KINROSS CHARTER TOWNSHIP
REGULAR MEETING
April 1, 2024
7:00 PM

CALL TO ORDER

APPROVAL OF AGENDA
April 1,2024

APPROVAL OF MINUTES
March 18, Regular Meeting

PUBLIC COMMENTS

SUPERVISOR'S REPORT

ACTION & DISCUSSION
Golf Course Restaurant/Bar Bids
Food Waste Updates
EPA- Pollution Prevention Grant
Water/Sewer Rate Structure
Cost of Living Allowance 2%
RV West Host

PAY BILLS

CORRESPONDENCE
Letter of Support- Bay Mills
Police Board Minutes- 3-25-24
Treasurer's Report

BOARD MEMBER COMMENTS

ADJOURNMENT

KINROSS CHARTER TOWNSHIP
REGULAR MEETING

March 18, 2024 **4884 W. Curtis St.**

MEMBERS PRESENT
Jim Moore, Supervisor
Loretta Robinson, Clerk
Bekki Kooyer, Trustee
Rick Bernhardt, Trustee
Mark Rice, Trustee
Rob Mills, Trustee

MEMBERS ABSENT
Kathy Noel, Treasurer

Also, present Mike Hoolsema, Joe Micolo, Renee Grey, Brian Huntley, Sam Ortiz, Jim Traynor and 2 others.

Supervisor Moore called the meeting to order at 7:00PM and led the Pledge of Allegiance.

#1 MOVED: by Mark Rice, second by Rick Bernhardt to approve the March 18 agenda. Motion carried.

#2 MOVED: by Rob Mills, second by Bekki Kooyer accept the March 4 meeting minutes. Motion carried.

PUBLIC COMMENTS

SUPERVISOR'S REPORT

- MIRA had their snowmobile races over the weekend and had a great turn out. We received a check for $1625.00.
- The Fair board reached out to us for a letter of support to receive a grant for lighting in the race track and horse arena. We did write one and forwarded it off.

#3 MOVED: by Mark Rice second by Loretta Robinson to adopt Resolution 2024-5 Budget Adjustment. Roll call was made with six (6) yes votes and one (1) absent. Motion carried.

#4 MOVED: by Jim Moore, second by Rick Bernhardt, to adopt Resolution 2024-65 General Appropriations Act Resolution Number 2024-6. Roll call was made with six (6) yes votes and one (1) absent. Motion carried.

#5 MOVED: by Mark Rice, second by Loretta Robinson, to approve the recommendation for the Mobile Good Vending Ordinance, with a fee of $150.00 per year. Motion carried.

#6 MOVED: by Mark Rice, second by Jim Moore, to approve the starting wages and step increases for EMS as followed: Starting wage for; EMT- $18.50, AEMT- $20.00 Paramedic- $24.00 The step increases will be set as per the Township; 6-month, 1 year, 2-year, 3-year, 4 years, with an increase of 50 cents. 5-year, 10-year, 15-year, 20-year, 30 years will be at $1.00. Motion carried.

#7 MOVED: by Rob Mills, second by Jim Moore, to hire Alexis Archibald for part- time EMT-b with a starting wage of $18.50. Motion carried.

#8 MOVED: by Mark Rice, second by Jim Moore, to approve Option B of the Designated Sleep Time which is as follows: - $15.00 per hour for Designated sleep time. If disturbed, they will receive their regular rate of pay for those 4 hours of DST. Overtime is applicable only if they work over 40 hours that week. Motion carried.

Recognition for Sam Ortiz. He has been with Kinross EMS for 11 years and has increased his education and scope of practice from an EMT to Paramedic to Critical Care Paramedic to Registered Nurse! Great job Sam!

#9 MOVED: by Mark Rice, second by Jim Moore, to table the EPA Pollution Prevention Grant until the next meeting when we have the discussion on the food waste project. There were five (5) yes votes, one (1) no vote and one (1) absent. Motion carried.

#10 MOVED: by Jim Moore, second by Rob Mills, to approve Janet Darling as the RV West Camp Host. Motion carried.

#11 MOVED: by Jim Moore second by Loretta Robinson to approve Jeanine Lacrosse as RV East Camp Host. Motion carried.

#12 MOVED: by Bekki Kooyer, second by Rob Mills, to pay the following bills.

General Fund	16,009.02
Fire Fund	1,446.27
Police Fund	7,885.15
Recreation Center Fund	8,425.07
Ambulance Fund	221,137.69
Property Management Fund	967.20
Parks Fund	88.92
Fairgrounds Fund	778.64

Golf Course Fund	2,957.19
Sewer Fund	75,167.90
Water Fund	14,411.24
Rubbish Collection Fund	14,775.73

Grand Total $364,050.02
Ck#58016-58118
Motion carried.

CORRESPONDENCE

- Personnel Committee Minutes- 3-14-24
- Park and Rec Committee Minutes- 3-11-24
- Memorandum- Township Investment
- Treasurer's Report
- 2% EMS Bay Mills

BOARD MEMBER COMMENTS

- Spring Clean-up will be on May 11th
- May 7th there will be a Special Election
- June 29th there will be there a babysitting class from 1-5 for ages 11-16 year olds
- Spring is coming!

Meeting adjourned at 7:24 PM.

____
Loretta Robinson, Clerk

____
James R. Moore, Supervisor

Dear Kinross Charter Township Board

I am writing you in hopes of reaching an agreement on the leased area located in the Oaks of Kincheloe golf course clubhouse. As you know, I have been the lease holder along with my business partner, who is no longer involved in said business, for the last few years.

Along with NEW food options, I have the available licensing to accommodate any functions.

I understand my business practices have not been satisfactory to you as a board at all times and hope to prove to you that I am willing to work the golf course and board to make a great experience for the golfers who play and love the Oaks

I am asking for a lease for the period of 1 year to begin with possible option after year one.

I would like to pay a lease for period of May 1 through October 1 2024 Season

At a lease amount of $500.00

2/3rds of the electric (requesting to be put in township name)(pro rate 1st month of $400.00)

100% of gas bill

With bill being due on 15th of each month

In addition a minimum payment of $500.00 to be paid towards previous Bills oweing beginning April 15th

All with a VERY strict grace period of 10 days if not paid on 25th of each month we would agree to lock us out and if bar was to be secured use the area as leased.

In addition I am in close contact with Bill Wilkins who has agreed to take the lead in all negotiations with board members as well as golf course management.

Business Proposal

Prepared for:

Kinross Charter Township

Completed by:

Ms. Kasey M Spencer

2024

Introduction:

My name is Ms. Kasey M Spencer. I am solely interested in leasing the ClubHouse Bar Area located at the township's golf course, The Oaks at Kincheloe. I have been a Kinross township resident for over 30 years. I have over 25 years of experience in the bar/restaurant industry. I have owned and successfully managed several million dollar businesses. I believe I have made major accomplishments of increasing sales and having many repeat satisfied customers on a daily basis, which I continue to do currently. I am the perfect candidate for this bar/restaurant lease opportunity with Kinross Township, without a doubt.

Goals & Operation:

As a frequent golfer, and resident of the community, I have had the opportunity to engage with local and visiting golfers that enjoy frequenting the Kincheloe Golf Course. By doing so, I have gained the knowledge of their concerns and changes that would serve the interests of the golfing public. My intention is to operate and maintain a successful and classy inviting atmosphere with high-quality food and excellent customer service. Accommodating all visitors to the best of my ability which would ensure their desire to return again and again. The goal is to establish a business that people enjoy frequenting and recommending, whether it be because they are out golfing, enjoy dinner and drinks with friends and family, or just to escape the everyday hum drum and converse with others.

Having set business hours is a must in this industry. Being open and ready for business before the first tee times and after the last tee time is essential not only to the bar/restaurant business, but also to the Clubhouse. Working hand and hand with the Golf Pro and uniting as a team not only benefits the patrons of the course, but also the Township. When people pick their golfing destination, the accommodations and atmosphere truly are going to play a major role in their decision making. I want to ensure that everyone's choice is The Oaks at Kincheloe. With my experience and many years of catering to large groups and parties, the ability to assist and assure our league golfers, tournament golfers, and all other events hosted by The Oaks at Kincheloe, would always be accommodated easily with high-quality food and excellent customer service.

Concerns:

I am aware that the previous tenant owned and operated under his own liquor license and that several equipment items were removed when he departed. If a resolution for keeping the current liquor license currently designated to the Golf Course Location, I want the township to be aware that I am in close contact with Ted Orm, Liquor Control Enforcer. He has guided me in the right direction to available beer & wine licenses as well as available Liquor License in our county. I have contacted the correct people in this regard, and if a lease is signed between myself and the Kinross Township, I have a license on standby that will be ready for me to purchase to use in the operation of the business at the golf course location. Any equipment that I may need to purchase or use is available to me.

Mission Statement:

The mission to obtain this lease with Kinross Township is to provide people with high quality food at a reasonable price. To create a welcoming environment for everyone, local surrounding areas. To ensure everyone, not only golfers, have memorable experiences that will bring them back time and time again. To help improve everyone's experience when golfing at The Oaks. Which, ultimately, benefits the township by acquiring more memberships and a higher volume of frequent golfers that choose Kincheloe as their golf destination.

Closing:

Establishing a successful business with a welcoming and relaxing environment that the community and surrounding areas frequent often is the main priority. This will benefit the Oaks at Kincheloe Golf Course by eventually bringing an increased volume of patrons, thus creating an increased revenue for the township. With the amount of experience and knowledge I have in the customer service, including the outstanding rapport I have with all local businesses and vendors, I believe I am the perfect candidate for this opportunity.

I appreciate your time in considering my proposal. I look forward to working with you and developing a successful relationship with the Charter Township of Kinross.

I can be reached at any time, by phone or email, listed below, with any questions or concerns.

Thank you!

KMSpencer

Kasey M Spencer
9066302324
Kaseyspencer10@yahoo.com

Report Title:

Kinross Charter Township Wastewater Treatment Plant

Cost-Benefit Study of Combined Heat and Power Energy Production and Use

Author:

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Director
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906-487-2102

Date: March 6, 2024

Michigan Technological University
Civil, Environmental, and Geospatial Engineering

TABLE OF CONTENTS

1.0 BACKGROUND

The Great Lakes Environmental Infrastructure Center (GLEIC) at Michigan Tech University is a technical assistance provider for EPA Region 5 as part of the Environmental Finance Center (EFC) program. EFCs provide technical assistance to public water and wastewater utilities at no cost to these public utilities in order to support their growth of technical, financial, and managerial capacity. Technical assistance aligns with Michigan Tech's core mission to support Michigan communities by applying technical knowledge in engineering and the sciences.

GLEIC received a technical assistance request from US EPA Region 5 on behalf of the Kinross Charter Township Wastewater Treatment Plant (WWTP). Contact with the Kinross Charter Township WWTP superintendent, Mr. Greg Wright, outlined areas where GLEIC could assist.

This report outlines the cost-benefit study used to model the facility's current energy (heat and power) production situation and to assess other potential operating alternatives that could assist the facility with decision-making.

Facility

The Kinross Charter Township WWTP is a relatively small (0.5 million gallons per day average flow) trickling filter plant. It uses anaerobic digestion to stabilize and reduce the volume of organic solids that the plant produces while treating wastewater. Anaerobic digestion destroys a portion of the organic matter in WWTP sludge by converting it to gases through biological processes. Heat is required in anaerobic digestion, but the process produces biogas, which is a methane-rich fuel source that can be captured and used to offset the purchase of other fuels like natural gas.

The Kinross Charter Township WWTP also takes in and co-processes food waste in the anaerobic digester, which includes canteen waste and fats, oils, and grease (FOG). Canteen food waste must be processed to remove non-biodegradable trash while FOG can be fed to the digester without mechanical processing. In this report, the term "food waste" will refer to both canteen food waste and FOG even though the facility treats these sources as separate. Food waste is rich in organic material and can be anaerobically digested along with the WWTP solids. Intake of food waste has several environmental advantages, including keeping these materials out of landfills where they could contaminate groundwater and soil, and the production and capture of biogas at the WWTP facility.

Biogas Use

Many WWTP facilities that produce and capture biogas use it for building heat during the winter and for heating the anaerobic digester year-round by combusting it in a boiler. As a general rule of thumb, the biogas potential of a WWTP can be estimated as 1 cubic foot per day for every 100 gallons per day of average-strength incoming wastewater (Metcalf & Eddy, Inc., 2023). As WWTP plant flow increases, biogas production can exceed the facility's heating needs, necessitating flaring (combustion for no benefit) of the excess gas especially in the summer when heating requirements are at a minimum.

