



GREEN CREATE

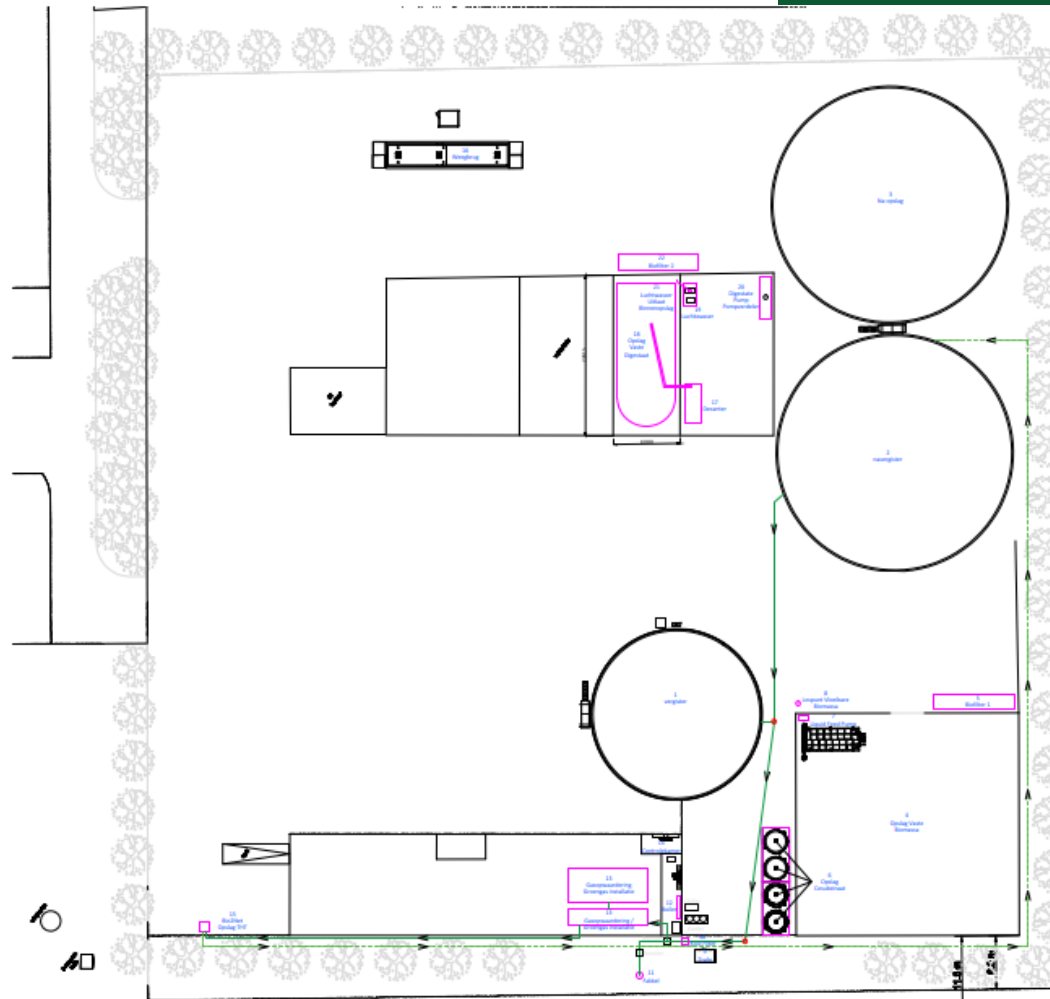
Waste-to-Value Solutions

OPERATIONAL MANUAL

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Site Layout



Notes

1. Vergister
2. Navergister
3. Na-opslag
4. Opslag Vaste Biomassa
5. Biofilter 1
6. Opslag Cosubstraat
7. Liquid Feed Pump
8. Lospunt vloeibare biomassa
9. Trafo
10. Kool Filter
11. Fakkels
12. Boiler
13. Gasopwaardering/Groengas Installatie
14. Controlekamer
15. Bio2Net Opslag THT
16. Weegbrug
17. Decanter
18. Opslag Vaste Digestaat
19. Luchtwater
20. Digestate Pump Pompverdeler
21. Luchtwater uitlaat binnenopslag
22. Biofilter 2

