ZORG BIOGAS

Proposal

Biogas plant 325 kW gross
for a pig farm 30 000 pigs/year

Date: 07/05/2024

Validity: 3 months

CONTENTS

OVERVIEW

We offer a solution to process pig manure from a pig farm 12 000 finisher pigs (30 000 pig annually) into biogas and electric power 325 kW gross/278 netto in a single-stage CSTR digester. Taking into consideration off-hours for maintenance and repairs it means 2,2 million kWh electric energy per year netto as an income.

Alternatively to the power generation raw biogas can be used directly in the existing boilers of a meat factory. 1900 m3 natural gas /day can be replaced or 20MWh thermal energy/day or 67 MMBTU. In that case the c-generator can be excluded from the total budget.

Raw material potential

Substrate	Quantity (tonnes/day)	Quantity (tonnes/year)	DM content: (%)	ODM content (%)	DM quantity (tonne s/ day)	ODM quantity (tonnes / day	Biogas yield (m^3 / tonneODM)	Biogas (m^3 /day)	Methane content (%)	Biogas (m^3 / year)
Pig manure	150	54750	5	75	7,5	5,6	550	3094	60	1129310

Biogas plant technical performances

Characteristics	Values	Figures
Number of digesters	units	1
Digester		
a) volume:		
Work	m^3	3400
Overall	m^3	3680
b) Organic load	kgODM/ m^3	1,5
c) Hydraulic retention time (gross)	days	25
d) Overall dimensions of the digester (diameter / height)	m	25,0/7,5
e) Temperature	^0C	+38
Gasholder		
a) Volume	m^3	984
b) Number of gasholders	units	1
c) Dimensions of the gasholder (diameter / height)	m	25/5,0

Number of personnel

Personnel is "0" people. Only 1 driver is needed to load substrates. Biogas plant is fully automated and remotely controlled from a smartphone or a notebook.

WORKING PRINCIPLE

The technology is based on the biochemical conversion of organic materials from high molecular weight compounds to low molecular weight compounds. The first stage of this process is hydrolysis. Hydrolysis produces organic acids and alcohols.

Organic compounds + H2O→ C5H7NO2+HCO3.

Further conversion of obtained dissolved compounds like organic acids and alcohols (C5H7NO2,HCO3) into gases - CH4, CO2. C5H7NO2 + HCO3 + H2O → CH4+CO2+NH4.

Biological process of consecutive (phasic) conversion of organic compounds take place in anaerobic environment i.e. in oxygen-free tank (biological reactor). At the first stage of fermentation, substrate hydrolysis take place under acidogenic bacteria influence. At the second stage, elementary organic compounds come through hydrolysis oxidation by means of hetero-acidogenic bacteria with production of acetate, carbon dioxide, and free hydrogen. The other part of the organic compound including acetate forms C1 compounds (elementary organic acids). Produced substances are the feedstock for methanogenic bacteria of the third type. This stage flows in two processes of A and B type the character which depends on caused by different bacteria type. These two types of bacteria convert the compound obtained during the first and second stages into methane CH4, water H20 and carbon dioxide CO2. Methanogenic bacteria are more sensitive to the living environment compared to acidogenic bacteria. They require a complete anaerobic environment and a longer reproduction period. The speed and scale of anaerobic fermentation depends on bacteria metabolic activity. That is why the biogas plant chemical process includes hydrolysis stage, oxidation, and methanization stage. For that kind of substrate, these processes take place in the same reactor

Technological process of biogas production

Pig slurry pumped into a receiving tank. The receiving tank is equipped with a submersible mixer, level sensors and Raw material preheating system. The raw material is heated to a temperature of + 25 ° C to avoid a sharp temperature drop when it is fed into the digester. Substrate from receiving tank is loaded into digester by portion with pump. In digester the substrate is brought up to a temperature of +38C. Constant temperature is sustained for the entire digesting period. The digester operating regime is mesophilic. The heated substrate in the digester is blended periodically by mixers. The average time of processing in the digester is 25 days (gross).

After the digester, the substrate is fed by pump to the separator area where it is separated into solid and liquid bio-fertilizer. Solid bio-fertilizer is discharged to the separation area and transported for storage; liquid filtrate is directed to a filtrate tank.

Digester are equipped with a gasholder for accumulating of biogas. The gas holder's weather protective film protects the gasholder from precipitation and damage by foreign objects. The weather protective film is fixed firmly by a special system. To protect the gasholder from overpressure, digester is equipped with safety valve, which start working at a pressure of 5 mbars and bleeds biogas to the atmosphere. The biogas then goes through a gas pipeline to a ground heat exchanger, where a condensate is discharged. Then biogas goes to a compressor, where the pressure is raised up to 80-150 mbar to meet engine requirements. After the compressor, biogas is supplied to CHP unit to produce electric and heat energy.

All technological processes are controlled and operated by an automatic system. Biogas plant work is monitored at the central control room monitor. The control room is equipped with a central control unit, which allows the switching of any biogas plant module into automatic or manual mode with local or remote control.