In facilities where significant quantities of excess biogas are created, it can be economical to use combined heat and power (CHP) units to combust the biogas, which both generates electricity and recovers heat. CHP units can also be run on natural gas to supplement their operation on biogas when additional heat and power are required.

CHP units in their simplest form are reciprocating gas engines coupled with a generator that makes electricity and a heat recovery unit that captures waste heat from the engine. CHP units have a higher efficiency than separate electric generation and heating units as they can produce efficiencies in the mid to high 80 percent range. They can be attractive for WWTPs that generate an excess of biogas because they use some of the excess biogas energy to make electricity that can offset plant use while also meeting plant heating needs, which increases the quantity of biogas that is used for a benefit.

The engines in CHP units require routine maintenance including oil and filter changes, and longer cycle maintenance such as replacing piston rings, cylinder heads, lining cylinders, replacing the pistons and turbocharger, as well as other non-routine repairs when problems occur. The electricity generation and heat recovery systems on a CHP also have longer cycle repairs and rebuilds that occur with use.

Natural gas can be fed directly to the CHP engine without any pretreatment; however, this is not the case with biogas, which must be run through a filter media to remove naturally-occurring chemicals (siloxanes and hydrogen sulfide) that can be harmful to the engine. Biogas used in CHP units must be pressurized by a positive displacement blower so it can be fed into the filters and engine. The biogas used in CHP units must also have moisture removed from it by chilling it in a refrigeration unit, which dries the gas. None of this additional treatment is required to combust biogas in a standard boiler.

2.0 PROBLEM STATEMENT

Wastewater treatment is an energy-intensive process, so small changes in energy costs or the scale of production can make a big difference to a facility's bottom line. The Kinross Charter Township WWTP has asked for a cost-benefit evaluation of their current power-use scenario where natural gas, biogas from WWTP solids, and biogas from food waste solids are being used to fuel its CHP units to determine if this operation mode is cost-effective. In addition to the current operating mode, several alternatives were analyzed to try to find optimal operating modes that lower cost and increase value, including 1) scaling up the production of food waste biogas, 2) removing food waste and increasing heat and power production via natural gas assuming a change in contract conditions would allow this, 3) removing food waste biogas production and halting the use of natural gas in the CHP units, and 4) reverting to previous operating conditions where WWTP solids biogas were burned in a boiler for process heat without CHP generation or food waste production. Each of these alternatives were analyzed based on their benefits, which come in the form of saleable electricity and usable recovered heat relative to the costs expended by the facility that are over and above baseline operating costs associated with the treatment of wastewater.

3.0 KNOWN INFORMATION

Energy Sources

The Kinross Charter Township WWTP uses natural gas and electricity as its primary utility-provided energy sources. The plant is set up to offset these energy sources by converting biogas into heat and electricity in two Kraft KB-100 CHP units. According to manufacturer literature (see Appendix A for manufacturer's cut sheet), each of these units can generate a maximum of 104 kilowatts of power and recover 488,000 BTU/hour of heat when running a full capacity. The CHPs at the plant are not able to run at full capacity because they overheat at full load. According to the plant superintendent, these units can only run at 90% capacity or less. The heat from the CHP units is captured in a standard glycol boiler loop that is used to heat some of the facility's buildings and the anaerobic digester. When the biogas-produced heat is not sufficient to meet facility needs, additional heat is added to the glycol loop by a standard natural gas boiler that acts as a lagging heater to the CHP units.

Net Metering Agreement

Electricity generated from the CHP units is net-metered and fed back to the power grid through an agreement with Cloverland Electric. The net electricity produced by the CHP units offsets (reduces) the facility's overall usage. The total power bill in 2023 was $67,648 for 566,414 kWh.

The total biogas production from the facility is not sufficient to run one CHP unit full-time. However, natural gas can be used to supplement the CHP units, but natural gas use is capped at a maximum of 25% of the total energy used by the CHP units according to the net metering agreement with Cloverland Electric. This agreement specifies that electricity generated from the facility can only be used to offset the facility's use, so the total benefit from power generation is capped at the facility's maximum use and excess production can't be monetized to generate revenue, only saved for a future credit against use. Excerpts from the Cloverland Electric agreement are included in Appendix A.

Cloverland Electric's 2023 rate sheet is available from their website, and it shows "Large Power" users have the following rate structure (where kW is kilowatts and kWh is kilowatt hours):

Facility fee: $141.01 / month
Energy optimization fee: $183.99 / month
Monthly demand rate: $11.51/ peak 15min kW usage
Energy charge: $0.06726 per kWh
Energy-Capacity Charge: $0.00824 per kWh
PSCR Charge: $0.006 kWh (variable)

The net metering agreement states that generated power is credited at "the retail price for purchased power" excluding monthly facility and demand charges. This means that generated power from the CHP units has a value equal to the "energy charge", "energy capacity charge", and the "PSCR charge", which equates to $0.0815 per kWh.

The "power supply cost recovery" (PSCR) charge, which is currently $0.006 kWh, has been zero or even negative in the past. According to Cloverland Electric's website, this charge is a *"fuel-cost adjustment factor used by utilities to reconcile for fluctuations in purchased power costs"*. Cloverland Electric states that *"at times it may be $0 or even a credit. The number you see there will adjust based on the need to fund fluctuating power supply costs."* A drop in the PSCR charge in the future would reduce the value of produced electricity by the WWTP.

Natural Gas Cost

Natural gas for the facility is purchased from DTE Energy at the market rate that varies slightly by month. The average natural gas rate the facility paid between March 2022 and February 2023 was 0.9139 per hundred cubic feet (CCF), which was calculated by subtracting the sum of the meter fee and monthly IRM fee (both of which are fixed monthly charges) from the total yearly bill and then dividing that by the total CCF of gas delivered in the year. The two fixed fees were subtracted from the calculation because they represent a cost that the facility will pay regardless of the operational status of the CHP units to maintain a gas service. The gas bill for the "new" natural gas boiler that is linked to the same heating loop as the CHP units was used for this analysis. A summary of natural gas bills and corresponding calculations for this use rate are included in Appendix A.

Energy Schematic and Input Assumptions

A simplified energy flow schematic for the operation of the CHP units is shown in Figure 1. The CHP units burn either biogas or natural gas while operating, but both fuels are not mixed in a single unit. The beneficial output from the operation of the CHP unit is heat, which can be used to offset boiler heat that uses natural gas, and electricity, which is net metered back into the power grid.

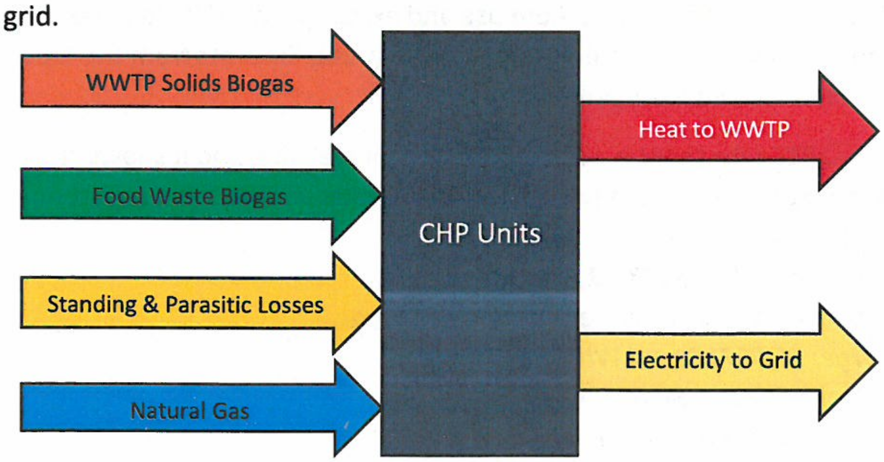

Figure 1: Simplified CHP energy flow schematic for the current operating scenario

Biogas from WWTP solids and biogas from food waste are generated in the same anaerobic digester, so there is no individual metering of each source. Biogas yearly flow totals are available, which indicate the facility generated on average a total of 14,266 cubic feet per day of biogas from both sources in 2023 of which 13,425 cubic feet per day were used to fuel the CHP units. The most recent data between October 1, 2023, and February 21, 2024, indicated that 11,881 cubic feet per day were used to fuel the CHP units.

An estimate of biogas from WWTP solids was provided by the WWTP plant superintendent by measuring gas flow rates when food waste has not been fed to the digester for approximately 30 days. A daily production rate of biogas from WWTP solids of 7,418 cubic feet per day was estimated as a result of this test, which is higher than the rule of thumb rate of 1 cubic foot per day/100 daily gallons of wastewater (Metcalf & Eddy, Inc., 2023). This high production rate may be a result of the facility having a relatively high strength wastewater due to a state prison that makes up a majority of the incoming flow. Subtracting the WWTP solids biogas flow from the two annual average gas estimates leaves a balance of between 4,463 to 6,007 cubic feet per day from food waste. The higher of the two estimates will be used in this analysis.

By contract the natural gas usage for the CHP can be up to 25% of the total energy (BTU) input. Records from 2023 indicate that 5,620 CCF of natural gas were used in a year to fuel the CHP units. For this analysis, it will be assumed that natural gas will make up 20% of the total energy input to the CHP.

The lower heating value of a fuel is the energy output that can be captured without recovering the energy that is contained in the water vapor created during combustion, which is lost. Biogas typically has a lower heating value (LHV) between 500 to 650 BTU of energy per cubic foot. Data taken from the short-term operation of the CHP unit showed an output of 85 kWh and an operating loss of 4.06 kWh. The operating loss is described in detail in the section below. The actual output of the generator results in 89.06 kWh for a gas flow of 28.8 cubic feet per minute of biogas. These numbers can be used to calculate the LHV of the biogas using the following calculations:

$$(85\ kWh\ generation\ +\ 4.06\ kWh)\ X\ \frac{9{,}620\ BTU}{kWh} = 856{,}757\ BTU\ per\ hour$$

$$\frac{\frac{856{,}757\ BTU}{hour}}{\frac{28.8\ cubic\ foot}{minute} X \frac{60\ min}{hour}} = 496\ BTU\ per\ cubic\ foot$$

A similar calculation was completed using gas flow and power production data between October 1, 2023, and January 1, 2024, which produced a similar value for biogas energy per cubic foot.

To be conservative the assumed energy value of biogas for this analysis will be set at 550 BTU/cubic foot, which will produce a best-case estimate. A LHV for natural gas was assumed to be 900 BTU/cubic foot, which is a standard book value.

Standing Losses

The CHP units use power throughout the year regardless of if they are running. These will be referred to as standing losses for the purposes of this report, which include idling losses when the CHP unit is not operating and operating losses when power is being produced. Idling losses are measured by each unit's net power meter. Idling losses come from ancillary equipment such as the CHP unit controls, the engine starter, and heaters. Idling losses can be measured directly from the net meter on each CHP unit when the units are not running. Analysis of the net CHP power meters indicates that idling losses from both units have averaged 16,212 kW per year or 3.07 kW per hour of idling (both units included), between 2022 and 2023. Figure 2, below, illustrates the actual idling losses from both units over two years from meter data received by Cloverland Electric.

