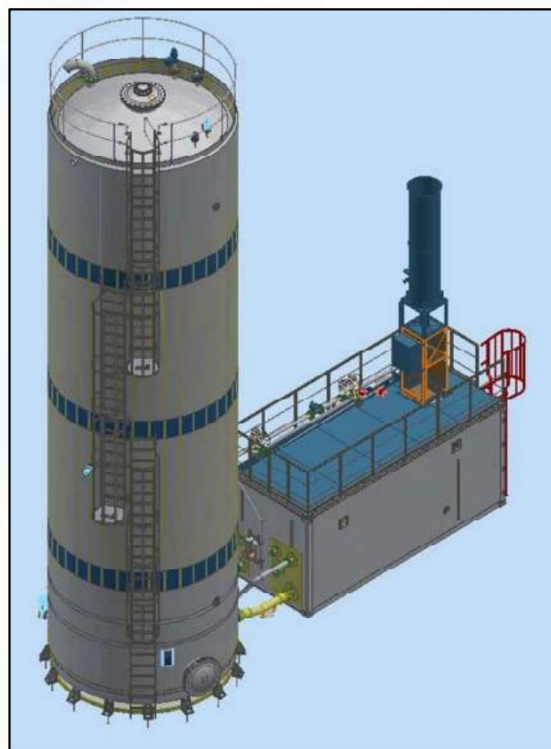




Econvert-EGSB®04013 ECO

18th of July 2022

Econvert-EGSB®04013 ECO rental for ESKA Sappemeer
Q220104



Dear [REDACTED]
Dear [REDACTED]

Herewith I'm sending you our Quotation for our mobile anaerobic wastewater treatment reactor for the ESKA Sappemeer location.

I hope this quotation meets your requirements. If you have any further questions, please do not hesitate to contact me.

With kind regards,

[REDACTED]

Econvert Water & Energy
Venus 35
8448 CE Heerenveen

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[REDACTED]
www.econvert.nl

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1. Introduction

1.1 Econvert Water & Energy

Econvert is a company founded to provide high-tech wastewater treatment solutions to fit the exact demand of its customers. A flat organization model, combined with highly skilled personnel, enable the company to be flexible in its solutions, but still maintain a highly competitive price level. The core of the company's product portfolio is anaerobic wastewater treatment. Besides the products Econvert-UASB®, Econvert-EGSB® and Econvert-IR®, the company supplies solutions for aerobic wastewater treatment and biogas treatment. Especially in the Paper Industry, Econvert has realized a large number of successful references. An up to date reference list of Econvert projects can be found in Appendix I.

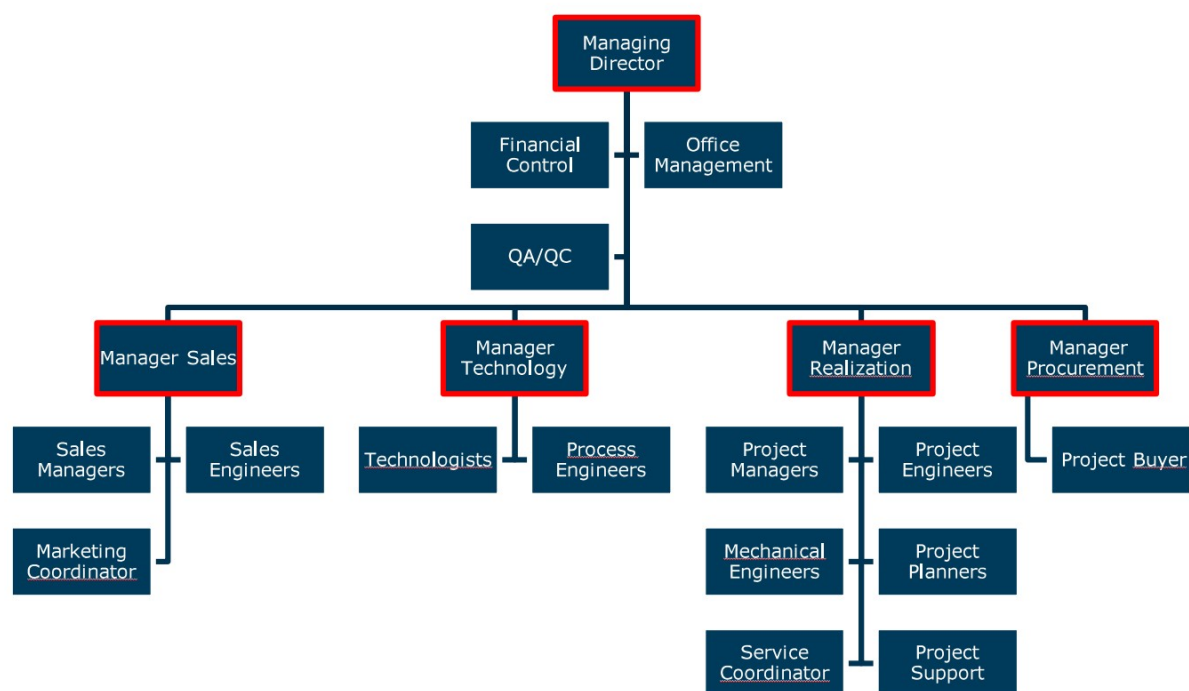


Figure 1: Organisation chart

Econvert Water & Energy is organized as a multi-project matrix organization. Project teams consist of a fixed combination of project manager/project engineer completed with a process engineer, a project planner and mechanical engineers. This way of working has turned out to be a real benefit to the quality delivered.

Projects are approached in a stage gate way. The **basic engineering** phase leads to an agreed definition of the project outlines, the lay-out, the PFD and the P&ID. The **detailed engineering** is the phase in which all the production drawings, equipment lists and 'approved for purchase' drawings are produced. **Procurement** and **installation** follow and will result in mechanical completion of the system. **Commissioning & Start up** finally will lead to a successful start-up of the plant, after which an acceptance test can be run.

This project approach is laid down in the Manual Primary Process of Econvert.

Why Econvert

- High level of biological & technical knowledge
- Flexible organization
- Innovative and creative thinking
- Deeply rooted in anaerobic technology
- Able to design and build total systems

Values

- Respect
- Professionalism
- Eager to learn
- Solution oriented
- Entrepreneurial



Corporate history

02-01-2012: Founding Econvert Water & Energy BV

Yearly Turnover:

- 2020: € 22.000.000
- 2021: € 25.000.000
- 2022: € 32.000.000 (prognosis)

For a full overview of our projects, we would kindly like to refer you to Appendix I – reference list.



1.2 Saur Industrial Water Division & Nijhuis Industries

Econvert Water & Energy is part of SAUR Industrial Water Division. SAUR is a leading global player in water treatment. SAUR is present in various countries, worldwide.

Our Vision

To foster purity and sustainability, both for our own and future generations, we need solid solutions for water, biogas and air purification, built on robust technology.