MAIN EQUIPMENT

Digester

Digester is a tank of cylindrical form (for better mixing during the fermentation). It is built of cast-in-situ reinforced concrete based on sulphate-resistant cement with thickness of walls and bottom - 0,25m. In the center of the digester there is a column with chapiter. Overlap of digester is reinforce concrete plate. On the tank's wall and in the bottom there is to be installed pipelines for heating, intended for assurance and maintenance of the optimal fermentation process temperature at thermophilic conditions. For heat conservation and reduction of heat energy consumption, the digester walls, overlap and bottom are insulated outside with 100 mm slabs of extruded polystyrene foam. Over the heater, the substructure walls and bottom are insulated with roll damp proofing. Superstructure and substructure heat insulation is protected by shaped sheet from the outside mechanical damages and rodents. The digester bottom has a slope 1%.

Specifications

Height :	7,5 m
Diameter :	25.0 m
The total volume :	3680 m^3
The substrate volume :	3400 m^3
	1 pcs

Receiving tank

Reinforced concrete reservoir for reception of liquid kinds of raw materials. The tank has raw material heating circuits installed on the inner side of the wall. A submersible mixer is installed in the tank for mixing

Specifications

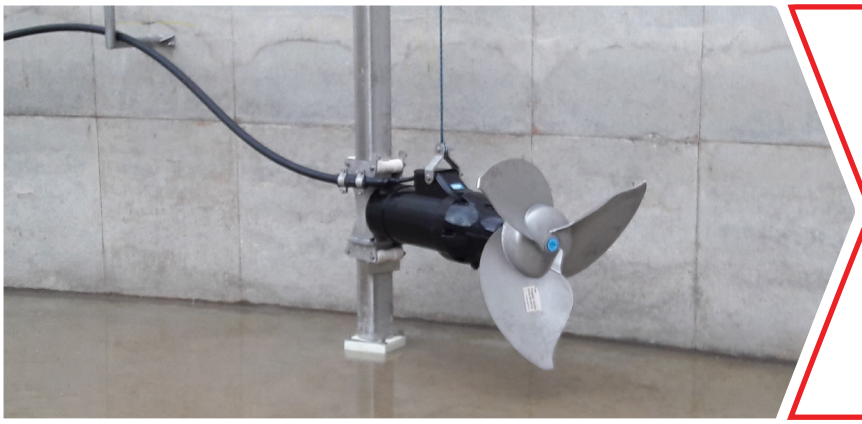
Diameter:	6,0 m
Height	2,0 m
Total volume:	50 m^3

Filtrate tank

The tank serves to collect the filtrate after the separator. The tank is equipped with level sensors

Specifications

Diameter:	6,0 m
Height	2,0 m
Total volume:	50 m³



Submersible mixer

The submersible motor agitator serves for mixing renewable raw materials (RRM), liquid substrate as manure and similar substrates. The electro-motor driven submersible agitator is designed for submersion operations in potentially explosive environments of Ex zone 2 and complies with Directive 94/9 EC. The submersible agitator can be attached to most sliding masts by means of the motor support. A mounting option for a hauling cable is provided on the motor support for height adjustment purposes.
Due to the 4-roller guidance of the motor support, the agitator can be lifted and lowered without friction and the square mast, even if the pull of the hauling cable is slightly angular. The motor support is designed for a 100 x 100 mm square sliding mast as standard, but can also be used for an 80 x 80 mm sliding mast by changing the rollers. The strain relief of the connecting cable can be positioned in the extension of the motor or towards the top on the motor support, depending on the requirements. This enables universal utilization with the most various installation kits.
The geared motor is made of spheroidal graphite iron(GGG40) and painted, the propeller is galvanized and the motor support is made of stainless steel. The submersible motor agitator is designed as a water pressure-tight monoblock unit for driving the three-vane propeller. The submersible agitator is of modular design, submersible electro-motor with flange-mounted planetary gear and bearing flange for holding the propeller. The conical shaft in the bearing flange is mounted in the oil bath by two angular roller bearings and sealed off from the agitating substrate with a mechanical seal.

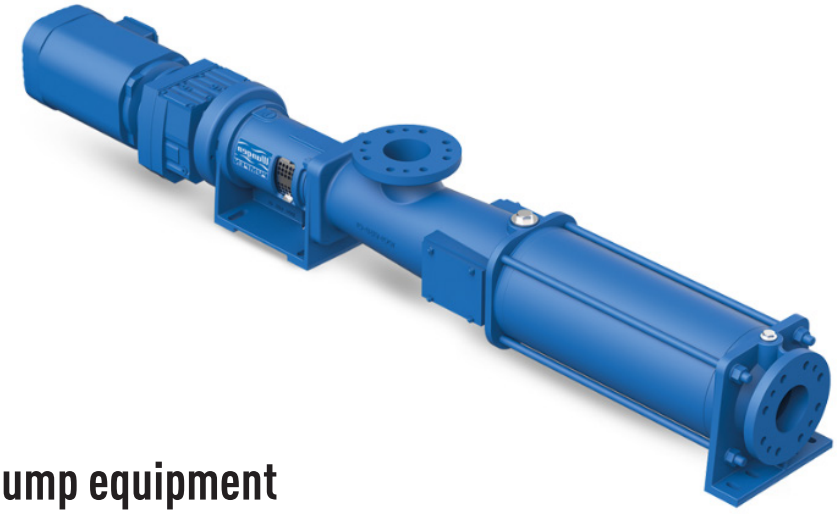
Specifications

Mixer for receiving tank

Nominal power	N= 5.0 kW
Quantity:	1 pcs

Mixer for digester

Nominal power	N=15.0 kW
Quantity:	3 pcs



Pump equipment

Pumps are used to transport substrate to the equipment and facilities in the biogas plant and away. Biogas plant design allows to access easily to all pumps. Pumps are driven by helical geared motor. Stator has hopper inlet for optimum filling of the pumping chamber, wear-protected, robust universal joint with feeding screw, robust bearing pedestal with close-coupled drive and self-centering of the drive shaft. Pumps have modular design for high flexibility, low life-cycle-costs.

