anaergia.com

COMPANY
PROFILE

FROM WASTE TO RESOURCE

FOR THE GOOD OF ALL

Anaergia

Anaergia
Fueling a Sustainable World™

ANAERGIA GOING PUBLIC

Sustainability, people and energy are Anaergia's keywords and, as a consequence, the mission of the Company is to work in synergy with the environment and its inhabitants.
Our stock exchange listing in Toronto shows exactly our interest in investing in the well-being of all citizens, territories and the Earth.

FUELING A SUSTAINABLE WORLD

Our imagination goes beyond the idea of sustainability itself and therefore we plan and build concrete solutions where technological innovation and care for the environment are our most relevant objectives. Anaergia's idea of circular economy is always evolving, and the common models of sustainability are considered the basis to fuel a more and more sustainable world.

anaergia.com

ABOUT US

We convert organic **waste** into **energy**. We design **unique technology solutions** and we combine them, taking into account the needs of the **entire life cycle of the food production and consumption**.

OUR STRENGTH

Anaergia's core strength is technology.
When used together, these technologies provide a significant competitive advantage (with 133 patents) and enable economic waste recovery in many parts of the World.

WHY WE DO IT

Because we believe in the future.
And because we believe that only circular economy can ensure a sustainable tomorrow for the generations to come.

FROM OUR ETHICAL CODE:

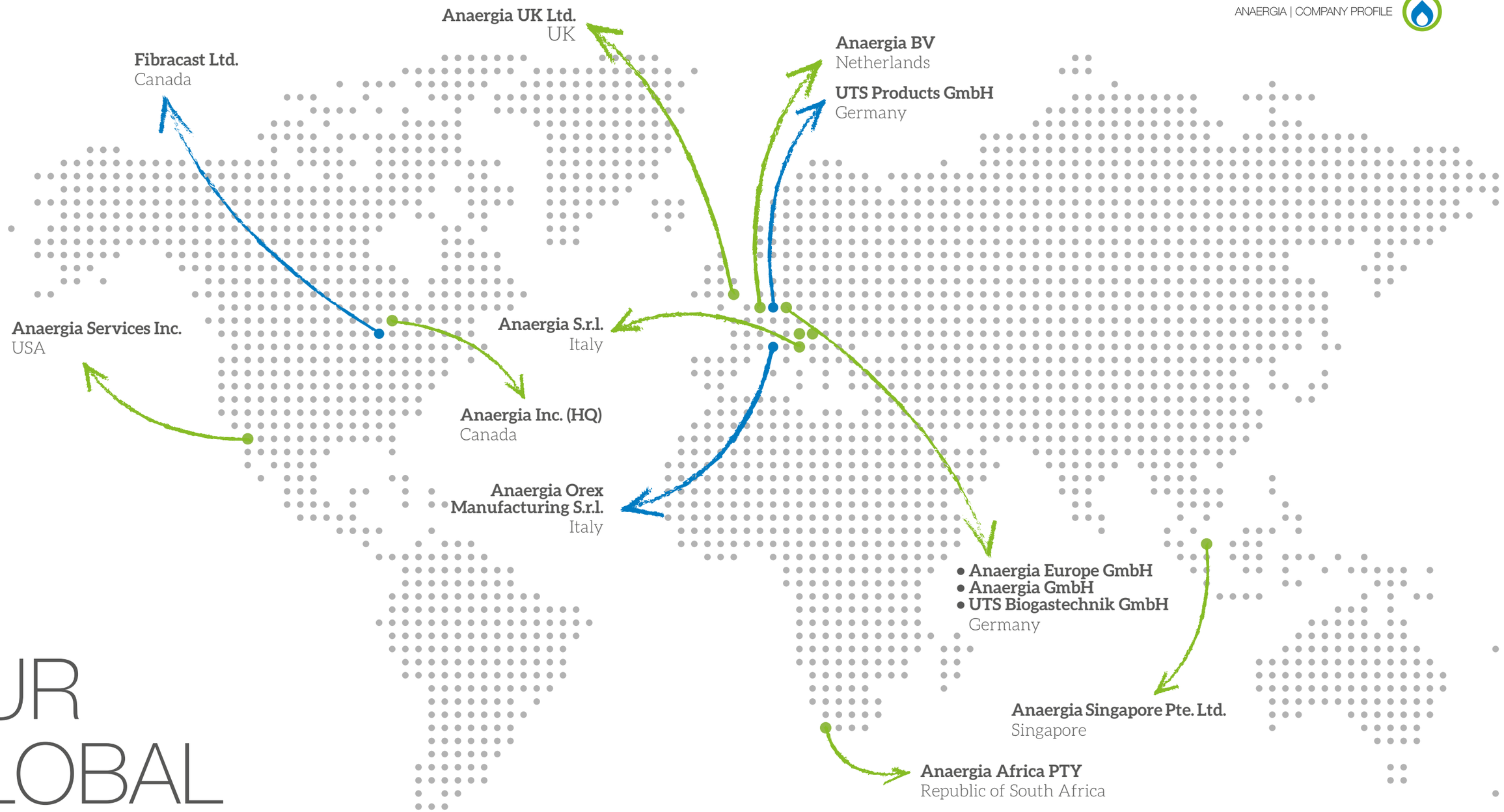
VISION
World leader in solving waste problems by recovering energy, water and fertilizer.

