KIVI- Duurzame fabrieken.

Duurzame energie, CO2 en meststoffen.

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Vision HoSt

VISION HOST

Biomass energy systems to convert Bio-waste to sustainable energy in the most efficient way. HoSt strives to be the market leader in the Netherlands and a prime actor in Europe for the supply of biomass energy systems.

A strong focus on research and development gives us the practical applications that form the basis of our success.

HoSt Products | 25+ years of experience

'FARMSCALE' DIGESTION

Experience in biogas plants on farm and industrial scale. From 65 to 6,500 kWe.

Agro waste, food waste.

'INDUSTRIAL' DIGESTION

Experience with systems from 5 MWt up to 25 MWt.
Industrial waste, sludges.

BIOGAS UPGRADING

Upgrading of biogas to natural gas quality and pure methane.

MANURE & DIGESTATE TREATMENT

Mineral recovery and clean water by: flotation units, UF/RO, Biology.

Bright Biomethane | Biogas Uprading

BIOGAS UPGRADING

Upgrading biogas to natural gas quality, also known as (pure) '**biomethane**'.

MEMBRANE TECHNOLOGY

Highly efficient membranes for the separation of methane from biogas.

GAS CLEANING

Experience with biogas from nearly all biogas plant types and from most forms of biomass feedstock.

CO_2 LIQUEFACTION

CO_2 recovery and liquefaction to create an extra source of revenue for the plant owner.

HoSt Biomass Combustion and Power Plants

BIOMASS COMBUSTION

From **5 MWt** up to **25 MWt.**

HEAT + POWER PLANT

From **1** to **10 MWe.**

FLUIDISED BED GASIFIERS

Clean technology suitable for 'difficult' fuels.

SERVICE & OPERATION

24/7 maintenance team throughout Europe.

HoST
BIO-ENERGY INSTALLATIONS

Industrial biogas plants

Farm scale biogas plant

Biogas upgrading

Slaughterhouse waste line

Food waste

Thermal Hydrolysis

No. 1 in Waste to Bioenergy

1- 5 MWe biomass fired CHP

Fuel experience

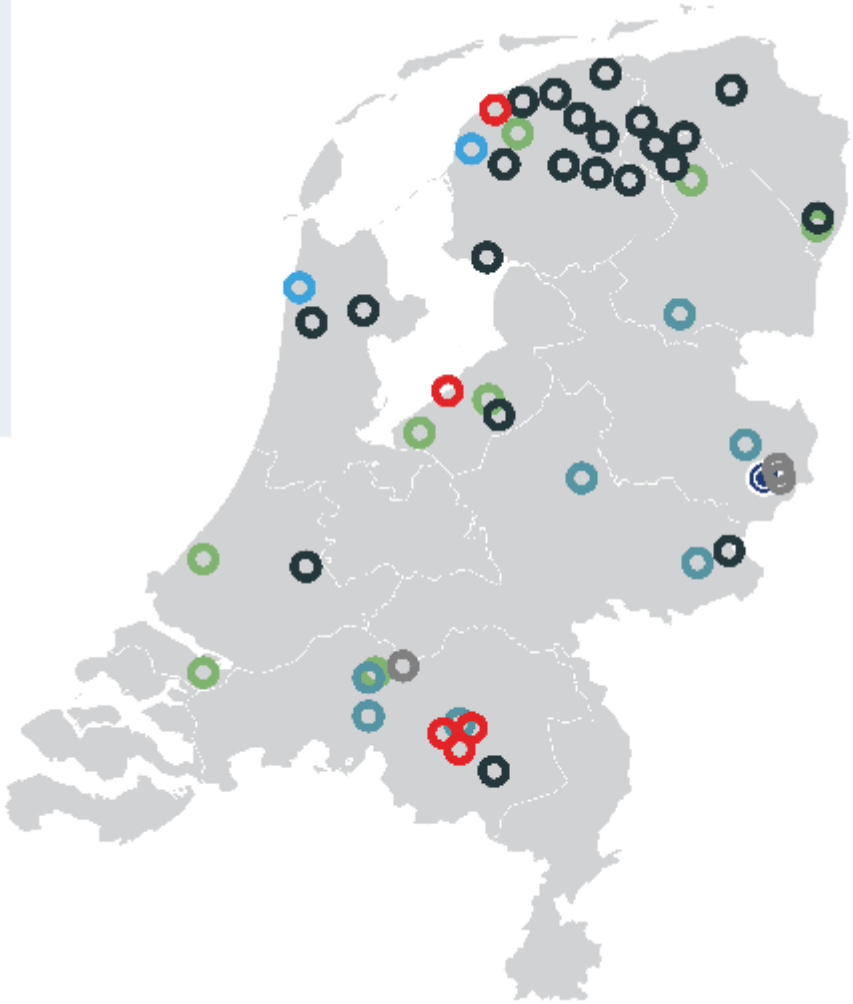
Wood, Bark, Demolition wood, straw, paper pulp, apple pommes

