BIHCON

Biogas | Hydrogen | Construction

WARRIORS TO SAVE THE PLANET

Integrated biorefinery model for the valorization of organic waste into biomethane and high value-added fertilizers

Presented by Marco Maccaferri

GM & Head of Sales BiHcon Srl

Company Overview:

Cambium Srl/GmbH - **Holding**

TerraX a new era — Srl/GmbH is dedicated to project development and plant operation (**Operation**)

BIHCON — Srl/GmbH focuses on technical design, construction, EPC, and technical maintenance of the plants (**Maintenance**).

OceanX — Srl/GmbH a newly established company, will focus on innovative projects in the **Power2X** sector, specifically in **biological methanation**.

AS OF TODAY, THE GROUP HOLDS:

31 REGISTERED TRADEMARKS ACROSS **EUROPE, JAPAN, AND THE USA**

31 **TOTAL PATENTS** 7 GRANTED AND 24 PENDING APPROVAL

31 **PATENT FILINGS WITH EUROPEAN, U.S., AND ASIAN PATENT OFFICES**

Cambium Holding company with strategic stakes in renewable energy businesses.

VALUE CHAIN (Full Integration)

Development → Construction → Maintenance & Operation

KEY COMPANIES

TerraX a new era → Project Development

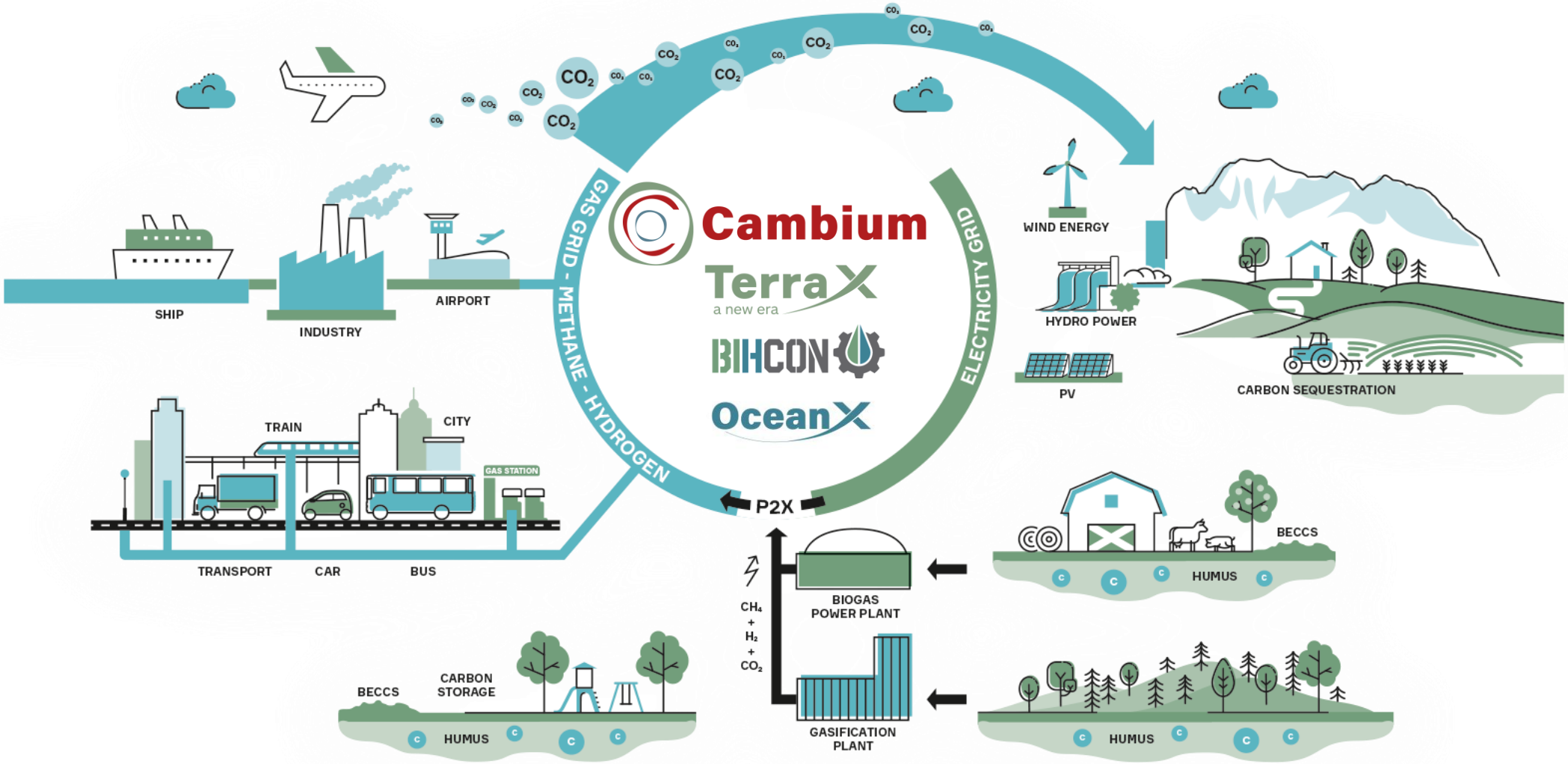
BIHCON → Implementation & Plant Management

