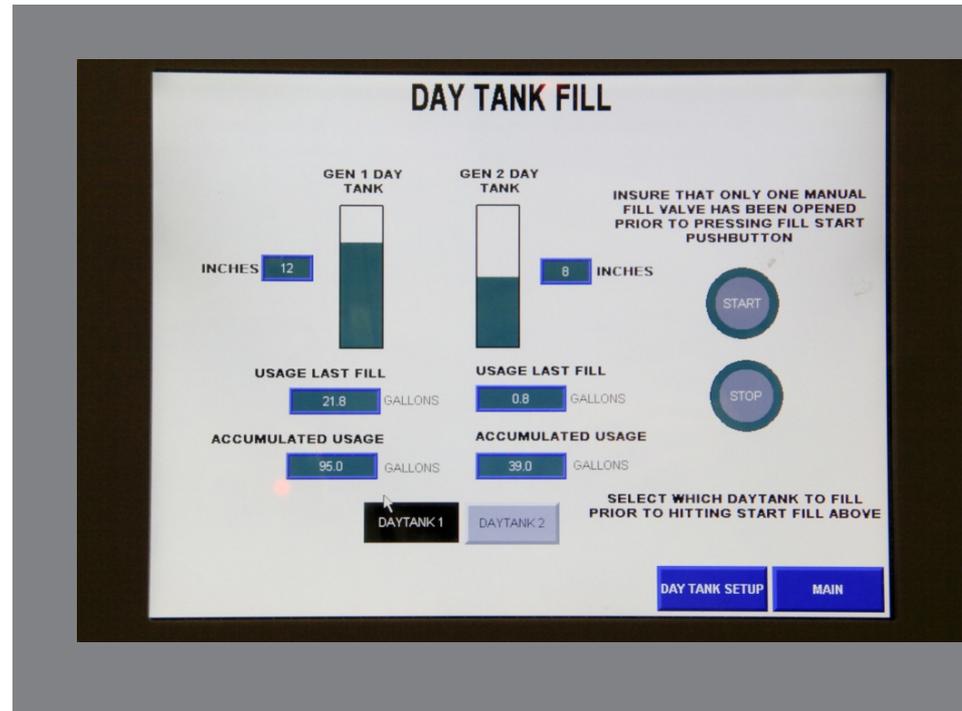
START	PRELUBE	IDLE	RATED	SYNC	ONLINE
EXH SILENCER SETUP		DAY TANK SETUP		MAIN	



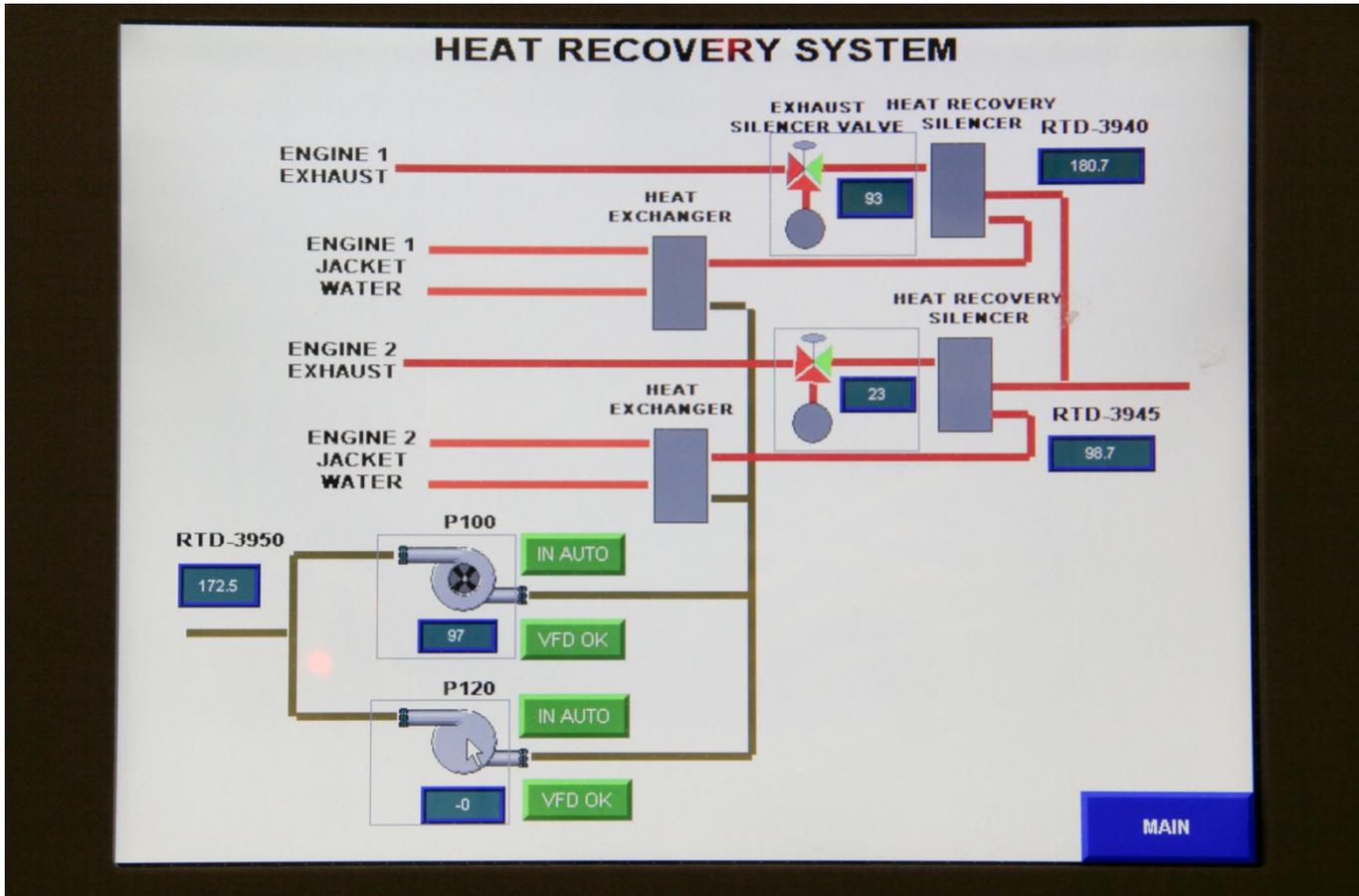
SCADA System Provides Platform



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



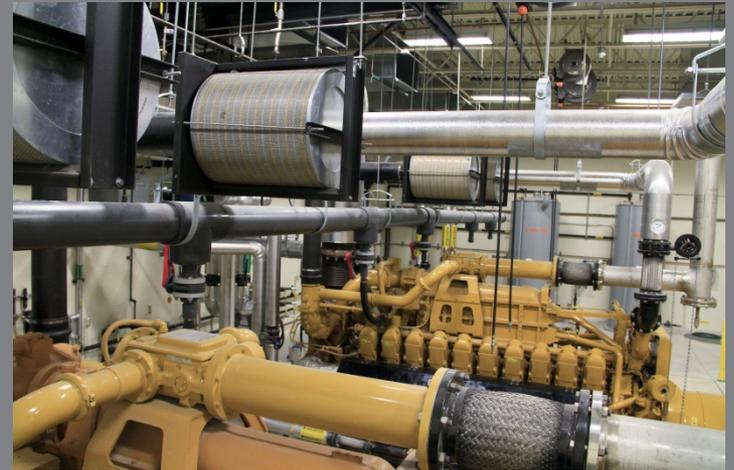
Recovered Heat Benefits



- 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?

A decorative graphic consisting of a solid green horizontal bar that spans the width of the slide. Below this bar, on the right side, there are several horizontal lines of varying lengths and colors, including shades of green and white, creating a layered, stepped effect.