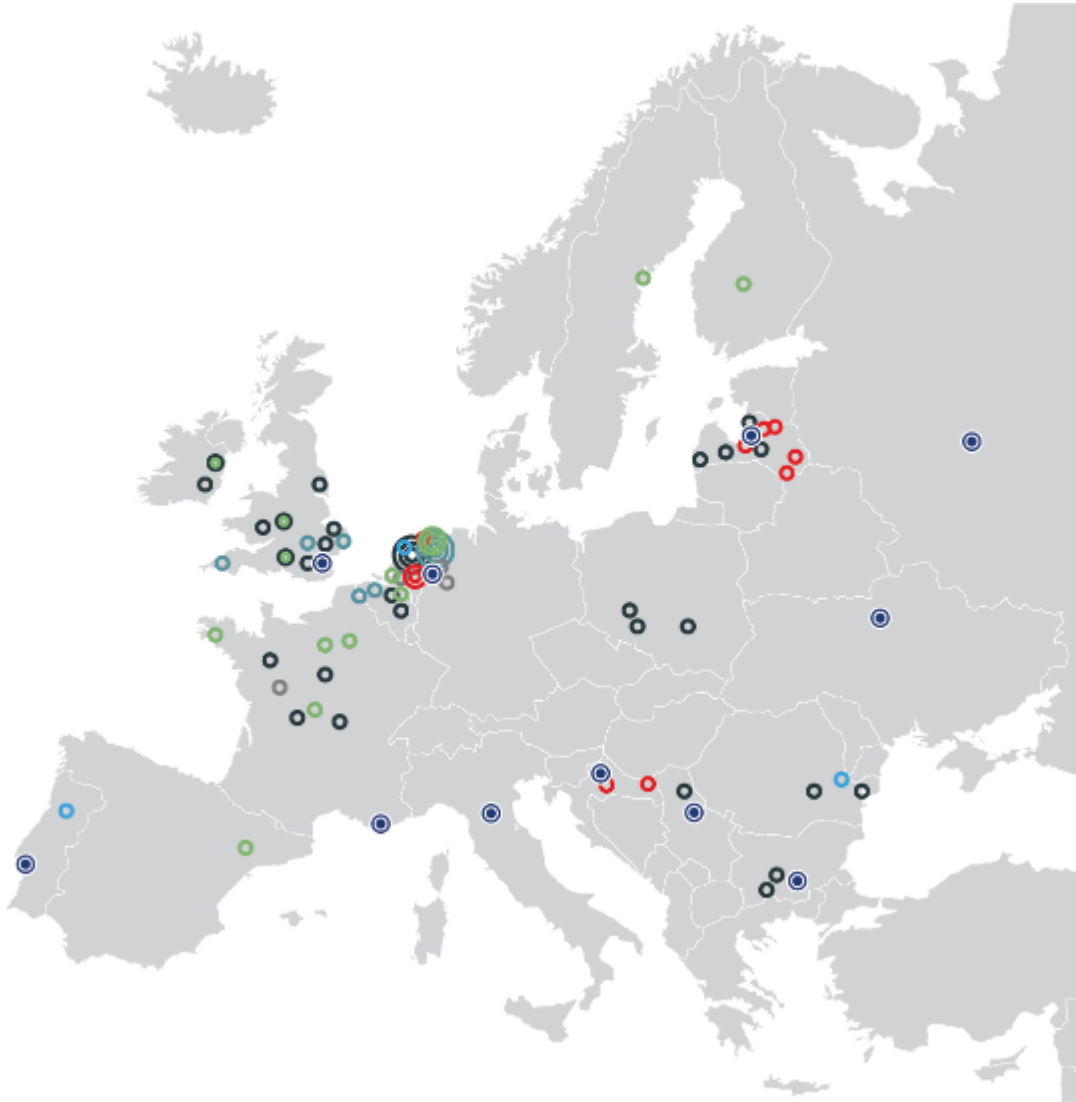
What makes HoSt unique?

- **Technologies**
  - EPC contractor (engineering Procurement and construction
  - Own Technology
  - Focus on new developments
  - Operation of plants
  - Own plants
- **Annual Growth:** 25% annual average Last 12 years
- In 2018: About 100 **engineers**
  - 35% University
  - 65% Bachelors
- **Turn-over** approx. €40-50 million
- **Expected**: 2021 double numbers

HOST
BIO-ENERGY INSTALLATIONS

- FARM SCALE BIOGAS PLANTS
- INDUSTRIAL BIOGAS PLANTS
- WOOD-FIRED CHP
- BIOGAS UPGRADING
- MICROFERM PLANTS
- GASIFIERS
- OFFICES / PARTNERS





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Eigen Exploitatie

- 2 grote vergister
  - Wabico: 120.000 ton afvalstromen→
    →Expansie naar 10 miljoen m3 aardgas per jaar
    → 4 miljoen Vloeibare CO2
    → 5000 ton fosfaat korrel
  - Marrum 35 000 ton mest→ 2, 5 miljoen m3 aardgas
  - Investering van 18 miljoen.
- 3 Hout WKK Projecten: 15 MWt, 3 MWe
  - 75 miljoen kWh = 300.000 huishoudens
  - 36 miljoen m3 aardgas = 360.000 huishoudens

  Investering van 38 miljoen

Waarom hebben we zoveel Voedsel afval .

- Circle 300 km rond NL 80 miljoen mensen

- Levensmiddelen industrie → veel afval .
  - Veevoer
  - Niet te gebruiken → vergisting

- Huishoudelijk en grootkeukens
  - Naar vergisting (nu nog veel naar compostering
  - Via afval water → slib naar vergisting

