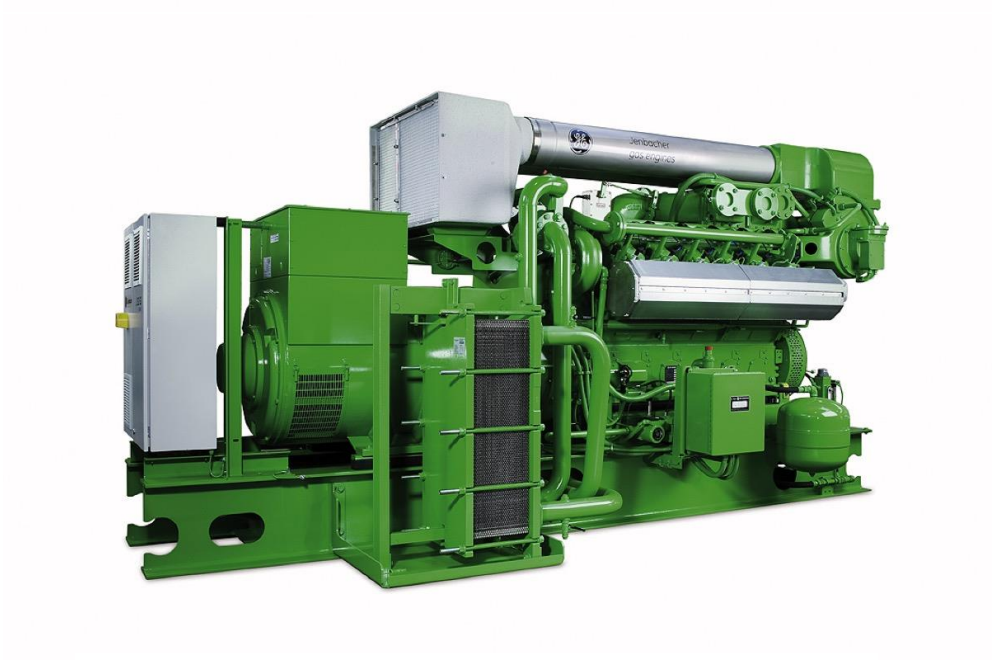

Equipment is a representative of a combined head and power motor. Actual equipment will be established through bidding.

Combined Heat & Power System

This fact sheet addresses common questions about the **combined heat and power system** that is being incorporated in the proposed project.

Purpose and Benefits of Process

The combined heat and power (CHP) system serves two main purposes in the proposed design:

1. The purpose is to recover the energy value of the methane produced by the anaerobic digesters. Without the CHP system the biogas produced by the anaerobic digesters would be flared resulting in a waste of the potential energy value.
2. The CHP engine (generator) will produce power that will offset a portion of the treatment plant power demand, which will significantly reduce the operating costs for the facility.
3. Heat recovered from the engine exhaust will allow production of steam for use in the thermal hydrolysis system.
4. Heat recovered from the engine cooling water will produce hot water for use in the treatment facility. Used include heating of the digester building and heating of certain process tanks.

According to the United States Environmental Protection Agency (EPA), the benefits of a CHP system include:

- Higher efficiencies – CHP requires less fuel to produce a given energy output and avoids transmission and distribution losses that occur when electricity travels over power lines.
- Environmental benefits – Because less fuel is burned to produce each unit of energy output and because transmission and distribution losses are avoided, CHP reduces emissions of greenhouse gases and other air pollutants.
- Economic benefits – CHP can save facilities considerable money on their energy bills due to its high efficiency and it can provide a hedge against electricity cost increases.

The above benefits described by the EPA are assuming that the input fuel to a CHP system and a conventional energy system are the same. Since

the majority of the fuel that will be consumed by the proposed CHP system is renewable biogas generated from the treatment of wastewater, the environmental and economic benefits are amplified. Environmental benefits are amplified because the use of renewable biogas offsets the amount of non-renewable natural gas or coal to be burned. Also by combusting the biogas, the CHP system is reducing the global warming potential of the biogas by 95%. Economic benefits are amplified because the biogas is generated on site as a byproduct of anaerobic digestion. This free source of gas offsets the amount of natural gas to be purchased.

Description of Process

The biogas created in the anaerobic digestion system will be piped to the CHP equipment pad, where it will be treated to lower the hydrogen sulfide, siloxane, and moisture content in the biogas in preparation for it to be burned in the CHP engine. This preparation helps minimize the amount of time the CHP engine needs to be turned off for maintenance.

The treated biogas is burned in the CHP engine to turn generators that produce electricity; this electricity will be consumed on-site, and will reduce the amount of electricity the Franklin WRF will have to purchase from the electrical grid. The exhaust gas from the combustion engine is routed through a heat recovery steam generator (HRSG) that uses the heat in the exhaust gas to convert hot water to steam; this steam is used in thermal hydrolysis system and is the main source of heat for the biosolids process.

Additionally, a closed loop cooling system, called a water jacket, is used to cool the engine to keep it from overheating. This loop sheds the heat it absorbs from the engine into a separate hot water loop, which will be used to provide building and process heating for the biosolids facility.

What Process Modifications will be made?

The CHP system will be an addition to the site rather than a modification of existing structure or systems. The entire existing biosolids system at the Franklin WRF is past its useful life and is being replaced with the proposed new biosolids process. The CHP system will consist of various gas cleaning equipment, an engine and generator, and heat exchangers. The gas cleaning equipment and heat exchangers will be outside on concrete pads and the engine and generator will be in a sound reducing enclosure.

Is the process a potential odor source? Is the process odor controlled?

The CHP engine should not produce any odors as contaminants will be removed prior to use in the engine, so the exhaust will be largely carbon dioxide and water. The gas cleaning has a waste stream that will go to the onsite sewer system, but is otherwise a sealed system. The waste stream will be a low flow stream that will go directly into the sewer system, so it should not produce much odor. We don't anticipate any odors from the CHP process to be detectable at the property lines.

Does the process include equipment that has the potential to create noise? If so, is there any noise control provided?

The process includes an internal combustion engine and generator system (and a second that may be added in the future) and will be housed outside, but in its own container with sound absorbing insulation. The engine and generator system specifications require sound proofing to achieve a sound value of 70 decibels at a distance of 1 meter from the container. For reference, this sound is roughly equivalent to the sound of a vacuum cleaner. The engines are approximately 400 feet away from the closest residential property; at this distance, the sound level will be approximately 30 decibels. For comparison purposes, 30 decibels is about the sound level in a library or a bedroom at night.

Will the process modification change the look and feel of the site?

The CHP system will be located outdoors adjacent to the proposed Digester Building. The engine and generator (eventually two engines and two generators) will be located in containers, that resemble shipping containers. Additional process equipment includes stainless steel tanks and piping that are associated with the digester gas cleaning system.

Will the process modification change the safety of the site?

The gas handling, gas cleaning and gas usage systems are designed in accordance with all safety standards, including NFPA 820, Standard for

Fire Protection in Wastewater Treatment and Collection Facilities. If methane generated by anaerobic digestion were not available for onsite energy needs, natural gas would be used to fulfill those same needs and the same network of gas piping and the same safety measures would be necessary.

In the unlikely event that a methane release were to occur the volume of release would likely be much more limited than a release from a natural gas pipeline break since the volume of available gas is limited to rate at which methane can be generated by the digesters. Since methane is lighter than air, it would rise into the atmosphere and be dispersed rather than migrate laterally to adjacent areas.