BUSINESS MODEL

Projects → **Sold to investors** *or* **Managed directly** → Long-term value creation

THE GROUP IS SEEKING AN INVESTMENT OF OVER €1 BILLION TO ACCELERATE ITS INDUSTRIAL PLAN, STRENGTHEN INTERNAL CAPABILITIES, AND CO-FINANCE STRATEGIC ASSETS IN EUROPE AND GLOBALLY.

Vision and Mission



Vision and Mission

By 2050, half of Europe's energy will come from electricity, and half from renewable molecules — **biomethane and biohydrogen**. Natural gas will be replaced by **renewable gases**, turning **biomass, waste and CO_2** into clean energy and promoting a **fully circular economy**.

Develop **360° technologies and projects** for **anaerobic digestion**, **biomass gasification**, and **Power-to-X**, producing **renewable gases and fertilizers** that replace fossil-based products and support **carbon neutrality by 2050**.

Services we provide

Design Solutions

We are experts in the elaboration of **design solutions**, related to biomethane and biohydrogen production plants, high rated and certified by an international advisor.

Projects Development

We are in charge of **developing** highly customized biomethane and biohydrogen production projects, investing in new technologies and pursuing the so-called circular economy.

Financing

With our team of experts, we are able to develop specific projects that meet the **requirements of investors**.

Construction

We are in charge of **building** highly customized biomethane projects, investing in pre-treatment, flexibility and redundancy and pursuing the **circular economy** by considering each project as a **bionergy hub**

Operation & Maintenance (O&M)

We provide full Operation & Maintenance (O&M) **services for biogas, biomethane and biohydrogen plants**. With extensive technical expertise and field experience, the company ensures optimal plant performance, efficiency, and reliability through preventive maintenance, **real-time monitoring**, and tailored **technical support** throughout the entire lifecycle of the facility.

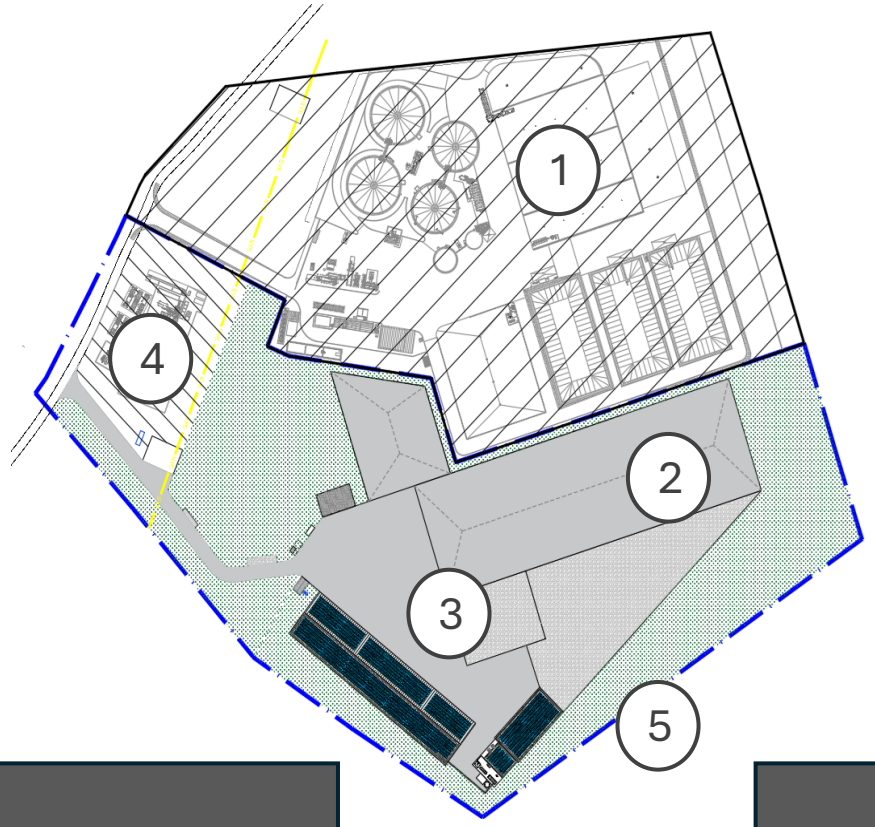
The Biorefinery of the Biomethane Plant

BIOREFINERY UK - UNLOCKING SYNERGIES FOR INTEGRATED, SUSTAINABLE PRODUCTION:

4. BIOLOGICAL METHANATION

of 7.000 t/a biogenic CO_2

incl. 10 MW_{el} electrolyzer and daily H_2-storage



1. OFMSW PRETREATMENT

With AD for 500 Sm^3/h biomethane production

2. UMIFICATION FACILITY

for on-site production of 20.000 t/a humus from digestate

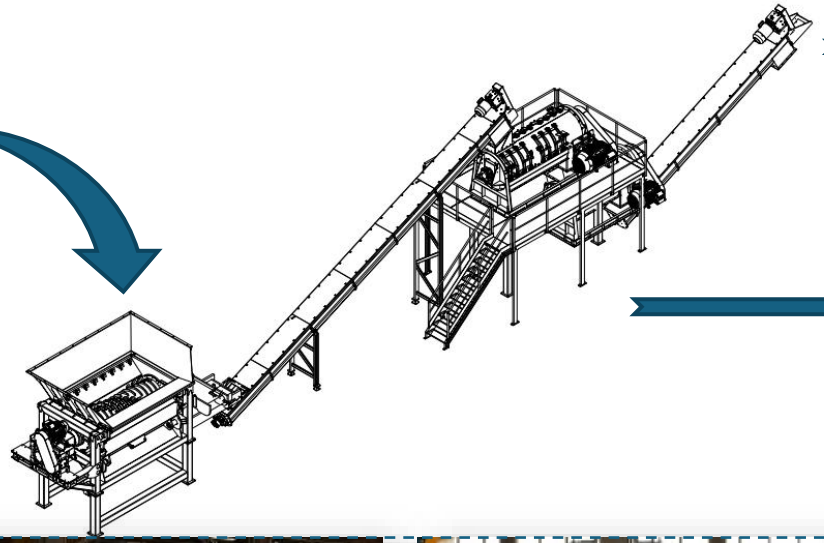
3. BIOFERTILIZER PRODUCTION FACILITY with capacity of 38.000 t/a biopellets via drying and pelletization of humus and/or solid digestate

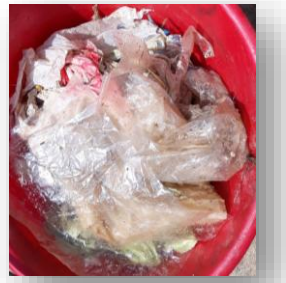
5. WOOD GASIFIER with cogeneration unit and two burners for heat/electricity self-consumption and biochar production as additive/stabilizer