Our Mission

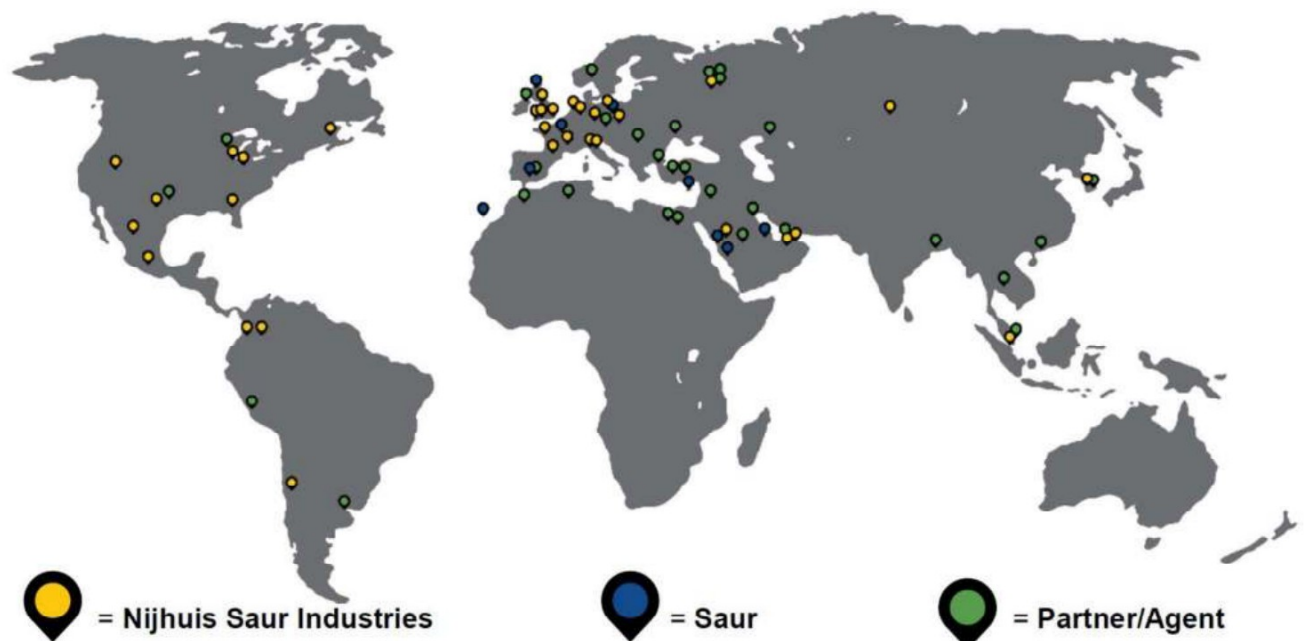
To deliver state-of-the-art, effective and efficient systems, solutions and services to treat the effluent, process water, biogas and air of a wide range of industries worldwide, based on our drive to realize the value of (waste) water, to recover valuable raw materials from waste, and to make them available for sustainable reuse.

WHERE NIJHUIS INDUSTRIES ADDS VALUE:

With over 1500 specific global references within the Food and Beverage sector, and 2600 global references worldwide, our unrivalled experience ensures our clients get the right technological solution for the right application, achieving the **optimum whole life cost**.

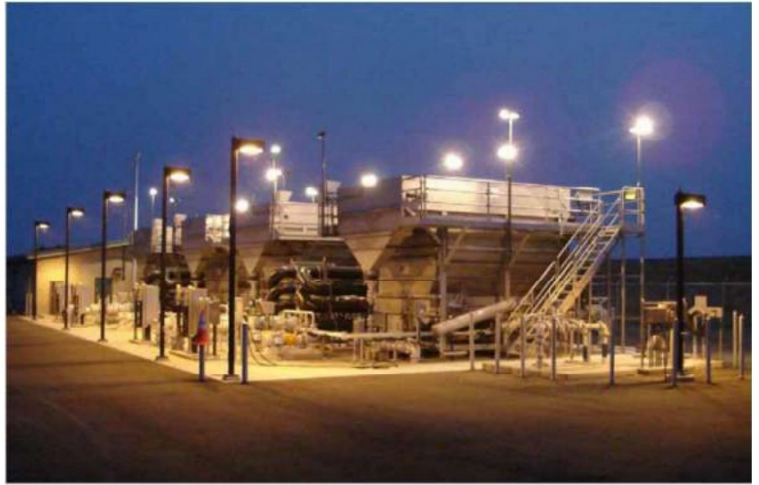
As part of the Nijhuis-Saur Industries group, we are one of the largest global water treatment companies in the world, and with four regional UK offices, we can ensure complete UK wide coverage and **unparalleled support to our customers**.

Nijhuis Industries deliver **solid and adaptive solutions** for sustainable water use, and the recovery of energy and resources. We help industries, utilities and cities to reduce, reuse and recover to advance water and climate change adaption, and to help build a more **resilient, sustainable** and **inclusive** future.



REALIZING THE VALUE OF WASTEWATER

Nijhuis Industries group designs, manufactures and delivers robust technology, solid solutions and added value services to treat effluent and process water and create biogas across a wide range of industries and municipalities. Nijhuis offers a unique portfolio of market leading solutions for primary, secondary and tertiary wastewater treatment, waste to value and disinfection. The company is committed to realize the value of (waste)water, recover valuable raw materials and make them available for sustainable re-use.



2 Request from ESKA Sappemeer

2.1 Initial request

As ESKA is looking to increase their wastewater treatment capacity at the Sappemeer plant for the long run. On the short term ESKA is looking for a temporarily solution to bridge the period needed to get a new/updated full scale system in place and to give the existing Paques IC reactor some relieve since this is running on 130% of the design capacity most of the time. Econvert has been brought in to advise on the possibilities. Next to the proposal for a custom anaerobic plant, Econvert is happy to offer ESKA a solution for the meantime, in form of a rental reactor.

2.2 Initial design parameters

ESKA requested a temporarily solution for the treatment of about 3 tons of COD per day for a period of about 2 years.

3 Econvert- EGSB® Technology

3.1 Anaerobic reactor selection

Econvert has various possibilities when it comes to selecting the type and sizing of a mobile anaerobic reactor. For this potential project of ESKA Sappemeer, an Econvert-EGSB®04013 ECO has been selected. This is a mobile anaerobic reactor that has a diameter of 4 meters and a height of 14 meters (13 mwc). It is able to treat 3250 kg COD during peak loading.

The table below shows more detailed information about the reactor and the design values.

