Lee Goosens
Lake Investments
(Via email)

3rd October 2025

Dear Lee

Stonehouse Farm – Lot 8, Handcross.

Further to our discussion, and recent reporting (Acoustic South East J3958 dated 19/12/2024), I write to reiterate a number of points.

Prior to these, it is relevant to understand some elements around the assessment of sound and its behaviour. Sound is argued as being measurable whilst noise is indicated as being unwanted sound (definition from the World Health Organisation, Guidelines for Community Noise dated 1999).

The Behaviour of Sound

In order to appreciate noise reports, it is important to know how sound behaves and propagates. Some details are provided in the following paragraphs.

Sound is measured in decibels (dB) and is often a relative sensation as one sound can mask another.

The dB scale is a logarithmic scale as opposed to a linear scale and it is important to note the following:

- A change in 1dB is not considered noticeable by a human
- A change is 3dB is only just considered noticeable by a human
- A change in 10dB is classed as a doubling or halving of loudness to a human, if a sound is at least 10dB below existing sound levels, it is generally considered that it does not contribute to the existing environment.
- The above is taken from Bruel and Kjaer, Measuring Sound, September 1984
- Smith,Peters,Owen, 1996 also refers as follows:

"*Subjectively, an increase of 3dB is just noticeable, whereas an increase of 10dB, a tenfold increase in intensity, is judged by most people as a doubling of loudness. A 1dB increase is just detectable under the most favourable laboratory conditions.*"

Sound emanating from a point source (a stationary object) reduces by 6dB each time the distance from it doubles (this is known as the inverse square law).

Sound emanating from a continuous line source (such as a road or a railway) reduces by 3dB each time the distance from it doubles.

Sound measured 1 metre from a hard surface increases by 3dB due to the reflection effect of the surface (commonly referred to as a "façade level").

For sound to be classed as "free field", it should be at least 3m from a reflective surface in the plane where it is measured (for example, when measuring road noise, a wall is considered to be the reflective surface but the ground is not, however when measuring aircraft noise, the opposite is true).

The image below, gives typical sound level values for everyday examples:

Painful Acoustic Trauma	140	Shotgun blast
	130	Jet engine 100 feet away
	120	Rock concert
Extremely Loud	110	Car horn, snowblower
	100	Blow dryer, subway, helicopter, chainsaw
	90	Motorcycle, lawn mower, convertible ride on highway
Very Loud	80	Factory, noisy restaurant, vacuum, screaming child
Loud	70	Car, alarm clock, city traffic
	60	Conversation, dishwasher
Moderate	50	Moderate rainfall
Faint	40	Refrigerator
	30	Whisper, library
	20	Watch ticking
	dB levels	

Figure 1. Typical Noise Level Examples

Outcomes from the Acoustic Report (J3958)

The measured sound pressure levels adjacent to the noise sensitive receptor at Hill Crest Farm were consistent across the survey period and only changed by 1dB. These were 59dB – 60dB L_{Aeq}, 07:00-19:00 hours – daytime. The soundscape at Hillcrest Farm is dominated by road traffic noise from Handcross Road.

Noise modelling software was used to predict the noise break out from the simultaneous uses of the proposed offices and the proposed B2/B8 uses.

The proposed offices were set to 65dB $L_{Aeq,T}$ internally, and the B2/B8 use was set to 85dB $L_{Aeq,T}$ internally, at an internal soundscape where employees would be required to wear hearing protection. These internal noise levels were used to represent a worst case(s).

The predicted noise break out from the proposed uses was 24dB $L_{Aeq,T}$ (rounded) at the nearest noise sensitive receptor. This was 22dB below the measured background sound pressure levels for the site and would not be audible.

To ensure a robust assessment, vehicle passes were also considered passing the long track adjacent to Hillcrest Farm. The outcome was that in a worst-case hour, the vehicle passes were predicted to be 44dB $L_{Aeq,T}$ and this was compared against 59dB $L_{Aeq,T}$ for the ambient soundscape. Again, the passes would not likely be audible.