Biogas Leiding

Hoofdleiding —————

Retour Leiding - - - - -

Operating Instructions for [REDACTED] Plant - Initial Start-up/Restart

1. All equipment must be checked and signed off prior to the commencement of the starting procedure.
2. During the initial start-up, a hazardous, potentially explosive atmosphere can occur in the gas space of the digester container. Ignition sources must be avoided (e.g: operate the agitator submerged).
2. The empty digesters are initially blocked from the gas upgrading system.
3. The digesters are connected to the atmosphere via the operationally ready overpressure protector and the exhaust lines.
4. The digesters are filled within a short time period with substrate that is as active as possible, until all inlets and outlets (liquid valve closure disks) are sealed with substrate. The process is strictly co-ordinated internally by specialists taking into account the available material and biology requirements.
5. The fermentation substrate is heated.
6. During the start-up/heating of the system, the system must not be fed further.
7. The gas generated during the starting of the digestion process discharges via the exhaust line(gas overpressure protection) into the open air, and displaces the air that is present in the digester.As soon as it is possible the gas is reverted to the flare for combustion.
8. After testing the gas quality, [REDACTED] fills into the gas system and the gas storage. The gas quality is sufficient and there is no explosion hazard if the methane content of the gas is greater than 30% and the oxygen content is < 3%.
9. The gas upgrading system is turned on when the digesters has a sufficient gas buffer as per set parameters. Sufficient [REDACTED] quality can be determined by gas measurement.

Operating Instructions for [REDACTED] Plant - Normal Conditions

The [REDACTED] installation is automated and integrated into our SCADA system. This ensures 24/7 monitoring and recording of all process related parts of the installation. The system is a live visual representation of the [REDACTED] installation.

Daily operations can be split in five categories:

1. Checks and operating tasks Recorded on list by operator, electronically)
2. Data recording
3. Feeding
4. Deliveries and offtakes
5. Administrative tasks

Check intervals can be split in four categories:

1. Daily
2. Weekly
3. Monthly
4. Exceeding 6 months: Bi-annually, annually, Two years, Five years, Ten years.

All safety equipment should be worn before daily duties commence this includes: Appropriate clothing and safety shoes together with a portable gas meter and any other equipment specified when accessing different parts of the installation.

Refer to the ATEX report for detailed zone identification and restrictions. [REDACTED] has fully implemented recommendations and requirements as mentioned in the report.

Daily Checklist and Tasks		
<u>Item</u>	<u>Specific Action</u>	<u>Comments</u>
✓ Live Scada interface	<ul style="list-style-type: none"> ✓ Feeding system (Hunning,T110-T140) <ul style="list-style-type: none"> - Feedstock levels(silos) and weights(feedbox) - Feeding quantities as per menu - screw conveyors - Pump ✓ Main digester (R210) <ul style="list-style-type: none"> -Mixers -Membrane pressure and buffer percentage -Temperature and heating pipe pressures -Foam present -Tank level -Blower ✓ After digester (R220) <ul style="list-style-type: none"> -Mixers -Membrane pressure -Tank level -Blower ✓ Thin fraction Storage (R300). <ul style="list-style-type: none"> -Mixers -Tank level ✓ Gas upgrader -PENTAIR Unit (G610) (Detailed sub checks) <ul style="list-style-type: none"> - Status: Production, Standby, Stop, Alarm, Production SL ✓ Bio2Net (Detailed sub checks) <ul style="list-style-type: none"> - Status: Grid Valve, Faults, Stop Supply or Warnings, THT dosing, gas composition. -H2S level,.wobbe index ,flow, flow count 	<p>See Figure 1 System can be accessed/reset remotely and all data is stored for 5 years.</p>