1. OFMSW Pre-treatment

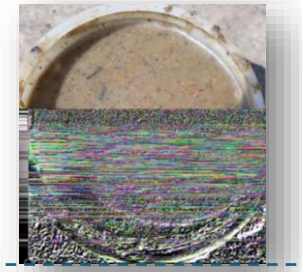
THE CHALLENGE

OFMSW





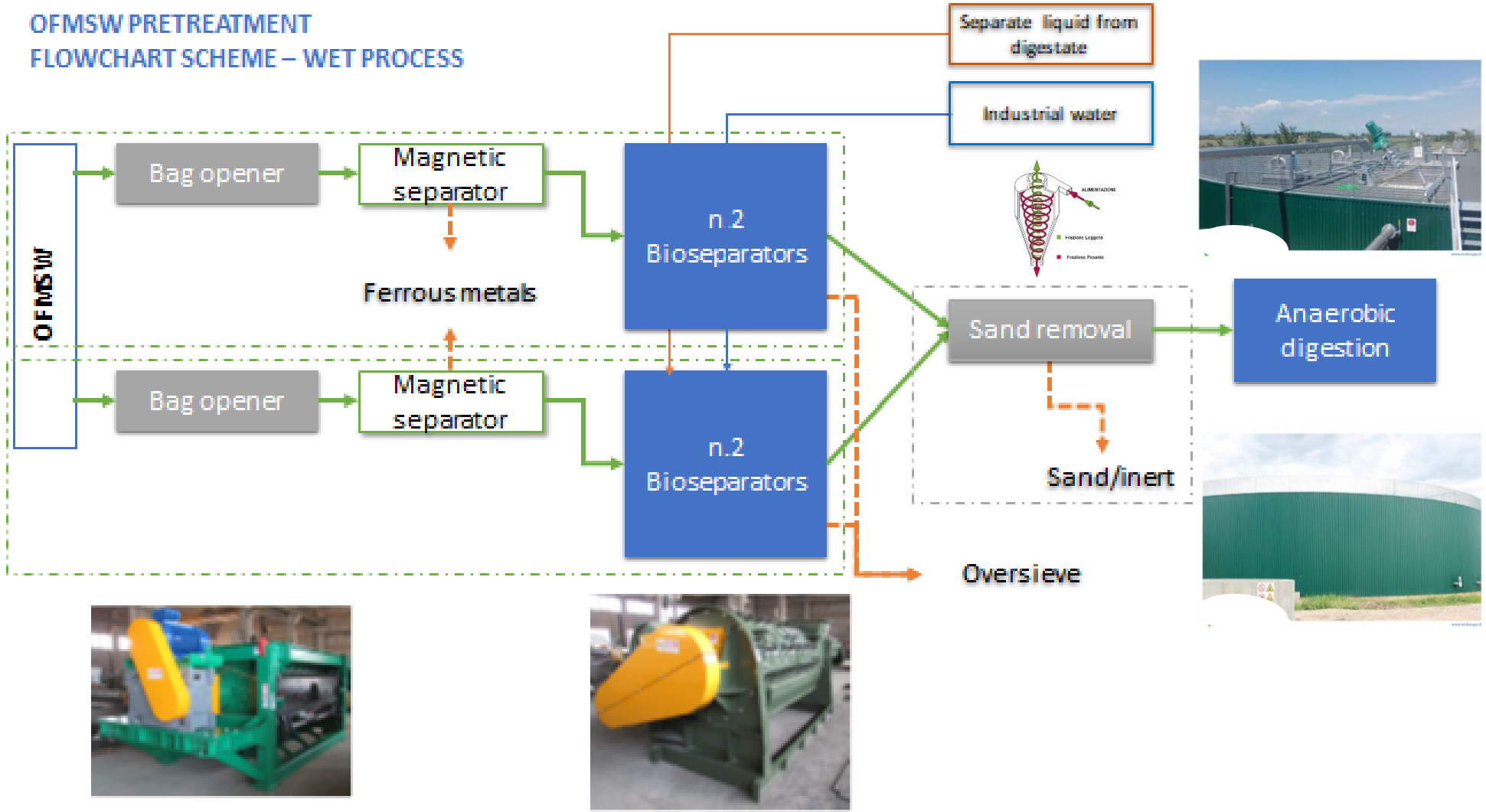
Plastic



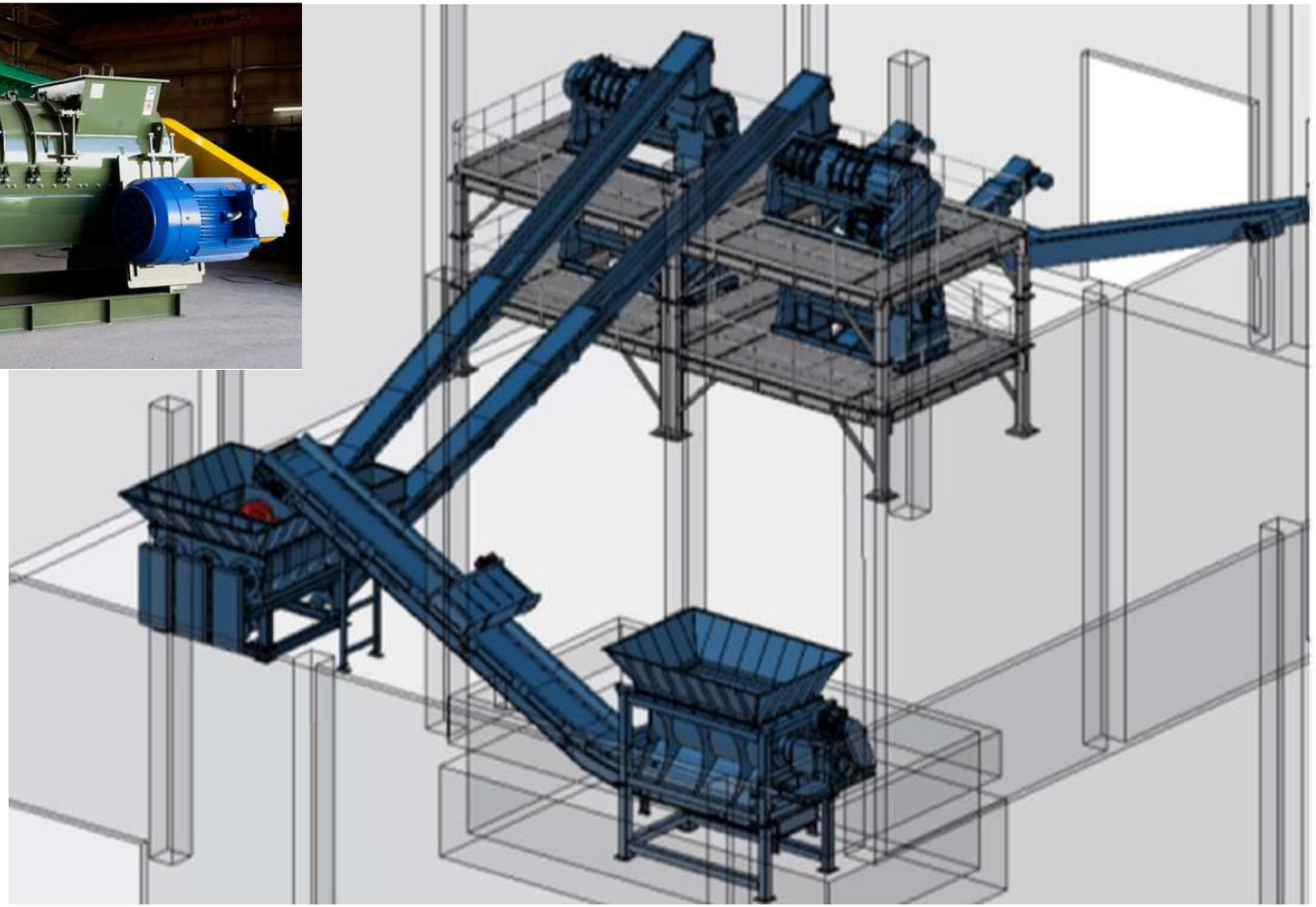
Organic waste suspension

- Separation of organic suspension from plastic
- High energy demand for pre-treatment
- Plastic is swimming and creating floating layer in AD

1. OFMSW Pre-treatment



1. OFMSW Pre-treatment



1. Tool box

TOOL box

THE SOLUTION DEVELOPED BY BIHCON TO CENTRALIZE ALL CONTROL OPERATIONS OF EACH TANK IN A SINGLE LOCATION.