Consented Uses

It is recognised that the current consented uses of the site are an AD plant and a robotic milking parlour. The AD plant forms the site where the offices are proposed, and the larger building is the consented milking parlour. It should be noted that the AD plant is currently in a dormant state and the milking parlour has not been fully constructed. Both uses will generate a noise impact.

Anaerobic Digestion (AD) Plant

Presently a dormant AD plant is located on part of the site.

When operational these are noisy processes with multiple pumps, stirrers, fans, deliveries (HGV), mobile plant ie dozer loaders etc to facilitate movement of waste products, condensers, fans, flares and combined heat and power plant type generators and/or engines. Such plant will also not just run during the daytime period, but elements of the plant for safety reasons will inevitably run 24/7. Images of the AD plant can be seen in Figure 2 below.

Figure 2. AD plant, site images

Figure 3. Consented Dairy/Milking parlour/Proposed B2/B8 Unit

Based on the supporting information for the DC/14/0729 application to Horsham District Council, a 237kW AD system engine was proposed. The following assumptions have been made;

The noisy elements of the AD system occur within the constructed building, as opposed to the 2 larger tanks which occupy the rectangular building adjacent (see Figure 2 above). On inspection at site, it is estimated that the building material is a Kingspan 1000 profiled insulated metal sheet with a Rw of 24dB.

From supporting documents from the original application an unsilenced engine has a sound pressure level of 103.1dB at 1m. To account for a reverberant internal space, a 6dB correction is applied. This accounts for an internal sound pressure level of 109.1 dB $L_{Aeq.T}$.

Subtracting 24dB through the Kingspan structure would provide 85dB externally. Importantly, from inside to outside, a 6dB loss to atmosphere occurs, so the outside sound pressure level is likely to be 79dB at 1m. Using a conservative 10log distance attenuation to the footpath measured at 8.4m from the building, this is estimated to be a distance attenuation/reduction in sound energy of 9.2dB. At the footpath position, the sound pressure level will therefore be 69.9dB, rounded to 70dB for the engine noise alone.

The accompanying documentation also specifically references an unsilenced gas exhaust system of 120dB at 1m. This is assumed to be the vent pipe measured at 14.4m from the building edge. Incorporating an additional 8.4m to the footpath position, this would account for 22.8m of distance to the footpath. This would account for a reduction of sound energy of 27.2dB using a 20log relationship for the point source (ie 20log(22.8/1)=27.2. The unsilenced gas system is therefore likely to be 92.8dB at the footpath position.

From photographs taken on site (see above), it is also apparent that there is external plant likely to have been operating too. From experience, there will inevitably also be sound generated from HGV/tractors bringing waste products to the site, shovel loaders, and other mobile plant as well as condensers, pumps etc.

Logarithmically combining the unsilenced engine and the gas system is calculated using $10\log(10^{7.0}+10^{9.28})$=92.8dB. Even if the gas system were only to be intermittent, the level of 70dB $L_{Aeq,T}$ at the footpath would be the dominant sound.

Given that there remains a planning condition around sound from the AD plant being inaudible at Hillcrest Farm, this is also capable of being calculated.

For a sound to be inaudible at a location it must generally be at least 10dB below the measured soundscape. It is known that the measured soundscape adjacent to Hillcrest Farm is 59dB $L_{Aeq,T}$. Therefore, for a sound to be inaudible at that location, it would have to be less than 49dB $L_{Aeq,T}$.

Therefore, for the AD unit being 70dB at 8.4m, inverse square law would apply and 20log(412/8.4) provide a distance attenuation of 33dB. This would be predicted to be 37dB $L_{Aeq,T}$ at Hillcrest farm and as stated, given the range below the measured soundscape, this would not be audible at Hillcrest farm. The sum does also not take account of the 22m of topographical change which would likely further reduce the predicted sound pressure level at Hill Crest Farm.

It stands to reason that the noise level with the plant operating inside the AD space and the gas system would be noisy and easily apparent at the footpath location.

The proposed office and B2/B8 units using the noise modelling software predicts 47dB $L_{Aeq,T}$ at the footpath location.