Daily Checklist and Tasks		
<ul style="list-style-type: none"> ✓ Pent Air Unit – Gas upgrader -Detailed checks 	<ul style="list-style-type: none"> ✓ Alarms <ul style="list-style-type: none"> - Critical errors - Warnings ✓ Bio Gas Compressor ✓ CO2 Compressor ✓ Oxygen Levels ✓ Heating Pipes ✓ NH3 Scrubber ✓ Booster ✓ Bio Gas/N2 Dosing ✓ H2S Filter ✓ Bio2Net ✓ Dehumidifier ✓ Membrane ✓ Fluid Cooler ✓ Glycol Cooler 	<p>System can be accessed/reset remotely and all data is stored for 5 years. 24/7 engineering support is available for any malfunctions</p>
<ul style="list-style-type: none"> ✓ Bio2Net – Detailed checks 	<ul style="list-style-type: none"> ✓ Gas composition ✓ Grid connection parameters ✓ Bio2net equipment status 	<p>See Figures 2-6 System can be accessed/reset remotely and all data is stored for 5 years. 24/7 engineering support is available for any malfunctions</p>
<ul style="list-style-type: none"> ✓ Physical Inspections -Site walkabout Noise, odour leaks, heat, vibration, spillages and corrosion. 	<ul style="list-style-type: none"> ✓ Condensation pits <ul style="list-style-type: none"> -Condensate drainage ✓ External Carbon Filter <ul style="list-style-type: none"> -Drain condensate in filter ✓ Boiler <ul style="list-style-type: none"> -Operational requirements ✓ Tanks on site <ul style="list-style-type: none"> -visual condition of membranes and fixings -Ground water ✓ Pressure valves on Main and after digester <ul style="list-style-type: none"> Water locks/overpressure valves -Water level sufficient 	<p>Operators are on site every day for inspections If a blowoff or any event out of the ordinary occurred it is registered on the Fumo website. https://www.fumo.nl/zelf-regelen/melding-ongewone-voorvallen#meldingongewonevoorvallen-314</p>

	- Check if blow offs occurred	
Daily Checklist and Tasks		
	<ul style="list-style-type: none"> ✓ liquid delivery point and Silos -visual inspection ✓ Bio-beds, fans and blowers -Running and air is flowing ✓ Decanter and solid fraction storage -Processing quantity -Storage capacity ✓ Acid washer -Ph level -Water level ✓ general site for any leakages ✓ Manure pump and valves when being used ✓ Bio2Net dosing of THT 	
✓ Flare – G620	✓ Visual inspection of unit and joining pipes	
✓ Feedstock Deliveries	<ul style="list-style-type: none"> ✓ To be inspected visually before unloading and noted,captured and filed ✓ Deliveries slips to be stored electronically, filed and stored on site. 	<p>Hardcopies of delivery notes filed and stored on site. System can be accessed/reset remotely and all data is stored for 5 years.</p>