1. The Spritz mix

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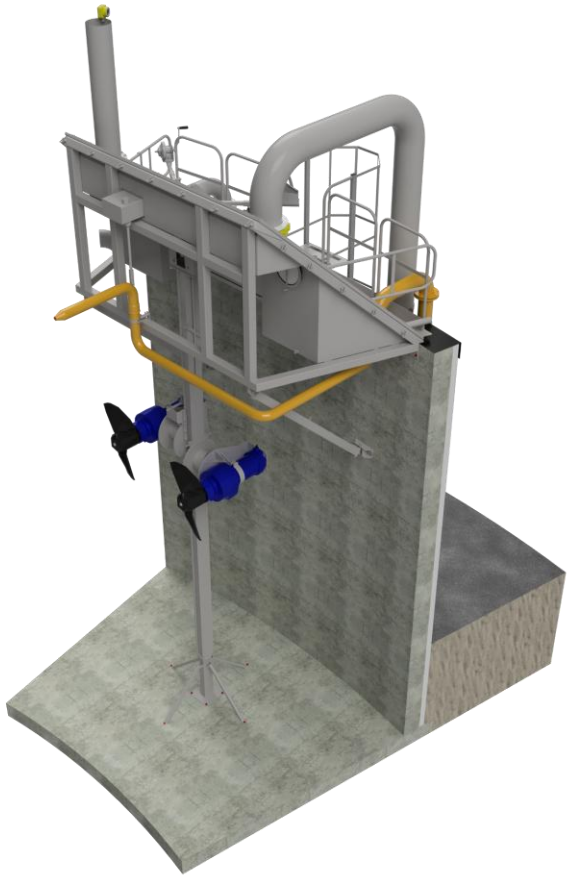
SPRITZ mix

BIHCON TECHNOLOGY FOR THE FORMATION OF SUPERNATANT AND CRUST



COMBINED SPRAYING AND AGITATION SYSTEM COMPOSED OF:

- **DIGESTATE PUMPING SYSTEM FROM THE PUMPING STATION**
- **MIXING AND NOZZLE**

ADVANTAGES:

- PREVENTION AND REMOVAL OF CRUSTS AND FLOATING LAYERS
- LOWER ENERGY CONSUMPTION
- REDUCED INVESTMENT IN MIXING SYSTEMS
- HOMOGENEOUS SUBSTRATE