MISSION
Our mission is to convert waste into useful resources, protect the environment, and sustain life for generations to come.

VALUES
We continuously improve ourselves and the world. We work together as a team. We deliver on our promises. We use our resources effectively.

OUR GLOBAL PRESENCE

Anaergia operates around the world with **14 locations**: in **North America, Europe, Asia and Africa**.



8
OFFICES

3
FACTORIES

+ 1700
PROJECTS

FROM WASTE TO RESOURCE

In a world context where waste constituents will become increasingly valuable in an overpopulated world, and the pressure to develop strong environmental policies is growing, Anaergia has been developed to make achievable **the goal of a sustainable and clean future**.

OUR SCOPE

Using the organic waste as starting point of a virtuous process aimed to create new energy, fertilizers, clean water.

WHAT WE OFFER

We design and build **integrated solutions** to **convert waste into useful resources**, protect the environment and sustain life for generation to come.
To reach this goal, Anaergia created a **set of technologies** that provide complete and cost effective solutions for converting waste to value.

WHERE OUR TECHNOLOGIES OPERATE

- **Selection and Recycling**
- **Organic Extraction**
- **Organic Polishing**
- **Anaerobic Digestion**
- **Digestate Treatment**
- **Water Treatment**

SECTORS WHERE WE OPERATE

SSO & OFMSW

BIOSOLIDS

MSW

AGRICULTURAL AND FOOD PROCESSING

SSO & OFMSW

ORGANIC FRACTION OF MUNICIPAL SOLID WASTE

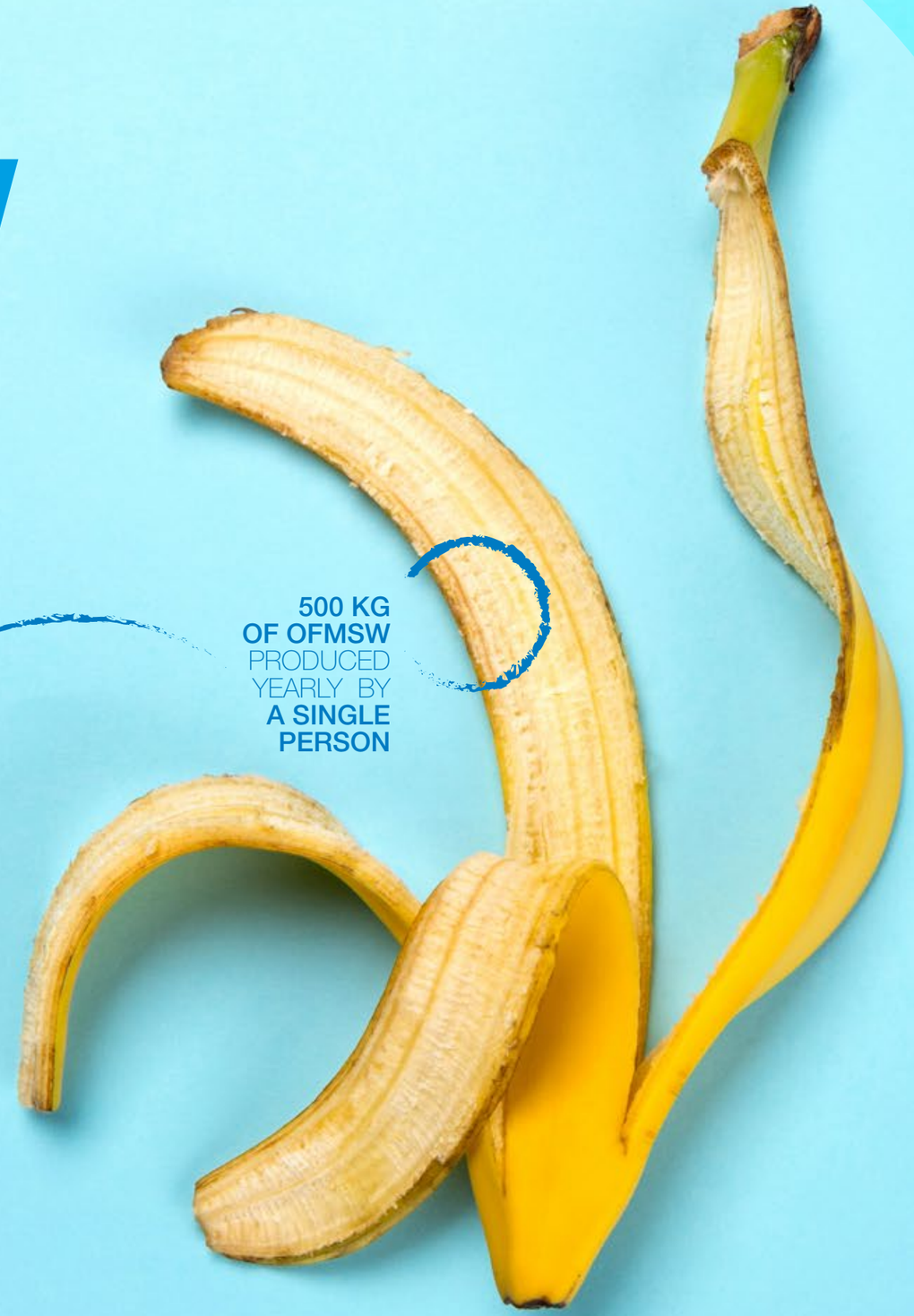
FROM OUR **SOLUTIONS** WE OBTAIN

70 M³ OF METHANE

100 KG OF ORGANIC FERTILIZER

88 KG OF AVOIDED CO_2 EMISSIONS

500 KG OF OFMSW PRODUCED YEARLY BY **A SINGLE PERSON**



SSO & OFMSW

The **OFMSW** (Organic Fraction of Municipal Solid Waste) is the material obtained from the mechanical separation of the organics from MSW.
SSO is the household organic waste separately collected. These are food leftovers and similar fractions, such as packaging paper with food residues.