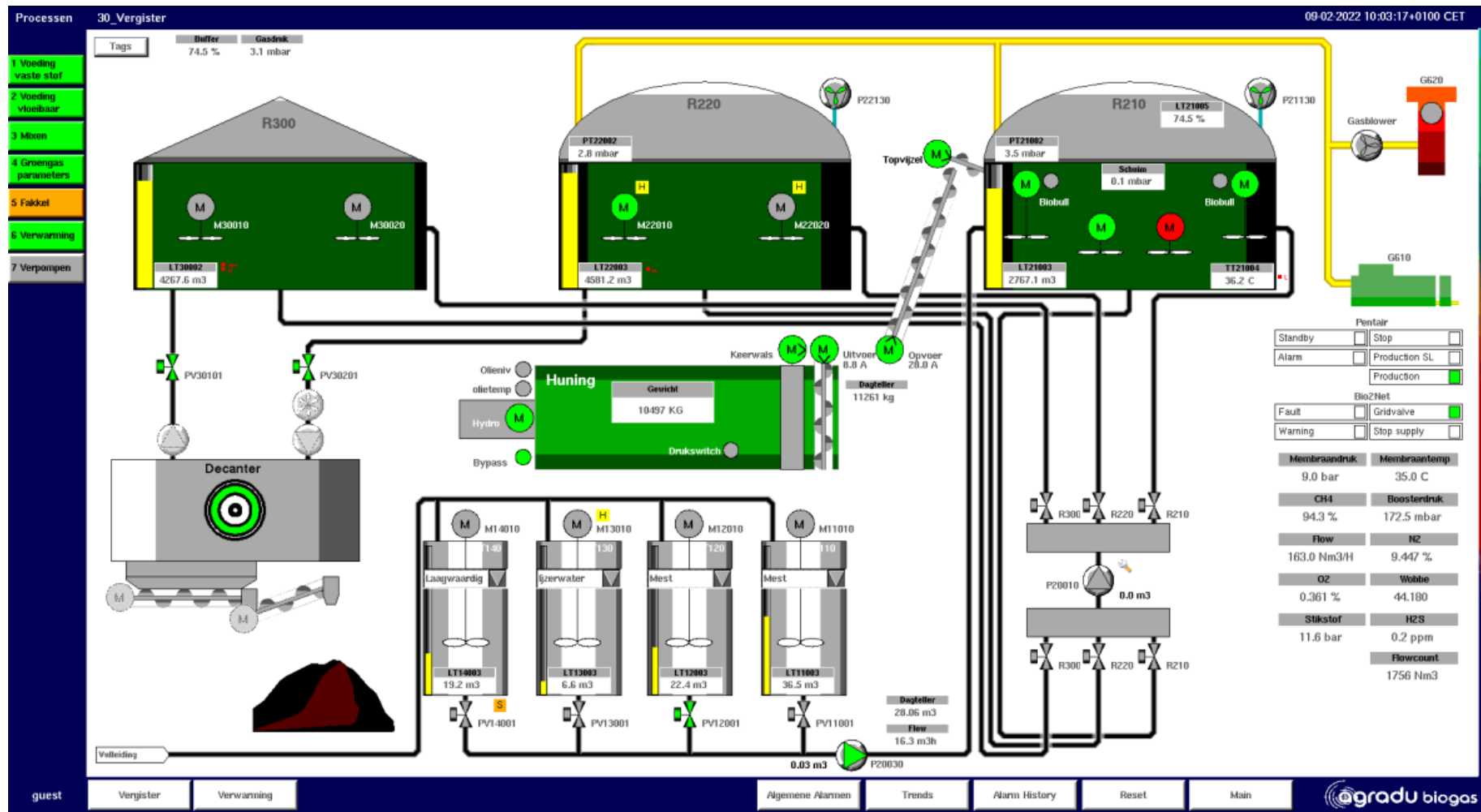


Figure 1: SCADA system interface

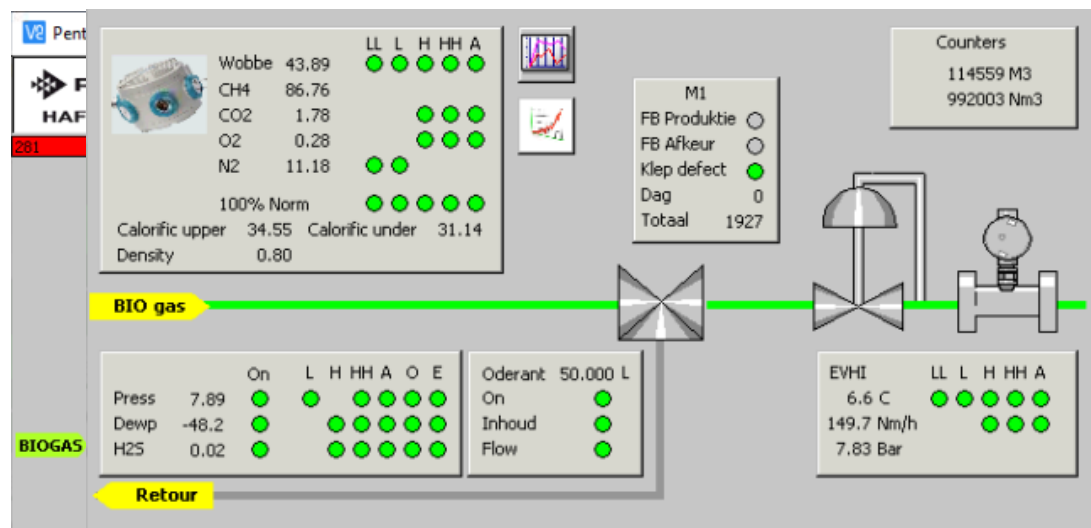


Figure 3 : Bio2Net Interface

	Booster	NH3 scrubber	H2S filter	Biogas Compressor 1	Dehumifier	Membrane	
Overview		BIO Gas / N2 Dosing	BIO2Net		Control		CO2 plant

