WCDEF Yonkers Joint WWTP
NYSDEC ID #3-5518-00342
Title V Air Permit Renewal #3
Supplemental Information
February 22, 2023

Section D

Manufacturer's New Engine Specifications

March 19, 2020

Megan Messmann
CDM Smith
60 Crossways Park Drive West,
Suite 340
Westbury, NY 11797

Dear Ms. Messmann,

Kinsley Energy is pleased to support CDM Smith and Westchester County in the development, installation, and operation of new biogas-fueled combined heat and power (CHP) systems at the Yonkers wastewater treatment plant. This letter serves to define the specified and expected NO_x emissions rate from our CHP systems operating in this specific application.

Kinsley Energy is proposing to supply CHP systems from TEDOM, a global CHP supplier with nearly 30 years of experience manufacturing over 8,000 CHP systems. Kinsley Energy is TEDOM's distributor and long-term service provider in the United States. TEDOM's engine supplier for this size range of biogas-fueled CHP systems is MWM, a German manufacturer of reciprocating engines. MWM has specifically analyzed the biogas composition and engine application for the Yonkers WWTP, and has supplied the attached datasheet showing expected engine performance. Please note the NO_x emissions specification on the fourth line which specifies a NO_x emissions rate of 250 mg/Nm^3 @ 5% O_2. These units are the standard emissions units in Europe and translate to 0.6 grams per brake horsepower-hour @ 15% O_2, which are typical U.S. units.

Please let us know if we can provide further information to Westchester County and the NYSDEC regarding this matter. We look forward to building a long and trusted relationship with all involved in this exciting project.

Sincerely,

Kent McCord
Sales and Project Engineering

Attachments: MWM datasheet – Yonkers WWTP biogas

The Kinsley Group
14 Connecticut South Drive
East Granby, CT 06026
www.kinsley-group.com
800.255.3503

TG-2020-3-3437-01

Tedom / WWTF Yonkers

Technical data
1200 kWel; 480 V, 60 Hz; Acc. to gas analysis

Design conditions

Inlet air temperature / rel. Humidity:	[°C] / [%]	25 / 80
Altitude:	[m]	100
Exhaust temp. after heat exchanger:	[°C]	150
NO_x Emission (tolerance - 8%):	[mg/Nm³ @5% O_2]	250

Genset:

Engine:	**TCG 2020 V12**	
Configuration code:	[-]	
Speed:	[1/min]	1500
Configuration / number of cylinders:	[-]	V / 12
Bore / Stroke / Displacement:	[mm]/[mm]/[dm3]	170 / 195 / 53
Compression ratio:	[-]	14
Mean piston speed:	[m/s]	9,8
Mean lube oil consumption at full load:	[g/kWh]	0,15
Generator:	**Marelli MJB 450 LB4 cUL**	
Voltage / voltage range / cos Phi:	[V] / [%] / [-]	480 / ±10 / 1
Speed / frequency:	[1/min] / [Hz]	1800 / 60
	Eisenbeiss GU 320	
	[dm³]	58

Fuel gas data: 2)

Methane number:		[-]	138
Lower calorific value:		[kWh/Nm³]	6,09
Gas density:		[kg/Nm³]	1,20
		Acc. to gas analysis	
Analysis:	CO_2	[Vol%]	38,50
	N_2	[Vol%]	0,40
	O_2	[Vol%]	0,00
	H_2	[Vol%]	0,00
	CO	[Vol%]	0,00
	CH_4	[Vol%]	61,10
	C_2H_4	[Vol%]	0,00
	C_2H_6	[Vol%]	0,00
	C_3H_6	[Vol%]	0,00
	C_3H_8	[Vol%]	0,00
	C_4H_8	[Vol%]	0,00
	C_4H_{10}	[Vol%]	0,00
	C_5H_{12}	[Vol%]	0,00
	C_xH_y	[Vol%]	0,00
	H_2S	[Vol%]	0,00
	H_2O	[Vol%]	0,00