Specifications

Substrate feed pump	
Flow rate:	40 m3/hour
Engine power:	7,5 kW
Pressure:	4 bar
Quantity:	1pcs
Substrate pump to separator	
Flow rate:	40 m3/hour
Engine power:	7,5 kW
Pressure:	4 bar
Quantity:	1pcs
Filtrate pump	
Flow rate:	40 m3/hour
Engine power:	7,5 kW
Pressure:	4 bar
Quantity:	1pcs

Gasholder

The gasholder provides for biogas storage and for equalizing pressure and biogas composition. The gasholder system has a two-layer construction. The external material consists of a weather-proof film of PVC-coated polyester fabrics with UV protection. Both sides are finished with an external N/5cm, internal membrane PELD (gasholder) membrane.

The gasholder has a methane permeation maximum of 260 cm3/m2 * 1 bar biogas resistance. The gasholder film temperature range allows operation from -30°C to +60°C.

The internal film is stretched under normal biogas pressure. Air is blown into the space between the external and internal membranes to pressurize the internal membrane and form the shape of the external membrane.

The biogas pressure in the gasholder is 2-5 mbar. The membranes are designed and cut out on NC machines. Welding is executed by high frequency currents. These steps yield substantial improvements for quality and service life compared to handmade membranes welded by standard welding equipment.

To prevent damage to the gasholder as a result of overpressure conditions, a safety valve is installed. To survey the internal membrane, an inspection window is installed on the external membrane.

Specifications

Height :	5,0 m
Diameter :	25,0 m
The total volume :	984 m^3
Quantity:	1 pcs.

Window with spotlight

Inspection windows are designed for visual control of processes inside the fermenter and post-digester. Spotlights were made in explosion-proof with automatic disconnection. Inspection windows are equipped with a cleaning washing system.

Specifications

Inspection windows Ø300
Spotlight VISULUX UL50 -G -H
230V, 50W, IP65

Separator

The Press Screw Separator covers a broad spectrum of applications, from agriculture to biogas and bioethanol plants. The innovative technology separates substrates in its solid and liquid elements. The secret of the versatility of the press screw separator is that it can adjust to different dry matter contents and Thick liquids (20% dry matter content). Slotted screens have different assortment and width of table cells and give possibility work with small solids and fiber contents. In the slotted screen, the solids are screened out from the liquid. The solids build up a layer which also acts as a filter to separate finer particles from the liquid. The auger flights convey this layer to the solids outlet. The screen surface is cleaned and a new filter layer is formed. The design of the screens is not conducive to plugging. The pressure in the first part of the screen is low but increases with the solid consistency to the solid output. The consistence of the gained solid can be varied with the help of a output regulator by the amount and position of counter weights. This way the required consistency of the final product for either further storage, use as fertilizer or the basis for compost can be reached. The liquid phase can easily be drained through a pipe or hose system.

Specifications

Engine power	**5,5 kW**
Flow rate	**15-20m3 / h**
Quantity	**1 pcs.**
Equipment	
Frame	
Screw	
Sieve for the filtration	
Counterweights	
The design of the protective room	

Biogas compressor

Biogas blower is a device used to move gas and increase pressure thanks to a rotating impeller within a toroidal channel, so there is a progressive increase of energy.
Blower is used to transporting biogas from gasholder storage to consumer.

Specifications

Flow rate	130 m^3/h
Pressure	150 mbar
Engine	1,3 kW
Quantity	1 pcs.

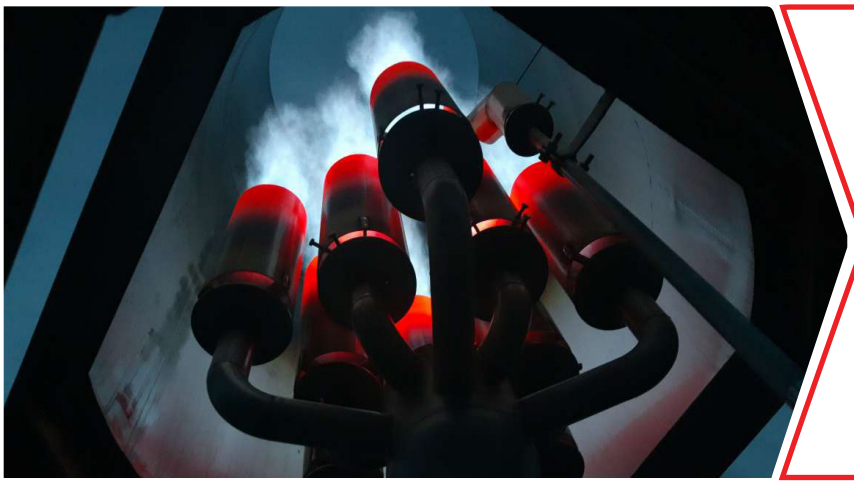
Gas analyzer (CH4, CO2, H2S)