Comparing the operational AD system of 70/93dB $L_{Aeq,T}$ rounded provides a substantial increase in noise levels and it is argued that the proposed office and B2/B8 units will be significantly quieter than the historic uses.

Dairy Unit

The dairy unit was consented by Horsham District Council under DC/06/1106. The planning decision notice has limited references to noise, other than deliveries/loading not to occur prior to 07:00 hours (condition 8), as well as doors to be kept closed when the facility is in operation (condition 12).

A recent Horsham application for a milking parlour (DISC/22/0306) lists a similar operation and had a milking machine measured as 75dB $L_{Aeq,1minute}$ at 1m. This complete with cows being moved into and out of the building is likely to also contribute to the soundscape, as measured at the footpath location.

In combination with the AD plant, the dairy location, would likely also be noticeable at the footpath location.

Summary

It is evidenced from the information above that the proposed offices and proposed B2/B8 unit would not be a concern at the nearest residential receptor.

It is also evidenced that the proposed new uses, would be quieter than the historic consented uses of the AD plant and the milking parlour. Whilst the location of the proposed offices and B2/B8 uses is rural, it is likely to have been dominated by a commercial/industrial soundscape.

Any questions or queries, please do not hesitate to call.

Yours sincerely

Scott Castle
Director
Acoustic South East

Enclosed : Stonehouse Farm Planning AD Description from DC/13/0259

Christopher Peters.

GREEN GAS TECHNOLOGIES LTD

DC/14/0729

System Description & Operation

Stonehouse Farm

Bob Phillips

6/13/2014

Table of Contents

Introduction

This document describes the proposed Anaerobic Digestion system for Stonehouse Farm, inSussex. It will include a general disposition of the system, the system's configuration and principles of operation.

System Description

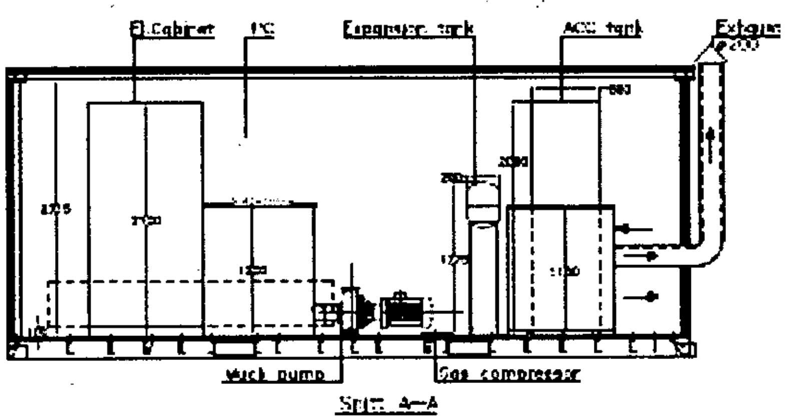
Principle System Elements

The system will comprise the following principle elements:

- Control Container including substrate pump
- 2 units 550 m3 Methanation Digesters
- Digestate interface to digestate dryer
- Gas interface to Combined Heat & Power Generator (CHP)
- CHP with grid interface and heat interface to digestate dryer
- Gas flare.

Control Container with Substrate Pump

The Control Container, as the name implies, control the operations of the AD plant through use of a PLC system that continuously monitors the status of the AD plant and controls its operation.



The control container houses an electrical fuse, switching gear and PLC in an Electrical Panel, human interface is via a PC.

The main substrate pump is also located in the Control Container, along with the Gas Compression Fan, Water Boiler (gas fired) and hot water management system.