Energy balance

Load:	[%]	**100**	**75**	**50**
Electrical power COP acc. ISO 8528-1:	[kW]	**1200**	**900**	**600**
Engine jacket water heat:	[kW ±8%]	634	455	324
Intercooler LT heat:	[kW ±8%]	132	99	69
Lube oil heat:	[kW ±8%]			
Exhaust heat with temp. after heat exchanger:	[kW ±8%]	618	536	406
Exhaust temperature:	[°C ±25°C]	445	488	520
Exhaust mass flow, wet:	[kg/h]	6840	5143	3546
Combustion mass air flow:	[kg/h]	6266	4699	3231
Radiation heat engine / generator:	[kW ±8%]	43 / 34	43 / 29	41 / 26
Fuel consumption:	[kW+5%]	2905	2246	1591
Electrical / thermal efficiency:	[%]	41,3 / 43,1	40,1 / 44,1	37,7 / 45,9
Total efficiency:	[%]	84,4	84,2	83,6

System parameters 1)

Ventilation air flow (comb. air incl.) with ΔT = 15K	[kg/h]	31100
Combustion air temperature minimum / design:	[°C]	5 / 25
Exhaust back pressure from / to:	[mbar]	30 / 50
Maximum pressure loss in front of air cleaner:	[mbar]	5
Zero-pressure gas control unit selectable from / to: 2)	[mbar]	20 / 200
Pre-pressure gas control unit selectable from / to: 2)	[bar]	0,5 / 10
Starter battery 24V, capacity required:	[Ah]	430
Starter motor:	[kWel.] / [VDC]	15 / 24
Lube oil content engine / base frame:	[dm³]	205 / -
Dry weight engine / genset:	[kg]	5080 / 12850

Cooling system 6)

Glycol content engine jacket water / intercooler:	[% Vol.]	35 / 35
Water volume engine jacket / intercooler:	[dm³]	111 / 14
KVS / Cv value engine jacket water / intercooler:	[m³/h]	38 / 34
Jacket water coolant temperature in / out:	[°C]	80 / 93
Intercooler coolant temperature in / out:	[°C]	43 / 46
Engine jacket water flow rate from / to:	[m³/h]	36 / 56
Water flow rate engine jacket water / intercooler:	[m³/h]	45 / 40
Water pressure loss engine jacket water / intercooler:	[bar]	1,4 / 1,4

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1) See also "Layout of power plants": 2) See also Techn. Circular 0199-99-3017 6) Gear oil cooling within intercooler coolant circuit

Frequency band f [Hz]	25	31,5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	L_{WA} [dB(A)]	S [m²]
Air-borne noise 3) $L_{W,Terz}$ [dB(lin)]	94,0	94,7	98,0	100,5	106,1	108,9	107,6	108,5	106,0	115,3	115,0	114,8	108,6	110,2	109,5	108,8	109,2	108,2	108,1	107,6	107,0	108,5	103,5	102,3	114,1	107,0	101,4	103,8	98,1	120,7 ±4dB(A)	114
Exhaust noise 4) $L_{W,Terz}$ [dB(lin)]	114,2	116,0	124,6	115,9	120,0	129,0	125,3	134,1	125,3	130,0	128,4	128,2	126,4	125,8	125,0	119,0	117,8	116,6	117,7	117,6	116,3	115,5	114,6	113,7	114,9	113,9	113,4	112,9	111,1	132,1 ±3dB(A)	15,5 5)

3) DIN EN ISO 3746 (σ_{R0}=±4 dB) 4) Measured in exhaust pipe (f ≤ 250Hz: ±5dB; f > 250Hz: ±3dB) L_W: Sound power level S: Area of measurement surface (S_0=1m²) 5) DIN 45635-11, Appendix A

Tedom / WWTF Yonkers

Technical data

1200 kWel; 480 V, 60 Hz; Acc. to gas analysis

Design conditions

Inlet air temperature / rel. Humidity:	[°C] / [%]	25 / 80
Altitude:	[m]	100
Exhaust temp. after heat exchanger:	[°C]	150
NO_x Emission (tolerance - 8%):	[mg/Nm^3 @5%O_2]	250

Notes for derating [7)]

		inlet air temperature			max. inlet air temperature	
		+ 5 °C	+ 10 °C	max. w/o power derating	island mode[8)]	grid parallel mode[9)]
Inlet air temperature	[°C]	30	35	44	50	50
Load:	[%]	100	100	100	no rating	83
Electrical power COP acc. ISO 8528-1:	[kW]	1200	1200	1200	no rating	999
Electrical / thermal efficiency:	[%]	41,2 / 43,4	41,1 / 43,8	40,9 / 45,0	no rating	40,1 / 46,5
Total efficiency:	[%]	84,6	84,9	85,9	no rating	86,6
Intercooler coolant temperature in / out:	[°C]	43 / 46	43 / 46	49[10)] / 52	no rating	55[10)] / 57