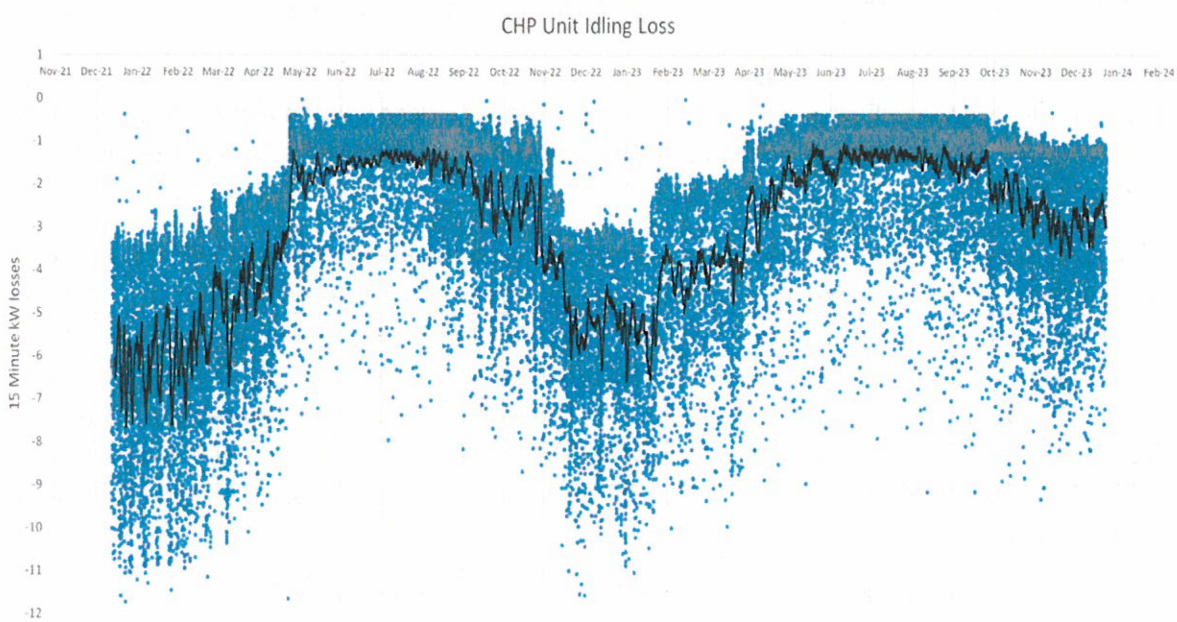

Figure 2: Two years of combined idling losses from both CHP units (Cloverland Electric Data)

The manufacturer's literature indicates that, during operation, a single CHP unit uses 4.06 kW of the power that it generates to run pumps, fans, and control systems during operation.

To simplify the calculations, the rate of 3.07 kW constant will be used for both operating and idling losses. Total standing losses from these sources are calculated as:

$$\frac{24\ hours}{day} X \frac{365\ days}{year} X\ 3.07\ kW = 26{,}893\ kWh\ per\ year$$

$$\frac{26{,}893\ kWh}{year} X \frac{\$0.0815}{kWh} = \$2{,}192\ per\ year$$

External Parasitic Losses

Parasitic losses for the purposes of this report are electrical use that come from equipment necessary to run the CHP systems; this electrical use is metered on the plant's main meter rather than the net CHP meter. These types of losses include the biogas chiller and the biogas blower. Parasitic losses are not typically metered but can be estimated based on electric motor details (voltage, power factor, phases) and estimates of total run time and amperage draw. For the purposes of this analysis, the two motors that make up the parasitic losses will be assumed to run only when the CHP units are in operation. Power usage from a three-phase electric motor is calculated by the following equation:

$$\frac{Running\ Hours\ X\ Power\ Factor\ X\ Voltage\ X\ Running\ Amps\ X\ 1.73}{1000} = kWh\ use$$

An estimation of parasitic losses based on 3,891 CHP operating hours in a year is 43,518 kW. Details for each of the parasitic losses are included in Figure 3. Note that the power factor for the biogas chiller was not apparent on its nameplate, so a conservative (best-case) estimate was used.

Motor Name	Yearly Runtime	Power Factor	HP	Phase	Voltage	Running Amps	KW Used	kW per hr. Operation
PD Blower	3,891	0.86	5	3	460	10.4	27,695	7.11
Biogas Chiller	3,891	0.7	5	3	460	7.3	15,823	4.06
						Total	43,518	11.185

Figure 3: Electric motors included in the parasitic power calculation

Electrical Generation

Manufacturer information from Kraft Power indicates that the CHP units have a heat rate of 9620 BTU/kWh generated, with a maximum input of 1,003,170 BTU/hour. A CHP's heat rate can be used to convert BTU input to electric output at its most efficient operating point, which is usually near full power. For the purposes of this analysis, it is assumed that the heat rate is constant throughout the CHP's power operating range. Data from Cloverland Electric illustrating the electricity output for both CHP units are shown in Figure 4, below. Analysis of this data shows that units are typically run one unit at a time with short periods where both are operating. Output averages for single unit operation range between approximately 45 kWh to

80 kWh as can be observed by the density of point readings in this range. For these calculations, it is assumed that the CHP units run at 90 kWh output, which will provide a best case result.

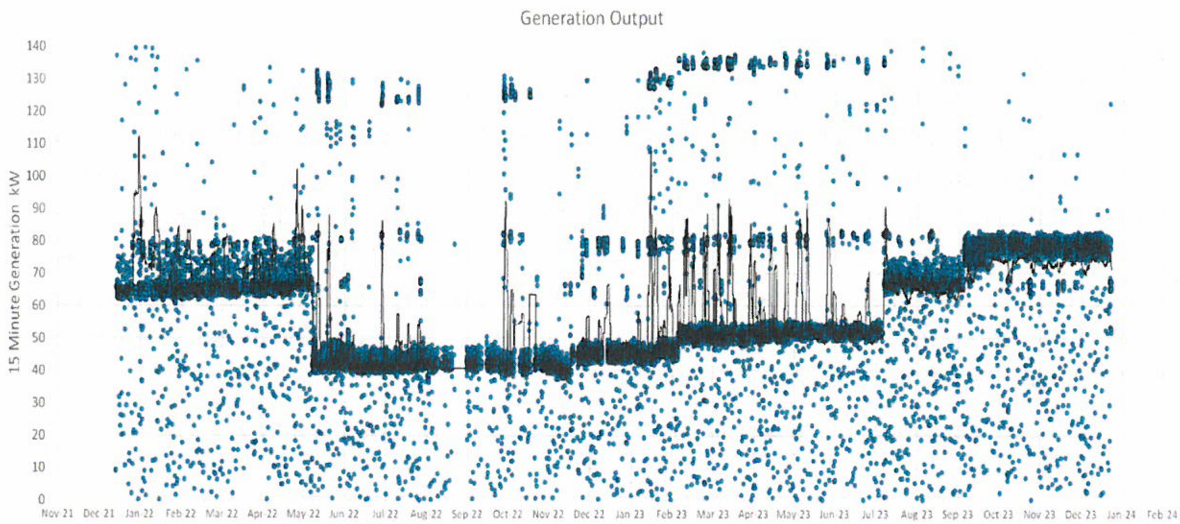

Figure 4: Two years of generation data from both CHP units (Cloverland Electric)

Heat Recovery

Manufacturer information from Kraft Power indicates that the CHP units have a maximum thermal recovery of 488,000 BTU/hour, which relates to a thermal efficiency of 48.7% of the total energy input. This is the volume of heat that is recovered by the system when operating at full power and can be used as process heat to offset natural gas usage. For process heat to be used beneficially the plant must have a heat demand that the recovered heat can satisfy, typically by replacing the use of a natural gas boiler.

4.0 BENEFIT-COST ANALYSIS FOR CURRENT OPERATING SCENARIO

The calculations in this section represent a theoretical best-case estimate of biogas generation and electricity output under the current operating mode. For these calculations, assumptions are optimistic and represent higher output than the facility has historically generated in terms of electricity generated for sale.

Energy Calculations

Energy calculations are separated by each fuel source, which are WWTP solids biogas, food waste biogas, and natural gas. Each fuel source is calculated similarly. Calculations for WWTP solids biogas are illustrated here as an example:

Total yearly energy from WWTP solids biogas:

$$\frac{7{,}418\ cubic\ feet}{day}\ X\ \frac{365\ days}{year}\ X\ \frac{550\ BTU}{cubic\ feet} = 1{,}489{,}163{,}500\ BTU\ per\ year$$

Total yearly electricity produced from WWTP solids biogas:

$$\frac{1{,}489{,}163{,}500\ \frac{BTU}{year}}{9{,}620\ \frac{BTU}{kWh}} = 154{,}799\ kWh\ per\ year$$

Value of electricity produces from WWTP solids biogas:

$$\frac{154{,}799\ \ kWh}{year}\ X\ \frac{\$0.0815}{kWh} = \ \$12{,}616\ per\ year$$

Total heat recovered from WWTP solids biogas:

$$\frac{1{,}489{,}163{,}500\ BTU}{year} X\ 48.7\% = 725{,}222{,}624\ BTU\ per\ year$$

$$725{,}222{,}624\ BTU\ per\ year\ X\ \frac{1\ therm}{100{,}000\ BTU} = 7{,}252\ therms\ per\ year$$

Equivalent heat necessary to be input into a natural gas burner to recover the same heat:

$$\frac{7{,}252\ \frac{therm}{year}}{85\%\ burner\ efficiency} = \ 8{,}532\ therms\ per\ year\ of\ natural\ gas\ burned$$

Cost of heat recovered if it was produced by burning natural gas:

$$\frac{8{,}532\frac{therm}{year}\ X\ 100{,}000\frac{BTU}{therm}}{900\frac{BTU}{cubic\ foot} X\ 100\ \frac{cubic\ foot}{C\ cubic\ feet}} X\ \frac{\$0.9139}{C\ cubic\ feet} = \ \$8{,}664\ per\ year$$

A summary of these calculations is shown in Figure 3, below, for each energy source. Note that the BTUs assumed for natural gas is 20% of the total BTUs for all fuel sources.

Benefit Calculations for Current Operating Scenario		
WWTP Solids Biogas		
WWTP solids biogas production	7418	CF/day
Biogas lower heat value (LHV)	550	BTU/CF
WWTP solids biogas yearly energy produced	1,489,163,500	BTU/year
WWTP solids biogas yearly power produced	154,799	kWh/year
WWTP solids value of power generated	$12,616	per year
WWTP solids biogas yearly heat recovered	7,252	therm/year
Equivalent BTU from natural gas burner	8,532	therm/year
Value of heat recovered in natural gas	$8,664	per year
Food Waste Solids Biogas		
Food waste biogas production	6,007	CF/day
Biogas lower heat value (LHV)	550	BTU/CF
Food waste biogas yearly energy produced	1,205,905,250	BTU/year
Food waste biogas yearly power produced	125,354	kWh/year
Food waste value of power generated	$10,216	per year
Food waste biogas yearly heat recovered	5,873	therm/year
Equivalent BTU from natural gas burner	6,909	therm/year
Value of heat recovered in natural gas	$7,016	per year
Natural Gas		
Maximum energy from natural gas in CHP	673,767,188	BTU/year
Natural gas used in CHP	7,486	CCF/YR
Power generated from natural gas	70,038	kWh/year
Value of power generated from natural gas	$5,708	per year
Natural gas yearly heat recovered	3,281	therm/year
Equivalent BTU from natural gas burner	3,860	therm/year
Value of heat recovered in natural gas	$3,920	per year

Figure 5: Heat and power calculations for the current operating scenario

Theoretical CHP Operating Benefit Summary

WWTP biogas power value	$12,616 per year
Food waste biogas power value	$10,216 per year
Natural gas power value	$5,708 per year
Total power production offset	**$28,541 per year**
WWTP biogas heat value	$8,664 per year
Food waste biogas heat value	$7,016 per year
Natural gas heat value	$3,920 per year
Total heat recovery offset	**$19,600 per year**
Total benefit for power and heat	**$48,140 per year**

Cost Overview

Significant costs for the operation of the CHP units were estimated or directly measured from past billing and were segregated based on the fuel source that they are associated with (WWTP solids biogas, food waste biogas, and natural gas). The intent of this study was to identify all major costs associated with the operation of the CHP units; however, there are still other costs that are not considered in this analysis, so this analysis should be considered to be conservative (a best-case estimate).

Costs for all fuel sources

CHP unit depreciation: Depreciation can be viewed in several ways depending on the context of the analysis. Some people may consider depreciation a "soft" cost and dismiss its value since it does not show up as a monthly bill and may not show up on a year-end balance sheet. However, depreciation will eventually manifest as a "hard" cost for the facility when equipment is replaced or sold. It is an estimate of the yearly amortized dollar volume a utility has spent to purchase the piece of equipment. Depreciation can also be used to represent the loss of salvage value for a piece of equipment that is to be replaced or sold.

The two self-contained CHP units represent a significant capital investment and are an asset with a defined usable life. According to the WWTP's asset management plan, these units cost approximately $348,000 each and have a useful life of 25 years.