The gas analyzer is a combined measuring device. It consists of a fixed Control block and a mobile gas measuring device. The Control block is designed for the automatic measurement and monitoring of the amount* and composition of gases produced in biogas plants. The device measures the gas compositions at the individual measuring locations sequentially. The mobile gas measuring device is usually docked to the Control box via the docking station (stationary measurements).
As an option, mobile measurements can be taken at selected measuring locations. The gas measuring device is removed from the Control docking station to carry out the measurement. When it is replaced in the docking station, the calculated measurement values are transmitted to the Control block and displayed.

Specifications

Set includes

Device for wall mounting
LCD display menu
Flow meter / control valve
Sensors



Biogas burner

The flare is designed for the temporary or periodical complete combustion of the biogas produced by biogas plants without the possibility of its use as an energy source. The burn system consists of a burner and additional equipment. The burner is designed on the principle of injection and consists of a combustion nozzle with an injector with an air supply control system, flame protection tube, fitting and burner control system. The biogas combustion system is made of stainless steel.

The supporting structure holds the burner and vertically mounted socket. The burn control system is installed in a case, which is mounted on the supporting structure of the combustion system and contains all the elements for monitoring and controlling ignition and flame.

Specifications

Flow rate	150 m^3/h

Heating system

Heating equipment is using for biogas plant heating and for sustaining constant temperature in the fermenter. Heating equipment includes circulation pumps, heat exchanger, heating manifold and pipes. The heat from the boiler is transferred to the biogas plant by using heat exchanger, and then is pumped through of biogas plant by circulation pumps. A heat carrier prepares water with an additive of ethylene glycol. Inlet temperature in the fermenter is 60C, the outlet is 40C.

Specifications

Circulating pump feeding heat carrier heating

Flow	25 m3 / h;
Pressure	1 bar,

Circulating pump feeding heat carrier to the digester

Flow	12 m3 / h;
Pressure	1.1 bar

The pumping station feeding propylene glycol

Flow	0.8 m3 / h;
Pressure	4 bar,

Co-generation Power Plant

A co-generation power plant (CHP) is used for producing electricity and heat. CHP is a very efficient technology for generating electricity and heat together. A CHP plant is an installation where there is simultaneous generation of usable electric power and heat in a single process, and it can provide a secure and highly efficient method of generating electricity and heat at the point of use. Due to the utilization of heat from electricity generation and the avoidance of transmission losses, due to electricity being generated on site, CHP typically achieves a 35 per cent reduction in primary energy usage compared with power stations and heat only boilers. This allows for economic savings where there is a suitable balance between heat and power loads. Another important factor, showing the benefits of cogeneration and CHP, is its low environmental impact. CHP produces lower quantities of pollutant emissions and heat pollution of the atmosphere. The current mix of CHP installations achieves a reduction of over 10 per cent in CO2 emissions in comparison with combined-cycle gas turbines.

Specifications

Produced electric power	330kW
Produced heat power	395kW
Emissions	NOx < 500 mg/Nm³ (5% O2)
Generator	400 V, 50Hz

Water supplying and sewerage system

Water supplying system provides biogas plant feed water, water for network circuits,the domestic water and fire safety systems. As used centrifugal single stage pumps as main pumping elements. These pumps are designed for pumping waste water, household / domestic water and sewage. Pressure Boosting Systems are designed for pure water pressure boosting in industrial plants. The booster comprises 2 to 3 (connected in parallel pumps) installed on a common base frame, and provided with all the necessary fittings.

Specifications

Drain pump
Pressure 4m
Flow 2-3 m3 / h
Engine 0,24 kW

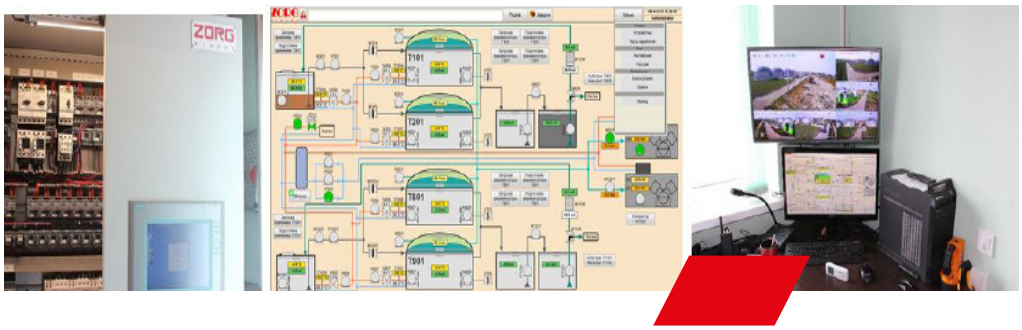
Equipment
Pump case control
Stove-base
gauges
Check valves
Float switches
Brackets
Valves

Air supply system

Air supply system ensures retention of the protective dome digester. This is achieved by installing a pneumatic lock and maintain the required pressure therein.