Notes:

1) See also "Layout of power plants":

2) See also Techn. Circular 0199-99-3017

3) DIN EN ISO 3746 (σ_{R0}=±4 dB)

4) Measured in exhaust pipe (f ≤ 250Hz: ±5dB; f > 250Hz: ±3dB)

5) DIN 45635-11, Appendix A

6) 60 Hz applications only: Gear oil cooling within intercooler coolant circuit

7) The derate information shown does not take into account external cooling system capacity. It assumes that external cooling systems can maintain the specified cooling water temperatures at site conditions.

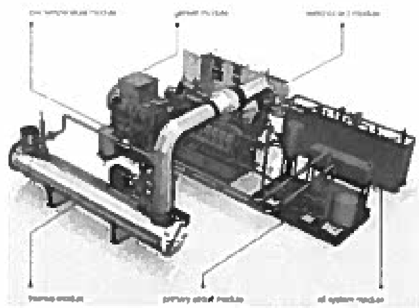
8) ISO 8528-1:2005-06, 6.3.1 a)

9) ISO 8528-1:2005-06, 6.3.1 b)

10) To maintain a constant air-fuel-mixture inlet manifold temperature, as the inlet air temperature goes up, so must the heat rejection. The listed aftercooler coolant temperatures have been increased considering a limited capacity of the heat exchange circuit to reject heat to the atmosphere. Non standard applications, e.g. use of cooling towers are hereby not considered.

TEDOM CHP System Datasheet

KINSLEY
The Energy Solutions Company



Project	Yonkers WWTP
TEDOM Model	Quanto D1200
Fuel Input	100% digester gas

System Performance	% rated load	100%	92%	75%	50%	Notes
Electrical Output	kW	1,200	1,100	900	600	
Electrical Efficiency	%, LHV	41.3%	40.9%	40.1%	37.7%	
Fuel Consumption	BTU/hr, HHV	11,017,918	10,198,533	8,510,723	6,035,013	
HT Hot Water Output	BTU/hr	2,286,576	2,070,432	1,638,144	1,187,654	Jacket Water only
Steam @ 12 psig (with HRSG)	lbs/hr	2,100	2,020	1,810	1,370	assuming 180F feedwater
Thermal Efficiency	%, LHV	44.2%	44.6%	45.0%	47.1%	includes both hot water and steam
Overall Efficiency	%, LHV	85.5%	85.5%	85.1%	84.8%	
Heat Rate	BTU/kWh, LHV	8,263	8,344	8,511	9,053	

Heat Recovery/Rejection	% rated load	100%	92%	75%	50%	Notes
Jacket Water Heat	BTU/hr	2,286,576	2,070,432	1,638,144	1,187,654	includes lube oil heat
LT Turbo Intercooler Heat	BTU/hr	354,931	329,904	279,850	170,640	
Engine Exhaust Temp	°F	815	840	891	946	
Exhaust Mass Flow, Wet	lbs/hr	15,215	13,957	11,440	7,885	

Engine Specifications			Notes
Manufacturer / Model #		MWM TCG2020 V12	
Cylinder arrangement, quantity		V 12	
Speed	RPM	1500	
Oil consumption, ave	grams/kWh	0.15	
Oil volume, engine	gallons	189	
Oil volume, replenishment tank	gallons	92	

Generator Specifications			Notes
Manufacturer / Model #		Marelli MJB 450 LB4	synchronous
Voltage / Frequency	VAC	480	
Speed / Frequency	RPM / Hz	1800 / 60	
Rated Power	kVA	1488	
Rated Current	A	1,790	
Power Factor		0.8 - 1.0	

Fuel			Notes
Fuel type		Biogas	
Lower heating value (minimum)	BTU/SCF	531	55% methane
Methane Number (minimum)		80	
Gas Pressure	psi	0.9	
Gas Temperature (maximum)	°F	95	