CHP unit simple depreciation is calculated as follows:

$$\frac{\$348{,}000\ unit\ cost\ \ X\ 2\ units}{25\ years} = \$27{,}840\ per\ year$$

Standing losses cost: Average yearly standing power usage is estimated to be:

$$\frac{24\ hours}{day}\ X\ \frac{365\ days}{year}\ X\ 3.07\ kW = 26{,}893\ kWh\ per\ year$$

$$\frac{26{,}893\ kWh}{year}\ X\ \frac{\$0.0815}{kWh} = \$2{,}192\ per\ year$$

CHP maintenance cost: A review of the maintenance schedule indicates that routine maintenance such as oil and filter changes occur between 300 and 800 hours of operation. A review of maintenance invoices that the WWTP paid to Kraft Power from 2023 indicates five routine visits for oil changes and one non-routine repair visit for a total of $16,946 while operating approximately 3,500 hours.

Communication with Kraft Power indicated that there is major scheduled maintenance and overhaul activity at 12,000, 24,000, and 48,000 hours of operation with this model CHP unit. Kraft Power provided cost estimates for each of these service intervals. At 12,000 operating hours, the turbocharger in the units will need to be replaced along with intercooler cleaning; this is estimated to cost approximately $5,000. At 24,000 operating hours, piston rings, cylinder liners, and cylinder heads need to be replaced along with checking some mechanical clearances; the estimated cost for this work is $22,000. At 48,000 operating hours, the pistons and crankshaft bearings are to be replaced, which usually requires the engine to be removed from the unit; the estimated cost for this service is $48,000.

CHP actual unit routine maintenance is calculated as follows:

$$\frac{\$16{,}946}{3{,}522\ hours} = \$4.81\ per\ hour\ of\ operation$$

CHP planned major maintenance and overhaul cycles:

$$\frac{\$5{,}000}{12{,}000\ hours} = \$0.41\ per\ hour\ of\ operation$$

$$\frac{\$22{,}000}{24{,}000\ hours} = \$0.92\ per\ hour\ of\ operation$$

$$\frac{\$48{,}000}{48{,}000\ hours} = \$1.00\ per\ hour\ of\ operation$$

Total CHP routine, planned major maintenance, and overhaul cost:

Total maintenance cost = $7.14 per hour of operation

As a basis for comparison, Kraft Power provides maintenance agreements for scheduled maintenance of the engine of these units for $5.75 per hour of operation plus consumables (oil, filters, etc.). This rate increases to $8.64 per hour of operation plus consumables when scheduled and non-scheduled maintenance of the engine is included. Kraft Power offers a total CHP system maintenance agreement covering scheduled and unscheduled maintenance for the engine, generator, and heat exchanger for a cost of $10.13 per hour of operation including all consumables.

The cost of $7.14 per hour of operation will be used for these calculations, which is conservative (best case).

<u>**Cost for all biogas sources**</u>

Biogas chiller and biogas filter unit depreciation: According to the WWTP's asset management plan, the biogas chiller costs approximately $50,000 and has a useful life of 15 years, and the biogas filter unit has a cost of $130,000 and a useful life of 25 years. Biogas chiller and biogas filter simple depreciation is calculated as follows:

$$\frac{\$130{,}000\ current\ cost}{25\ years} = \$5{,}200\ per\ year$$

$$\frac{\$50{,}000\ current\ cost}{15\ years} = \$3{,}333\ per\ year$$

Total depreciation = $8,533 /year

Biogas chiller power and biogas blower power use (parasitic losses): The biogas chiller and biogas blower are estimated to use 43,518 kWh of electricity when operating at 3,891 hours per year. Running amps were provided by the plant superintendent.

$$\frac{11.185\ kW}{hours\ of\ operation}\ X\ \frac{3{,}891\ hours}{year}\ X\ \frac{\$0.0815}{kWh} = \$3{,}547\ \ per\ year$$

Biogas filter media replacement: Biogas must be treated by a filter before it can be burned in the CHP units. The filter media has a fixed capacity to treat contaminants. A recent quote that the plant superintendent received for the replacement of the media was $28,075 plus routine gas sampling totaling $1,380. It is anticipated that this media is nearing replacement after over 13,300 hours of operation. Manufacturer literature suggests sampling for filter breakthrough beginning at 10,000 hours. The cost for biogas media replacement is calculated as:

$$\frac{\$28{,}075 + \$1{,}380}{13{,}300\ hours} = \$2.21\ per\ hour\ of\ operation\ on\ biogas$$

In the current operating scenario, the CHP units operate 3,113 hours on biogas per year out of the total 3,891 total hours of operation.

The biogas media replacement is calculated as:

$$\frac{\$2.21}{hour} X \frac{(3{,}113\ hours\ of\ operation\ on\ biogas)}{year} = \$6{,}879\ per\ year$$

<u>Costs for only food waste biogas</u>

Food waste processor devaluation: Canteen food waste is shredded, sorted, and pulped by a food waste processor. According to the WWTP's asset management plan, these units cost approximately $150,000 each and have a useful life of 30 years. Simple depreciation is calculated as follows:

$$\frac{\$105{,}000\ current\ cost}{30\ years} = \$3{,}500\ \ peryear$$

Food waste collection labor: Food waste is collected and processed by township staff. An estimate of $32,000 per year for labor to collect food waste and process it was provided by the plant superintendent for approximately four tons per week of raw food waste. This food waste collection and processing results in a constant feed rate of approximately 150 gallons of food pulp per day.

Food waste collection fuel: Since food waste is collected by WWTP staff, there is an expense for fuel for the heavy vehicles used for this collection. This expense is not tracked separately, but a token value of $100 was included as a placeholder for this value.

Food waste trash disposal: During food waste processing, a reject stream of plastics and other nonbiodegradable waste is generated. The WWTP pays for the disposal of this waste. Bills from 2023 show the actual disposal cost to be $3,813 for five dumpster loads of waste.

Food waste sludge disposal: Food waste digestion results in biogas as a product and sludge as a waste. Sludge is disposed of by the WWTP by hauling and land spreading via a contract with a hauler. Sludge disposal costs include a fuel cost premium, so the average price is not fixed. Sludge disposal costs averaged $0.1069 per gallon at a typical 3.5% solids over the course of two years. The WWTP can feed approximately 150 gallons of food waste pulp per day at a steady intake rate. Food pulp is around 20% solids according to the plant superintendent. Multiplying this percentage by the density of water, which is 8.34 pounds/gallon, gives total dry pounds of solid. A benchmarking study indicated that between 26% to 36% of solids remain after food waste pulp is digested (East Bay Municipal Utility District, 2008). A conservative estimate of 30% will be used for this analysis.

Food waste sludge disposal is calculated as follows:

$$\frac{150\ gallons}{day} X \frac{365\ days}{year} = 54{,}750\ gallons\ of\ food\ pulp\ at\ 20\%\ solids$$

$$54{,}750\ gallons\ X\ 20\%\ X\ \frac{8.34\ pounds}{gallon} = 91{,}323\ pounds\ solids\ pre\ digestion$$

$$91{,}323\ pounds\ X\ 30\% = 27{,}397\ pounds\ of\ solids\ post\ digestion$$

$$\frac{27{,}397\ pounds}{8.34\ \frac{pounds}{gallon} X\ 3.5\%} = 93{,}857\ gallons\ food\ waste\ of\ sludge$$

$$93{,}857\ gallons\ sludge\ X\ \frac{\$0.1069\ per}{gallon} = \$10{,}033\ per\ year\ or$$

$$\frac{\$0.18}{gallon\ of\ food\ pulp}\ or\ \frac{1.717\ gallons\ of\ sludge}{gallon\ of\ food\ pulp}$$

Food waste building heat: The building that houses the food waste processing equipment and the food waste storage tanks is a relatively large building that is heated by its own natural gas-fed heater. The plant superintendent indicated that the annual gas bill for heating this space was $7,417 per year. Heating would not be necessary if food waste was not being processed and if the building was winterized. Ventilation and lights for this building are on the central plant meter and are not considered for this analysis.

Food waste building roof heat tape energy use: The food waste building has several 240-volt, three-phase electric heat tapes that are used to keep exposed roofs from collecting ice. These heat tapes run constantly during cold weather, or for approximately five months of the year. Heat tape would not be necessary if food waste was not being processed and if the building was winterized.

Measurements on these heat tapes show a total amp draw of 13.8 amps. Running amps were provided by the plant superintendent. The total power used is calculated by the following equation:

$$\frac{Running\ Hours\ X\ Power\ Factor\ X\ Voltage\ X\ Running\ Amps\ X\ 1.73}{1000} = kWh$$

$$5\ months\ X\ 30\ days\ X\ 24\ hours\ =\ 3600\ hours$$

$$\frac{3{,}600\ hours\ X\ 1PF\ X\ 240\ volt\ X\ 13.8\ amps\ X\ 1.73}{1000} = 20{,}627\ kWh$$

$$20{,}627\ kWh\ X\ \frac{\$0.0815}{kWh} = \$1{,}681\ peryear$$

Food waste mixer pump energy use: Food waste pulp and fats, oils, and grease (FOG) must be continually stirred by two 5-horsepower (hp) mixers that run ten minutes on and five minutes off during food waste processing. Food waste pulp and FOG are stored separately. The food waste pulp mixers run all year while FOG mixers are estimated to run only half of the year since FOG is not always available. Running amps were provided by the plant superintendent. The total power used is calculated by the following equation:

$$\frac{5{,}840\ hours\ X\ 0.631\ PF\ X\ 460\ volt\ X\ 4.7\ amps\ X\ 1.73}{1000} = 13{,}783\ kWh$$

$$\frac{2{,}920\ hours\ X\ 0.631\ PF\ X\ 460\ volt\ X\ 4.1\ amps\ X\ 1.73}{1000} = 6{,}452\ kWh$$

$$20{,}235\ \ kWh\ X\ \frac{\$0.0815}{kWh} = \$1{,}649\ per\ year$$

Food waste pulp processor energy use: Canteen food waste must be processed using a food pulping machine that shreds the contents and screens it to remove solids like plastic bags and other non-biodegradable solids and then pumps the food waste pulp to the food holding tanks. While this processor is estimated to run only three hours per week, it has over 90 hp of motors associated with it. The power factors for the feed augers were not available so they were estimated. Running amps were provided by the plant superintendent. Figure 6, below, details the electricity use for the food processor motors.

Motor Name	Runtime	Power Factor	HP	Phase	Voltage	Running Amp	KW Used	
Food Mill	156	0.855	50	3	460	65	6,899	
Pulp Pump	156	0.8	10	3	460	6.9	685	
Feed Auger 1	156	0.8	10	3	460	4.7	467	Assumed PF
Feed Auger 2	156	0.8	10	3	460	4.7	467	Assumed PF
Waste Auger	156	0.8	10	3	460	6.5	646	Assumed PF
Auxiliary	156	0.74	3	3	460	4.25	390	
							9,554	kWh per year
							1.2	kWh/gal pulp

Figure 6: Food waste processing motors and energy use

The estimated annual cost for food waste processing when producing approximately 150 gallons of food pulp a year is calculated as:

$$9{,}554\ kWh\ X\ \frac{\$0.0815}{kWh} = \$779\ peryear$$

Consumables: Food waste processing is by nature a messy job, requiring heavy-duty disposable gloves and biodegradable grease solvents for cleanup. Over the course of the year, the facility spent approximately $2,560 for these consumables, according to the plant superintendent.

Other labor: This is a placeholder for other labor costs, which are not included in this calculation. Currently, this is set as $0.

<u>**Cost for only natural gas**</u>

Natural gas generation uses fuel that is paid at the market utility rate of $0.9139 per CCF. In this alternative, natural gas use makes up a constant 20% of total energy input on a BTU basis so it is tied to biogas use. Natural gas use is calculated as:

$$7{,}468\ hundred\ cubic\ feet\ X\ \frac{\$0.9139}{hundred\ cubic\ feet} = \$6{,}842\ peryear$$

Balance Sheet for the Current Operations Scenario: The current operating scenario considers 3,891 hours of operation in a year for variable costs and the output of heat and power. The total cost for this alternative for all sources is $147,166 and the total benefit is $48,140, leaving a deficit of $99,025. The balance sheet for this alternative is shown in Figure 7, below.