Figure 2: Gas upgrader interface

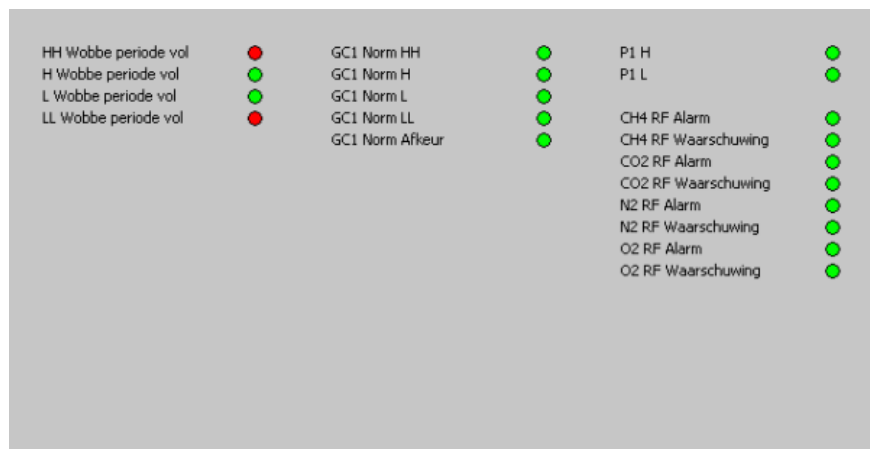


Figure 4 : Bio2Net Parameters



Figure 5 : Bio2Net Parameters

Hourly Wobbe proces	44.04 MJ/Nm3	GC1 CH4	86.99 vol%
Hourly CO2 proces	1.77 vol%	GC1 CO2	1.76 vol%
Hourly O2 proces	0.28 vol%	GC1 O2	0.28 vol%
Hourly N2 proces	10.96 vol%	GC1 N2	10.97 vol%
Hourly Wobbe gasnet	44.04 MJ/Nm3	GC1 Wobbe	44.04 MJ/Nm3
Hourly CO2 gasnet	1.77 vol%	GC1 CVs	34.64 MJ/Nm3
Hourly O2 gasnet	0.28 vol%	GC1 CVI	31.22 MJ/Nm3
Hourly N2 gasnet	10.96 vol%	GC1 Density	0.80 MJ/Nm3
		GC1 100%Norm	99.99
Aantal minuten in periode wobbe HH Dag	0 min		
Aantal minuten in periode wobbe H Dag	0 min		
Aantal minuten in periode wobbe L Dag	0 min		
Aantal minuten in periode wobbe LL Dag	0 min		
		Gem Wobbe HHH Grens	44.71 MJ/Nm3
Hourly Wobbe HH totaal	600 min	Gem Wobbe HH Grens	44.61 MJ/Nm3
Hourly Wobbe H totaal	2458 min	Gem Wobbe H Grens	44.41 MJ/Nm3
Hourly Wobbe L totaal	558 min	Gem Wobbe L Grens	43.46 MJ/Nm3
Hourly Wobbe LL totaal	600 min	Gem Wobbe LL Grens	43.26 MJ/Nm3
		Gem Wobbe LLL Grens	43.16 MJ/Nm3

Figure 6 : Bio2Net Parameters

Weekly Checklist		
Item	Specific Action	Comments
Leak Detection	<ul style="list-style-type: none"> ✓ Mixers ✓ Carbon Filters and Bottoms ✓ Feeding Screws ✓ Gas upgrader ✓ Gas piping 	Done with gas meter and applicable safety equipment.
Flare	✓ Sparking correctly	Start on manual mode.
Feedstock	✓ Availability and storage space	Co-ordinate with suppliers and storage space
H2S control	✓ Raw gas, Gas after filter 1,2 and 3 tested with Drager sticks	Results are recorded and actions taken accordingly
Bio2net external web interface	✓ Checking status of external interface to ensure it correlates to live system.	External provider
Loader	<ul style="list-style-type: none"> ✓ Visual inspection of all joints and fixings ✓ Grease all manufacturers points 	Record working hours
Reporting	✓ Feeding, gas produced	As per company policies
equipment itinerary check	✓ All tools on site stored safely	Checked with tool list
Weather conditions	✓ Plan for adhoc weather.	Prepare site if storms,snow or icing is predicted.