WITH OUR TECHNOLOGIES WE GUARANTEE ALL PROCESSES RELATED TO THE TREATMENT OF SSO & OFMSW:

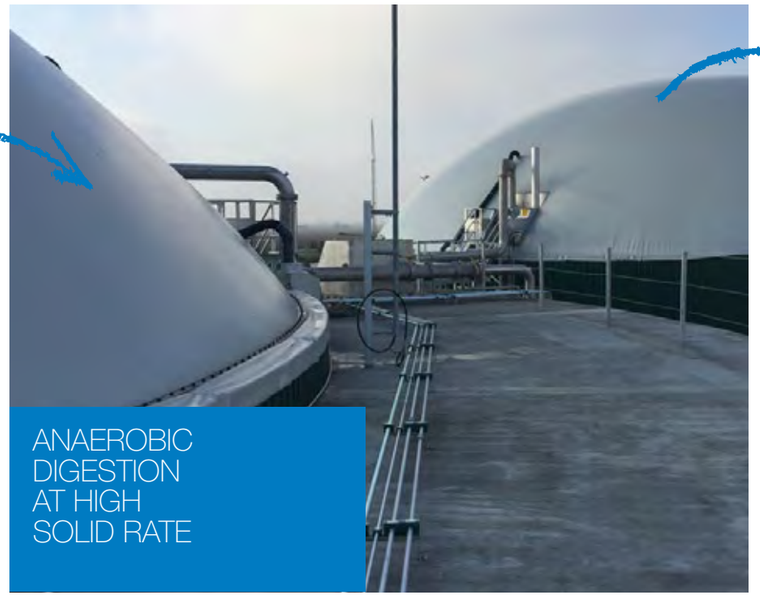
- PRETREATMENT
- ORGANIC FRACTION CONVERSION TO BIOGAS
- HIGH QUALITY DIGESTATE PRODUCTION
- EXTRACTION OF THE ORGANIC FRACTION
- CONTINUOUS ANAEROBIC DIGESTION WITH HIGH SOLIDS CONCENTRATION
- PLASTIC AND INERTS REMOVAL
- SOLID LIQUID SEPARATION