Combustion & Ventilation Air			Notes
Combustion Mass Air Flow	*lbs/h*	13,952	rated power
Exhaust Back Pressure Allowed	*psi*	0.44-0.73	total back pressure on engine
Heat Rejection to Ventilation Air	*BTU/h*	262,000	total system heat
Ventilation Inlet Air Temp, min/max	*°F*	32 / 104	Indoor open module installation

Emissions			Notes
NOx	*g/bHP-h*	< 0.6	
CO	*g/bHP-h*	< 1.8	system includes oxidation catalyst
PM	*g/bHP-h*	< 0.07	
VOCs	*g/bHP-h*	< 0.10	
CHCO	*g/bHP-h*	< 0.02	

Acoustics			Notes
Engine/Generator	*dBA*	113 @ 1m	
Exhaust	*dBA*	< 92 @ 1m	with TEDOM silencer

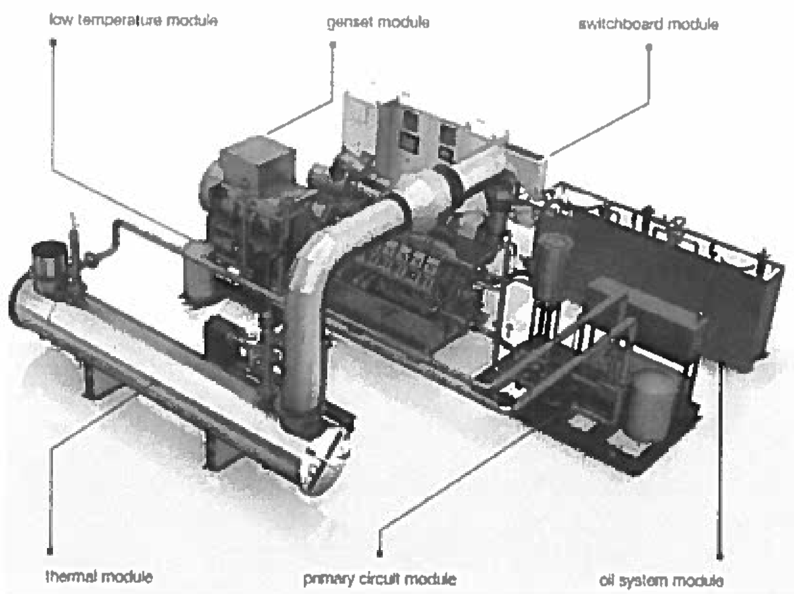
Kinsley Energy Systems	14 Connecticut South Drive	(800) 255-3503
Authorized TEDOM Distributor	East Granby, CT 06026	sales@kinsleyenergy.com

1. TECHNICAL SOLUTION

a. TEDOM CHP System

TEDOM Quanto D1200 Combined Heat and Power System

The heart of our proposal is the TEDOM Quanto D1200 Combined Heat and Power System. Based in the Czech Republic, TEDOM is a manufacturer of fully integrated combined heat and power (CHP) systems rated from 35 kW to 4 MW. TEDOM has installed more than 7,800 CHP and DG systems totaling more than 1,800 MW over their 30-year history.



Some of the advantages of TEDOM CHP systems include:

- Factory-engineered, assembled and tested for high quality, rapid installation
- A deep base of technical experience among TEDOM's nearly 1,000 engineers, service technicians, and support staff. TEDOM is a leading customer of MWM, who will work seamlessly with Kinsley and TEDOM to ensure the project's success.
- Customized solutions designed to suit the customer's energy demand
- Highest electrical efficiencies available in all power capacities
- Integrated heat recovery systems to generate hot water, steam, and/or to drive an absorption chiller
- On-board system and site electrical controls for grid-parallel, emergency, and/or islanded operation
- Paralleling solutions for multiple units, for both electrical and thermal output
- Low total cost of ownership through:
  - Low-cost design and assembly of high-quality equipment
  - Long engine life and service intervals (up to 80,000 hours)

Proposed CHP System

TEDOM's CHP System includes the following sub-systems and components:

- Engine / genset
- Fuel system (after gas mixing system)
- HT and LT heat rejection / recovery
- Oil management
- Engine paralleling and synchronization, including generator circuit breaker
- Engine and auxiliary controls
- System designed and fabricated to UL2200 - Standard For Stationary Engine Generator Assemblies (Kinsley to provide field certification to UL2200.)