Econvert-EGSB®04013 ECO		AVG	MIN	MAX
Number of reactors	-	1	1	1
Influent				
Reactor influent flow	m³/h	40,0	30,0	33,9
TCOD conc	mg/L	3000	2000	4000
TCOD load	kg/d	2880	1440	3250
Wastewater dependent parameters				
TSS	kg/m³	100	100	100
VSS	%	70%	70%	70%
TCOD conversion eff.	%	75%	75%	75%
Operating conditions				
Temperature	°C	35	35	35
Pressure	mbarg	40	40	40
pH	-	7,0	7,0	7,0
Reactor selection				
Reactor type	-	EGSB	EGSB	EGSB
Shape	-	Circ	Circ	Circ
Waterlevel	m	13	13	13
V upflow	m/h	6	6	6
Surface	m²	13	13	13
Volume	m³	163	163	163
Sludge height	m	9,0	9,0	9,0
Sludge volume	m³	113	113	113
VSS mass	kg	7917	7917	7917
Hydraulics				
HRT (influent)	h	4,1	5,4	4,8
Reactor input (influent + ext. rec)	m³/h	75	75	75
External recirculation	m³/h	35	45	42
Total flowrate bottom	m³/h	75	75	75
V upflow bottom	m/h	6,0	6,0	6,0
Process indicators				
COD converted load	kg/d	2160	1080	2438
TCOD in	mg/L	1944	1097	2347
CCOD total	mg/L	1194	597	1347
VLR TCOD	kg/m³·d	17,63	8,81	19,89
VLR CCOD	kg/m³·d	13,22	6,61	14,92
SLR TCOD	kg/kgVSS.d	0,36	0,18	0,41
SLR CCOD	kg/kgVSS.d	0,27	0,14	0,31
Effluent				
COD load effluent	kg/d	720	360	813
COD conc effluent	mg/L	750	500	1000
Biogas				
Spec. gasprod.	m³/kg-CCOD	0,42	0,42	0,42
Gas flow	m³/d	907	454	1024
Gas flow	m³/h	38	19	43

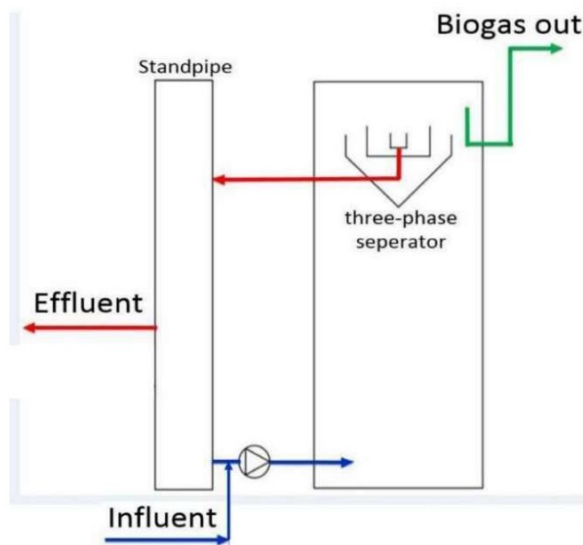
3.2 Econvert-EGSB® technology

Anaerobic wastewater treatment is based on the biological degradation of COD, performed by specialized bacteria. As COD consists of several organic components, both long chain molecules (like starch) and short chain molecules (like fatty acids), the conditioning of the influent of the anaerobic process is critical. The more stable the influent, and the closer to the ideal composition for the requested bacterial activity, the higher the overall process performance. Econvert designs its reactor from exactly this perspective. The key matters to influence are:

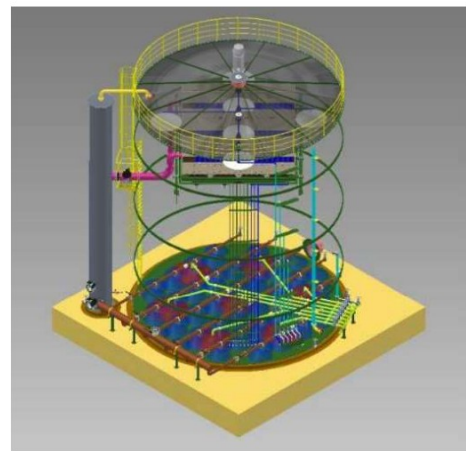
- pH
- Temperature
- TSS (Flotation system probably needed)
- Acidification degree
- COD concentration at inlet of the reactor
- Mixing
- Wastewater specific components (for example non-typical calcium or sulphate concentrations)

Working principle

The wastewater is fed into the standpipe where it mixes with the external recirculation. This external recycle is needed to dilute the incoming wastewater. Due to the up-flow velocity (approximately 4-6 m/h), in the sludge bed some turbulence is created, ensuring maximum contact between the granules and the influent. From this external recycle the wastewater needs to be pumped into the influent system at the bottom of the reactor. The influent system assures optimal distribution. In the head space of the reactor the biogas is collected and is then led out of the reactor.



Schematic process Econvert-EGSB®



Impression Econvert-EGSB®

Influent system

The main reason to pay attention to a proper influent system in an internal recirculation reactor is to ensure a proper granular growth within the reactor. Granular growth is based on several conditions like acidification, calcium concentration and COD-concentration in the feed supplied to the bacteria. Mainly the latter is of importance when designing the influent system of the reactor, as this can be altered by external recirculation of treated wastewater. The following topics are addressed in the design process:

- Influent dilution to obtain the right COD concentration
- Even distribution of influent/recirculation feed to the sludge blanket

From these considerations, the influent system was designed. The main components of the influent system are:

- Influent pipes with evenly distributed holes at the bottom of the pipes
- Heavy sludge extraction points

Reactor feed distribution

From a central header outside of the reactor, several influent pipes transport the water evenly divided into the reactor. The pipes are provided with holes in the bottom to assure a good distribution and to prevent clogging. Each influent pipe has its own route to the other side of the reactor where all pipes have their own hand controlled valve, just outside the reactor wall. At the header every single influent pipe is provided with a hand controlled valve. In this way individual pipes can be flushed in case of clogging or to prevent clogging. This type of influent system has proven its robustness and efficiency for several years now.

Sludge extraction system

Granular growth should be based on a balance of growth of acidifying bacteria (the outer layer) and methanogenic bacteria (the core). Disturbing this balance will cause bad sludge that may either fall apart (the methanogenic core is too big), or grow too fast due to low acidification of the influent. It is key to be able to remove sludge whenever necessary. In order to do so, sludge extraction points must be available. Econvert-EGSB® is equipped with a sludge extraction point in the middle of the reactor.

Settler

In the head space of the reactor the settler (three-phase separator) separates water, sludge and biogas. The Econvert-EGSB® settler is a patented design that realizes a long degassing time for the water and granules, and prevents floating granules to leave the reactor. Due to the special design of this settler, sludge retention will be optimal. The three-phase separator consists of differentiated gas/water and sludge/water separation compartments. These compartments achieve a very effective separation of effluent, sludge and biogas. The settler is designed by Econvert and is patented. The settler is made of PPC, completely co-polymer. Due to the special design of these settler, sludge retention will be optimal.

Intensive mixing

The Econvert-EGSB® operates with an up-flow velocity of 4-6 m/h. Because of this the granules are fed homogenous and the reactor is able to operate on a high volumetric loading rate. Furthermore this intensive mixing prevents the so called "dead zones" in the sludge and therewith prevents partial overloading of granules. Besides that the gas production is really stable because there is no biogas build-up underneath the sludge bed like in UASB systems.

No smell set up – gas tight and pressurized

The reactor is completely gas tight and will operate at a biogas pressure of max 180 mbar(g). No ventilation and bio filter are needed. Loss of biogas is not possible and dangerous situations because of H₂S emissions are eliminated. Because of the strict anaerobic environment in the tank and its settler, no elementary sulphur will be produced so no cleaning activities are needed at the overflow gutter of the settler.

Additionally due to this closed and pressurised set-up, a blower is not needed to transport the biogas and the biogas will cooled/dried under pressurized circumstances.