Industrial Biogas Plants

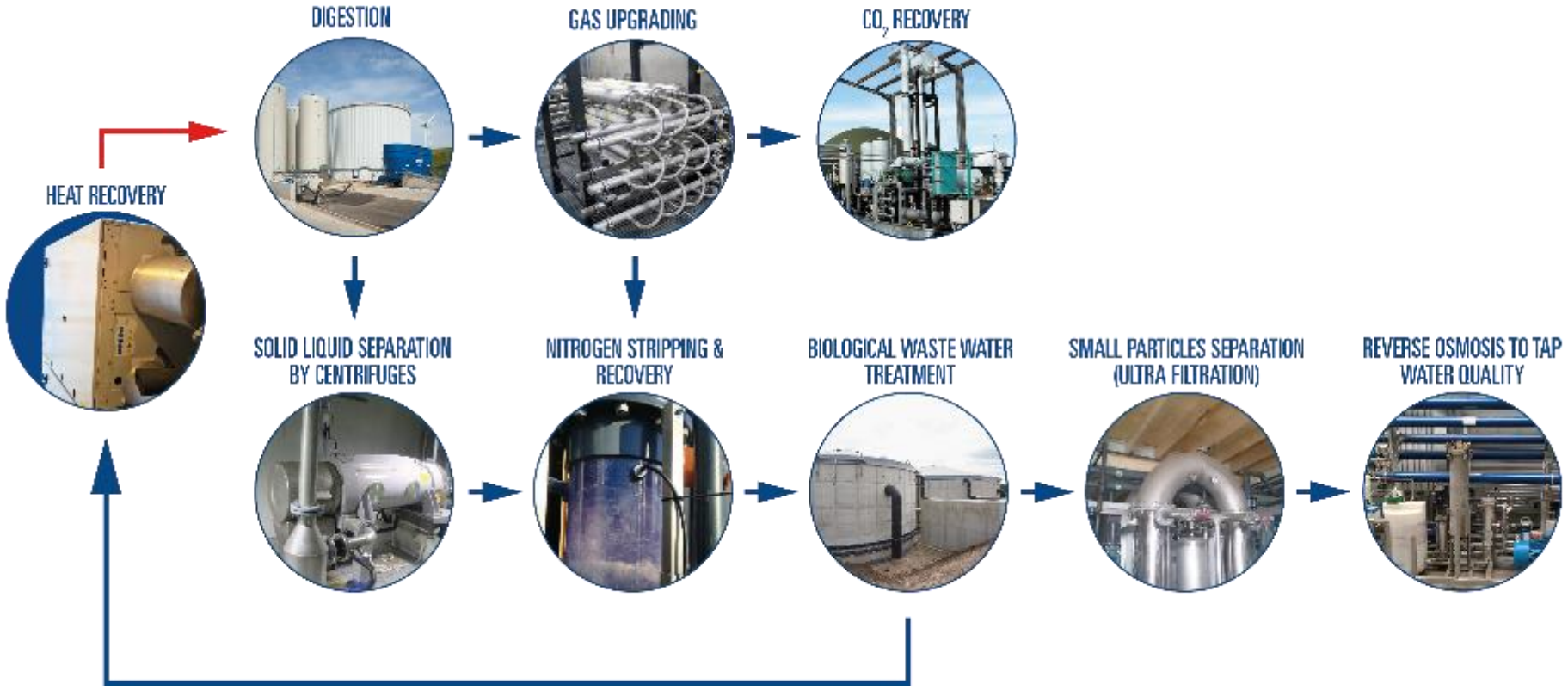
Reest and Wieden, the Netherlands

Apeldoorn, the Netherlands

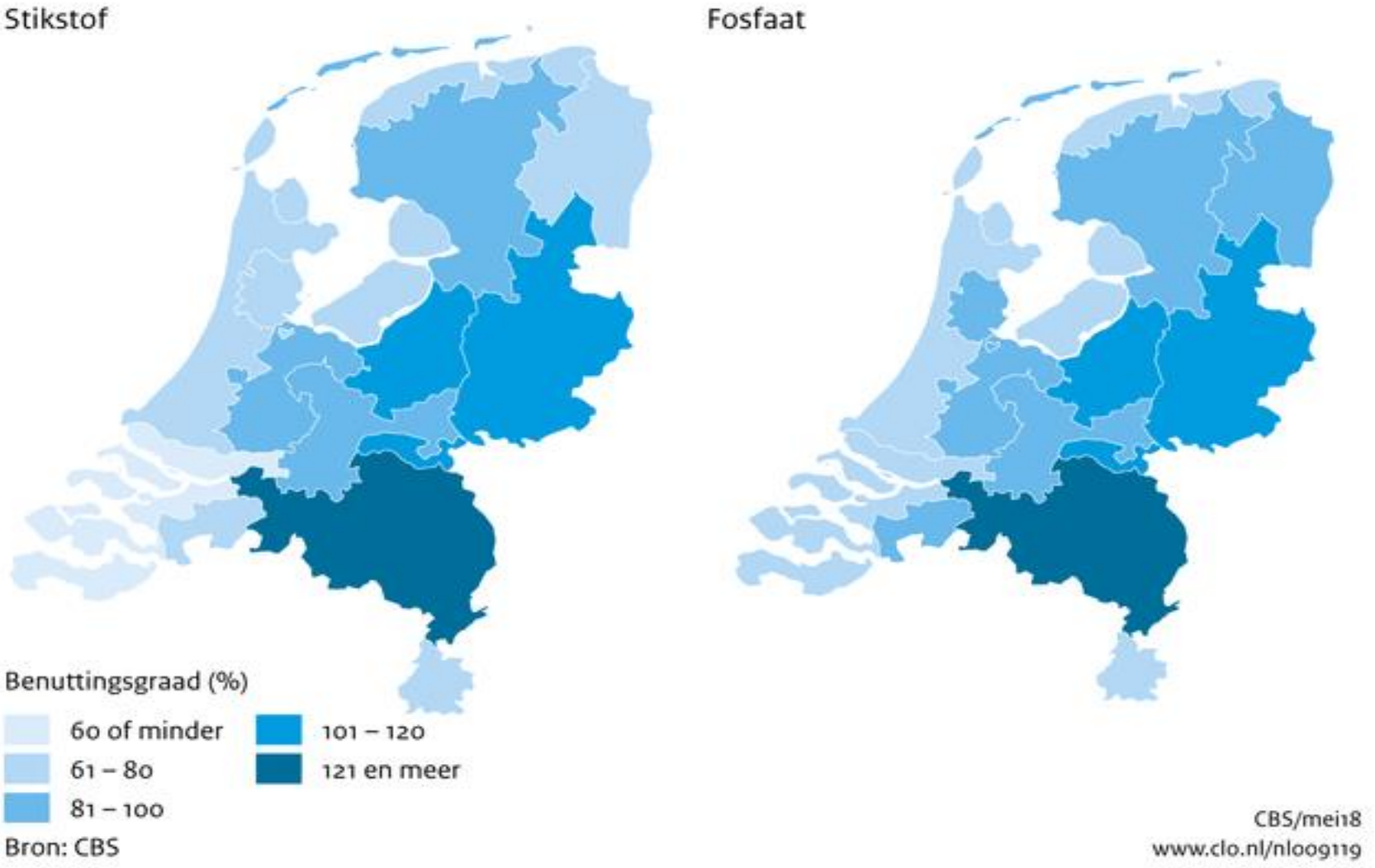
Doel (eigen) Biogasinstallaties :

- Naast energie andere grondstoffen
  - **Compost**
  - **Fosfaat**
  - **Stikstof**
  - **Kalium**
  - **CO2**
  - **???**

Wabico Waste Digestion + Digestate treatment



Benutting van de plaatsingsruimte voor stikstof en fosfaat uit dierlijke mest, 2016



Fosfaat

- Fosfaat voor 90% niet oplosbaar.
- Alleen te gebruiken als droge korrel

- O&O
  - Afscheiden door centrifuges, vijzelpers, bandfilter, kamerfilterpers
  - welke PE & Flocculant
  - Hoe droge stof gehalte verhogen (24%→ 30%)
  - Energieverbruik.
- Drogen zonder beschikbare warmte (geen wkk)
  - Warmte pomp droger
  - Composteren.

Stikstof (kunst)mestgebruik in Nederland

Beperking Stikstof uit Dierlijke mest

- Grasland max 240 kg/ha (=1,8 koe/ha)
- Akkerbouw max 170 kg/ha

80% landbouw = veeteelt, waarvan 75% voor grasland en 25% voor mais.

Totaal stikstof gebruik per ha = 400 kg/ha.

Kunstmest: 400.000.0000 kg N

Hiervoor wordt **1.000.000.000 m3 aardgas gebruikt**

Stikstof terugwinnen

Strippen → Absorberen

Gebruikelijk:

$NH_3 + H_2SO_4 \longrightarrow (NH_4)_2SO_4$

Probleem: Zwavelzuur verzuurt de grond.
Product heeft geen waarde

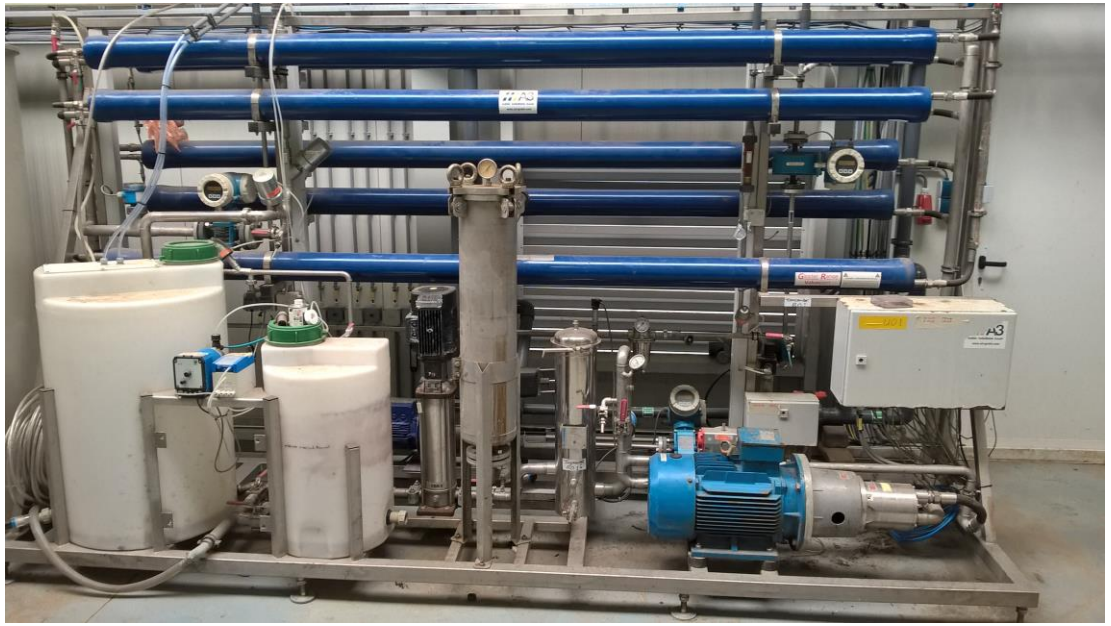
O&O

NH_3 op andere wijze binden / Concentreren

Belangrijkste meststof is N, P, K

- **K** Blijft over in de vloeistof nadat P, N er uit zijn gehaald

Ultra filtratie



Reverse Osmosis

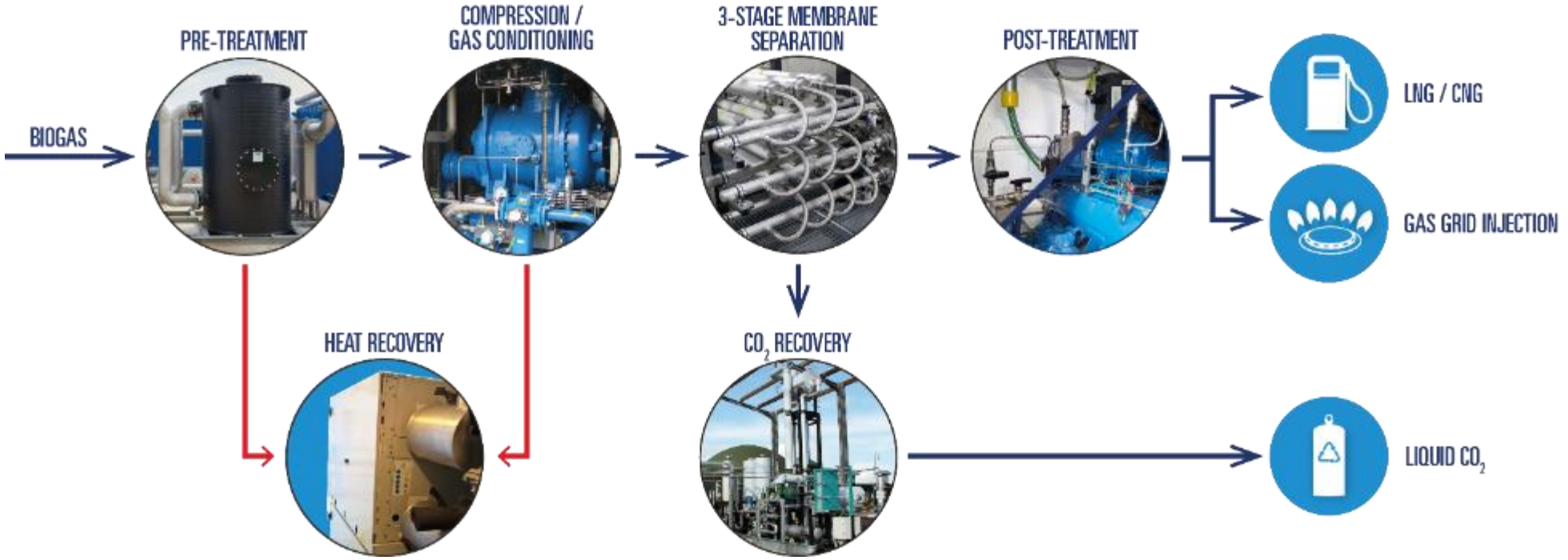
Agriculture Biogas Plants

Spilsby, England

Doboles Pagasts, Latvia

BRIGHT
BIOMETHANE

The Bright Biomethane Process



BRIGHT BIOMETHANE

HoST
BIO-ENERGY INSTALLATIONS

Bright Biomethane®: From biogas to biomethane

Plants from 40 Nm³ /h to 5000 Nm³ /h

Bright Solutions since 2012

- 100% focus on biogas upgrading
- References all over Europe
- First project finalized in 2012

WHY membrane systems ?

- Separation of CH_4 and CO_2
- Technology with low energy consumption
- Minimal loss of CH_4 (<0,5%)

BRIGHT BIOMETHANE

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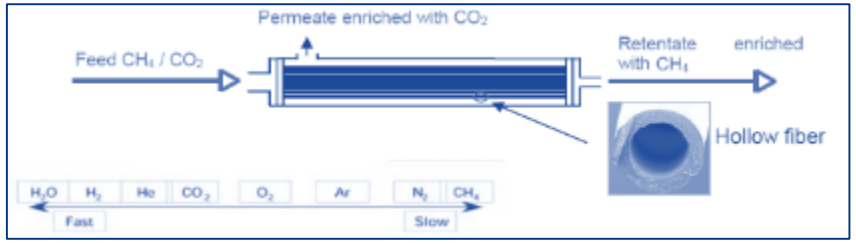
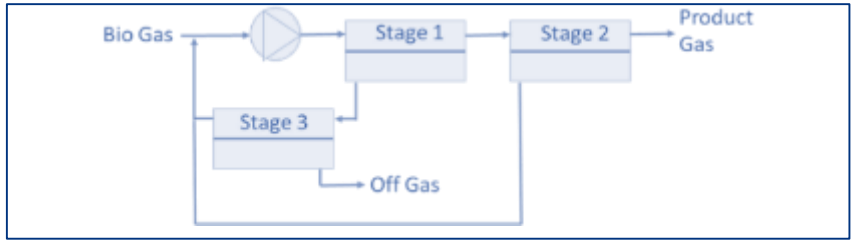
Membrane Separation: How?