Specifications

Flow rate	200l/min
Max. Pressure	8Bar
Speed	2850 rev/min
Receiver capacity	9,5l



Automation and electrical equipment

Process control equipment is used for supervision and regulation operation of the plant and for the limitation of damage. In case of emergency (for example, breakdown of the electrical power supply) the biogas plant is automatically transferred to safe operating conditions by the process instrumentation. Critical electrically driven devices are supplied with emergency power. An automatic system allows the supervision of the plant in real time and to recognize and correct aberrations immediately; to run the plant at its optimum saving resources and costs; and to record for the electronic database operation parameters. The automatic system consists of a control cabinet and sensors for parameter control of technological processes and execution devices.

The control cabinet is designed based on the industrial controller Siemens CPU315-DP2, using periphery distributing system Simatic ET200S, and operator panel OP277 Touch with touch-sensitive controls. Communications is executed by PROFIBUS and MPI with physical interface RS-485. The control program is designed based on the Simatic Step7. The control cabinet is a modular design. The upper part has a power box with central and front-end processor. The periphery distributing system, Simatic ET2005, is installed with input - output units. The lower part with interface relay and clips is installed for connecting execution devices. The entire plant is controlled by a single operator.

Specifications

Incoming control case with automatic set ASE-1, 2, 3
Base Siemens CPU315-DP2 controller
Peripherals Simatic ET200S
Control panel OP277 touchscreen
Communication PROFIBUS and MPI
Interface RS-485
Control system Simatic Step7

Sensors

Sensors are used to measure physical quantities (temperature, pressure, level of moisture) data collection.
installation kits

Specifications

Conductometric sensor
Pressure Sensor / level
Ultrasonic sensor
Gas Pressure Sensor
Temperature converters with protective sleeves
The moisture sensor and the gas temperature

SPECIFICATION LIST

№	Equipment	Characteristic	Q-ty
1	**Submersible mixer for digester**	**N=15,0kW**	**3**
1.1	Airtight motor gearbox		3
1.2	Hydraulic screw (wear-resistant steel)		3
1.3	Mixer control mechanism		3
1.4	Electric motor mount		3
1.5	Set of fasteners		3
2	**Substrate feed pump**	**40 m3/hour N=7,5 kW**	**1**
3	**Gasholder**	V = 984m3	1
3.1	Dome level sensor		1
3.2	Gasholder film PELD methane permeation max.260 cm3/m2*d*1 bar, 650 N/5cm bio-gas resistant		1
3.3	Air blower		1
4	**Safety valve of digester**		**1**
5	**Window with a searchlight**	**set**	**1**
5.1	Inspection window RD300 (mounts and sealant included)	Ø300	2
5.2	Spotlight (mount system bundled) VISULUX UL50 -G -H	230V, 50W, IP65	1
6	**Submersible mixer for pre-tank**	**N=5,0kW**	**1**
6.1	Airtight motor gearbox		1
6.2	Hydraulic screw (wear-resistant steel)		1
6.3	Mixer control mechanism		1
6.4	Electric motor mount		1
6.5	Set of fasteners		1