Monthly Checklist		
Item	Specific Action	Comments
All Fire and Equipment	✓ As per layout and accessible.	Visual inspection
Pest control	✓ Monthly inspection and evaluation	External party
Maintenance Sheets	✓ Check machinery or compliance items scheduled for the month	Recorded on company network
Feedstock Analysis	✓ Feedstock are analysed monthly if required	Recorded on company network
Stock take	✓ All raw materials stocks are noted and stored	Recorded on company network
Reporting	✓ Monthly report of feedstocks used and transported away.	Recorded on company network
Biology testing	✓ Composition of biology tested	Applicable action taken if required
ISCC audit	✓ Monthly audit of gas produced.	External audit

Bi-annually, Annually, Two years, Five years, Ten years Checklist		
Item	Specific Action	Comments
All Fire Equipment	✓ Serviced yearly, full refurbish every five years, Replace every ten years	External service provider, advises on up to date fire detection and fighting information
Electronic machinery and equipment	✓ Checked every two years or as stipulated.	As per company and regulation policies
Bio2Net equipment	✓ Bi-annual service by provider	External party
Gas analysis for net beheer	✓ Bi-annual analysis.	External party
Stedin yearly audit	✓ In accordance to Stedin standards	Arranged with representative
BHV and Safety staff training	✓ Annual refresher course	Assess staff accordingly
Service level agreements	✓ All external service providers -Bio2Net -Gas analysis -Gas upgrader service -Pest Control -Safety equipment -all product suppliers	External parties
Stock take	✓ Annual raw materials stocks are noted on the last calendar day of the year.	As per company policies
Reporting	✓ Annual report of feedstocks used and transported material away.	Internal company policy
ISCC audit	✓ annually audit of gas produced.	External audit required for sale of HBE certificates
Portable gas detectors	✓ Replaced every 2 years	External party
Digester roofs	✓ Every two years inspection required	External party
Flare	✓ Annual inspection and service	External party
Atex inspection	✓ As required by external audit party	External party
Loader	✓ Annual service and inspection	External party
Site electrical inspection	✓ Advised to do every two years or when any new machinery has been installed	External party
Weighbridge	✓ If calibration shows issues or every five years	External party
Digester structure	✓ Inspection every Ten years	External party

Operating Instructions for [REDACTED] Plant - Malfunction occurs

[REDACTED] Malfunction classification			
Type	Description	Example	Time to action repairs
General	Malfunctions that influences gas production but do not pose any safety risks and mostly doesn't result in gas leaks.	Pumps blockages. Feeding system delays. Loader breakdown.	Within 8 hours
Medium	Malfunction that influences gas production and can lead to safety risks.	Blockages in feeding lines. Physical breakdowns of equipment. Sensor failures.	Within 4 hours
Urgent	Malfunctions that result in safety risks and gas leaks.	Gas Upgrader shutdown. Electronic malfunction. Gas leaks. Power outage	Immediately or maximum of 30 minutes later than malfunction occurs.

General And **Medium** malfunctions should be assessed by the operator on site within specified time.
If the malfunctions falls within the expertise and training of the operator, the malfunction can be repaired or alarm reset immediately.

Typical procedure:

1. Receive alarm from system
2. Log into system to effected machinery and specific alarm description for example(Motor starter error or thermal warning)
3. Risk assessment of area and part malfunctioned, if external specialist assistance required contact relevant suppliers.
4. Visual inspection of malfunctioned part with relevant safety equipment.
5. Repair or reset machinery/system .

All events that are not considered to be within normal operation must be reported to the FUMO: <https://www.fumo.nl/zelf-regelen/melding-ongewone-voorvallen>

Urgent malfunctions should be assessed by the operator on site within specified time.

If the malfunctions falls within the expertise and training of the operator, the malfunction can be repaired or alarm reset immediately.

Typical procedure:

1. Receive alarm from system
2. Log into system to effected machinery and specific alarm description for example (power outage)
3. Risk assessment of area and part malfunctioned, if external specialist assistance required contact relevant suppliers.
4. Visual inspection of malfunctioned part with relevant safety equipment if safe for the operator.
5. Repair or reset machinery/system.