- CO_2 passes trough the membrane faster than CH_4



- 3 stages for optimal recovery of CH_4



- Recycle for flow control and optimal recovery of CH_4

BRIGHT BIOMETHANE

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CO_2 Liquefaction

Total utilisation of biogas production

CO_2 Liquefaction

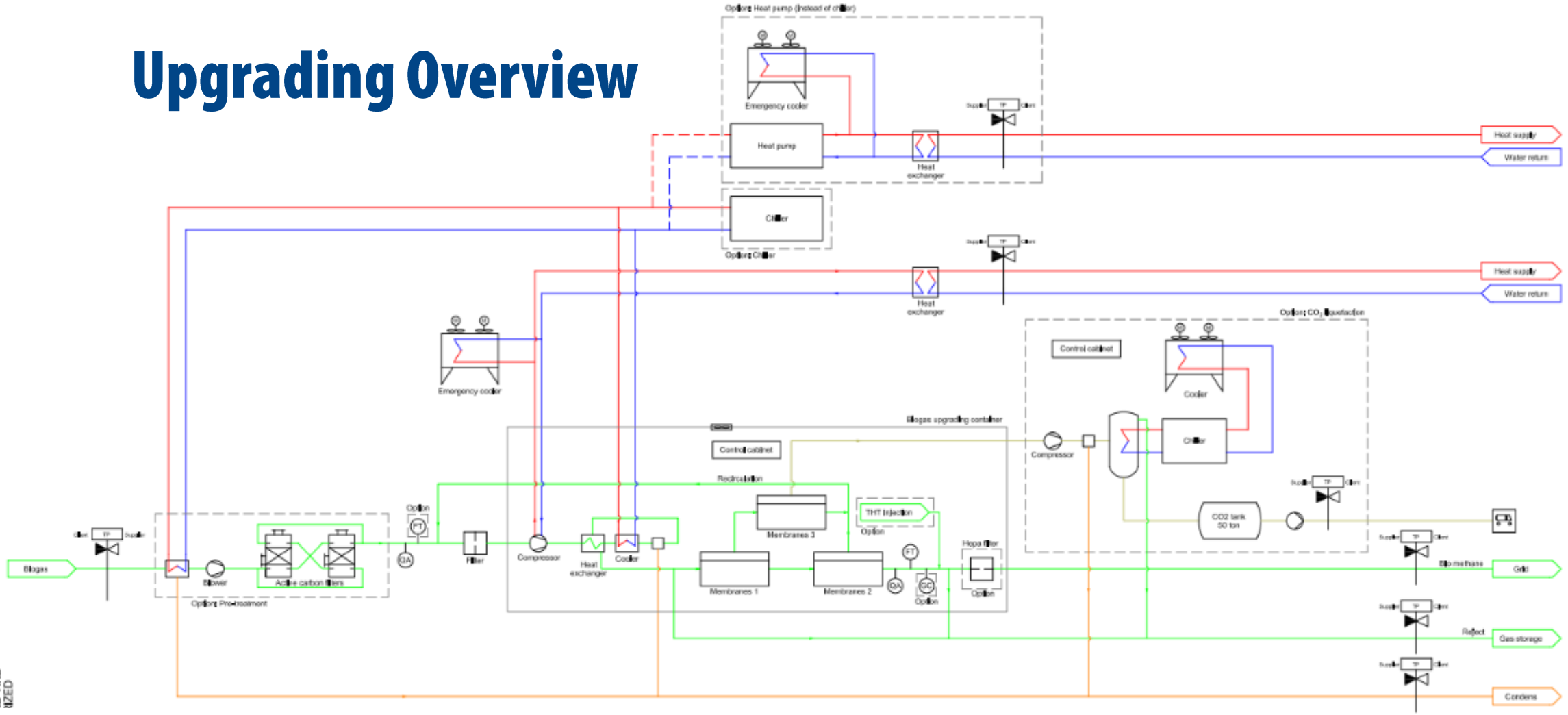
WHY?

- Storage
- Sales
- Transport
- Reduction of CH_4 loss of upgrading

WHAT?

- CO_2 liquefaction station
- Purification and liquefaction

Upgrading Overview



BRIGHT BIOMETHANE

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HoSt CFB gasification technology

Iberfer, Portugal. Different types of fuel, like: dried chicken manure, wood chips.

COMBUSTION

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Biomass-Fired CHP plants

1-10 Mwe / 3-25 Mwt

Research on Combustion technology (1)

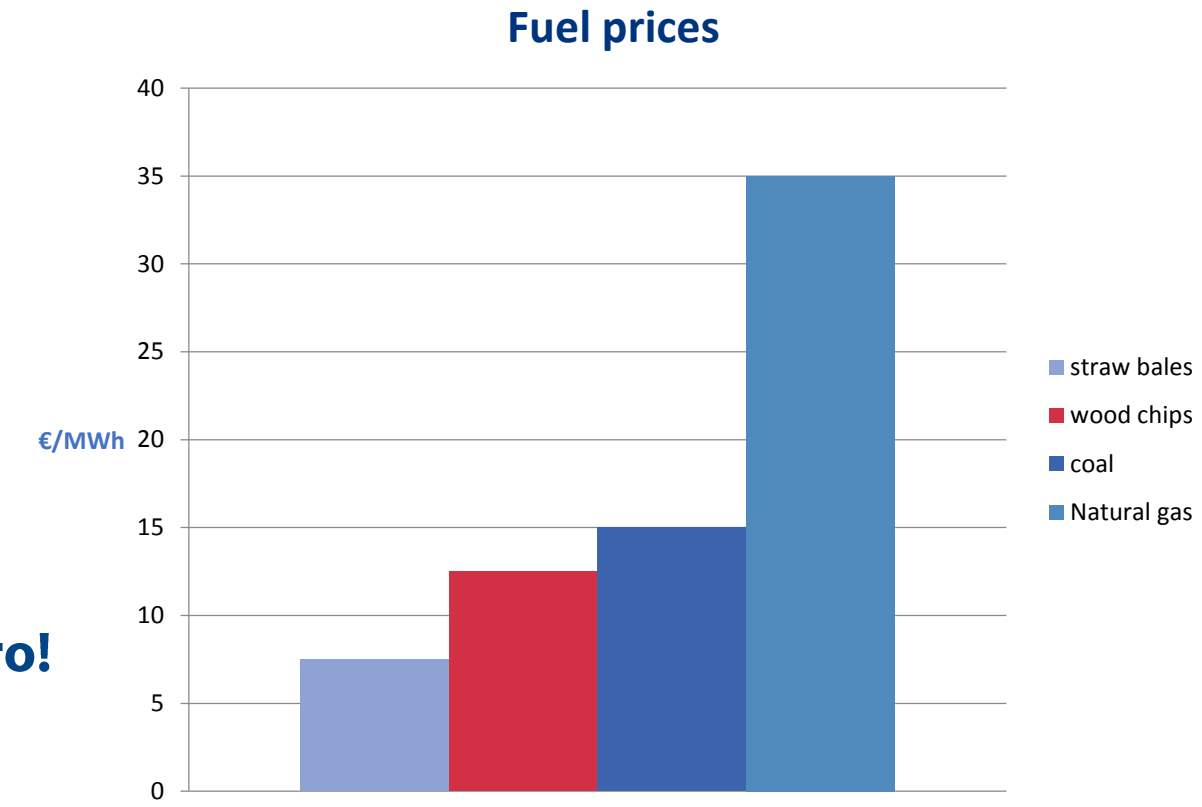
Careers for Process and Project engineers:

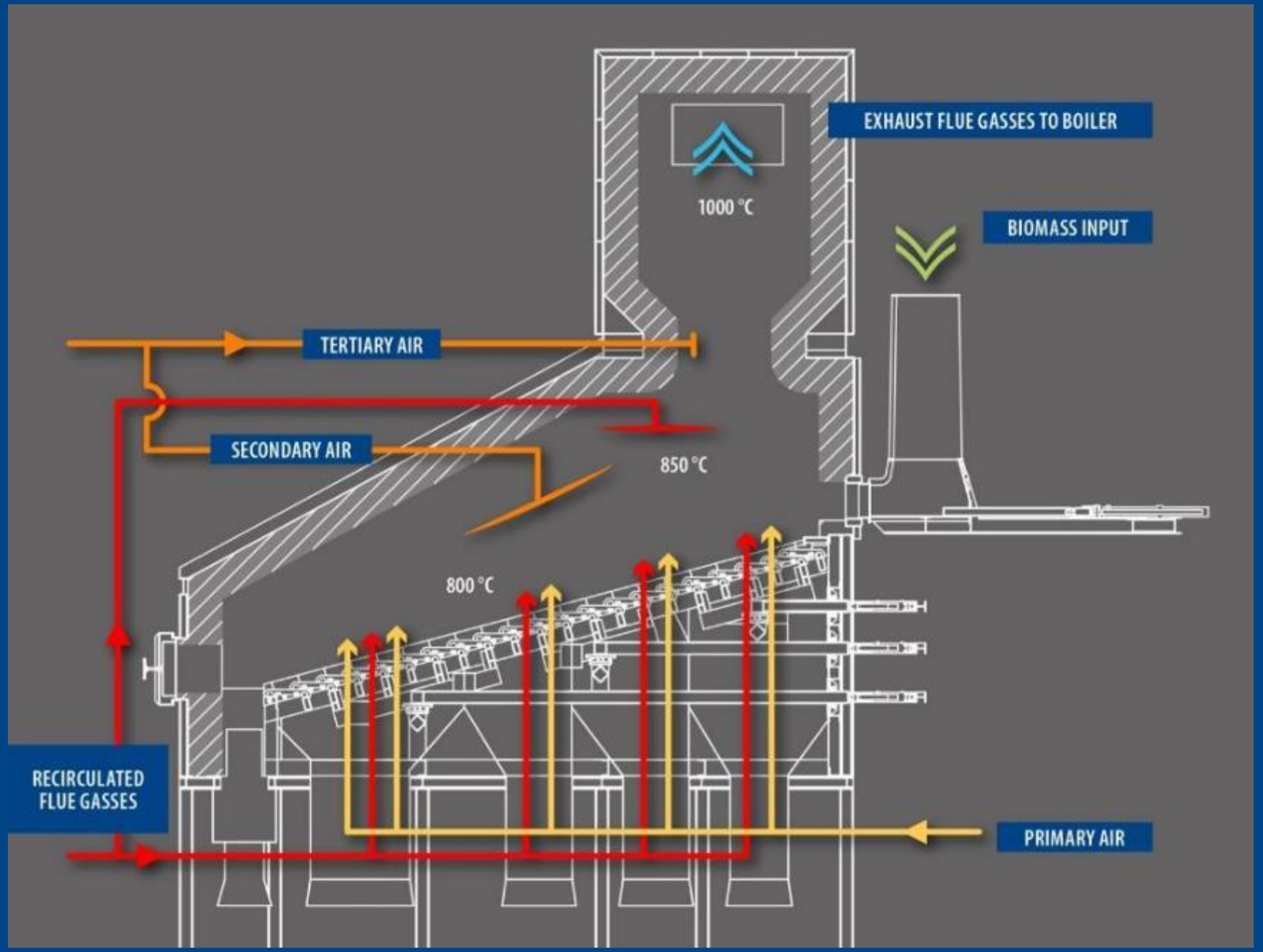
- Development
- Optimizing processes
- Process engineers
- Sales engineers
- Commissioning and Trouble shooting

Biomass vs. Fossil fuels

- Natural gas : 18 - 40 €/MWh
- Coal: : 10 - 15 € /MWh
- Wood (chips) : 10 - 15 € /MWh
- Straw : 8 - 12 €/MWh
- Waste : -50 - 0 €/MWh

The value of fossil fuels will go to zero!




EXHAUST FLUE GASSES TO BOILER
1000 °C
BIOMASS INPUT
TERTIARY AIR
SECONDARY AIR
850 °C
800 °C
RECIRCULATED FLUE GASSES
PRIMARY AIR

Research on Combustion technology (2)

Combustion of Difficult fuels (low ash melting point)

- **LOW NOX** - Under stoichiometric combustion on the grate
- **FULL COMBUSTION** due to secondary and tertiary air and turbulence
- **LOW TEMPERATURES** on the grate
- **CONTROL** of furnace end temperature to reduce refractory wear

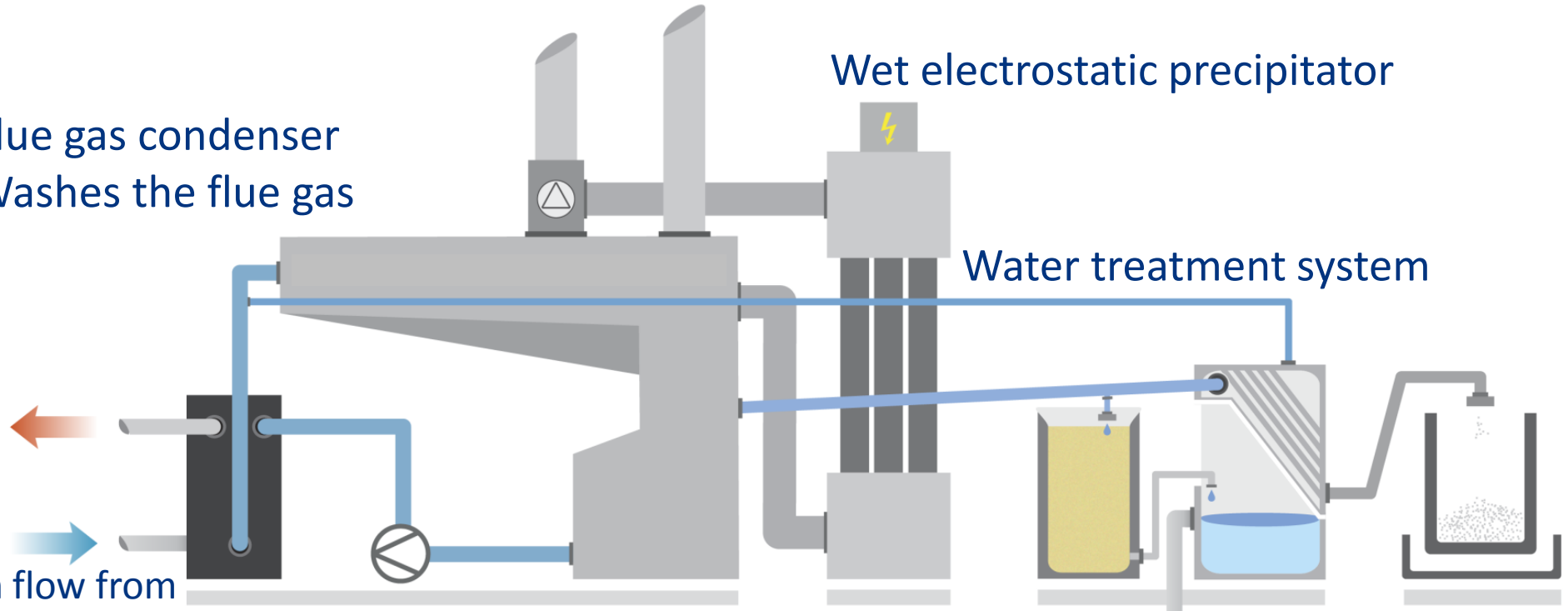
"Zero emissions"