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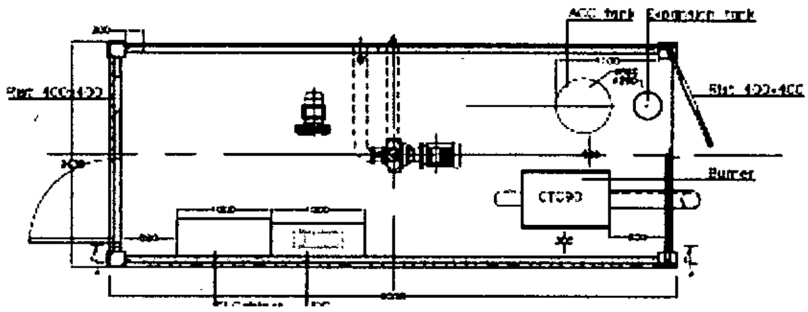
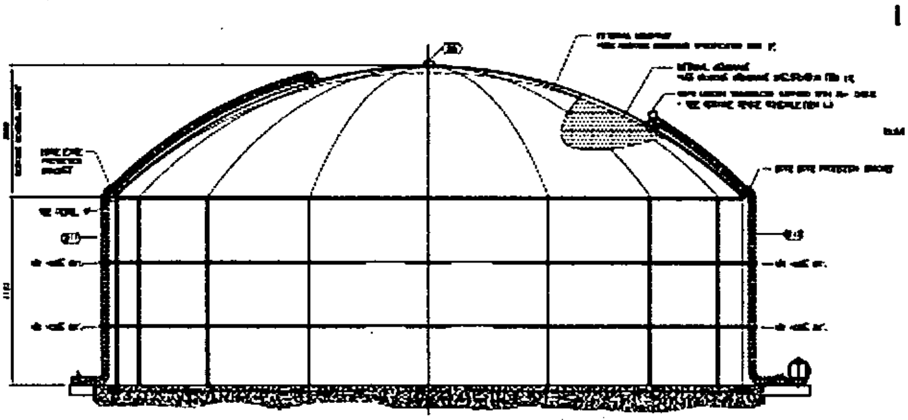


The container is equipped with fire and gas detection sensor, also linked to the PLC to ensure safety.

Methanation Digesters

The system will be equipped with two 550 m3 methanation digesters. The digesters will be constructed of Glass Reinforced Plastic panels. The tank when erected will stand 4,123 metres high and have a diameter of 13,66 metres.



A Biogas Class II PVC dome adds a further 2,85 metres to the height of the digester.

The tanks are double sealed with expansion compensating sealant, and are built in a depressed catchment pit at a depth of 3 metres. The whole catchment pit is in a ~~chalk~~ sandstone stratum that is lined with impervious concrete with an integrated sump equipped monitoring sensors and pumping equipment.

The pit has the capacity to retain more than the entire content of both digesters.

The digestate in the digesters will be agitated by the Gas Mix system developed by Landia. This system ensures adequate agitation of the digestate without the need for moving parts within the tank, thus negating the possibility of tank damage from within the tank.

The digester tanks will covered by PVC membrane to capture and store the biogas. This arrangement can capture and store up to 220 m3 gas each. This is equivalent to 2 hours gas supply to the CHP.

Digestate Interface to Digestate Dryer

The transfer of completed digested will take mechanically and without the digestate making contact with the atmosphere until it enters the dryer.

At this moment in time it is not known whether the dryer will be capable of streaming digestate continuously through its system or whether it operates in a batch type mode.

In any event the design of the AD system can facilitate a buffering of completed digestate at an equivalent of three days output.

Gas Interface to Combined Heat & Power (CHP) Generator

Gas will have its operational pressure increased from a raw gas pressure of 0.5mbar to 8mbar, to an operational pressure of 100mbar to feed the CHP. This will be achieved using a centrifugal turbo fan.

The compressor will be controlled and regulated by the system PLC.

Gas Flare

In the event of a CHP breakdown and an eventual accumulation of gas, the PLC will automatically start the flaring of excess gas, once the gas feed pressure from the methanation tanks reaches a pressure greater than 8mbar.