Balance Sheet for Current Operating Scenario		
Expenses for all sources		
CHP unit depreciation	$27,840	per year
CHP standing loss cost	$2,192	per year
CHP short and long-term maintenance cost	$27,800	per year
Expenses for biogas sources		
Biogas chiller and gas filter depreciation	$8,533	per year
Biogas chiller power use	$1,290	per year
Biogas PD blower power use	$2,257	per year
Biogas media replacement	$6,879	per year
Expenses for food waste biogas		
Food waste processor devaluation	$3,500	per year
Food waste collection labor	$32,000	per year
Food waste trash disposal	$3,813	per year
Food waste sludge disposal	$10,033	per year
Food waste building heat (natural gas)	$7,417	per year
FOG and food waste mixer energy use	$1,649	per year
Food waste processor energy use	$779	per year
Food waste building roof heat tape energy use	$1,681	per year
Consumables (gloves and degreasers)	$2,560	per year
Food waste collection fuel	$100	per year
Other labor	$-----	
Expenses for natural gas		
Natural gas used for power generation	$6,842	per year
Total expenses	**$147,166**	per year
Benefits		
Natural gas power value	$5,708	per year
WWTP biogas power value	$12,616	per year
Food waste biogas power value	$10,216	per year
Total power production offset	**$28,541**	per year
Natural gas heat value	$3,920	per year
WWTP biogas heat value	$8,664	per year
Food waste biogas heat value	$7,016	per year
Total heat recovery offset	**$19,600**	per year
Total benefits	**$48,140**	per year
Net	**$(99,025)**	per year

Figure 7: Balance sheet for the current operation of the CHP units under theoretical current conditions for 3,891 hours of operation in a year

Individual Energy Source Cost / Benefit Analysis

Cost Fractions

Costs that are shared between two or more energy sources need to be split based on a factor that is representative of the energy sources' contribution to the expense. This split allows analysis of the cost and benefit for each fuel type. For this study, the fraction of power value generated by each fuel source divided by the total power value for all fuel sources was used as a proxy to split costs since it is proportional to both the benefits and costs derived.

Costs split by all three energy sources (i.e., WWTP biogas, food waste biogas, and natural gas) are calculated as follows:

WWTP biogas power value	*$12,616 per year*	*44.2%*
Food waste biogas power value	*$10,216 per year*	*35.8%*
Natural gas power value	*$5,708 per year*	*20.0%*
Total power production offset	*$28,541 per year*	

Biogas costs were split using the following calculation:

WWTP biogas power value	*$12,616 per year*	*55.3%*
Food waste biogas power value	*$10,216 per year*	*44.7%*
Total power production offset	*$22,832 per year*	

Balance Sheets Subdivided by Fuel Source

The costs in the main balance sheet (Figure 7) for the current operating scenario were split using the cost fractions in the previous section. Balance sheets split by fuel source are provided in Figures 8 through 10, below.

WWTP Biogas CHP Cost Model		
CHP unit depreciation	$12,306	per year
CHP standing loss cost	$969	per year
CHP short- and long-term maintenance cost	$12,289	per year
Expenses for biogas sources		
Biogas chiller and gas filter depreciation	$4,715	per year
Biogas chiller power use	$713	per year
Biogas PD blower power use	$1,247	per year
Biogas media replacement	$3,801	per year
Total expenses	**$36,040**	per year
WWTP power value	$12,616	per year
WWTP heat value	$8,664	per year
Total benefits	**$21,280**	per year
Net	**$(14,760)**	

Figure 8: WWTP solids biogas fuel balance sheet for the current operating scenario

Food Waste Biogas CHP Cost Model		
Expenses for all sources		
CHP unit depreciation	$9,966	per year
CHP standing loss cost	$785	per year
CHP short- and long-term maintenance cost	$9,951	per year
Expenses for biogas sources		
Biogas chiller and gas filter depreciation	$3,818	per year
Biogas chiller power use	$577	per year
Biogas PD blower power use	$1,010	per year
Biogas media replacement	$3,078	per year
Expenses for food waste biogas		
Food waste processor devaluation	$3,500	per year
Food waste collection labor	$32,000	per year
Food waste trash disposal	$3,813	per year
Food waste sludge disposal	$10,033	per year
Food waste building heat (natural gas)	$7,417	per year
FOG and food waste mixer energy use	$1,649	per year
Food waste processor energy use	$779	per year
Food waste building roof heat tape energy use	$1,681	per year
Consumables (gloves and degreasers)	$2,560	per year
Food waste collection fuel	$100	per year
Other labor	$-----	per year
Total expenses	**$92,717**	per year
Food waste power value	$10,216	per year
Food waste heat value	$7,016	per year
Total benefits	**$17,232**	per year
Net	**$(75,485)**	per year

Figure 9: Food waste biogas fuel balance sheet for the current operating scenario

Natural Gas CHP Cost Model		
Expenses for all sources		
CHP unit depreciation	$5,568	per year
CHP standing loss cost	$438	per year
CHP short- and long-term maintenance cost	$5,560	per year
Natural gas used for power generation	$6,842	per year
Total expenses	**$18,408**	per year
Natural gas power value	$5,708	per year
Natural gas heat value	$3,920	per year
Total benefits	**$9,628**	per year
Net	**$(8,780)**	per year

Figure 10: Natural gas fuel balance sheet for the current operating scenario

5.0 ALTERNATIVE 1: SCALE UP FOOD WASTE

Scaling up food waste production has been a goal of the facility. This alternative will evaluate the impact of tripling food waste gas production assuming that sufficient sources can be found. In this alternative, it is assumed that the biogas BTU value will increase from 550 BTU/CF to 650 BTU/CF in response to the additional proportion of food waste being digested. Tripling the food waste biogas in addition to the other fuel sources will allow one CHP unit to run almost continuously at 8,709 hours per year, which would produce approximately $59,175 worth of power, which is beginning to approach the facility's annual electric bill. This alternative assumes that food waste labor will not increase under the assumption that efficiencies will be found or waste will be delivered to the facility with the increased volume, and it assumes that the food waste mixer run time will not increase with the added volume.

Benefit Calculations for Alternative 1

Benefit calculations for this alternative are shown in Figure 11, below.

Benefit Calculations for Alternative 1		
WWTP Solids Biogas Calculations		
WWTP solids biogas production	7418	CF/day
Biogas lower heat value (LHV)	650	BTU/CF
WWTP solids biogas yearly energy produced	1,759,920,500	BTU/year
WWTP solids biogas yearly power produced	182,944	kWh/year
WWTP solids value of power generated	$14,910	per year
WWTP solids biogas yearly heat recovered	8,571	therm/year
Equivalent BTU from natural gas burner	10,083	therm/year
Value of heat recovered in natural gas	$10,239	per year
Food Waste Solids Biogas Calculations		
Food waste biogas production	18,007	CF/day
Biogas lower heat value (LHV)	650	BTU/CF
Food waste biogas yearly energy produced	4,272,160,750	BTU/year
Food waste biogas yearly power produced	444,092	kWh/year
Food waste value of power generated	$36,193	per year
Food waste biogas yearly heat recovered	20,805	therm/year
Equivalent BTU from natural gas burner	24,477	therm/year
Value of heat recovered in natural gas	$24,855	per year
Natural Gas CHP		
Maximum energy from natural gas in CHP	1,508,020,313	BTU/year
Natural gas used in CHP	16,756	CCF/YR
Power generated from natural gas	156,759	kWh/year
Value of power generated from natural gas	$12,776	per year
Natural gas yearly heat recovered	7,344	therm/year
Equivalent BTU from natural gas burner	8,640	therm/year
Value of heat recovered in natural gas	$8,774	per year

Figure 11: Alternative 1 benefit calculations assuming three times the food waste gas is produced

Alternative 1 Balance Sheet

The balance sheet for this alternative is shown in Figure 12, below. The alternative 1 balance sheet illustrates that the intake of additional food waste produces a larger deficit than current operations even if collection labor does not increase and biogas energy values increase significantly. The estimated deficit in this alternative is over $124,000. The largest drivers of this increase are CHP unit maintenance, biogas media replacement, food waste trash disposal, and food waste sludge disposal.

Balance Sheet for Alternative 1		
Expenses for all sources		
CHP unit depreciation	$27,840	per year
CHP standing loss cost	$2,192	per year
CHP short- and long-term maintenance cost	$62,223	per year
Expenses for biogas sources		
Biogas chiller and gas filter depreciation	$8,533	per year
Biogas chiller power use	$2,886	per year
Biogas PD blower power use	$5,052	per year
Biogas media replacement	$15,397	per year
Expenses for food waste biogas		
Food waste processor devaluation	$3,500	per year
Food waste collection labor	$32,000	per year
Food waste trash disposal	$11,439	per year
Food waste sludge disposal	$30,100	per year
Food waste building heat (natural gas)	$7,417	per year
FOG and food waste mixer energy use	$1,649	per year
Food waste processor energy use	$2,336	per year
Food waste building roof heat tape energy use	$1,681	per year
Consumables (gloves and degreasers)	$2,560	per year
Food waste collection fuel	$100	per year
Other labor	$-----	
Expenses for natural gas		
Natural gas used for power generation	$15,313	per year
Total expenses	**$232,219**	per year
Benefits		
Natural gas power value	$12,776	per year
WWTP biogas power value	$14,910	per year
Food waste biogas power value	$36,193	per year
Total power production offset	**$63,879**	per year
Natural gas heat value	$8,774	per year
WWTP biogas heat value	$10,239	per year
Food waste biogas heat value	$24,855	per year
Total heat recovery offset	**$43,868**	per year
Total benefits	**$107,747**	per year
Net	**$(124,472)**	per year

Figure 12: Alternative 1 balance sheet assuming three times the food waste gas is produced

6.0 ALTERNATIVE 2: REMOVE FOOD WASTE INCREASE NATURAL GAS

This alternative will evaluate the impact of removing food waste biogas and its associated costs, which is the most expensive fuel source the plant has, as well as the impact of increasing CHP unit run time using natural gas, assuming that there is a contractual change to allow this to occur. This alternative will increase CHP unit run time to nearly full-time with 8,600 hours for one CHP.

Benefit Calculations for Alternative 2

Benefit calculations for this alternative are shown in Figure 13, below.

Benefit Calculations for Alternative 2		
WWTP Solids Biogas Calculations		
WWTP solids biogas production	7418	CF/day
Biogas lower heat value (LHV)	550	BTU/CF
WWTP solids biogas yearly energy produced	1,489,163,500	BTU/year
WWTP solids biogas yearly power produced	154,799	kWh/year
WWTP solids value of power generated	$12,616	per year
WWTP solids biogas yearly heat recovered	7,252	therm/year
Equivalent BTU from natural gas burner	8,532	therm/year
Value of heat recovered in natural gas	$8,664	per year
Natural Gas CHP		
Maximum energy from natural gas in CHP	5,956,654,000	BTU/Year
Natural gas used in CHP	66,185	CCF/YR
Power generated from natural gas	619,195	kWh/year
Value of power generated from natural gas	$50,464	per year
Natural gas yearly heat recovered	29,009	therm/year
Equivalent BTU from natural gas burner	34,128	therm/year
Value of heat recovered in natural gas	$34,655	per year

Figure 13: Alternative 2 benefit calculations assuming no food waste and increased natural gas use

Alternative 2 Balance Sheet

The balance sheet for this alternative is shown in Figure 14. The balance sheet illustrates that removing food waste and its associated costs will reduce the overall operating deficit; however, purchasing additional natural gas and the associated CHP unit maintenance still leave an operating loss of over $65,000 a year.

Balance Sheet for Alternative 2		
Expenses for all sources		
CHP unit depreciation	$27,840	per year
CHP standing loss cost	$2,192	per year
CHP short- and long-term maintenance cost	$61,445	per year
Expenses for biogas sources		
Biogas chiller and gas filter depreciation	$8,533	per year
Biogas chiller power use	$2,850	per year
Biogas PD blower power use	$4,989	per year
Biogas media replacement	$3,801	per year
Expenses for natural gas		
Natural gas used for power generation	$60,487	per year
Total expenses	**$172,137**	per year
Benefits		
Natural gas power value	$50,464	per year
WWTP biogas power value	$12,616	per year
Food waste biogas power value	$----	per year
Total power production offset	**$63,080**	per year
Natural gas heat value	$34,655	per year
WWTP biogas heat value	$8,664	per year
Food waste biogas heat value	$----	per year
Total heat recovery offset	**$43,319**	per year
Total benefits	**$106,399**	per year
Net	**$(65,737)**	per year

Figure 14: Alternative 2 balance sheet no food waste and primarily natural gas for power

7.0 ALTERNATIVE 3: REMOVE FOOD WASTE AND NATURAL GAS

This alternative will evaluate the impact of discontinuing the production of food waste and discontinuing the use of natural gas to run the CHP units. This alternative will focus on using the WWTP solids biogas, which is essentially a free energy source. This will decrease CHP unit run time to 1720 hours per year for one CHP.