Small footprint

Because of the high up-flow velocity and because of the high mixing of Econvert-EGSB® reactor, it can be loaded up to 20 kg of COD/m³.day. This could never be achieved in the UASB systems where the maximal loading rate is 8-10 kg COD/m³.day. Because of the higher possible loading rate and the higher up-flow velocity, the EGSB reactor can be build smaller in volume but also much smaller in footprint compared to a UASB. Because of this the tank as well as the concrete slab can be build much smaller which causes savings on CAPEX.

4 Scope of Supply

4.1 General

The total project comprises the implementation of the following major items:

- ☐ Primary treatment:
- ☒ Anaerobic treatment: Econvert-EGSB®04013 ECO
- ☐ Aerobic treatment:
- ☐ Tertiary treatment:
- ☒ Biogas treatment: Biogas emergency flare included in Econvert-EGSB®04013 ECO
- ☐ Caustic tank

4.2 Scope split and interfaces

E = Econvert; C = Customer; NA = Not applicable

GENERAL	E	C	NA	Remarks
HARDWARE				
Civil works	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Like foundation, excavation etc.
Interconnected piping	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	E: Between container, tank and flare C: Interconnected piping from existing WWTP
Underground piping	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Insulation of i.c.-piping	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	E: Biogas piping above ground level C: Other piping
Tracing of i.c.-piping	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	E: Biogas piping above ground level C: Other piping
Lightning protection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	In case existing can be used
SERVICES				
Lifting/hoisting	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Scaffolding	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Transport to the site	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Loading and unloading of goods	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Free working area	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Crane needs to access the area where the system will be positioned.
Outdoor storage	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Indoor storage	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Waste containers	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Emptying of containers	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Utilities during erection				
Water	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3 bar
Electricity	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Tie ins and Tie outs				
Water	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Compressed air	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	>5bar

Electricity	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Biogas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Caustic	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Dosed in existing conditioning tank
Acid	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Dosed in existing conditioning tank
Nutrients	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sufficient available in wastewater
Caustic and acid storage	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Nutrients storage	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
NDT inspections	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
HAZOP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C: Chairman E: Attends the HAZOP
Snow clearing	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Road paving (temp.)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Travel, board, lodging	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Canteen/toilets	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Cleaning social rooms	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Customs clearance	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Custom duties	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Econvert-ECO® 4013	E	C	NA	Remarks
HARDWARE				
Tanks	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Internals	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pumps	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	E: Recirculation pump, C: Feed pump located at reactor
Blowers/compressors	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Mixers	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Motors for pumps, blowers, mixers	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Process piping	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Valves	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Instruments	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cabling	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	E: Econvert-EGSB® ECO® C: Cabling from grid to control container of Econvert-EGSB® ECO®
Frequency controllers	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	E: Econvert-EGSB® ECO®
Automation hardware	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	E: Econvert-EGSB® ECO®
Stairs, platforms and railing	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Insulation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Where needed
Tracing	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If needed
SERVICES				
Installation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2 persons, 4-5 days
Installation supervision	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1 person, 4-5 days
Automation software	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	E: Econvert-EGSB® ECO®
Functional specification design	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	E: Econvert-EGSB® ECO®
I/O checks	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	E: Econvert-EGSB® ECO®
Functional testing	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	E: Econvert-EGSB® ECO®

Hydraulic testing	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	E: Econvert-EGSB® ECO®
Anaerobic seed sludge	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Start up	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	E: Econvert-EGSB® ECO®
Training	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Manuals	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

4.3 Additional list of requirements for the customer to provide

To be able to install, connect and operate the installation. The renter should provide the following services:

1. Foundation + calculations for foundations (see preliminary lay out attached)
2. Wastewater piping from INFLUENT SOURCE to container (a feed pump is included in the scope of Econvert and will be situated in the containerized pump and control room)
3. Effluent piping for wastewater
4. Drain piping from sampling points sink
5. Drain piping from condensate vessel
6. Drain piping from container
7. Electrical connection
8. Earthing and lightning protection
9. Fresh water connection
10. Chemicals (NaOH and nutrients) storage (caustic normally not needed)
11. Piping from chemical storages to container mobile unit and if needed to homogenisation tank
12. Analysis equipment
13. Costs for **seed sludge** and transport of seed sludge (Econvert can offer this)

5 Bill of Materials

5.1 Econvert-EGSB®04013 ECO

HARDWARE	Material	Dimension	Amount
1. Econvert-EGSB®04013 ECO reactor	GRP	Ø4.0m * 13mwc	1
<ul style="list-style-type: none"> • Closed (gas tight) • Prefabricated • Connections for piping • Support structure settler • Manhole • Overpressure safety valve 		DN600	1
2. Econvert-EGSB®04013 ECO settler	PPC	Ø 3.0m	1
<ul style="list-style-type: none"> • Circular shaped three phase separator • Overflow weir 			1
3. Standpipe	GRP	Ø0.5 m	1
<ul style="list-style-type: none"> • Integrated in tank • Connections for piping 			
4. Cage ladder	Galvanized steel		1
<ul style="list-style-type: none"> • Cage ladder with platforms • Handrail on top of reactor and container 			1
5. Influent piping	HDPE	DN80/DN100	
<ul style="list-style-type: none"> • Influent header 		DN100	1
6. Effluent piping	HDPE	DN200	1
<ul style="list-style-type: none"> • Connection to standpipe • Scope is terminated at tank wall 			
7. Biogas piping	HDPE	DN65	
<ul style="list-style-type: none"> • Connection to biogas flare (max 10 m) • Connection to condensate trap/biogas buffer 			1
8. Heavy sludge removal			
<ul style="list-style-type: none"> • Knife gate valve (lug-type) • Scope is terminated at lug-type knife gate valve 		DN100	2
9. Sludge sampling points	AISI 316	DN40	5
<ul style="list-style-type: none"> • Placed at every 2 meters • 5 taps for sampling 			
10 Biogas emergency flare		80 m³/h	1
<ul style="list-style-type: none"> • Enclosed flare, flame inside fire tube • Flame arrestor 			
11 Condensate trap	HDPE	30L	1
12 Pumps			
<ul style="list-style-type: none"> • Recirculation pump 75 m³/h • Nutrient dosing diaphragm pump • Nutrient dosing unit • Caustic dosing diaphragm pump • Caustic dosing unit • Acid dosing diaphragm pump • Acid dosing unit 			1
			1
			1
			1
			1
			1
			1

13	Containerized control and equipment room	20 ft	1
	• Separated control and equipment space		
14	PLC, cabinet and cabling		1
	• Internal wiring supplied		
	• Fully programmed for stand-alone operation		
	• Touch screen panel		
	• Remote log-in possible		
15	Instrumentation		
	• TC		3
	• pH		3
	• LS condensate trap		2
	• LA standpipe		1
	• PI gas		1
	• Biogas flow control		1
	• Influent flow control		1
	• Recirculation flow control		1

This bill of materials (BOM) serves for indicative purposes only, a new list will be provided prior to rental.

5.2 Start-up and training

The start-up and training will be provided by Econvert staff and is offered optional. At least one person of the customer will be trained in operating the installation. Preferably the training, which contains approximately 1 day of theory and several days of practical training, is given to 2 or 3 people of the customer. The installation is also delivered with an operations manual.