The table below summarizes the overall system performance of a single CHP system for this project, operating on 100% digester gas. A complete CHP system datasheet is provided in Attachment J.

System Performance	% rated load	100%	92%	75%	50%	Notes
Electrical Output	kW	1,200	1,100	900	600	
Electrical Efficiency	%, LHV	41.3%	40.9%	40.1%	37.7%	
Fuel Consumption	BTU/hr, HHV	11,017,918	10,198,533	8,510,723	6,035,013	
HT Hot Water Output	BTU/hr	2,286,576	2,070,432	1,638,144	1,187,654	Jacket Water only
Steam @ 12 psig (with HRSG)	lbs/hr	2,100	2,020	1,810	1,370	assuming 180F feedwater
Thermal Efficiency	%, LHV	44.2%	44.6%	45.0%	47.1%	Includes both hot water and steam
Overall Efficiency	%, LHV	85.5%	85.5%	85.1%	84.8%	
Heat Rate	BTU/kWh, LHV	8,263	8,344	8,511	9,053	

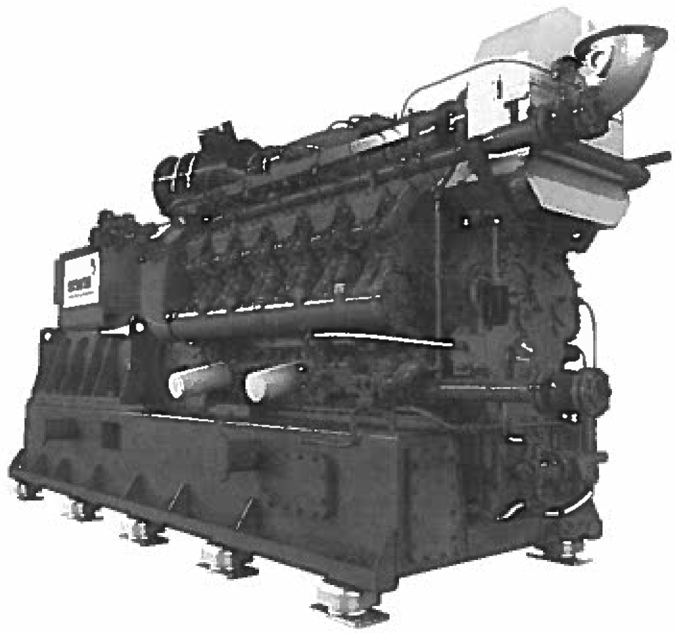
A comprehensive technical description of TEDOM's CHP system, with MWM engine generator, is provided in Attachment J.

b. Engine / Generator

MWM TCG 2020 V12

This 1200kW fully integrated CHP system features the MWM TCG 2020 V12, proven to be one of the most advanced and reliable natural gas reciprocating engines on the market today –. Key features of this engine for this project include:

- Ability to operate on a mixed gas from 0 to 100% digester gas
- High electrical efficiency up to 41.3% operating on 100% digester gas
- Low NOx emissions of less than 0.6 g/bHP-h
- Long-term durability with a time before major overhaul of 64,000 operating hours



Attachment M contains datasheets for the engine operating on 100% digester gas, 100% natural gas, and mixed gases. Attachment P is the Marelli generator that is paired with the MWM engine.

Engine step load capability is critical for this island-mode application, and Attachment O shows the step load capability of this system. Step loading is further discussed in the Sequence of Operations section below.

c. Engine and CHP Controls

TEDOM will engineer and supply the complete CHP control system, including engine controller, system controller, local engine and auxiliary control panel, and master control panel.