Benefit Calculations for Alternative 3

Benefit calculations for this alternative are shown in Figure 15, below.

Benefit Calculations for Alternative 3		
WWTP Solids Biogas Calculations		
WWTP solids biogas production	7418	CF/day
Biogas lower heat value (LHV)	550	BTU/CF
WWTP solids biogas yearly energy produced	1,489,163,500	BTU/year
WWTP solids biogas yearly power produced	154,799	kWh/year
WWTP solids value of power generated	$12,616	per year
WWTP solids biogas yearly heat recovered	7,252	therm/year
Equivalent BTU from natural gas burner	8,532	therm/year
Value of heat recovered in natural gas	$8,664	per year

Figure 15: Alternative 3 benefit calculations assuming only WWTP solids biogas are used

Alternative 3 Balance Sheet

The balance sheet for this alternative is shown in Figure 16, below. This alternative decreases the operating loss to just under $35,000.

Balance Sheet for Alternative 3		
Expenses for all sources		
CHP unit depreciation	$27,840	per year
CHP standing loss cost	$2,192	per year
CHP short- and long-term maintenance cost	$12,289	per year
Expenses for biogas sources		
Biogas chiller and gas filter depreciation	$8,533	per year
Biogas chiller power use	$570	per year
Biogas PD blower power use	$998	per year
Biogas media replacement	$3,801	per year
Expenses for natural gas		
Natural gas used for power generation	$---	per year
Total expenses	**$56,223**	per year
Benefits		
Natural gas power value	$----	per year
WWTP biogas power value	$12,616	per year
Food waste biogas power value	$----	per year
Total power production offset	$12,616	per year
Natural gas heat value	$----	per year
WWTP biogas heat value	$8,664	per year
Food waste biogas heat value	$----	per year
Total heat recovery offset	**$8,664**	per year
Total benefits	**$21,280**	per year
Net	**$(34,943)**	per year

Figure 16: Alternative 3 balance sheet no food waste and primarily natural gas for power

8.0 ALTERNATIVE 4: BURN WWTP SOLIDS BIOGAS IN BOILER

This alternative will evaluate the costs and benefits of discontinuing the CHP unit operation and food waste processing and returning to using the WWTP solids biogas as a process heat source in the plant boiler. The biogas boiler has a burner efficiency of 80%, which captures less energy from the biogas as a percentage than the CHP units. However, this operation mode comes with few costs other than possibly some increased maintenance on the boiler. The simplified energy flow schematic for this alternative is shown in Figure 17.

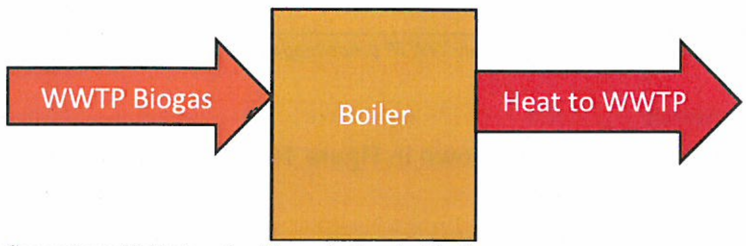

Figure 17: Energy flow schematic for burning biogas in the plant boiler

Alternative 4 Balance Sheet

The balance sheet and associated benefit calculations for this alternative are shown in Figure 18, below. This is the only alternative evaluated that would create a positive net benefit to the facility because it removes significant maintenance and equipment depreciation costs while also providing an offset in natural gas savings. There would also be a potential under this alternative to repurpose or sell unused equipment, which would further add to the financial benefit of this option. It should be recognized that not all of the biogas can be burnt beneficially in the boiler and some degree of flaring will be necessary in the summer, which will reduce the net benefit.

Balance Sheet for Alternative 4		
Expenses for all sources		
Gas Burner Maintenance	$2,000	per year
Total expenses	**$2,000**	per year
Biogas flow rate	$7,418	CF / day
WWTP Solids Biogas Heat Produced From Burner	1,191,330,800	BTU/ year
WWTP Solids Biogas Heat Produced From Burner	11,913	therm/year
Equivalent BTU from natural gas burner	14,016	therm/year
Value of heat recovered in natural gas	$14,232	per year
Total benefits	**$14,232**	per year
Net	**$12,232**	per year

Figure 18: Balance sheet for burning WWTP solids biogas in the plant boiler

9.0 DISCUSSION

Interpreting Results

The results of this analysis represent a best-case (optimistic) analysis for the current operating conditions, which means that the actual financial situation is likely not as optimistic as is illustrated here, which should be a consideration for those interpreting the results of this study.

An attempt was made to isolate or estimate all apparent significant costs in this analysis; however, there are several that are not included, such as the cost of financing the current facility (if any), lighting and ventilation costs for the food processing building, costs for replacement and maintenance of buildings, other costs associated with mechanical systems beyond the CHP units, costs for support equipment, and costs for the food waste processor.

Cost-benefit analysis is ultimately a decision-making tool. Assigning costs to an activity and then determining how the beneficial values associated with the activity measure up can be a powerful tool. In most cases, these types of analyses focus on concrete costs and benefits that a facility will have to pay at some point; however, other costs and benefits can be included, such as the value of environmental stewardship, social benefits, and other community considerations that have not been included in this study. Ultimately, this report is intended to provide background information to assist the Kinross Charter Township Board in making decisions in their specific use case. This report should not be interpreted as a detraction from WWTPs trying new technologies such as food waste digestion or the use of combined heat and power generation, but rather it is intended to set the stage for their economic analysis and the complex decisions that go into operating cost-effectively.

Potential Areas of Economy

A cost-benefit analysis should consider areas where costs could be cut or revenue increased to give the full economic picture. The following are areas that have the potential to change and have some measure of impact on the cost analysis.

Electricity Rate Change

The only revenue stream for the WWTP in this analysis is the sale of electricity back to Cloverland Electric, which is currently at the rate of *$0.0815* per kWh. While it may be unlikely that the utility will offer a higher rate of sale for power produced by the WWTP, it is worth considering the impact this may have.

The electrical sale rate (break-even sale rate) that would be necessary to overcome balance sheet deficits in each alternative can be calculated by dividing the total deficit by the total kWh of power produced and adding that to the current power rate. The current operating scenario is calculated as follows:

$$\frac{\$99{,}025}{350{,}191\ kWh} + \$0.0815\ kWh = \$0.364\ kWh$$

The break-even electric sale rates for each alternative are shown in Figure 19, below:

Alternative	Deficit	kWh produced	Break-even elec. rate
Current operating scenario	$99,025	350,191	0.364 kWh
Alternative 1: Scale up food waste	$124,472	783,794	0.240 kWh
Alternative 2: Remove food, add NG	$65,737	773,994	0.166 kWh
Alternative 3: WWTP Solids biogas only	$34,943	154,799	0.307 kWh

Figure 19: Calculated break-even power rates to cover operating deficits for each alternative

Since this study was created with a best-case (optimistic) view of plant operations, the break-even electric rates in Figure 19 will likely fall short of actual break-even rates when real-world conditions are applied.

Maintenance Savings

One of the largest variable costs in this analysis is the maintenance of the CHP unit, which consists of three types: routine light maintenance, which includes oil, filter, and spark plug changes; non-routine maintenance, which is work to correct operational problems or parts failures; and heavy maintenance and overhaul, which are the long-cycle rehabilitation activities such as replacing piston rings, cylinder heads, lining cylinders, and the turbocharger. In total, this study estimated the sum of these costs to run between $7.14 to $10.13 per operating hour when provided by an outside supplier.

Routine light maintenance could be accomplished by WWTP staff. Non-routine maintenance would require diagnostics tests, specialized knowledge and tools, and is likely not efficient for WWTP staff to attempt these activities. CHP unit heavy maintenance and overhaul accounts for approximately $2.33 per operating hour of the total maintenance cost, and it is assumed that these activities require specialized tools and knowledge that WWTP staff would not possess to accomplish these tasks efficiently.

Actual bills for the five oil change maintenance events in 2023 showed an average of approximately $1300 in labor per oil change with a total of $6,500 per year. WWTP staff labor associated with these tasks would likely be less than a contractor, and there is a savings in travel time to the site. Assuming that staff labor could save 25% on contractor labor, which may not be realistic, the savings on a per-hour rate would be calculated as:

$$\frac{\$6{,}500\ contractor\ labor}{\$3{,}500\ operating\ hours}\ X\ 25\% = \$0.46\ per\ operating\ hour\ savings$$

While a savings of $0.46 per operating hour is an improvement, it still leaves a maintenance cost between $6.68 and $9.67 per operating hour, which will not bring any of the evaluated alternatives out of deficit.

Using plant labor instead of contractor labor for oil changes eliminates regular inspections by a manufacturer's representative, which may result in minor operational problems being left undiagnosed. There is also a risk that the cost of parts, oil, and oil disposal may be higher for the WWTP without a contractor's bulk purchasing power.

Tipping Fee

Currently, the WWTP is taking food waste at no cost to the sources of this waste. In fact, in the case of canteen food waste, the facility is paying for the disposal of the residual non-biodegradable waste that is separated after pulping at a cost of approximately $3,800 per year, and for all sources of food waste, and the WWTP is expending labor to collect this waste. At a minimum, the facility should be charging a fee for the intake of this waste equal to the rate of traditional disposal of these materials.

The Environmental Research & Education Foundation (EREF) tracks municipal landfill cost per ton on a national basis. EREF's average cost per ton of landfilled material for Michigan in 2020 was $42.77 per ton (The Environmental Research & Education Foundation, 2021). The WWTP processes approximately 208 tons of canteen food waste material a year, according to the plant superintendent's estimate. The tipping fee for this material at the average Michigan tipping fee rate would be approximately $8,900, which would cover the $3,800 that the WWTP facility is paying to dispose non-biodegradable trash. However, recovery of a tipping fee would not bring the food waste process out of a deficit.

Operating Output Level

One of the main drivers of the cost efficiency of electrical generation is the scale of output. Typically, cost per kWh drops as power output increases because it is easier to overcome the fixed costs, which are the same if the plant outputs 1 kW or 10,000,000 kW. All of the CHP alternatives considered in this report assumed the CHP units were running at 90 kWh. Data from Figure 4 illustrates that this is not the case, with operating periods as low as 40 kWh output and average output between 65 and 85 kWh. This lower output level is a concern because the per-hour maintenance cost for the CHP unit is one of the most significant costs on the balance sheet followed by fuel. One of the impacts of this lower operating output is less benefit from heat and electricity per hour of operation. The CHP unit generates approximately $13.97 per hour in value from capture heat and electricity generated when operating at 100% loading; this equates to a rate of $0.1397 of benefit per percent load. In reality, efficiency is lost when operating at less than full power, but this loss in efficiency is neglected in this discussion.

Data collected in this study estimated CHP maintenance costs to range from $7.14 per operating hour to $10.13 depending on how much of the unscheduled maintenance is accounted for. The maintenance services rate from Kraft Power of $10.13 per operating hour is a rate that Kraft Power can presumably cover its costs and make a profit on, so it represents a likely maximum for units of this type.

Fuel is the next most significant cost for operating the CHP units. The WWTP solids biogas is essentially a free fuel because it is a product of normal plant operation; however, there is a cost of approximately $2.21 per hour of operation for the biogas filter media. Presumably, the cost of the biogas media scales based on biogas throughput rather than hours of operation, but data to make this estimate accurate is not present and it is likely insignificant to the overall discussion point. When natural gas is used to fuel the CHP unit at full output, the unit can use as much as $10.16 per hour in natural gas, which is a rate of $0.1016 per percent load.

Figure 20, below, plots CHP operating costs considering only maintenance costs and fuel costs per hour as a function of the percent load of the CHP unit. For the purposes of this discussion, Figure 20 does not include all other operating costs; however, these omitted costs are significant. The red and blue solid lines correspond to a maintenance cost of $7.14 per hour (biogas and natural gas respectively) while the upper bounds of the shading relate to the maintenance cost of $10.13 per hour. This figure also illustrates the heat and power dollar values being produced at different loading levels via the dashed green line. Figure 20 illustrates that, just considering maintenance and fuel costs, the units are not cash positive operating at under 68% load on free biogas under the lowest estimate of maintenance costs and may not be cash positive at 90% load under higher maintenance costs. The units are never cash-positive running on natural gas given the current electricity and natural gas rates.