1. Pumping Station | Plug and Play

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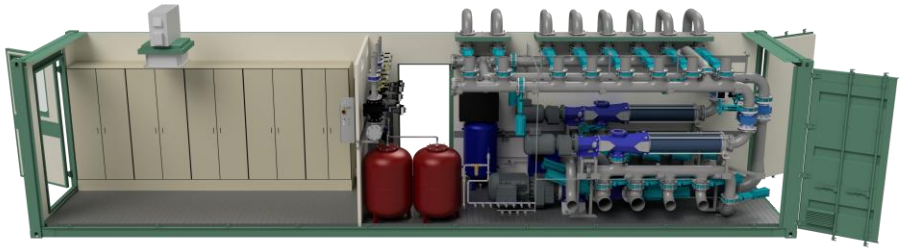
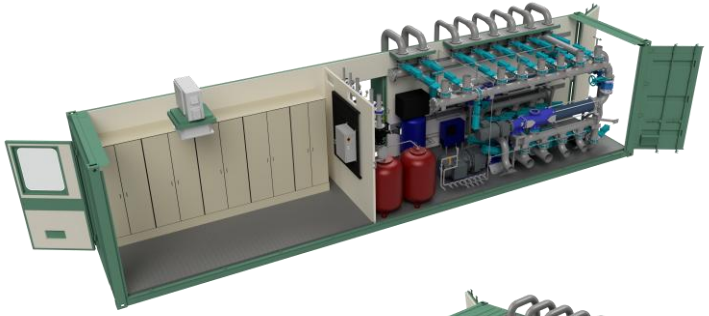
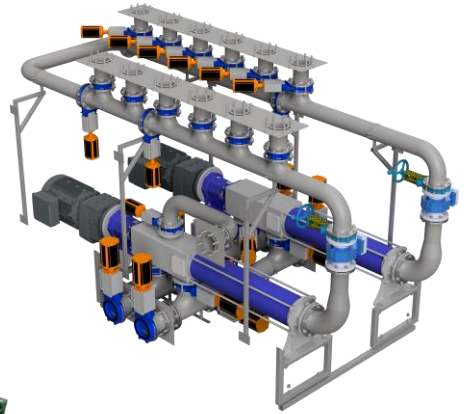
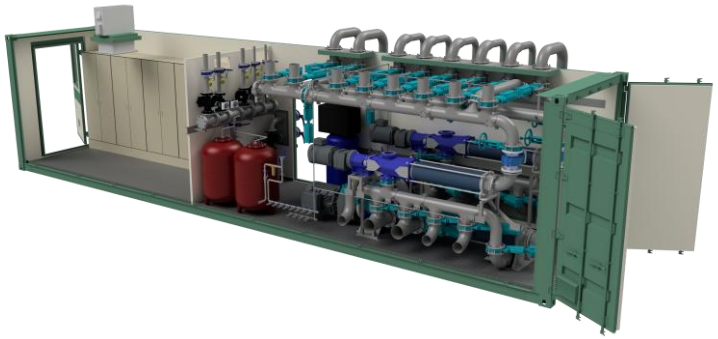
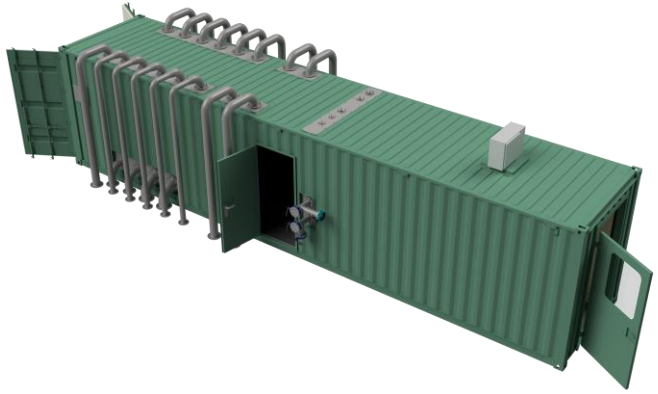
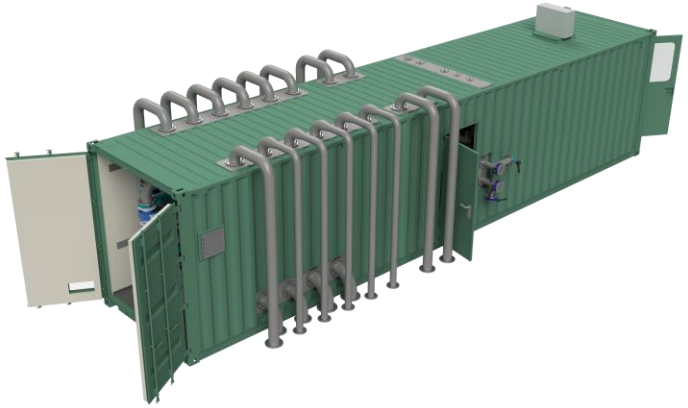