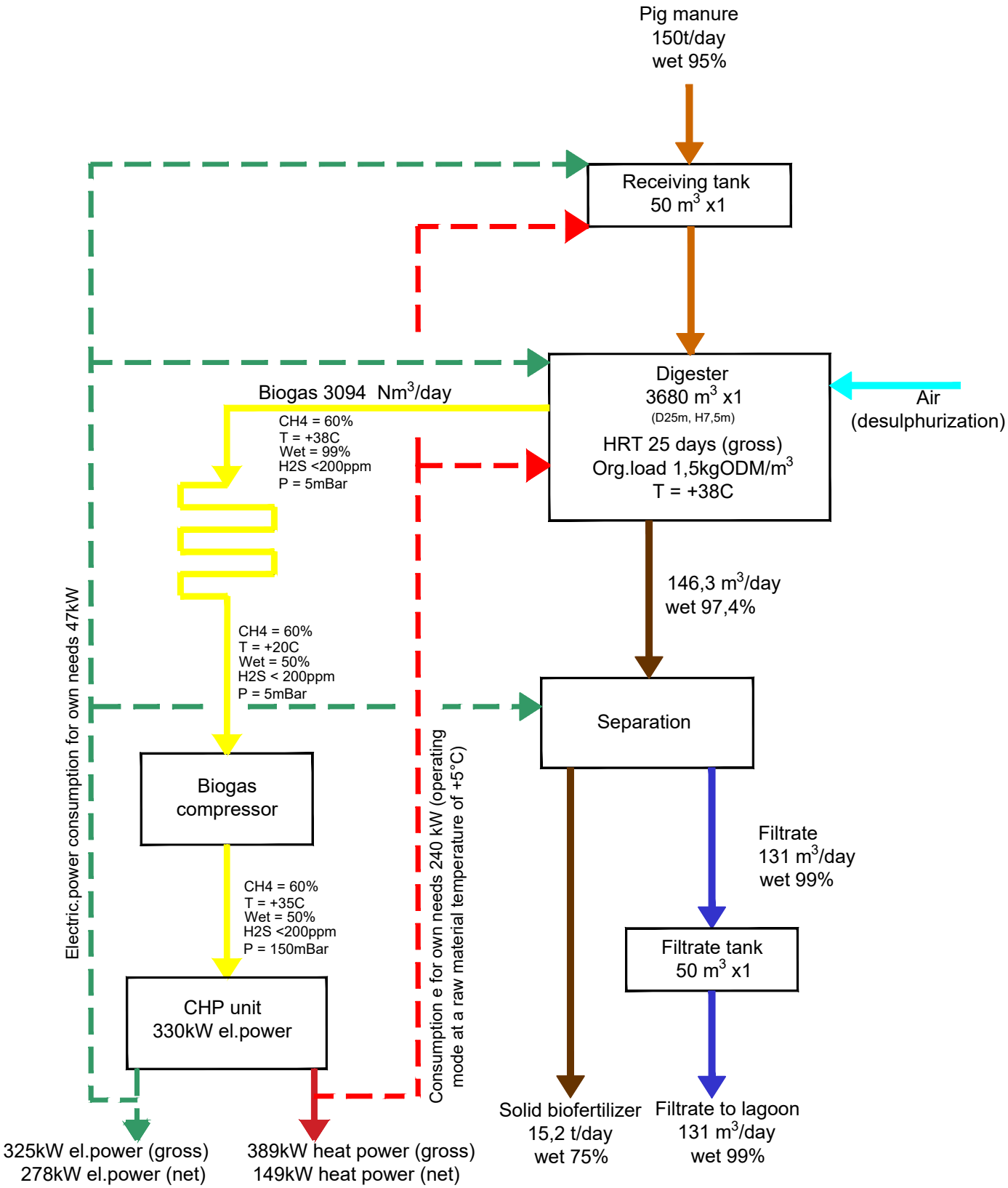
№	Equipment	Characteristic	Q-ty
7	**Substrate pump to separator**	**40 m3/hour N=7,5 kW**	**1**
8	**Separator**	**N=7,5 kW, Q=25m3/h**	**1**
9	**Biogas compressor**	**Q=130 m^3/h H=150mBar N=1,3 kW**	**1**
10	**Electromagnetic flow meter**		**1**
11	**Biogas analyzer (CH4 , CO2 , H2S)**		**1**
12	**Flare**	**150 m3/h**	**1**
12.1	Compressor		1
12.2	Manual locking element		1
12.3	Deflagration fuse		1
12.4	On-site control cabinet		1
12.5	Auto ignition system		1
12.6	Auto Main Gas Solenoid Valve		1
13	**Heat supply system, complete, disassembled**	**set**	**1**
14	**Air compressor (desulphurization)**		**1**
15	**Water supply and sewerage system, complete, disassembled**		**1**
16	**Automation with electrical equipment** complete, disassembled		**1**
16.1	Incoming distribution cabinet with a set of automation DB-1		1
16.2	Incoming distribution cabinet with a set of automation DB-2		1
17	**Sensor set**		**1**
17.1	Conductivity sensor		3

№	Equipment	Characteristic	Q-ty
17.2	Pressure / level sensor		3
17.3	Ultrasonic sensor	SPA-380-08 (0-6m)	1
17.4	Gas pressure sensor	SEN 3276 B156 G1/2 0,4Bar	2
17.5	Thermal converter	TR10-B-M-DZ	2
17.6	Thermowells for thermocouples	TR10-B	2
17.7	Thermal converter heating circuit	TR30-P-Z-Z-A-ZZZ-13R-	2
17.8	Substrate pressure sensor	SEN-3251 G1 4Bar	3
17.9	Substrate pressure sensor	SEN-3251 G1 2,5Bar	3
17.10	Coolant pressure sensor	SEN 3276 B065 G1/2 6Bar	2
17.11	Immersion level sensor	LS-10 0,6Bar 4-20 mA	1
17.12	Humidity and gas temperature sensor	ESFTF-I	2