Training will be given in English or Dutch. If translation is needed than this is to be discussed.

Theoretical training: Interactive presentation (about 2-3 hours):

- Safety
- Biological processes
- Working principle reactor
- Important parameters (temperature, pH, nutrients etc.)
- Analysis
- Possible disturbances

Practical training: on-site training, a tour around the new installation (about 2 hours)

Training will be given during the commissioning or start-up phase. Digital training material will be provided in the form of an operating manual and handouts of the training. The operation manual will be available in Italian language.

If more training or more sessions are needed then this is possible and can be discussed. Also a visit to a reference site can be part of the training. This is to be discussed.

5.3 Maintenance

The maintenance of installation is the responsibility of EcoR. The first-line maintenance tasks that must be performed monthly or quarterly will be performed by the customer in accordance with the maintenance plan that becomes part of the agreement once the installation has been delivered.

5.4 Process control

Process monitoring is primarily the responsibility of the customer. Every day, operation will be checked and a number of times a week water samples will be taken, analyzed and interpreted. Econvert staff (hired by EcoR) regularly monitor the installation and the measured values remotely.

If additionally a service contract is agreed, Econvert staff will log into the installation on a daily basis. The measurement values will also be checked and interpreted daily during that period. After approximately three months this number of moments will decrease to twice a week. In addition, an Econvert process engineer will visit the site and installation on average every two to three months to catch up and perform a general check.

5.5 Responsibilities

A future rental contract will show the precise split of responsibilities and tasks. A concept of this contract can be delivered soon if wanted. In general split of responsibilities will be as follows:

- EcoR:
 - o Maintenance (Replacing larger equipment parts and maintaining software)
 - o OPTIONAL: Process support (Online support (remote), interpretation of monitoring data and feed-back to the tenant)

5.6 Process support

If additionally a service contract is agreed, Econvert staff will log into the installation on a daily basis. The measurement values will also be checked and interpreted daily during that period. After approximately three months this number of moments will decrease to twice a week. In addition, an Econvert process engineer will visit the site and installation on average every two to three months to catch up and perform a general check.

- Tenant:
 - o Daily operation of the system (visual inspection, taking samples + keeping monitoring data and first-line maintenance like replacement of electrodes etc.)
 - o Adjust and aligning set points in the control system (in the beginning in cooperation with Econvert)

The above mentioned covers the daily operation. In case of system failure/calamities EcoR needs to be informed within 16 hours of this.

Process support is optionally offered.

7 Appendices

7.1 Appendix I – Reference list

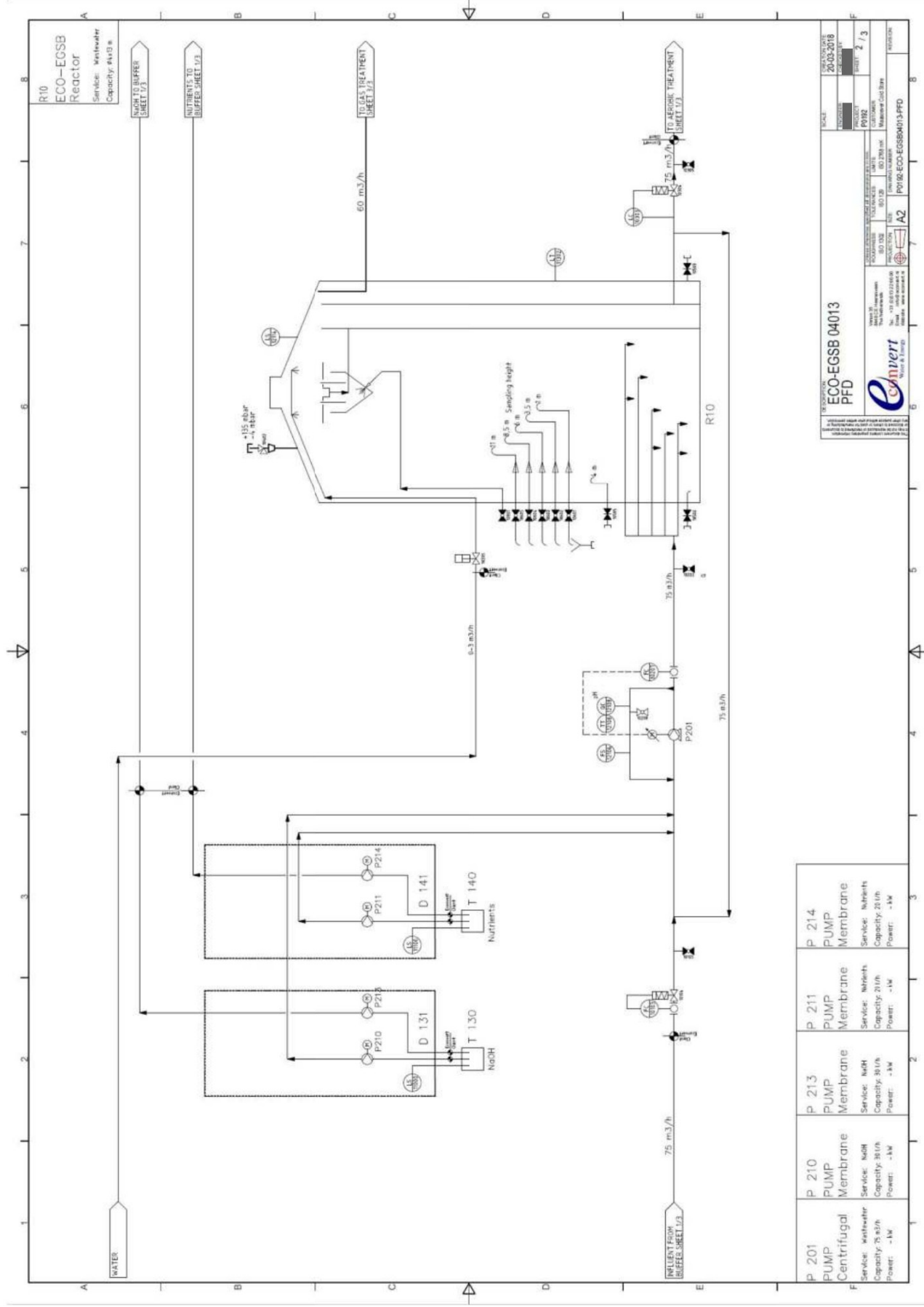
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Type	Location	Industry	Construction year
Econvert -IR®	Montenegro	Food and Beverage	2014
Econvert -IR®	Poland	Pulp and Paper	2014
Econvert-EGSB® (rebuild)+Econvert-Dsulph®	Germany	Pulp and Paper	2015
Econvert -IR®	United Kingdom	Pulp and Paper	2015
Econvert-Dsulph®	United States	Pulp and Paper	2015
Econvert-UASB® influent system	The Netherlands	Chemical and Pharma	2016
Econvert -IR®	Finland	Pulp and Paper	2016
Econvert -IRC® + Econvert-Dsulph®	Austria	Pulp and Paper	2016
Econvert-Dsulph®	Austria	Pulp and Paper	2016
Econvert -IR®	Germany	Pulp and Paper	2016
Econvert -IR® + Econvert-Dsulph®	The Netherlands	Pulp and Paper	2016
Rental ECO EGSB	The Netherlands	Food and Beverage	2017
Econvert-EGSB®	Germany	Pulp and Paper	2017
Econvert-Dsulph®	Germany	Pulp and Paper	2017
Econvert -IR®	Russia	Food and Beverage	2018
Econvert-UASB®	Belgium	Food and Beverage	2018
Econvert-EGSB®	Germany	Food and Beverage	2018
Econvert -IR®	The Netherlands	Food and Beverage	2018
Econvert-UASB® retrofit	The Netherlands	Food and Beverage	2018
Econvert-EGSB®	France	Food and Beverage	2018
Econvert-EGSB®	The Netherlands	Food and Beverage	2018