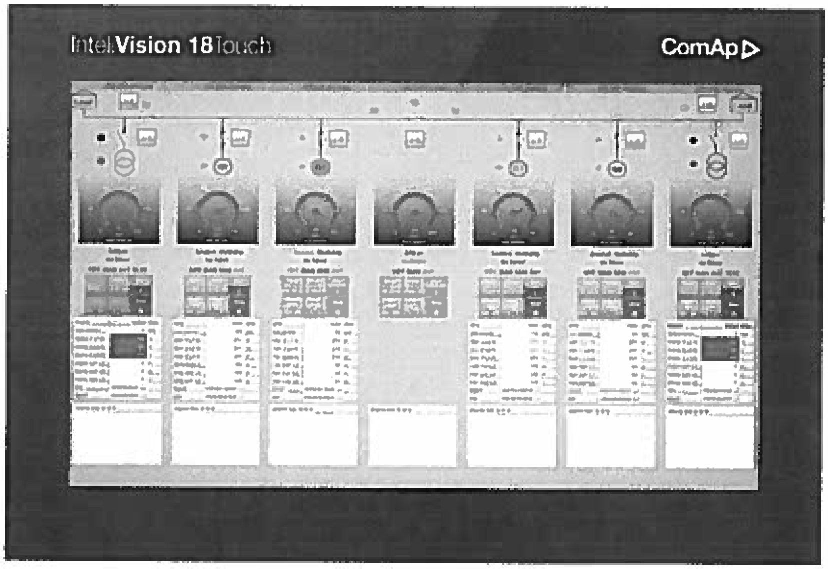
Engine controller – MWM TEM controller supplied with the engine/generator assembly

System/auxiliary controller – ComAp InteliSys Gas. ComAp is an international leader in industrial grade controllers for power generation applications. The ComAp controller manages all aspects of the CHP system including automatic paralleling and synchronizing of multiple generators. A datasheet for the ComAp controller is found in Attachment Q.

CHP System Control Panel – TEDOM designs and assembles their control panels in one of their factories in the Czech Republic. Each CHP system will have a local panel, with 18" touch screen HMI, that will provide complete control and monitoring functions of the engine generator and auxiliary components.

Master Control Panel – The TEDOM built master control panel is essentially a full copy of the local control panel, with the ability to control and monitor both CHP systems from one location. The master control panel will include pilot lights and audible alarm as specified, as well as a local data server with battery back-up. SCADA integration, with protocol conversion as necessary, will be managed from the master control panel.

The HMI for the master control panel will be the ComAp Intelivision 18Touch, shown below. This one screen will be custom-designed to allow access to both engine generators, both gas blending systems, and both HRSGs.



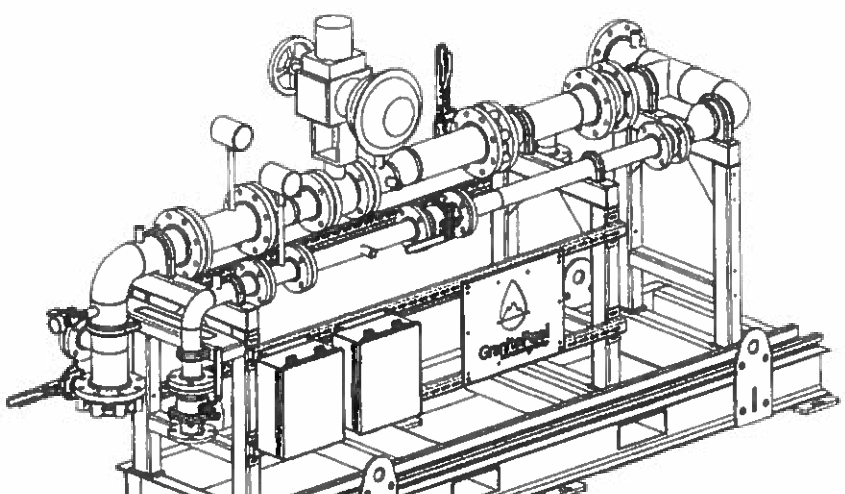
e. Fuel Blending System

Kinsley will supply a fuel blending system that will mix natural gas and digester gas prior to entering the engine fuel train. The gas blending system will have two fundamental control options:

- Automatic control to minimum digester gas – will maximize digester gas % based on the available pressure in the digester gas system
- Manual mix % set point – used during start-up when operating on natural gas and then slowly blending in digester gas, and during emergency operation on natural gas