APPENDICES

Annex 1

Material flow diagram



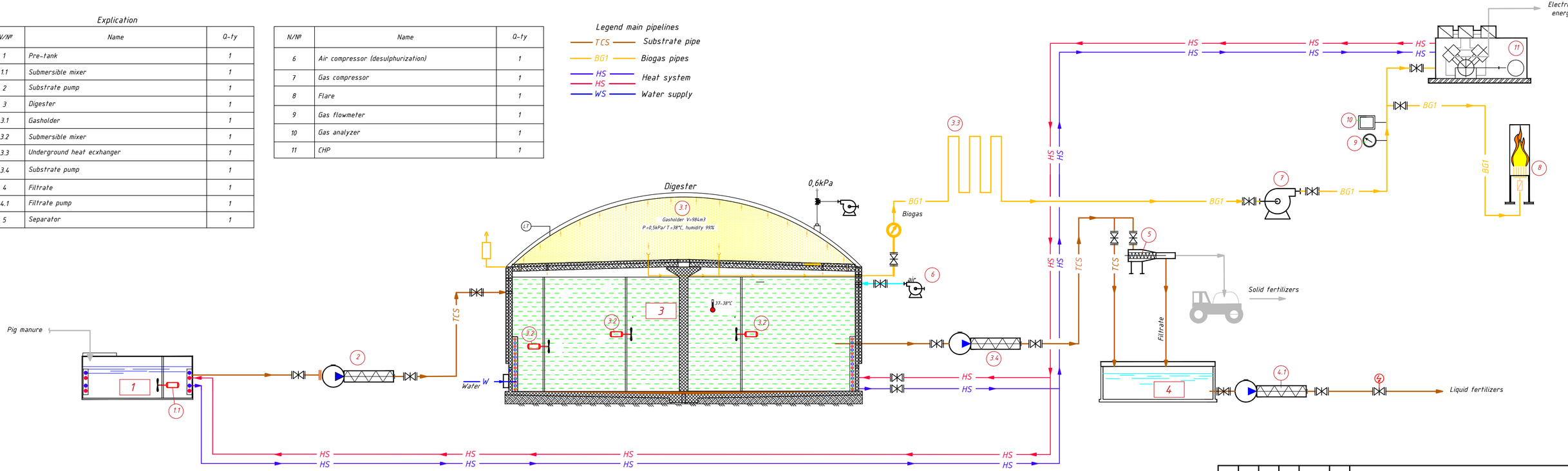
Explication

N/№	Name	Q-ty
1	Pre-tank	1
1.1	Submersible mixer	1
2	Substrate pump	1
3	Digester	1
3.1	Gasholder	1
3.2	Submersible mixer	1
3.3	Underground heat ecxhanger	1
3.4	Substrate pump	1
4	Filtrate	1
4.1	Filtrate pump	1
5	Separator	1

N/№	Name	Q-ty
6	Air compressor (desulphurization)	1
7	Gas compressor	1
8	Flare	1
9	Gas flowmeter	1
10	Gas analyzer	1
11	CHP	1

Legend main pipelines

- TCS — Substrate pipe
- BG1 — Biogas pipes
- HS — Heat system
- HS — Heat system
- WS — Water supply