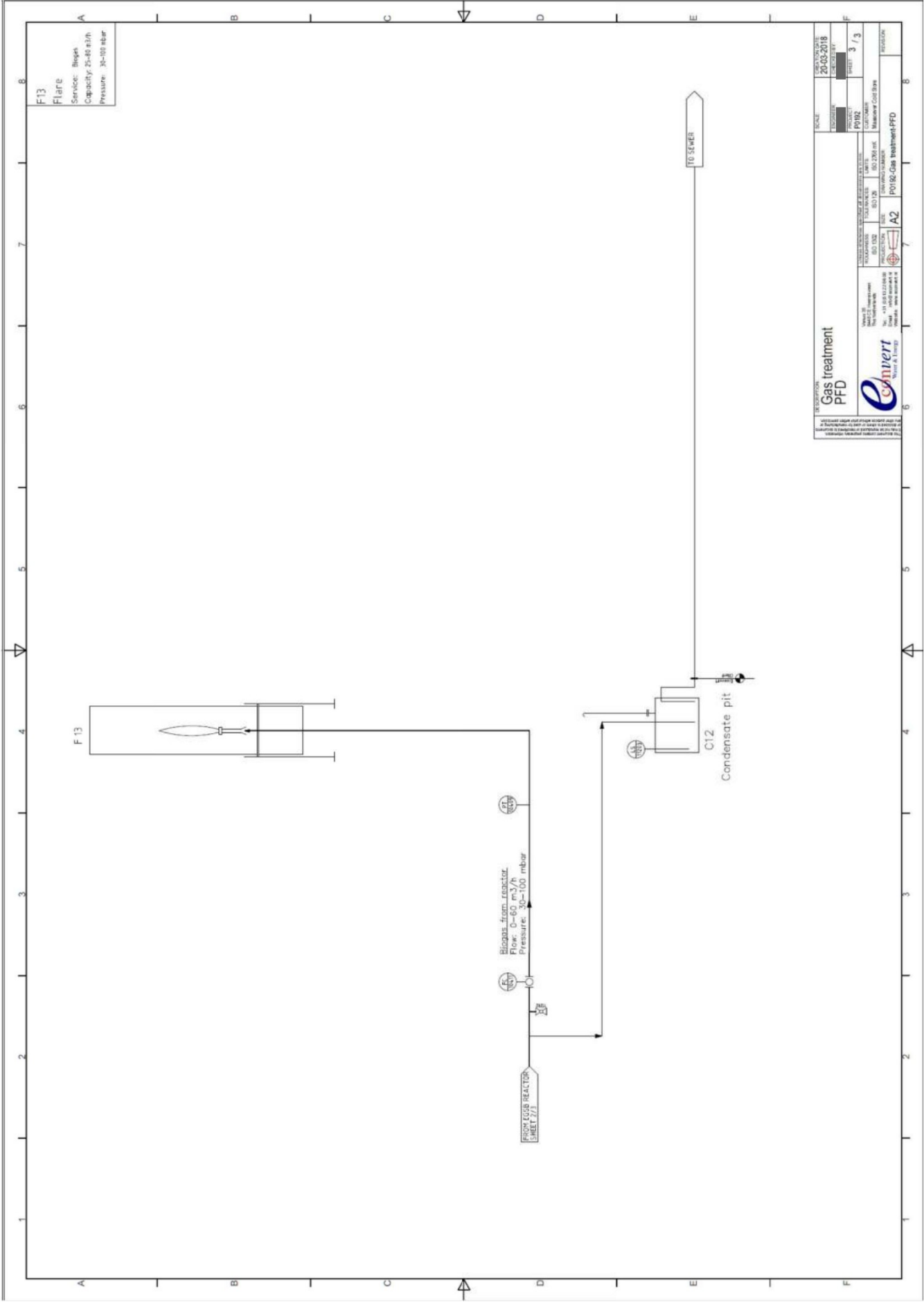
Econvert-Dsulph®	Germany	Food and Beverage	2018
Rental ECO EGSB	The Netherlands	Food and Beverage	2018
Rental ECO EGSB	The Netherlands	Food and Beverage	2018
Econvert -IR®	Poland	Pulp and Paper	2018
Econvert -IR® + Econvert-Dsulph®	Germany	Pulp and Paper	2018
Econvert -IRC® + Econvert-Dsulph®	Germany	Pulp and Paper	2018
Econvert -IR® + Econvert-Dsulph®	Austria	Pulp and Paper	2018
Econvert-Dsulph®	Germany	Pulp and Paper	2018
Econvert -IR®	Germany	Pulp and Paper	2018
Econvert-Dsulph®	Canada	Brown bin digester	2019
Econvert-EGSB®	Germany	Food and Beverage	2019
Econvert-Dsulph®	Germany	Pulp and Paper	2019
Econvert-EGSB®	Germany	Pulp and Paper	2019
Econvert -IR® + Econvert-Dsulph®	Poland	Pulp and Paper	2019
Econvert-EGSB® + Econvert-Dsulph®	Germany	Pulp and Paper	2019
Econvert-EGSB® + Econvert-Dsulph®	France	Pulp and Paper	2019
Econvert-Dsulph®	Germany	Pulp and Paper	2019
Econvert-EGSB®	The Netherlands	Food and Beverage	2018/2019
Econvert-EGSB®	Italy	Pulp and Paper	2018/2019
Econvert -IR®	Germany	Pulp and Paper	2018/2019
Econvert-EGSB®	Germany	Pulp and Paper	2019
Econvert-Dsulph®	Canada	Biogas	2020
Econvert-Dsulph®	Germany	Community sewage treatment plant	2020
Econvert-EGSB®	Norway	Condensate	2020
Econvert-EGSB®	Peru	Pulp and Paper	2020
Econvert -IR® + Econvert-Dsulph® retrofit	Saudi Arabia	Pulp and Paper	2020
Econvert -IR®	Mexico	Pulp and Paper	2020
Econvert -IR® + Econvert-Dsulph®	Poland	Pulp and Paper	2020