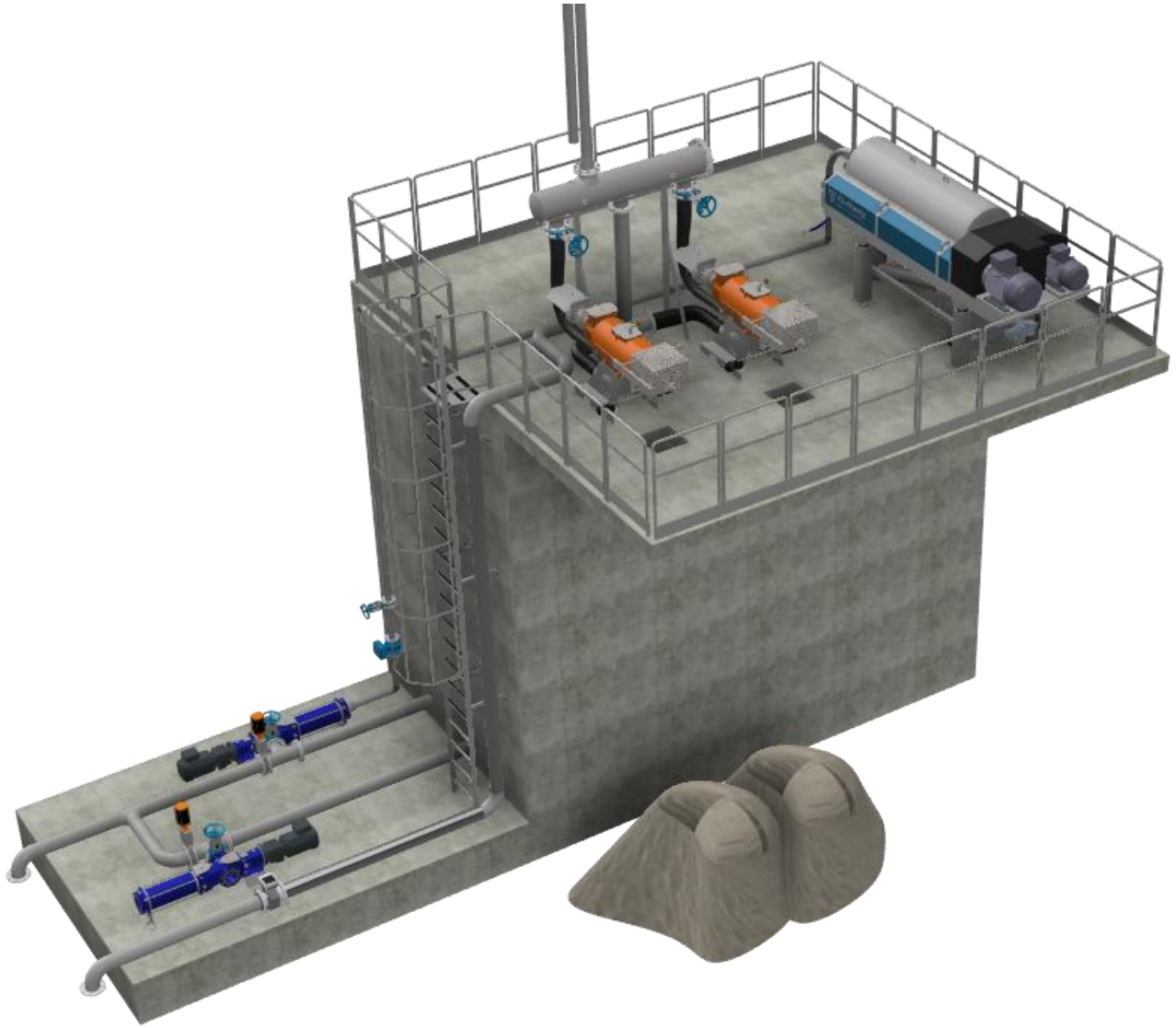






THE TECHNOLOGICAL CONTAINER IS THE HEART OF THE PLANT AND HOUSES THE PUMP ROOM AND THE CONTROL PANEL ROOM.

1. Solid-Liquid separation system



A DOUBLE SOLID-LIQUID SEPARATION SYSTEM IS NEEDED TO ENSURE PLASTIC REMOVAL

2. Umification Facility

Stercus UK

- Innovative umification facility with 20.000 t/a humus production
- Transform liquid digestate in a stable odor free solid biofertilizer
- Total reduction of output quantity of AD plants of app. 70%
- Increased nutrient concentration in the fertilizer (reducing water)
- Additional income of AD plants with the production of a premium biofertilizer enriched with NPKS as needed

2. Umification Facility

Stercus UK

- Recovery of micro/macronutrients via zeolite/biochar addition
- Overall process improvement with reduced nutrient losses and reduction in nitrogen emissions
- Addition of magnesium salts during the stabilization process to enable struvite formation: $MgNH_4PO_4$
    - Increasing the N-content in the fertilizer
    - Reducing N-emissions
    - Estimated N-recovery up to 80%
    - Production of slow-release premium fertilizer

Struvite (MAP) crystals produced in a manure treatment plant:

3. Biopellet Production

Stercus UK

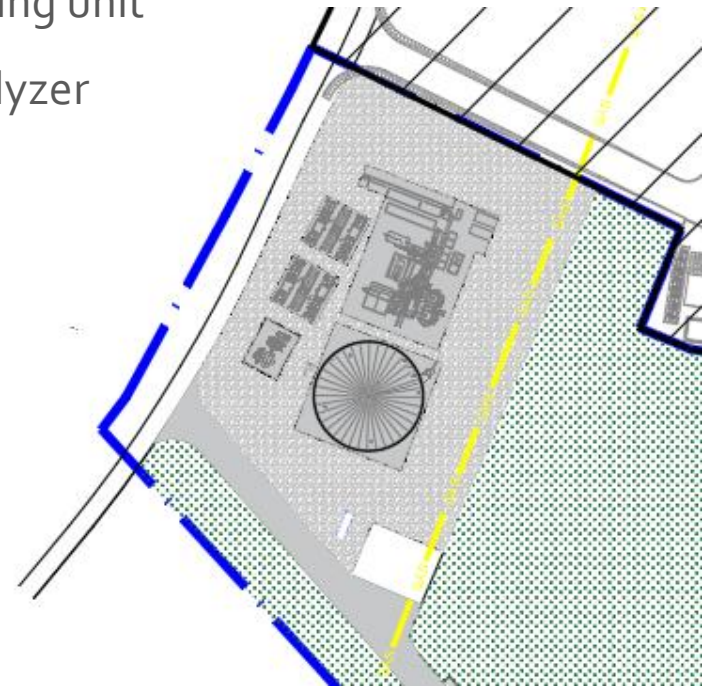
Experience: Greenergy in Molinella – Emilia-Romagna (built in 2012)