Operational Description

General

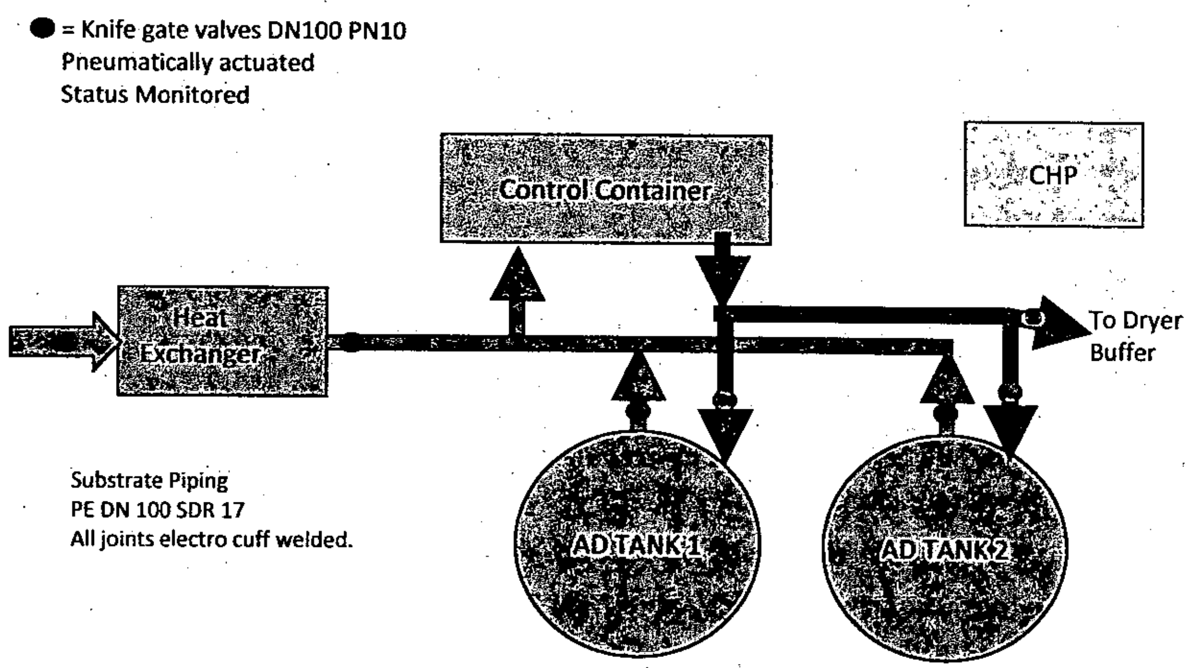
Operationally the AD system will operate as a batch flow single stage stirred process as the substrate entering the system has already been thoroughly hydrolysed.

In all likelihood the process will call for a 14 to 20 day average retention time.

The system will deliver 38m^3 of substrate to the process daily portioned in batches 4 to 8 portions. The feed in rate will be determined during the system commissioning phase of the installation.

Substrate Movement

All substrate movements are controlled and monitored by the PLC in accordance with schedules developed by the operator.



The two AD tanks can operate in Mesophilic (38°C – 42°C) or Thermophilic (55°C to 58°C) depending on the requirements of the operator. The tanks can also be operated in parallel or cascaded modes.

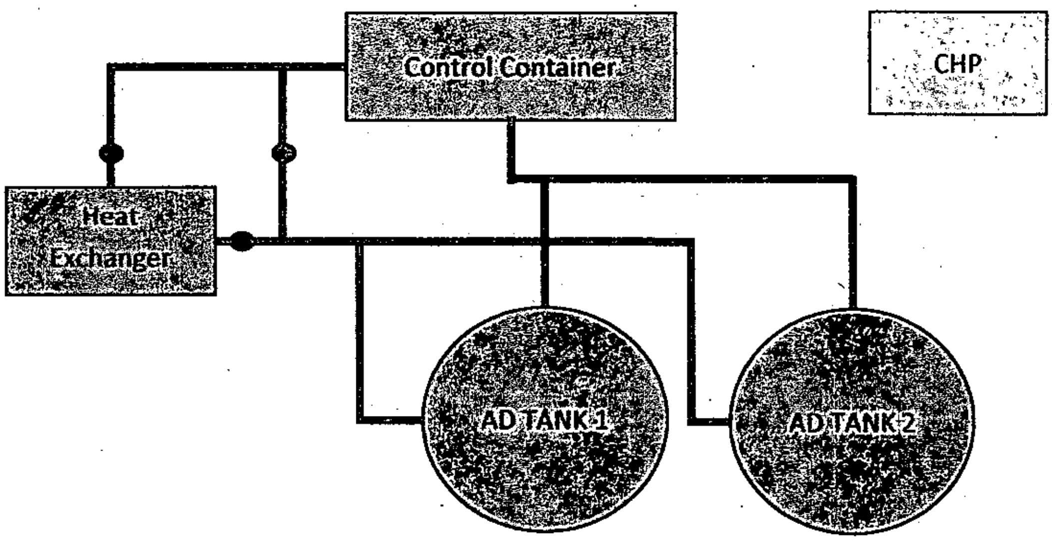
The PLC controls the flow of substrate to and from the relevant tanks via pneumatically actuated knife gate valves. These valves are equipped with position sensors. The valves are normally closed with air pressure from a compressed air reservoir holding in a closed state. A valve is activated (opened) by the activation of a magnetic switch to reverse the air pressure to the cylinder actuator.