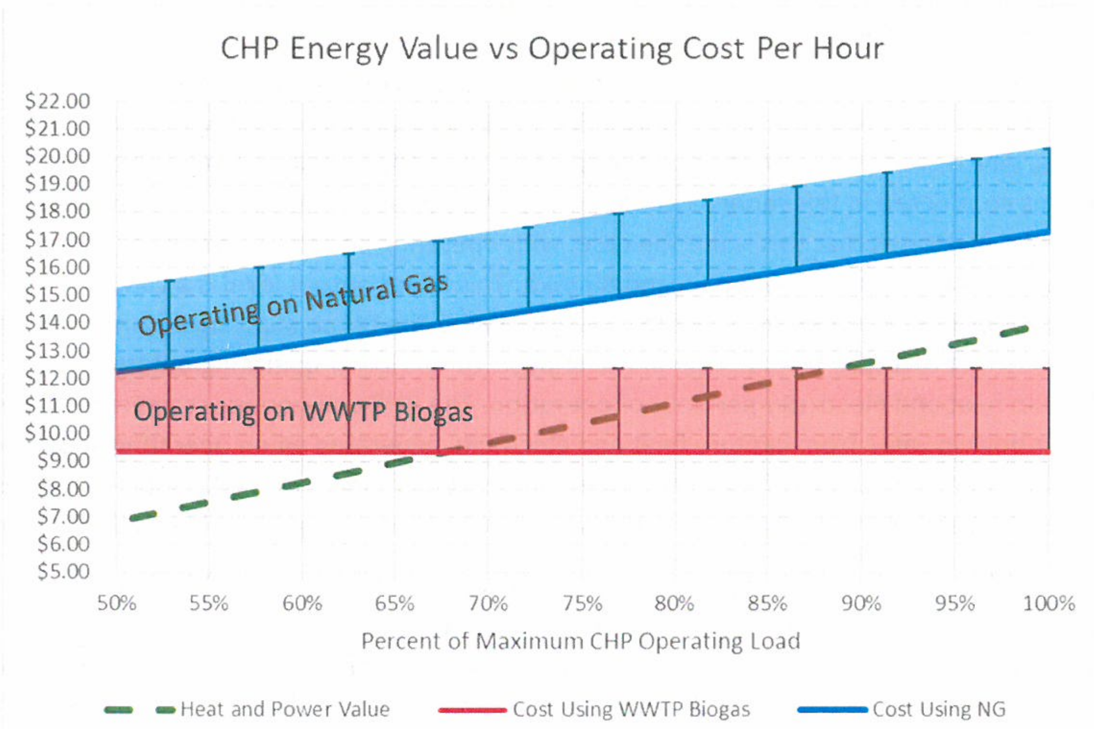

Figure 20: CHP maintenance and fuel costs vs heat and power value produced at different output rates. Note: This chart neglects all other operating costs, and these costs are significant.

Useful Heat Recovery Limits

The plant superintendent has stated that historically (pre-CHP install), when biogas was burned in the boiler for process heat, there were periods when the gas production exceeded heating demand resulting in biogas being sent to the flare during the summer.

Calculations from Alternative 4 indicate that the 7,412 cubic feet a day of WWTP solids biogas produce 11,913 therms per year in heat when burned. It is reasonable to assume based on the flare frequency that the summer heating demand is satisfied at around 11,913 therms per year.

Alternative 2 and 3, which result in one CHP unit operating nearly full time, recover over 36,000 therms per year in heat. This recovery rate is likely more than what the facility can use in the summer, so it may not realize the full benefit of the heat it could recover under these alternatives, which further degrades the operating deficit under these alternatives.

A more detailed analysis of plant heat demand should be conducted if the WWTP is considering an option that results in increased CHP runtime than it has historically had since a portion of the excess heat captured may not be beneficial and would result in lowered benefits and higher deficits than calculated here.

10.0 REFERENCES

East Bay Municipal Utility District. (2008). *Anaerobic Digestion of Food Waste.* EPA Funding Opportunity No. EPA-R9-WST-06-004.

Metcalf & Eddy, Inc. (2023). *Wastewater Engineering: Treatment and Reuse, 4th Edition.* Boston: McGraw-Hill .

The Environmental Research & Education Foundation. (2021). *Analysis of MSW Tipping Fees - 2020.*

APPENDIX A: BACKGROUND INFORMATION

CHP Technical Information

KB 100 – TECHNICAL PARAMETERS

KRAFT ENERGY SYSTEMS
COMBINED HEAT AND POWER

CONTRACT			
CHP UNIT	Kinross WWTP (US-MI)		R257
ENGINE	KB 100 Outdoor	serial no.	257.2/18
GENERATOR	MAN E 0836 LE302	serial no.	112 5065 554 5067
Switchboard / Control system	Leroy Somer LSA 44.3 M6	serial no.	352 619 / 2
Electric output	CP / ComAp InteliSys-Gas	serial no.	H 186 066 002 / 002
Thermal output	104 kW		
	488,000 BTU/hr		

Genset parameters [1)]

Fuel / quality @ LHV	biogas / 550 - 700 BTU/scf [2)] (55 % CH_4 and higher); natural gas / commercial quali
Fuel consumption @ LHV	1,003,170 BTU/hr [3)]
Electric heat rate @ LHV	9,620 BTU/kWh_e
Nominal electric output	104 kW_e [4)]
Cogen thermal output	143 kW [5)]
Gas operating pressure on the BIO / NG train inlet	2 / 1 psig
Nominal electrical voltage / frequency	480 V / 60 Hz
Nominal power factor	1.0
Dimensions (length × width × height)	
– CHP container placement	210 × 80 × 103 in
– CHP after assembly	210 × 130 × 173 in
Total weight – max.	16,000 lb
Sound level @ 32ft (10m) distance	65 ± 3 dB(A)
Ambient temperature range, which is container designed for	-20° to 95 °F

<u>Heating system</u>

– thermal gradient	165 / 181.6 °F
– process water flow	65.0 US GPM
– max. operating pressure	87 psig (opening press.)

<u>Efficiencies</u>

Electric efficiency	35.5 %
Thermal efficiency	48.7 %
Combined efficiency	84.1 %

Excerpts from Cloverland Power Agreement

Net Metering Program

Availability

The net metering program is open to all residential and commercial members who operate renewable electric generators (Category 1 – 20 kW or less and *Category 2 – up to 150 kW) that are interconnected with the cooperative's system and generate all or a portion of their own retail electricity. Category 3 (150 kW to 550 kW) net metering is only available for Methane Digesters.

General Requirements

All application fees, procedures and requirements contained within this document are derived from the Michigan Public Service Commission's Interconnection Standards Rules (R 460.481-460.489) and the Commission-approved Generator Interconnection Requirements or Generator Interconnection Procedures as well as other applicable State (MCL Act 295) and Federal (Part 292 of Title 18 CFR) laws. The State of Michigan inspector or the local governing electrical authority will require an inspection before final electrical connections are made.

Generator

The electric generator must be fueled by a renewable energy resource as defined within MCL Act 295. The generator must be installed on the member's premises, serve only those premises and sized to meet the member's electric needs. The nameplate capacity of the generator must not exceed 20 kW for Category 1 installations, 150 kW for Category 2 installations, and 550 kW for Category 3. For Category 3, the primary energy source of the facility must be biomass, waste, renewable resources, geothermal resources, or any combination thereof, and 75 percent or more of the total energy input must be from these sources. The electric generator shall not exceed the member's annual energy needs in kilowatt-hours (kWh).

Interconnection Process

- Complete and Submit Generator Interconnection Application (Fee included)
- CEC Engineering Review
- Interconnection Study (as needed) at member's expense
- Interconnection and Parallel Operating Agreement including Site Plan and One-Line Electrical Diagram
- Approve Design/ROW requirements
- Construction (as needed) at member's expense
- Cloverland Electric Cooperative Electrical Site Evaluation

Generator Interconnection Requirements

Member is required to submit electrical diagrams and schematics documenting the interconnection and technical specifications of the interconnection equipment as part of the Interconnection Agreement and Application. The cooperative reserves the right to refuse any system design it deems unsafe and/or improperly engineered. Interconnection equipment must be UL-1471 approved for grid tie applications and meet IEEE 519 and 1547 standards.

Facilities must be designed and operated in parallel with Cloverland's system without adversely affecting the operation of Cloverland's equipment, other members' services or presenting any safety hazards.

The member must have a means of disconnect to isolate the generation system from the Cloverland System. This means of disconnect must be accessible to Cloverland Employees, located within ten feet (10') of the meter, lockable, and must provide a visible break (i.e. safety switch).

ii

Generator Interconnection Requirements-Continued

The interconnection rules and requirements will determine whether any additional equipment is required for the interconnection and to calculate and determine the assignment of costs. The member is responsible for all the costs incurred by the cooperative to install and/or upgrade facilities to handle the member's interconnected generation.

The cooperative will replace your current electronic meter with a bi-directional billing meter. This meter ensures proper billing credit for any excess generation. All metering equipment will be installed, maintained, read and owned by the cooperative.

Fees

Members are responsible for all distribution study costs, installation costs, and any required upgrades to the utility service. Other fees include an interconnection application fee.

Billing Process

Members will be billed for the total amount of electricity (kWh) used at the premises. The bill will include a credit for the amount of electricity generated on-site up to the amount of the monthly billed consumption.

Net Excess Generation (NEG)

For any energy generated beyond the current month's consumption (billing period) you will receive Net Excess Generation credits (NEG). These NEG credits, if any, carry over to the next billing period and are used to offset the energy charges in the next billing period.

Monthly Rate

Members continue to pay the retail price for all purchased power based on posted CEC rate schedules. The NEG credit is currently the applicable retail rate (excluding any monthly facility charge). Demand charges will also apply where applicable.

Average Cost per Hundred Cubic Feet of Natural Gas from Bills

New Natural Gas Boiler Bills from 2022					
Bill Start Date	Days	CCF Used		Total Bill	
2/1/2023	30	2943		$ 2,465.30	
1/1/2022	28	2850		$ 2,713.31	
12/1/2022	32	3269		$ 3,198.41	
11/1/2022	31	1659		$ 1,682.15	
10/1/2022	29	1917		$ 1,934.53	
9/1/2022	33	1619		$ 1,665.99	
8/1/2022	29	983		$ 1,009.29	
7/1/2022	28	852		$ 782.52	
6/1/2022	34	1037		$ 980.46	
5/1/2022	30	1736		$ 1,648.91	
4/1/2022	28	2372		$ 2,085.42	
3/1/2022	33	3083		$ 2,595.92	
		24320		$ 22,762.21	Total Bill
				$ 536.37	Fixed Fees
				$ 0.9139	Average Cost per CCF

EPA
Pollution Prevention

While a variety of projects are eligible, the program's priority areas are:

1. Prevention of Greenhouse Gas Emissions

2. Hazardous Materials Source Reduction

3. Innovative approaches to conservation of materials and resources

4. Environmental Justice through P2 Actions

*Additional project examples can be found within the NOFO.

Example projects include, but are not limited to:

- Educating retailers on the Safer Choice program, and the EPA Recommendations for Specifications, Standards and Ecolabels to support the increase in availability and use of safer cleaning products and other environmentally preferable products.
- Providing P2 technical assistance in multiple languages.
- Partnering with schools and daycare facilities to improve indoor air quality through P2 actions.
- Building capacity for organizations or residents to understand pollution prevention techniques and approaches and transfer those lessons in their communities.

Pollution Prevention

$2.2 BILLION
dollars savings for business

917 MILLION POUNDS
hazardous materials reduced

49 BILLION GALLONS
water saved

19.8 MILLION METRIC TONS
greenhouse gases eliminated

30.4 BILLION KILOWATT HOURS
energy savings

I. FUNDING OPPORTUNITY DESCRIPTION

I.A. Background

Applicants are strongly encouraged to read this announcement in its entirety. It provides important information on the goals and priorities of the program, explains statutory program requirements, explains criteria used to evaluate and score grant applications, and explains agency grant policies and procedures.

The U.S. Environmental Protection Agency, Regions 3, 4, 5, 7, 8, 9, and 10 (the Regions) are issuing a Notice of Funding Opportunity (NOFO) to eligible entities to implement pollution prevention projects through the Source Reduction Assistance grant program. Source Reduction Assistance (SRA) grants can support research, investigation, experiments, surveys, studies, demonstration, education, and/or training using source reduction approaches (also known as "pollution prevention" or "P2").