- Treatment of 60.000 t/a humus and/or solid digestate derived from the anaerobic digestion of OFMSW based on the drying and pelletization of the input material
- 38.000 t/a biofertilizer production as biopellets with ≥ 85% DM for sale in big-bags or 50 kg bags
- Biochar from wood gasifier, utilized as additive in biofertilizer production, for AD process stabilization of the adjacent biomethane plant and/or its sale

4. Biogenic CO2 methanation

Stercus UK

- Biomethanation Plant with a total installed capacity of 500 Sm³/h biomethane
- Adjacent to the biomethane and biopellet production facilities
- Utilizing electricity and heat from the wood gasifier
- Plant based on the biological methanation of 7.000 t/a bio-CO2 from the upgrading unit of the adjacent biomethane plant using green H2 produced by a 10 MW_{el} electrolyzer
- Daily hydrogen storage for optimized energy management

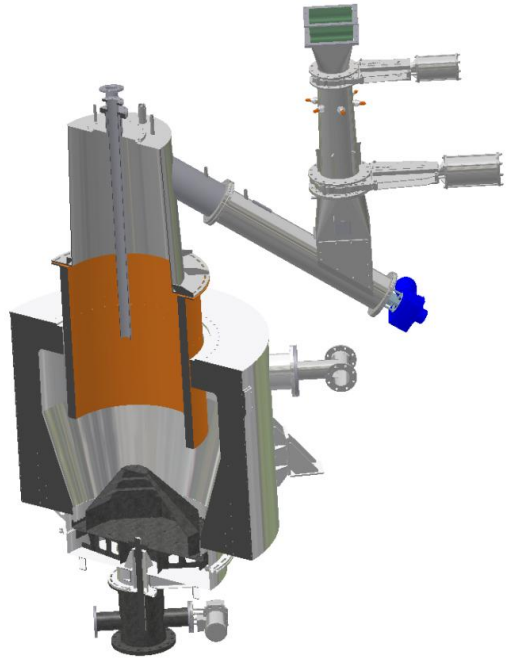


Source: Electrochaea

5. Wood Gasification

Stercus UK

Experience: Energiegen. Stans – CH (built in 2007/2011)



- Wood gasifier with cogeneration unit and two burners for heat/electricity self-consumption and biochar production as additive/stabilizer
- Adjacent to the biomethane and biopellet production facilities
- 1.000 t/a biochar production utilized as additive in biofertilizer production, for AD process stabilization of the adjacent biomethane plant and/or its sale
  - 3.600 kW fuel thermal input
  - 500 kW_{el} from cogeneration unit
  - 700 kW_{th} from cogeneration unit
  - 550 kW_{th} from gasification
  - 1.000 kW_{th} from syngas burner

DiBiMeth - Direct Biogas Methanation

Biomethanation Lentini

- DEVELOPMENT OF **INNOVATIVE POWER-TO-X PRODUCTION PROJECTS**
- FOCUS ON DIRECT METHANATION OF BIOGAS WITH GREEN H_2 FOR BIOMETHANE PRODUCTION
- **PROPRIETARY PROCESS DEVELOPED**
- PLANT ENGINEERED
- PATENT FILING IN PROGRESS
- NEXT STEPS: PROJECT DEVELOPMENT AND PERMITTING FOR INDUSTRIAL-SCALE IMPLEMENTATION

KEY PARAMETERS:

500 Sm^3/h Biomethane
275 Sm^3/h from Biogas
225 Sm^3/h from DiBiMeth
10 MW_{el} Electrolyzer
for 3.500 h/a
BESS for parasitic load

Bio-H2 Production via Direct Biogas Reforming

"Bio-H2 Terenten" in Terenten – South Tyrol

- Biogas AD plant revamping
- incl. 300 bar bio-H2 Trailer Filling Station
- incl. CHP for autoconsumption

→ 200 $kW_{el.eq.}$

→ 200 kg/d bio-H2 system

→ 80 t/a bio-H2

→ 10 buses

→ 1.400 GLU

Feed-in tariff expired

No possibility to gas grid connection

Many thanks for your attention

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www.bihcon.com

Headquarters
Piazza Gilm/Gilmplatz, 2
I-39031 Brunico/Bruneck (BZ)
South Tyrol- Alto Adige

Office of Operations:
Zona Artigianale/Handwerkerzone, 14
I-39040 Varna/Vahrn (BZ)
South Tyrol- Alto Adige