All events that are not considered to be within normal operation must be reported to the FUMO: <https://www.fumo.nl/zelf-regelen/melding-ongewone-voorvallen>

Possible urgent malfunctions

Power outages

- Outages with a time of 15 minutes or lower can be accommodated by the system re-starting normally, the digester container has sufficient storage to accommodate the amount of gas not injected into the grid during this time.
- Outages between 15 minutes and 45 minutes should be addressed by the manual startup of the flare as it is fitted with a 12v battery supply to ignite the gas in case of an emergency.
- Outages with a time 45minutes and more to initiate the rental procedure of the backup generator by a local nearby supplier. While the generator is on its way the manual operation of the flare remains the responsibility of the site operator.

Heating, hot running machines and parts, substrate or oil becoming hot

- Avoid contact with hot surfaces, fluids, gases, ...
- Caution with hot water discharge.

Gas upgrading unit

- Shut off gas supply outside
- Activate the emergency off switch outside of the unit, if the automatic immediate shutdown did not commence.
- If necessary, force ventilation (e.g., in the case of gas odor)

- If there is a gas odour, avoid ignition sources, e.g., non EX-protected sources, open flame, or formation of sparks.

Danger of explosion

- If the gas alarm comes from a gas-warning device, the area should be evacuated until alarm disabled by competent person

Electrical system

- Work on the electrical systems must be performed only by a skilled electrician

Pumps and mixer

- Switch off the electrical supply, and secure the switch against unintentional actuation

Pits and shafts

- After malfunctions, all safety equipment must be checked for the proper function.
- Note: Before entry and while in the pits and ducts, it must be guaranteed that there is no hazard of poisoning, as well as that sufficient breathable air is present. Operating equipment must be reliably secured against switching on. Ensure that there is sufficient ventilation. In the case of insufficient ventilation, there is a danger of asphyxiation, fire, and explosion

Foam forming

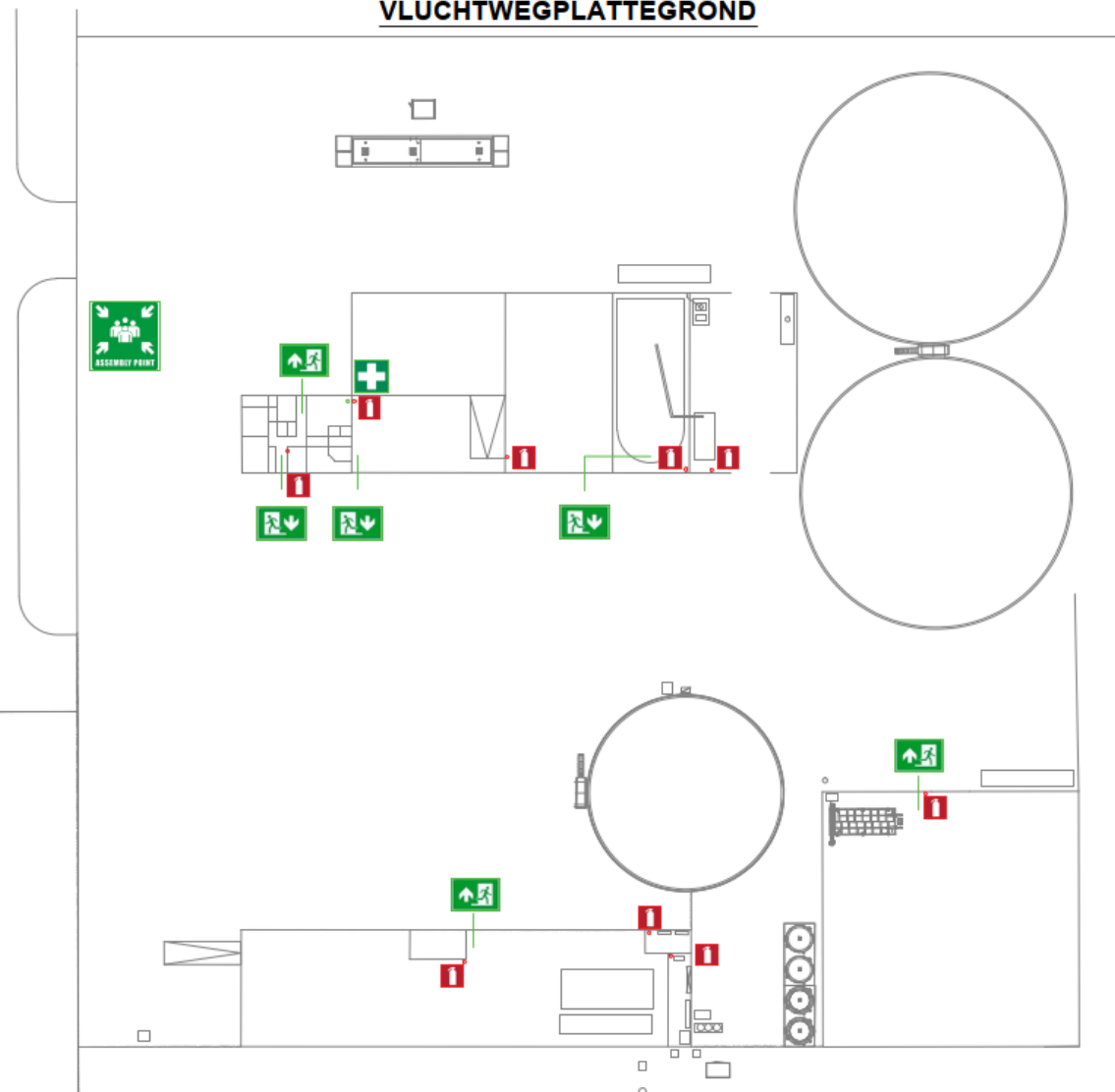
- If the high foam alarm is triggered, feeding is automatically stopped.
- A plant operator will be notified and will go to the plant if the incident occurs after working hours.
- The situation is assessed on site and acted upon accordingly depending if the foaming is contained within the digester or if an emergency overflow of foam occurred.
- In the event of an emergency overflow the spillage is to be contained and cleaned as quick as possible.