ZeroEmission®

- **Clean flue gasses for injection in Green houses (CO_2 injection)**
- **DUST CAPTURE**
- **CAPTURE OF INORGANIC COMPONENTS**
  - Bicarbonate injection
  - Activated carbon injection
  - Bag house filter, Cyclone, WESP, ESP
- **NOx REDUCTION**
  - SCR, SNCR (urea or ammonia)
- **Additional New technology**

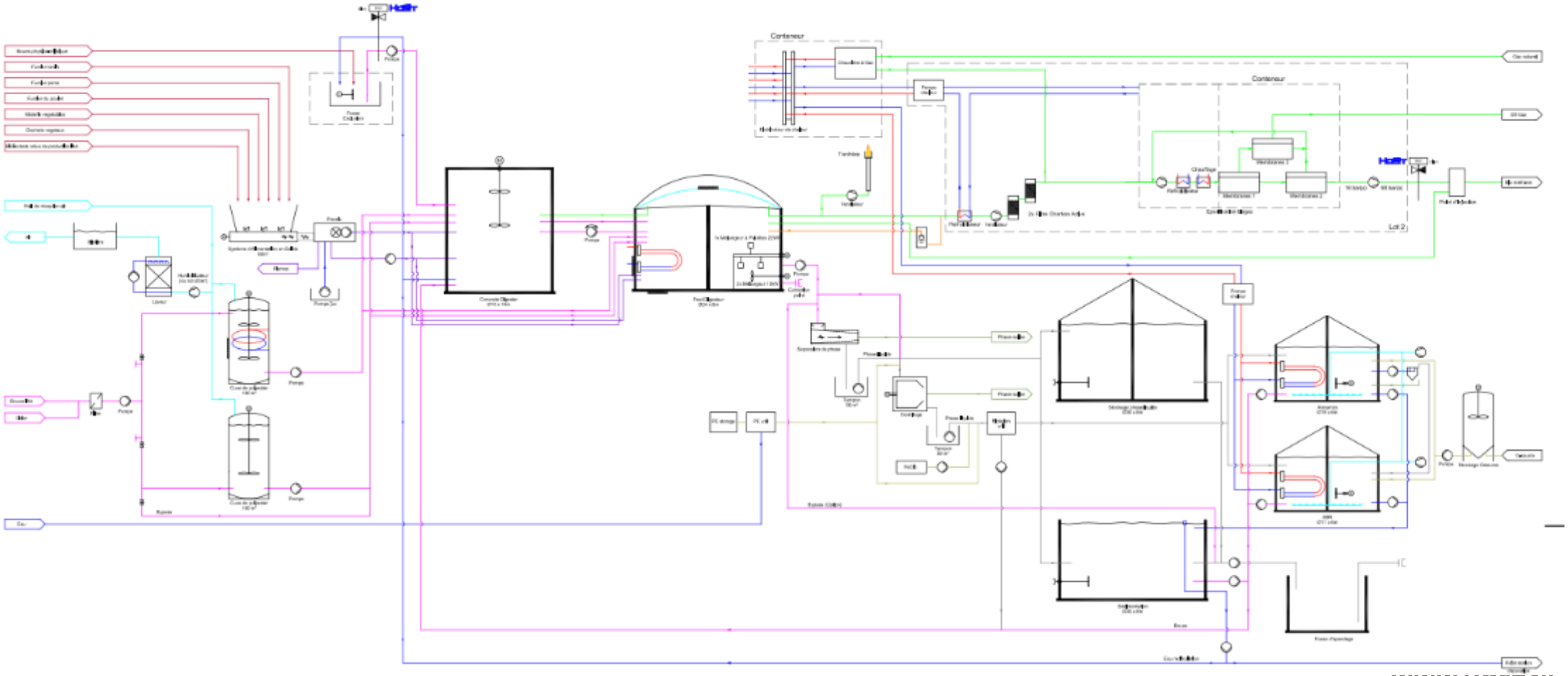
To the stack
< 10-20 [mg/nm^3]
53.5 [°C]

From the wood firing system
< 150-250 [mg/nm^3]
160 [°C] High water vapour content