In the event of a system failure or a power failure, all valves will be automatically closed.

All valves are checked by the PLC before and during pumping operations. Should a valve be in a wrong position or be in an in-between position the pumping operation will be inhibited and an error event broadcast in the PLC and through an SMS link up, to the operator.

Digester Heating System

In the Stonehousefarm application as much of the heat in the substrate fed to the AD plant will be conserved, thus reducing the amount of biogas used in the maintenance of the digester temperatures.



The control container includes a gas fired boiler capable of providing up to 90kW of energy to the digester tanks. To ensure a stable operation of the boiler, the hot water circuit includes an accumulator tank.

The digester heaters have their own temperature regulation circuits on the tank wall. This enables the digesters to operate in different digestion modes, mesophilic or thermophilic, as determined for the most efficient operation of the system.

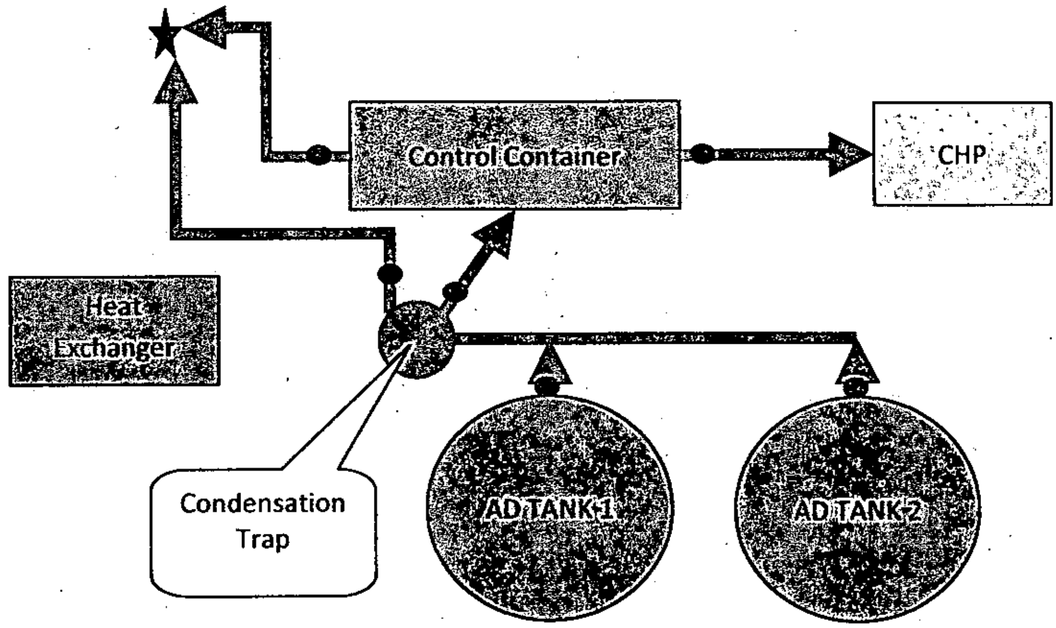
The inclusion of the heat exchanger can be selected as desired hot water system. The PLC will manage the connection and disconnection in accordance with the transfer of substrate; which it also manages.