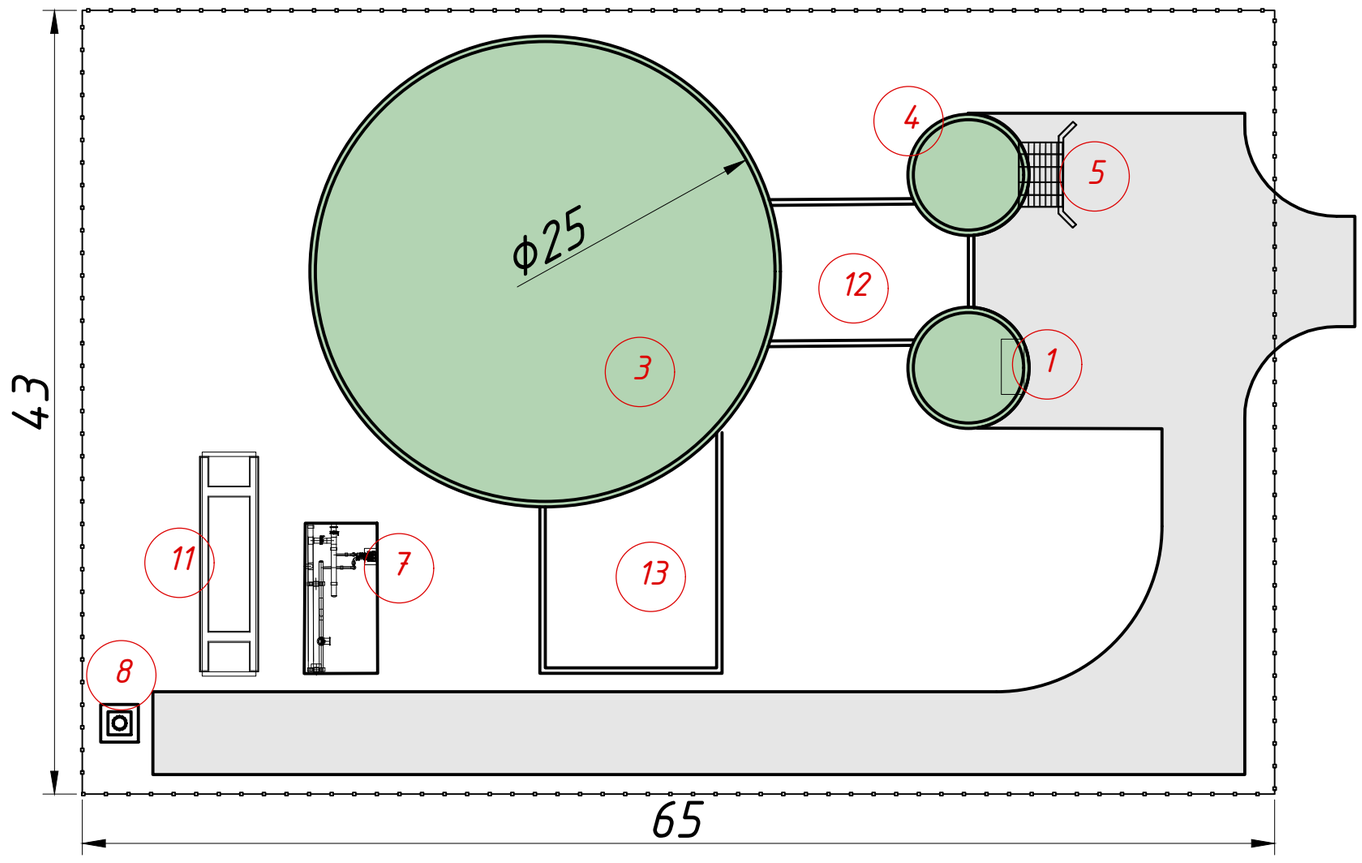


Basic diagram

Zorg Biogas GmbH

297x730

Plan



Explication

N/№	Name	Q-ty
1	Pre-tank	1
3	Digester	1
4	Filtrate	1
5	Separator	1
7	Gas compressor	1
8	Flare	1
11	CHP	1
12	Technical room	1
13	Equipment room	1

ZORG BIOGAS

Annex 4

Name equipment	Instal. Pow. (kW)	Q-y (pcs)	Total installed power (kW)	Working hours per day	Consumption kWh per day
Submisrsible mixer (Digester)	15,0	3	45,0	16,0	720,0
Submisrsible mixer (rec.tank)	5,0	1	5,0	6,0	30,0
Substrate Feed pump	7,5	1	7,5	4,0	30,0
Biogas compressor	1,3	1	1,3	24,0	31,2
Separator	5,5	1	5,5	5,0	27,5
CHP	6,0	1	6,0	24,0	144,0
Substrate pump to separator	7,5	1	7,5	4,0	30,0
Filtrate pump	7,5	1	7,5	4,0	30,0
Air compressor for gasholder lock	1,5	1	1,5	1,0	1,5
Air blower for double membrane	1,0	1	1,0	24,0	24,0
Circulation pump for supplying at carrier to the digester	0,8	1	0,8	24,0	18,0
Circulating pump feeding hot water at technical building	0,1	1	0,1	only ambiant temp +15°C	
Propylene glycol pump station	0,8	1	0,8	0,5	0,4
Desulphurization system compressor	1,5	1	1,5	24,0	36,0
Drinage pump	1,0	1	1,0	0,5	0,5
Lighting of the biogas plant territory	1,0	1	1,0	8,0	8,0
Spot light for digesters inspection windows	0,1	1	0,1	0,5	0,0
Working lighting of switchboard	0,1	1	0,1	0,5	0,1
Total installed power, kW			**93**		
Total consumed electric energy, kWh per day					**1131**
Total consumed power, kW					**47**

Equipment price

Pos.	Description	Quantity	Unit Price, EUR	Total Price, EUR
1	Roof with Gas-Holder 1/5 D25m	1	59 000,00	59 000,00
2	Over- and underpressure safeguard	1	7 200,00	7 200,00
3	Sight glasses/viewing windows with projector	1	3 900,00	3 900,00
4	Filtrate pump N=7,5 kW	1	23 000,00	23 000,00
5	Substrate feed pump N=7,5 kW	1	23 000,00	23 000,00
6	Digested Substrate pump unit N=7,5 kW	1	23 000,00	23 000,00
7	Substrate separation unit 5,5 kW	1	37 000,00	37 000,00
8	Submersible mixer 5,0 kW (Receiving tank)	1	12 200,00	12 200,00
9	Submersible mixer 15,0 kW (digester)	3	21 000,00	63 000,00
10	Biogas blower 130 m^3/hour	1	7 400,00	7 400,00
11	Gas conditioning unit 130 m^3/hour	1	7 000,00	7 000,00
12	Biogas burner 150 m^3/hour	1	14 000,00	14 000,00
13	Heat supply station, as a unit, knocked-down.	1	16 300,00	16 300,00
14	Automatic with electric equipment, as a unit	1	87 000,00	87 000,00
15	Sensors (set)	1	24 900,00	24 900,00
16	Air supply system	1	8 000,00	8 000,00
17	Water supply and canalization system, as a unit.	1	12 100,00	12 100,00
	TOTAL (EXW, Memmingen, Germany): Euro			**428 000,00**

Posiiton	Price (EXW, Memmingen)
Detailed project design	42 000 Euro
Supervision	20 000 Euro
Start-up, training	20 000 Euro
Equipment	428 000 Euro
Co-generation Jenbacher 330kW)	280 000 Euro
Construction and installation	500 000 Euro
Delivery to any port worldwide	28 000 Euro
Total	1 318 000 Euro

Implementation terms and payment

Months	1	2	3	4	5	6	7	8	9	10	11	12
Detailed project design	50%		50%									
Approvals and permissions (by customer)												
Equipment supply				50%		50%						
CHP				50%		50%						
Construction												
Supervision					50%				50%			
Plant start-up											50%	50%

% - Payment from the amount of the contract

Contracts

Project implementation is executed simultaneously under several contracts

- **Engineering contract**
- **Equipment supply contract**
- **Supervision contract**
- **Start-up and training contract**

ZORG BIOGAS

Business center “Twin Yards”
Walter-Gropius-Straße 23,
DE-80807, München, Germany

Mob. +49 1511 457 29 45 (WhatsApp, Viber, Telegram)

igor.reddikh@zorg-biogas.com
www.zorg-biogas.com