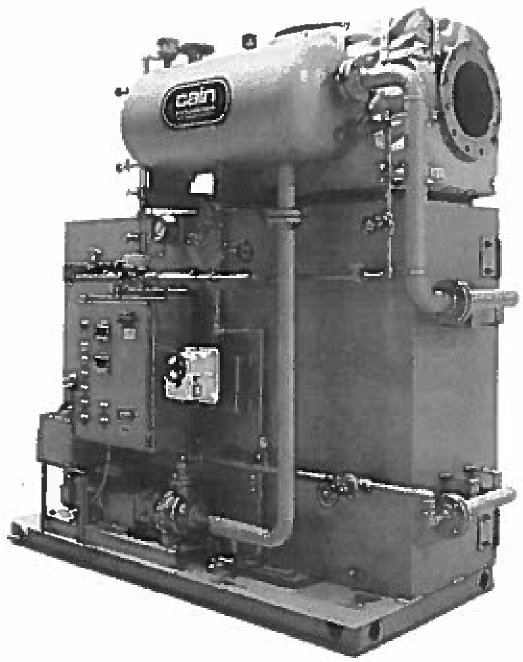
The gas blending controls for each separate system will be incorporated into the individual CHP System Control Panels, and the Master Control Panel will have the ability to display gas blending system parameters – such as mix %, flow rates, and pressure – and the ability to set digester gas pressure or mix % set points.

Kinsley's preferred supplier is Granite Fuel Engineering, based in Vaughan, Ontario, with manufacturing in Houston, TX. An alternate supplier is Preferred Utilities Mfg Corporation in Danbury, CT. An example gas blending system from Granite Fuel is shown below, and a detailed process flow diagram is shown in Attachment T.



g. Heat Recovery Steam Generator

The heat recovery steam generators (HRSG) will be supplied by Cain Industries, Inc. from Germantown, WI. The units will be designed to the exhaust conditions of the MWM engine, and will each generate 2,100 lbs/hr of steam at 12 psig. The units include an integral exhaust bypass for controlling steam pressure, and include ModBus communications for integration with the Master Control Panel and facility SCADA system. Attachment S contains the specifications for the Cain HRSG.



i. Resistive Load Bank

A single 1,250 kW resistive load bank will be supplied by Mosebach Manufacturing Company from Pittsburgh, PA. The load bank will have a resolution of 25 kW and can be controlled remotely by the Master Control Panel. The load bank will also have a "Generator Auto Load Sensing (GLS) Module" which is designed to sense load on a generator and maintain a minimum power load. This feature will be used as required to assure reliable operation of the engine generator systems. Attachment U contains specifications of this load bank.

j. High Resistance Grounding Resistor

Two high resistance grounding systems sized to this application will be supplied by Post Glover from Erlanger, KY. Their PulserPlus.Net™ product is Post Glover's 4th generation system, and has been engineered and tested to be easy to install and provide the most comprehensive feature set available. See attachment V for more information.

l. Bill of Material

Bill of Material	Manufacturer / Part No.	QTY
Combined Heat and Power System	TEDOM Quanto D1200 OM	2
1200 kW gas engine - biogas-fueled	MWM TCG 2020 V12	2
Generator - 480 VAC, 60 Hz	Marelli MJB 450 LB 4	2
Engine and auxiliary control panel	TEDOM	2
Engine controller	MWM / TEM	2
CHP system controller with multi-island synchronization control and generator protection	ComAp InteliSysGas	2
Generator circuit breaker	ABB	2
Master control panel with ComAp genset controller, HMI display, data server, and battery backup	TEDOM	1
Inlet fuel gas train including regulator and shut-off valves	TEDOM	2
Exhaust silencer - 92 dBA @ 1 m	TEDOM	2
Jacket water cooling skid with pump, controls, and plate/frame hex	TEDOM	2
Facility hot water lead/lag pump set	TEDOM	2
Turbo cooling skid with pump, controls, and plate/frame hex	TEDOM	2
Lube oil makeup tank	TEDOM	2
Dual-fuel gas blending system	Granite Fuel Engineering	2
Back-fire relief valve	Jeremias PRVF	2
Heat recovery steam generator	Cain Industries ESG1	2
Resistive load bank - 1250 kW	Mosebach XL1250	1
High-resistance grounding resistor	PulserPlus.Net LV	2
Protocol converter	RedLion	2
Spare parts (per RFP requirements)	See Attachment Y	
Factory preservation for long term storage		
3-months storage		

m. Operational Plan and Limitations

Start-up

The planned sequence of operations for starting the three blowers is as follows:

1. Start-up both engines on 100% natural gas and synchronize on a common bus
2. Increase load to 1200 kW using resistive load bank
3. Start blower 1 and ramp up to full power with VFD ramping up over 5-minute start time
    a. Resistive load bank will automatically reduce load to maintain constant 1200 kW on engines

4. Start blower 2 and 3 sequentially while automatically reducing load bank to maintain constant 1200 kW on engines
5. Slowly mix in digester gas to desired mix %
6. Shift load to one engine
7. Shut down one engine

The use of the load bank in the sequence above may not be necessary because the engines should have the load step capability to start the blowers. But the conservative baseline operating sequence is to use the load bank as described.