Econvert -IRC® + Econvert-Dsulph®	Slovakia	Pulp and Paper	2020
Econvert-Dsulph®	Germany	Pulp and Paper	2020
Econvert -IR®	United Kingdom	Pulp and Paper	2020
Econvert -IRC® + Econvert-Dsulph®	Germany	Pulp and Paper	2020
Econvert -IRC® + Econvert-Dsulph®	Germany	Pulp and Paper	2020
Rental ECO EGSB	France	Pulp and Paper	2020
Econvert-EGSB®	Germany	Pulp and Paper	2020
Econvert -IR®	Mexico	Pulp and Paper	2020
Rental ECOR IR	Romania	Pulp and Paper	2020
Econvert-EGSB® + Econvert-Dsulph®	The Netherlands	Pulp and Paper	2020
Econvert-EGSB®	Germany	Waste and Wastewater	2020
Econvert-EGSB®	Norway	Chemical and Pharma	2019/2020
Econvert-UASB®	France	Food and Beverage	2021
Rental ECO EGSB	Poland	Food and Beverage	2021
Rental ECOR IR + Econvert-Dsulph®	The Netherlands	Pulp and Paper	2021
Econvert -IR®	Colombia	Pulp and Paper	2021
Econvert -IR®	Germany	Pulp and Paper	2021
Econvert-EGSB® + Econvert-Dsulph®	The Netherlands	Pulp and Paper	2021
Rental ECO EGSB	The Netherlands	Pulp and Paper	2021
Econvert-Dsulph®	Germany	Pulp and Paper	2021
Econvert -IR®	France	Pulp and Paper	2021
Econvert -IR®	Belgium	Pulp and Paper	2021
Econvert-Dsulph®	The Netherlands	Pulp and Paper	2021
Econvert-EGSB®	France	Pulp and Paper	2021
Econvert-IR® + Econvert-Dsulph®	Mexico	Pulp and Paper	2020/2021
Econvert -IRC® + Econvert-Dsulph®	France	Pulp and Paper	2020/2021
Engineering	The Netherlands	Chemical and Pharma	2022
Engineering	United States	Chemical and Pharma	2022

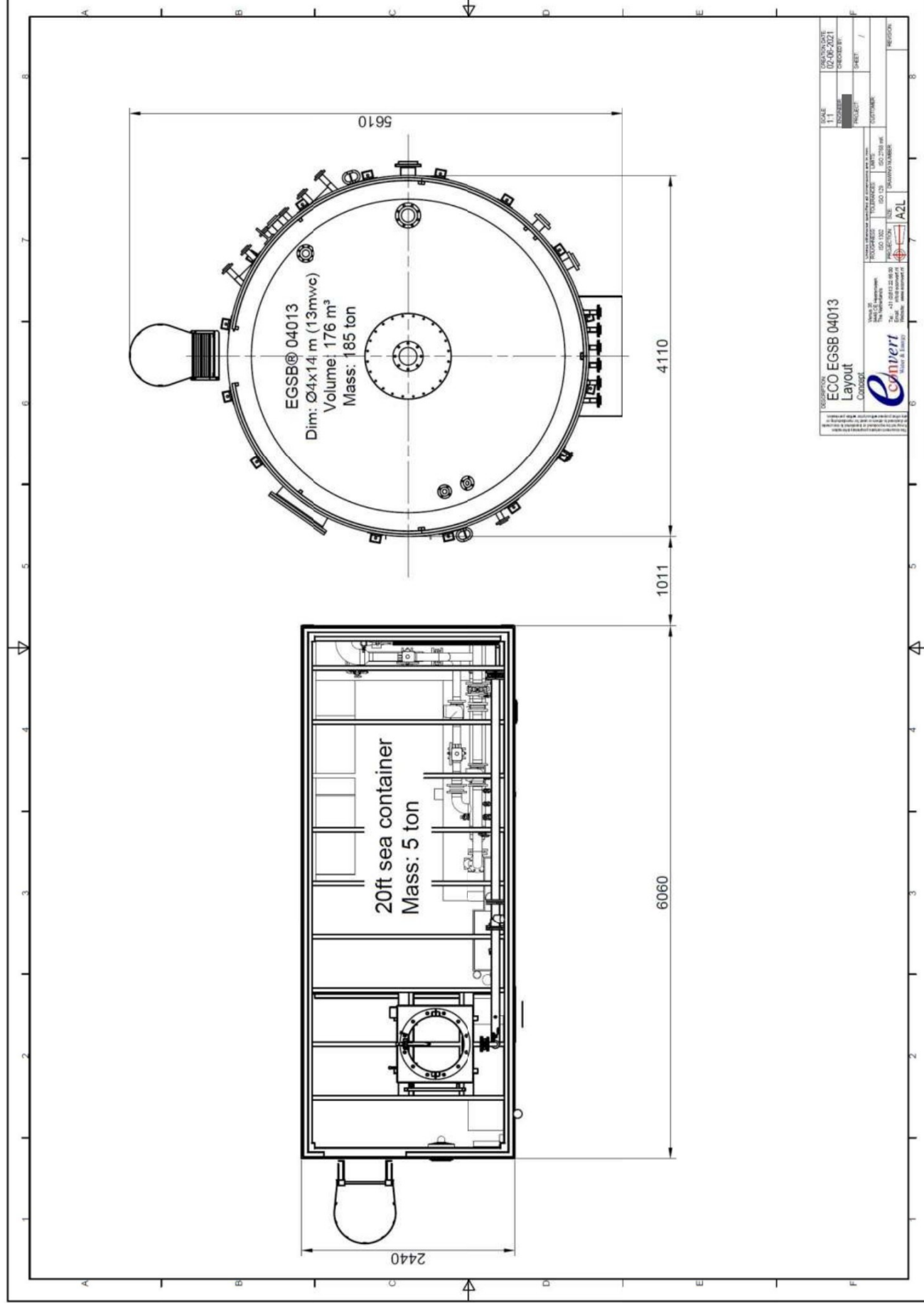
Engineering	Russia	Food and Beverage	2022
Econvert-EGSB®	United Kingdom	Food and Beverage	2022
Buffer tanks	Germany	Food and Beverage	2022
Engineering	United Kingdom	Food and Beverage	2022
Engineering	Russia	Food and Beverage	2022
Engineering	Germany	Industrial process water	2022
Econvert-EGSB® + Econvert-Dsulph®	Lithuania	Pulp and Paper	2022
Econvert -IRC® + Econvert-Dsulph®	Romania	Pulp and Paper	2022
Rental ECO EGSB	Estonia	Pulp and Paper	2022
Engineering	France	Pulp and Paper	2022
Engineering	France	Pulp and Paper	2022
Engineering	Norway	Pulp and Paper	2022
Engineering	Spain	Pulp and Paper	2022
Primary sedimentation	Spain	Pulp and Paper	2022
Econvert-EGSB®	Germany	Biochemicals	2021/2022
Hyvab	Norway	Pulp and Paper	2021/2022
Econvert-EGSB®	-	Food and Beverage	TBA
Econvert-EGSB®	South Africa	Food and Beverage	TBA
Econvert-EGSB® + Econvert-Dsulph®	Chile	Food and Beverage	TBA
Engineering	United kingdom	Food and Beverage	TBA
Basic Engineering	Jamaica	Food and Beverage	TBA
Econvert-EGSB®	Spain	Food and Beverage	TBA
Econvert-UASB® retrofit	Italy	Pulp and Paper	TBA
Econvert-UASB® influent system	Germany	Pulp and Paper	TBA
Econvert -IR®	Germany	Pulp and Paper	TBA
Econvert-EGSB®	Italy	Pulp and Paper	TBA
Rental ECO EGSB	France	Pulp and Paper	TBA
Econvert -IR®	Germany	Waste and Wastewater	TBA