How Does EPA Define P2? Pollution prevention is any practice which reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling of discarded material, treatment, or disposal. P2 reduces the hazards to public health and the environment associated with the release of those substances, pollutants, or contaminants. P2 practices include equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, and substitution of raw materials. EPA has also interpreted P2 as including practices that increase efficient use of water, energy, raw materials, or other resources that may protect natural resources through conservation methods, or in-process recycling (i.e., process improvements to reuse materials within the same business/facility in the production process). Reducing the amount of pollution in the environment means producing less waste to control, treat, or dispose. Less pollution means fewer hazards posed to public health and the environment.

For more information about P2 please visit: https://www.epa.gov/p2

P2 is a powerful tool that can protect public health and the environment by:

- Reducing the use, release, and exposure to toxic chemicals
- Employing upstream solutions that reduce the need for, and costs of environmental cleanup and pollution management
- Reducing the demand for virgin, raw materials
- Reducing the demand for, and cost of, utility services, such as electricity, water supply, and wastewater treatment due to increased energy and water efficiency
- Increasing the efficiency of materials use and reuse
- Reduction of single-use plastics

Apr. 15: EPA Source Reduction Assistance Grants Application Deadline

From: Schilf, Julie (schilf.julie@epa.gov)

To: schilf.julie@epa.gov

Date: Wednesday, February 21, 2024 at 08:25 AM EST

Hi everyone -

U.S. EPA Region 5 has opened the FY2024-2025 Source Reduction Assistance Notice of Funding Opportunity (see attached NOFO and program flyer). This regional competitive grant program provides funding for projects that promote practical source reduction practices, tools, and training or Pollution Prevention (P2) approaches, such as reducing single-use plastics, or using green cleaning or other safer chemical alternatives.

Tribes, States, local governments, and not-for-profit organizations are eligible for funding. Region 5 anticipates awarding 1-4 projects ranging from $40,000-$240,000 up to a total of $240,000 in federal funds. The number of awards is subject to the availability of funds, the quality of applications received, and other applicable considerations. The application deadline is April 15, 2024.

While a variety of projects are eligible, the program's priority areas are:
1. Prevention of Greenhouse Gas Emissions
2. Hazardous Materials Source Reduction
3. Innovative approaches to conservation of materials and resources
4. Environmental Justice through P2 Actions

Those interested in applying are encouraged to carefully review the Notice of Funding Opportunity, which can be accessed here. **If you have questions or need more information regarding this grant opportunity, please contact Claudia Santiago at 312-886-0674 or Santiago.claudia@epa.gov.**

Julie Schilf
US EPA Region 5
312-886-0407

Sign up to Stay Connected and receive reports, information about EPA grants, and In the Loop with EPA: Circular Economy Updates.

FY24-25 SRA NOFO-FINAL.pdf
528.7kB

SRA FY24 Flyer.pdf
313.2kB

From: Kristine Mesh
Sent: Friday, February 23, 2024 1:39 PM
To: kclerk@kinross.net
Subject: Campground host

Hi Loretta. My name is Kristine (Kris) and I'm writing in regards to the RV West employment position. I'm currently residing in Florida but looking to potentially move back North again and I feel this opportunity would be a good fit for me. I have my own RV camper and means to get around and won't be a worry at all. I am a very peculiar clean and tidy person, I like things to be organized and neat. I also enjoy the outdoors so this would be awesome to be able to do! My number is and I look forward to hopefully heading that way.

Sent from my iPhone=

Bay Mills Indian Community
12140 West Lakeshore Dr.
Brimley, Michigan 49715
(906) 248-8100 Fax (906) 248-3283

March 26, 2024

Kinross Charter Township Board
4884 W. Curtis Street
Kincheloe, MI 49788

Dear Kinross Charter Township Board,

Bay Mills Indian Community (BMIC) respectfully submits this letter in support of the township's food waste collection program. BMIC has been participating in this program since January of this year. We were sorry to recently hear the Kinross Charter Township Board is considering discontinuing the food collection program. BMIC urges the Township to consider continuing this program through the planned trial study using compostable bags. Hopefully these results and other factors at the time will justify offering the program to other entities throughout the Eastern Upper Peninsula and Lower Michigan. The Township's anaerobic digester combined with the waste water treatment system is an innovative and green technology which diverts material from landfills, reduces greenhouse gas emissions (GHG) and decreases our shared community's dependence on fossil fuels.

According to the Department of Energy, Great Lakes and Environment, food is the most landfilled material in the state, making up 1.5 million tons each year. Landfilled food waste creates methane, a potent GHG, among others, which cannot be captured by landfill gas collection systems. It is imperative for the health of our community and future generations, that we take steps now to do what we can to reduce our impacts that contribute to climate change.

The Environmental Protection Agency, US Department of Agriculture and the Food and Drug Administration is implementing a national strategy to reduce food loss and waste. One of the goals of this strategy is to increase recycling of food and organic materials which will in turn "reduce greenhouse gas emissions, save households and businesses money, and build cleaner, and healthier communities." Capturing and diverting food and other organic waste from landfilling will help the nation achieve the goal of a 50% recycling rate by 2030. The State of Michigan's MI Health Climate Plan includes a similar goal.

At BMIC, we are working toward being the best stewards of the environment we can be through a variety of strategies. Our partnership with Kinross Charter Township's food waste collection program is an important component in our strategy to reduce landfilled waste.

Chi miigwetch (thank you),

Whitney Gravelle

Whitney B. Gravelle
President, Bay Mills Indian Community

KINROSS CHARTER TOWNSHIP
KINROSS DISTRICT POLICE BOARD
REGULAR MEETING

March 25, 2024 | 4884 W. Curtis Street

MEMBERS PRESENT | **MEMBERS ABSENT**

Mike Brown
Gary Grabendike
Herman Calkins
Pat McMahon

Gus Ortiz

Also Present: Chief Micolo

Herman Calkins called the meeting to order at 1835

MOVED: Mike Brown read the minutes of the 2/26/24 meeting.

MOVED: by Gary Grabrendike, second by Herman Calkins, to accept the minutes of the February 26, meeting as read. Motion carried.

MOVED: by Pat Mcmahon, second by Herman Calkins to pay the bills in the amount 682.18. Upon a roll call vote, all members present voted, "Aye". Motion declared carried.

PUBLIC COMMENT: none

DISCUSSION:

none.

MOVED:

MOVED: by Herman Calkins second by Gary Grabendike to adjourn the meeting at 1900 hours, motion carried.

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Pat Mcmahon

Kinross District Police Department

P.O. Box 5123, 4884 W. Curtis Drive
Kincheloe, MI 49788
(906) 495-5889

ACTIVITY REPORT FOR THE MONTH OF FEBRUARY 2024

TIME CATEGORY	FEBRUARY	YTD2024	YTD2023
Traffic Patrol	106	209	241
Criminal Complaints	16	33	42
Non-Criminal Complaints	77	152	155
Court/Prosecutor's Office	8	14	10
Report Time	47	98	111
Administrative/Training Time	96	189	162
TOTAL HOURS	350	696	721
INCIDENT DATA			
Criminal Complaints (UCR)	8	18	20
Non-Criminal Complaints	38	58	63
Accidents Investigated	1	2	5
TOTAL COMPLAINTS	47	78	88
Property Inspections	115	246	213
Liquor Inspections	4	8	8
Motorist Assists	1	2	2
Subjects Investigated	30	62	101
Traffic Stops	18	36	41
Verbal Warnings	15	31	37
Traffic Citations	3	6	4
Criminal Arrests	1	3	4
Miles Driven	782	1486	2256

SUMMARY:

During the month of February our department investigated 8 criminal complaints, 38 noncriminal and 1 accident for a total of 47 complaints. Officers issued 3 traffic citation and issued 15 verbal warnings. Officers made 1 criminal arrest in February.

Officers on patrol stopped a motorcycle for a traffic violation. A subsequent investigation led to the arrest of a male subject for driving with suspended license, no insurance and no registration. He was given a court date and released.

Officers assisted the ambulance 2 times, served 9 civil papers, investigated 1 larcenies, 5 domestic disputes, 1 destruction of property complaints, 1 assault complaint, assisted county agencies 2 times, 0 criminal sexually conduct complaints, 0 breaking and entering complaints, investigated 2 juvenile related complaints, assisted DHS 1 time, assisted the fire dept 0 times and investigated 1 suicidal person.

Respectfully submitted,
Chief Joe Micolo

TREASURER'S REPORT

Account Number	Description	Beg Balance	Receipts	Disbursements	End Balance
000-001.000	GENERAL FUND - CHECKING	741,433.72	161,279.01	60,113.89	842,598.84
000-002.000	GEN FUND - UNUSED ARPA FUNDS	19,037.58	0.00	0.00	19,037.58
000-001.000	ROAD MILLAGE FUND	474,352.03	41,971.99	0.00	516,324.02
000-001.000	FIRE FUND - CHECKING	24,053.81	266.13	14,348.62	9,971.32
000-002.000	FIRE FUND - BLDG SAVINGS	31,447.42	0.00	0.00	31,447.42
000-002.005	FIRE FUND - VEH. SAVINGS	3,000.00	0.00	0.00	3,000.00
000-001.000	POLICE FUND - CHECKING	306,253.14	88,145.74	34,052.76	360,346.12
000-002.000	POLICE FUND - SAVINGS	0.00	0.00	0.00	0.00
000-001.000	RECREATION FUND - CHECKING	141,620.72	67,651.93	14,681.48	194,591.17
000-002.000	RECREATION FUND - SAVINGS	13,188.92	0.00	0.00	13,188.92
000-001.000	AMBULANCE FUND - CHECKING	268,362.65	259,576.88	202,825.99	325,113.54
000-002.000	AMBULANCE FUND - VEH. SAVINGS	40,000.00	0.00	0.00	40,000.00
000-002.005	AMBULANCE FUND - EQUIP SAVINGS	0.00	0.00	0.00	0.00
000-001.000	PROPERTY MNGMT - CHECKING	54,159.46	45,165.80	34,264.59	65,060.67
	" "- RESERVED FOR TAXES	25,770.43	3,010.00	28,780.43	0.00
000-001.000	PUBLIC IMPROVEMENT FUND	4,354.28	0.00	0.00	4,354.28
000-001.000	PARKS FUND	81,550.27	241.20	10,499.17	71,292.30
000-001.000	FAIRGROUNDS FUND - CHECKING	5,114.66	488.80	4,160.30	1,443.16
000-001.000	GOLF COURSE FUND - CHECKING	9,256.51	11,280.41	10,389.86	10,147.06
000-001.010	GOLF COURSE-RESERVED FOR TAXES	1,053.65	0.00	1,053.65	0.00
000-002.000	GOLF COURSE FUND - SAVINGS	0.00	0.00	0.00	0.00
000-001.000	SEWER FUND - CHECKING	644,761.94	330,173.49	164,107.40	810,828.03
000-002.001	SEWER FUND - OPERATION & MAINT	280,000.00	0.00	140,000.00	140,000.00
	SEWER FUND - SAVINGS	42,019.50	0.00	0.00	42,019.50
000-001.000	WATER FUND - CHECKING	177,300.37	31,862.49	44,721.43	164,441.43
	WATER FUND - SAVINGS	28,990.11	0.00	0.00	28,990.11
000-001.000	RUBBISH COLLECTION FUND	51,940.46	18,832.95	14,927.56	55,845.85
	TOTAL AVAILABLE CASH	3,469,021.63	1,059,946.82	778,927.13	3,750,041.32
000-001.001	DPW SECURITY DEPOSITS	5,305.00	0.00	100.00	5,205.00
000-002.020	SEWER FD-SRF CONSTR ACCOUNT	67.14	0.00	0.00	67.14
000-002.025	SEWER FD-SEG 1 BOND RESERVE	375,270.00	0.00	0.00	375,270.00
	SEWER FD-SEG 1 BOND REDEMPTION	210,686.40	0.00	0.00	210,686.40
000-002.042	SEWER FD-SEG 2 BOND RESERVE	180,000.00	0.00	0.00	180,000.00
	SEWER FD-SEG 2 BOND REDEMPTION	49,365.63	0.00	0.00	49,365.63
000-002.045	SEWER FD-SEG 3 BOND RESERVE	0.00	0.00	0.00	0.00
	SEWER FD-SEG 3 BOND REDEMPTION	21,509.84	0.00	0.00	21,509.84
	AMBULANCE FUND A/R (NET)	930,119.40	555,171.85	479,930.42	1,005,360.83