Limitations on Fuel Gas Blending
Changing the fuel heating value while operating in island-mode is generally not allowed. Island-mode operation generally requires the engine to dynamically modulate power output to match a varying electric load. Changing the fuel heating value at the same time that electric load is varying can lead to uneven and uncontrolled combustion in the cylinder (engine knocking), which can severely impact engine long-term life and durability.

A key assumption of this application and proposal is that the steady-state electrical load of the blowers is stable and does not change over time, and the blowers are understood to be always operated at 100% load. Under stable conditions, it may be possible to slowly change the fuel heating value (digester mix %). The allowable rate of change to fuel heating value will be a maximum of 5% per minute, and will ultimately be determined during the initial operational testing of the system.

During the engineering phase of the program (Task 1), we will work with CDM Smith to measure the steady-state electrical load of three blowers. This will inform the development of the sequence of operations, which will be reviewed and approved by TEDOM and the engine manufacturer prior to releasing the equipment designs to fabrication.

If the electrical load proves not to be sufficiently stable, dynamic fuel blending will be disabled. If this case, the alternative mode of operation will be to operate the engine at a fixed digester gas %, set by the operator based on the historical trend of digester gas availability. To change the operating digester gas %, the idle engine will be brought online at the new fixed mix % using the electrical load bank. The load would be then be shifted to this engine at the new fixed mix %, and the original engine shutdown.

Blower Shutdown
One of the biggest concerns to long-term engine durability is the impact of a sudden blower shutdown, causing an instantaneous drop in engine load, which will over-speed the engine and stress the engine components. To mitigate this risk, the electric load bank will be used to maintain load on the engine during a blower shutdown. The load bank will be constantly connected to the electrical bus and the "Generator Auto Load Sensing" feature will always be active, monitoring engine load and ready to instantaneously add resistive load in the event of a sudden change such as a blower shutdown.

Loss of Digester Gas

A sudden loss of digester gas will likely result in an immediate, controlled shutdown of the engine. If this occurs, and natural gas remains available, the engines will be able to automatically restart on 100% natural gas.

Emergency Operation on Natural Gas
In the event of a utility outage at the Westchester facility, the two engines will be able to power all five electric blowers while operating on 100% natural gas. The sequence of operations to achieve this will be developed during the engineering phase of the project.

n. Technical Exceptions to the Specifications and Drawings

Section	Exception
1.1.B	The CHP system will be designed and field certified to UL 2200 as a complete system. Kinsley will not accept a blanket compliance to all standards listed.
1.3	Submittal drawings and documentation will not show complete internal design details for mechanical, electrical, and controls at the completion of Task 1 prior to Release to Fabrication. At this stage, submittal documents will focus on equipment performance and functionality, as well as interface design details such as physical dimensions, mechanical interfaces, and electrical/controls cable and wiring interfaces. Final as-built drawings will be supplied upon delivery of equipment.
2.2.A.7	The Master Control Panel will not monitor facility fire alarm, ventilation, and combustible gas detection systems. Each engine control system has a separate Emergency Shutdown circuit into which these facility safety function can be wired so that engine shutdown is initiated if a facility safety event occurs.
2.7.A.1	Standard glycol % for the jacket water engine coolant system is 35% for an indoor application such as this.
2.7.C.2	The low temperature cooling water heat exchanger will be a plate and frame type with stainless steel plates.
2.8.C	Analog electric meters such as are defined here, and elsewhere, will not be discreet meters, but rather are built into the comprehensive engine generator control and monitoring system and accessible through the Control Panel HMI screens.
2.8.F.3	The CHP System/Auxiliary Control and Master Control Panels will be provided with a voltage-free maintenance switch rather than a 120V disconnect switch.
2.8.F.9	The engine controller will be manufactured by MWM.
2.8.F.9	There are requirements in this section, and others, that reference grid-parallel capability. This CHP system as proposed will not have the capability to operate in parallel with the electric grid.