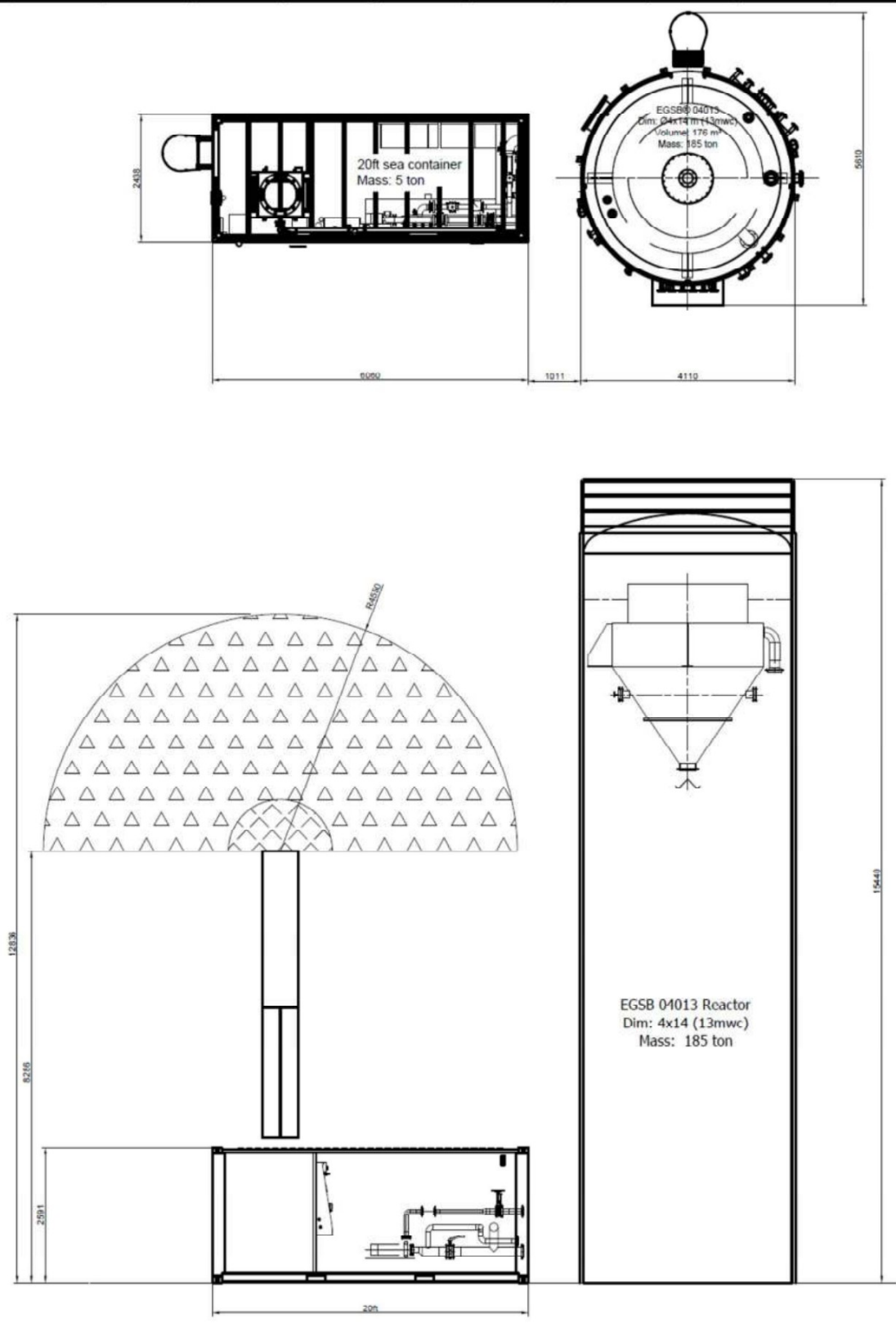
7.2 Appendix II - Preliminary PFD





7.3 Appendix III - Preliminary Lay-Out





EGSB 04013 Layout & Side view Preliminary For sales purposes only		SCALE: 1:50 CREATION DATE: 23-08-2019 DESIGNED BY: [Redacted] CHECKED BY: [Redacted]
Version 01 Drawn by: [Redacted] The Netherlands	ISO 15926 ISO 15926-1 ISO 15926-2 ISO 15926-3 ISO 15926-4 ISO 15926-5 ISO 15926-6 ISO 15926-7 ISO 15926-8 ISO 15926-9 ISO 15926-10 ISO 15926-11 ISO 15926-12 ISO 15926-13 ISO 15926-14 ISO 15926-15 ISO 15926-16 ISO 15926-17 ISO 15926-18 ISO 15926-19 ISO 15926-20 ISO 15926-21 ISO 15926-22 ISO 15926-23 ISO 15926-24 ISO 15926-25 ISO 15926-26 ISO 15926-27 ISO 15926-28 ISO 15926-29 ISO 15926-30 ISO 15926-31 ISO 15926-32 ISO 15926-33 ISO 15926-34 ISO 15926-35 ISO 15926-36 ISO 15926-37 ISO 15926-38 ISO 15926-39 ISO 15926-40 ISO 15926-41 ISO 15926-42 ISO 15926-43 ISO 15926-44 ISO 15926-45 ISO 15926-46 ISO 15926-47 ISO 15926-48 ISO 15926-49 ISO 15926-50 ISO 15926-51 ISO 15926-52 ISO 15926-53 ISO 15926-54 ISO 15926-55 ISO 15926-56 ISO 15926-57 ISO 15926-58 ISO 15926-59 ISO 15926-60 ISO 15926-61 ISO 15926-62 ISO 15926-63 ISO 15926-64 ISO 15926-65 ISO 15926-66 ISO 15926-67 ISO 15926-68 ISO 15926-69 ISO 15926-70 ISO 15926-71 ISO 15926-72 ISO 15926-73 ISO 15926-74 ISO 15926-75 ISO 15926-76 ISO 15926-77 ISO 15926-78 ISO 15926-79 ISO 15926-80 ISO 15926-81 ISO 15926-82 ISO 15926-83 ISO 15926-84 ISO 15926-85 ISO 15926-86 ISO 15926-87 ISO 15926-88 ISO 15926-89 ISO 15926-90 ISO 15926-91 ISO 15926-92 ISO 15926-93 ISO 15926-94 ISO 15926-95 ISO 15926-96 ISO 15926-97 ISO 15926-98 ISO 15926-99 ISO 15926-100	CUSTOMER: [Redacted] PROJECT: [Redacted] DRAWING NO: [Redacted] SCALE: 1:50 DATE: 23-08-2019 DRAWN BY: [Redacted] CHECKED BY: [Redacted] APPROVED BY: [Redacted]

7.4 Appendix IV - Preliminary P&ID