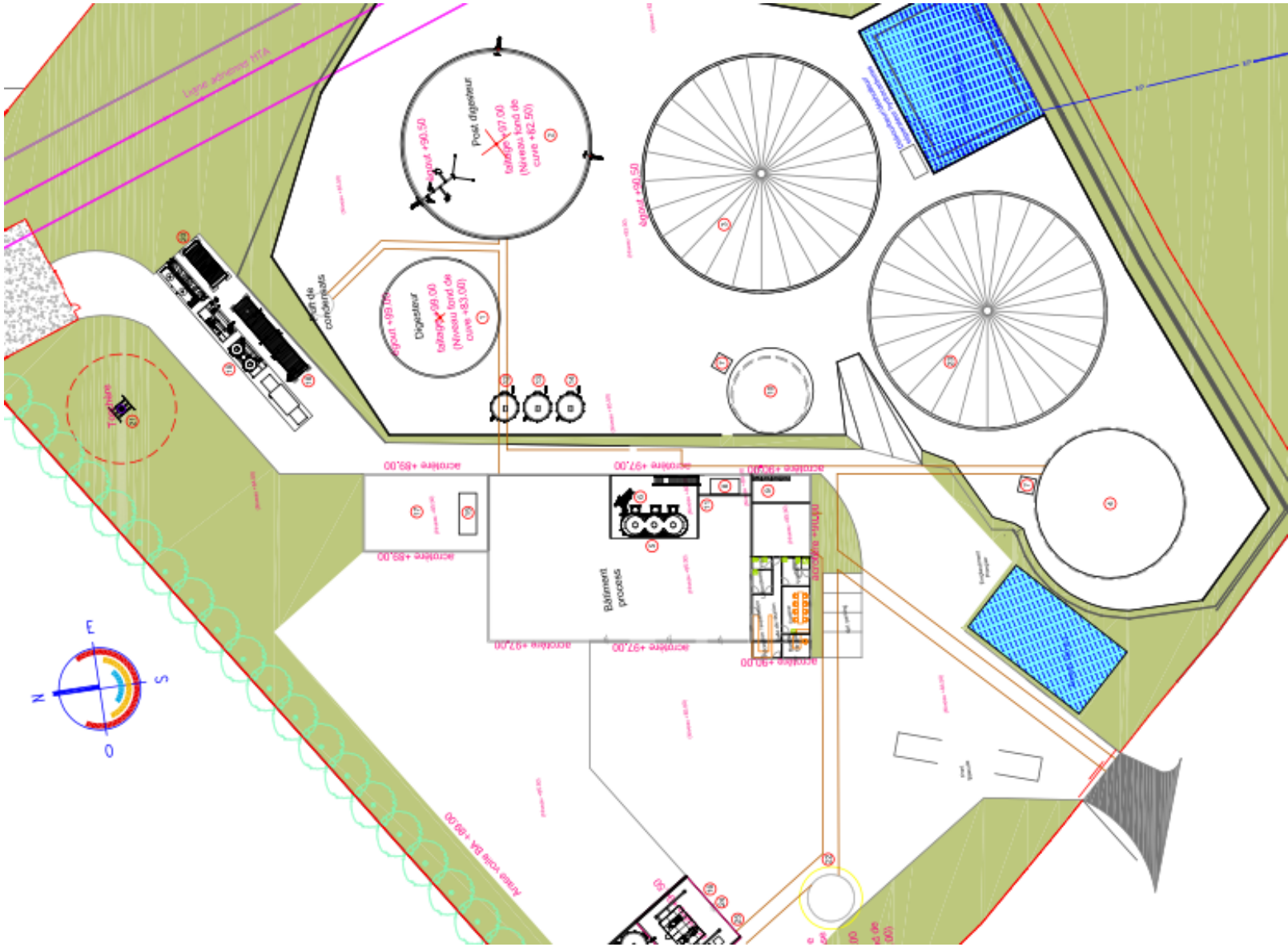


Questions ??

Example 1 – Anaerobic Digestion



Example 1: Anaerobic Digestion



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Category 2 & 3 Sanitation

(Slaughterhouse waste)

DIGESTION

Sludge Digestion

Maximum energy recovery from sludge

Farm Scale Biogas Plants all over Europe

HOST
BIO-ENERGY INSTALLATIONS

THE 'FARMSCALE' BIOGAS PLANT

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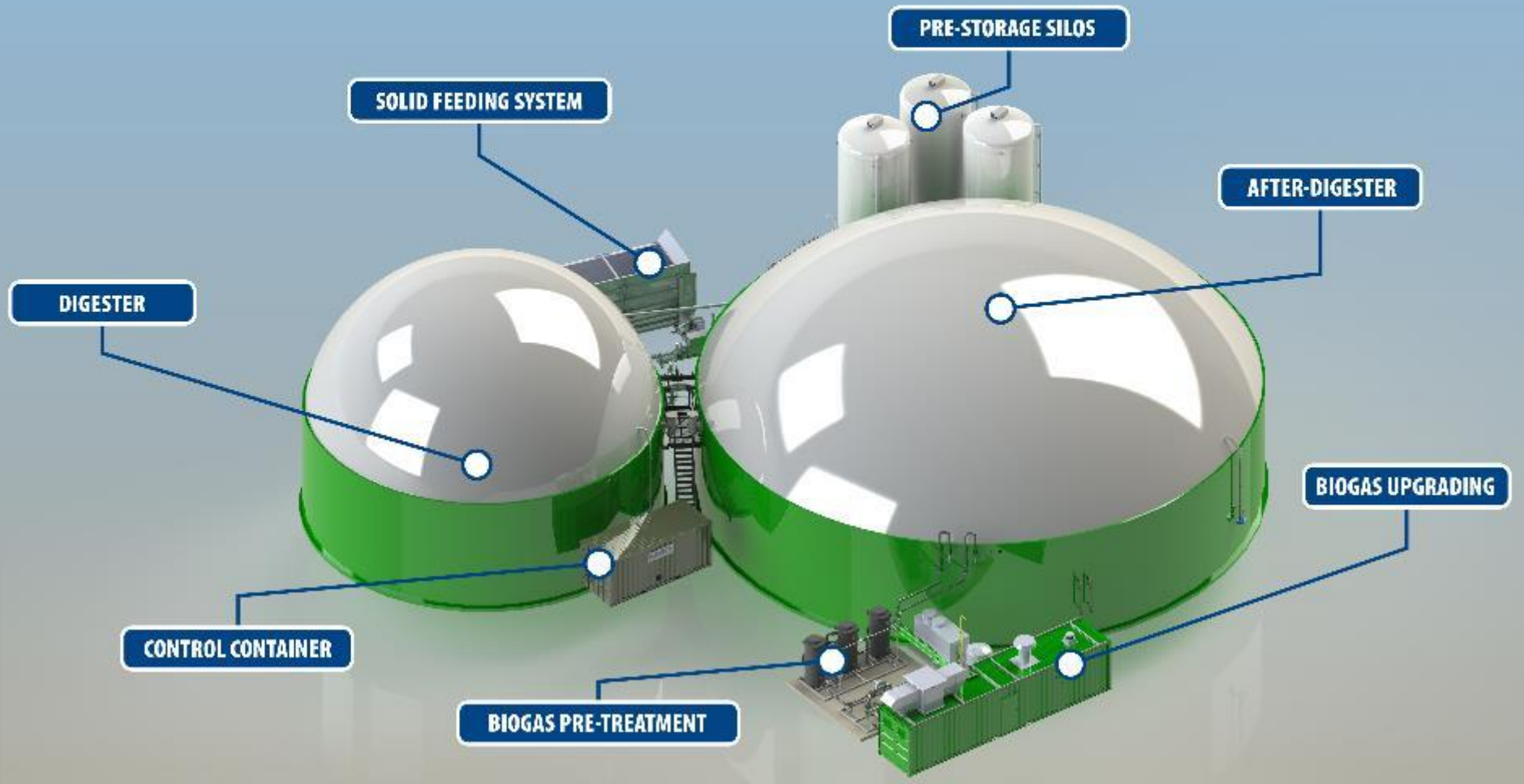

Industrial Biogas Plant

Echten, Netherlands: 1,4 Mwe




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