Operating Instructions for [REDACTED] Plant - Shutdown

1. Stop the substrate supply into the digester and wait until the fermentation process has reduced significantly or completely stopped; the substrate removal can then from the container continue to occur. The quantity of the substrate removed must not be greater than the quantity of generated gas in the digester in order to prevent a potentially hazardous atmosphere.
2. If the quantity of substrate removed can become greater than the quantity of gas generated, the digester container is locked against the gas upgrading system, and the connection to the atmosphere is created, e.g., by emptying the sealing liquid supply. By adding air, a potentially explosive atmosphere can develop in the digester.
3. The digester container must be blocked from the gas upgrading system in order to avoid a backflow of gas.
4. A potentially explosive and hazardous atmosphere can form around outlet openings. all safety precautions should be taken in these areas.
5. Before entry into and while in the digester container, it must be guaranteed that the danger of asphyxiation, fire, and explosion has been safely prevented by sufficient ventilation and that sufficient breathable air is present. Operating equipment (e.g., pumps and agitators) must be secured against being switched on (lockout procedures).

Site Emergency layout and Alarm Card

VLUCHTWEGPLATTEGROND



The floor plan shows a building layout with several rooms and corridors. Key features include:

- Assembly Point:** A large green icon with people and arrows pointing to a central area on the left side.
- Exits:** Multiple green icons with arrows pointing outwards from various rooms and corridors.
- Fire Extinguishers:** Red square icons with a white '1' inside, located in several rooms.
- First Aid:** Green square icons with a white cross, located in a room on the left.
- Emergency Routes:** Green lines with arrows indicating the path from various rooms to the assembly point.

ALARMNUMMER :112

BIJ BRAND:

- BEDIEN HANDBRANDMELDER
- BEL 112
- WAARSCHUW HET BHV TEAM
- SLUIT RAMEN EN DEUREN (NIET OP SLOT DOEN!)
- VOLG DE INSTRUCTIES VAN HET BHV-TEAM EN DE BRANDWEEER
- VERLAAT HET GEBOUW VIA DE VLUCHTROETES

BIJ ONGEVAL:


- BEL 112
- VERMELD:
 - UW NAAM
 - PLAATS VAN HET ONGEVAL
- WAARSCHUW HET BHV TEAM

BIJ ONTRUIMING:

- SCHAKEL ELEKTRISCHE APPARATUUR UIT
- VOLG DE INSTRUCTIES VAN HET BHV-TEAM, DE DIRECTIE EN DE BRANDWEEER
- VERLAAT HET GEBOUW VIA DE VLUCHTROETES

LEGENDA :

- VLUCHTROETE
- BRANDBLUSSER
- VERZAMELPUNT
- + EHBO



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