The CHP hot water system is not necessarily integrated with the AD hot water system, but could be integrated should that be operationally required.

The main feed pipes for the flow and return of water in the system insulated 32mm alupex pipes. Each digester tank has its own circulation pump with a shunt valve controlled by the PLC from criteria regarding target temperature, max flow temperature set and the temperature measured in the digester.

The heating pipes are located in the floor of the digesters comprising 25mm alupex heater pipes embedded in heat transferring cement.

Gas Management



The gas pipe work is built using DN100 PE pipe SDR11. Apart from when joining gas equipment, all joins in the pipe work are achieved using electro-welded sleeve joints. All pipe work is tested post-installation and post maintenance using an inert gas pressure test at 3 Bar for a period of 3 hours.

All gas pipe work is within the bounds of the building within which the AD plant is installed. Should it be necessary to feed gas outside the bounds of the building, piping will continue in its PE format underground and be migrated to 2" steel piping.

All piping will be clearly marked as gas bearing.

There is no purpose built gas reservoir; each of the digester tanks has the capacity of storing 220m3 of biogas, the equivalent of 4 hours operation of the CHP.

The gas system is equipped with a condensation trap for the removal of excess water vapour in the biogas and to also reduce H2S.

The gas, after the condenser, is piped to the Control Container where it is monitored by a gas analyser before passing to a gas compressor. He compressor compresses the gas from a pressure range of 0,2 – 8 mBar to the range 30 mBar to 100 mBar, depending on the pressure requirement of the gar fuelled equipment.

Gas pressure is monitored pre-condensation trap and post compressor. Data from sensors are fed to the PLC.

The gas flow is controlled by the PLC, monitoring gas pressure and quality. Valves located at critical points throughout the gas network, offer supervision of gas flow and isolation in maintenance situations.

Condensation Trap

The condensation trap consists of a 200 litre to 400 litre chamber filled with non-glazed porcelain beads. The raw gas from the methanation digesters is fed to the bottom of the porcelain bead bed and allowed to percolate upwards through the beads. The dried gas is fed off from the top of the chamber.

The bottom section of the chamber collects the condensate and through 25 mBar water lock. Condensate is drained to the drainage sump, a sump which is periodically sampled and tested before draining outside of the system.

Hot Flare

Flaring of excess gas is arranged in two modes; a low pressure mode for when the CHP is running but the gas production exceeds consumption; and a high pressure mode for when the CHP is out of operation and the gas production is still too high.

Generally the flare is under the control of the PLC, however manual operation is also possible.

Environment & Safety

Environment

Precipitation and Flooding

The system is installed under a roofed, structure. As a result the system will be somewhat protected from precipitate flooding. However any influx of water will be well drained and all equipment is well protected from water damage.

The location of the site, on high ground, negates the possibility of flooding caused by overflowing water courses.

Bio-aerosols

Because the plant is fed from a Thermo Aerobic Digester where complete hydrolysis and pasteurisation is achieved, the substrate and resultant digestate is completely free of bio-aerosols and odour making hydrocarbons.

Accidental Discharge of Substrate or Digestate

In the event of damage to containment vessels, the digester tanks are placed in a bunded pit capable of containing the entire content of both digester tanks.

Substrate piping is both robust and protected, however if whilst carrying out maintenance of the piping system the piping is located in a impermeable cement area, with a sump for collection of eventual run-off from opening a pipe for maintenance.

Generally a procedure in the operator's manual calls for the flushing of substrate pipes prior to the commencement of a maintenance intervention.

Any accidental spills from piping, valve or pump service and maintenance will be caught up in the drainage sump and can be re-entered to system.

In the event of a total system failure and complete failure of the digesters, all substrate can be contained until it can be removed for proper disposal at another site, if necessary.

Gas Leaks and Fire

The Control Container and the roof of the building are equipped with smoke and hydro-carbon gas detectors, monitored by the PLC. In the event of them being triggered, an audio and visual alarm will be activated, along with a warning transmitted through SMS.

Depending on the nature and location of the sensor trigger, the PLC will shut down part or all of the systems operations, venting gas to the flare.

Safety

The plant will at all times be subject to current regulations and directive of Health, Safety and Environment, HSE.

The AD plant is secured in a building with controlled access.

Access to the AD plant internally to the total site will be controlled and personnel access limited. Any visitors to the plant will at all times be accompanied by a qualified system operator.

In the event of maintenance or repair of digesters or in the digester pit, personnel will be required to carry H2S detectors. Whilst there are personnel working in the digesters or in the digester pit, a safety watch is to be kept from a safe distance from the digesters.

Phillips
June 2014

Engine noise pressure level at 1m [dB]	75.8	76.7	89.7	96.2	98.5	97.7	93.7	89.7
Damping attenuator [dB]	-8	-15	-30	-42	-38	-44	-46	-32
dB(A) correction	-26.4	-16.1	-8.6	-3.2	0	1.2	1	-1.1
Subresult noise pressure level [dB(A)]	41.4	45.6	51.1	51	60.5	54.9	48.7	56.6
Noise pressure level at 1m [dB(A)]	63.6							

Exhaust gas system - silenced

Frequency	63	125	250	500	1k	2k	4k	8k
Soundpressure level [dB] (at 1m)	95.6	98.4	98.4	104.2	120	100.3	100.3	87
Soundpres. reduction resonance silencer	-7	-17	-23	-12	-23	-7	-3	-1
Soundpres. reduction absorbtion silencer	-16	-37	-35	-40	-47	-43	-38	-28
dB(A) correction	-26.4	-16.1	-8.6	-3.2	0	1.2	1	-1.1
Soundpressure level [dB] (at 1m)	46.2	28.3	31.8	49	50	51.5	60.3	56.9
Soundpressure level [dB] (at 1m)	62.8							

From: "Sioly, Cyril" <cyril.sioly@cogenco.com>
Subject: **Noise Level 250kW**
Date: 3 July 2014 15:04:58 GMT+01:00
To: [redacted]
Cc: [redacted]>
1 Attachment, 19.6 KB

Mr Cooper,

Following our phone discussion I could not find any information regarding noise data of a 250kW unit. Nevertheless please find enclosure the noise data of a 237kw unit which should have a similar noise spectrum.

Best regards

Cyril Sioly
Cogenco Limited
Mobile +44(0) 7827 982751

Sound Pressure Levels

Cogenco

CGC 237	Engine:	MAN E 2842 E 312	Speed:	1500	RPM
Overall level	65	dB(A)			

Engine - Unsilenced

Frequency	63	125	250	500	1k	2k	4k	8k
Engine noise pressure level [dB] (at 1m)	75.8	76.7	89.7	96.2	98.5	97.7	93.7	89.7
dB(A) correction	-26.4	-16.1	-8.6	-3.2	0	1.2	1	-1.1
Subresult noise pressure level [dB(A)]	49.4	60.6	81.1	93.0	98.5	98.9	94.7	88.6
Noise pressure level at1m [dB(A)]	103.1							

Exhaust gas system unsilenced

Frequency	63	125	250	500	1k	2k	4k	8k
Soundpressure level [dB] (at 1m)	95.6	98.4	98.4	104.2	120	100.3	100.3	87
dB(A) correction	-26.4	-16.1	-8.6	-3.2	0	1.2	1	-1.1
Soundpressure level [dB] (at 1m)	69.2	82.3	89.8	101	120	101.5	101.3	85.9
Soundpressure level [dB] (at 1m)	120.2							

With canopy

Frequency	63	125	250	500	1k	2k	4k	8k
Engine noise pressure level [dB] (at 1m)	75.8	76.7	89.7	96.2	98.5	97.7	93.7	89.7
Damping canopy [dB]	-15	-23	-30	-35	-38	-39	-41	-40
dB(A) correction	-26.4	-16.1	-8.6	-3.2	0	1.2	1	-1.1
Subresult noise pressure level [dB(A)]	34.4	37.6	51.1	58.0	60.5	59.9	53.7	48.6
Noise pressure level at1m [dB(A)]	65.0							

Air attenuators

Frequency	63	125	250	500	1k	2k	4k	8k