KEY PROCESSES

01
PRE-TREATMENT

EXTRACTION OF THE ORGANIC FRACTION

02
ORGANIC FRACTION CONVERSION TO BIOGAS



ANAEROBIC DIGESTION AT HIGH SOLID RATE

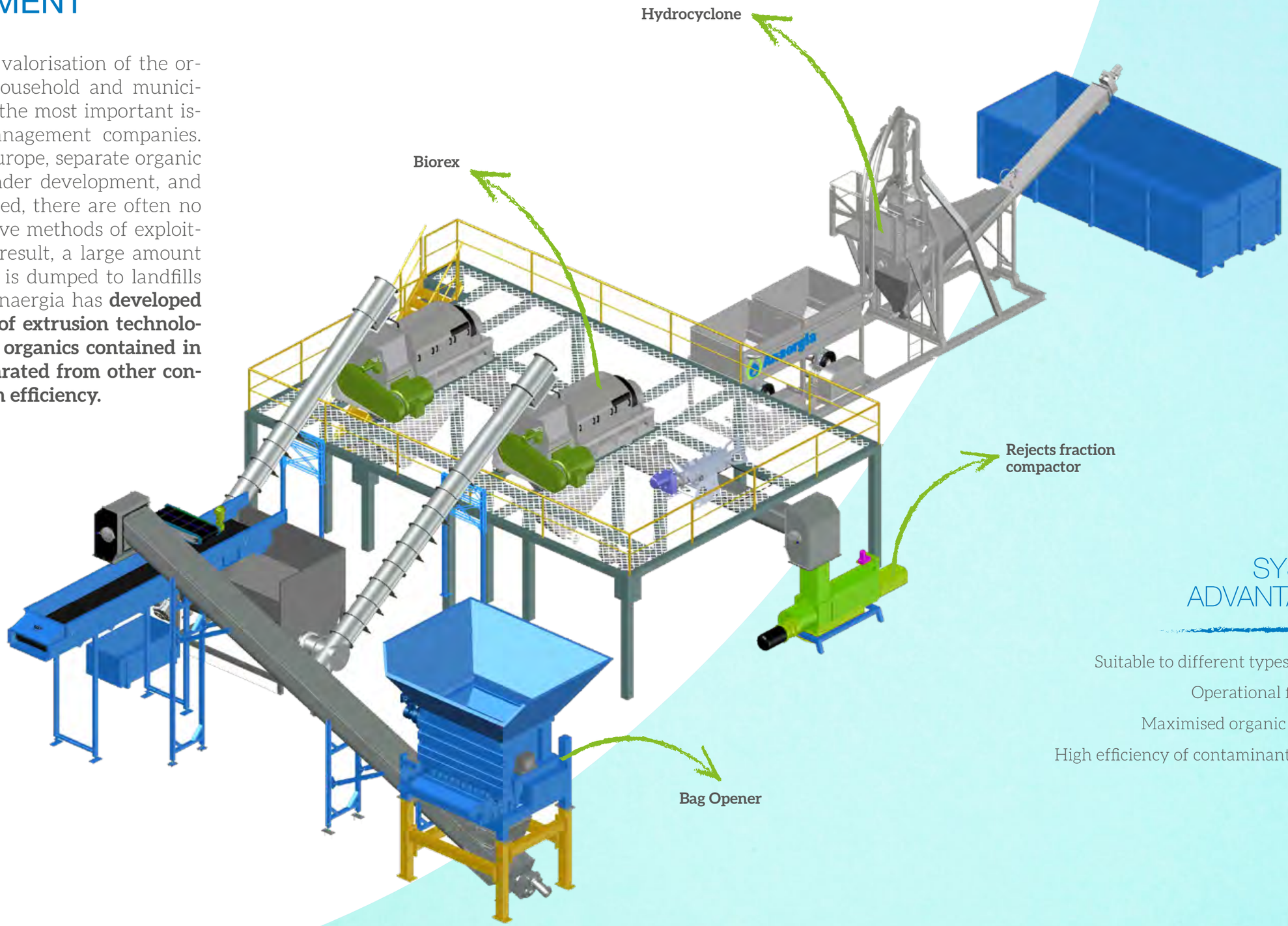
03
HIGH QUALITY DIGESTATE PRODUCTION

PLASTIC REMOVAL AND SOLID/LIQUID SEPARATION

FOCUS 01

PRETREATMENT

The treatment and valorisation of the organic fraction of household and municipal waste is one of the most important issues for waste management companies. In many areas of Europe, separate organic collection is still under development, and even where it is used, there are often no efficient and effective methods of exploiting OFMSW. As a result, a large amount of organic material is dumped to landfills and incinerators. Anaergia has **developed a unique portfolio of extrusion technologies that allow the organics contained in OFMSW to be separated from other contaminant, with high efficiency.**



SYSTEM ADVANTAGES

Suitable to different types of waste

Operational flexibility

Maximised organic recovery

High efficiency of contaminant removal

FOCUS 02

THE CORE OF THE PROCESS: ANAEROBIC DIGESTION

Anaerobic digestion is a complex biological process in which, in the absence of oxygen, the **organic matter is transformed into biogas**.

This transformation takes place in the digester. We use **two types of digesters,** depending on the needs of the specific project: **CSTR and PLUG FLOW**.

continuous operation

modular design

high efficiency mixing

equipped with service boxes

CSTR DIGESTER

INPUT: SSO & OFMSW
OUTPUT: LIQUID → WATER TREATMENT

compact structure of the reactor

easy installation

pre-fabricated panels for high quality construction

precast modular structure

PLUG FLOW DIGESTER

INPUT: SSO & OFMSW
OUTPUT: DRY → COMPOSTING

FOCUS 03

WATER TREATMENT: FIBREPLATE™ ULTRAFILTRATION

Anaergia's **FibrePlate™** ultrafiltration membranes offer **highly efficient performances**, mechanical resistance and higher permeation flows than market standards, allowing a **significant reduction in the space needed, investment costs and operating costs.**

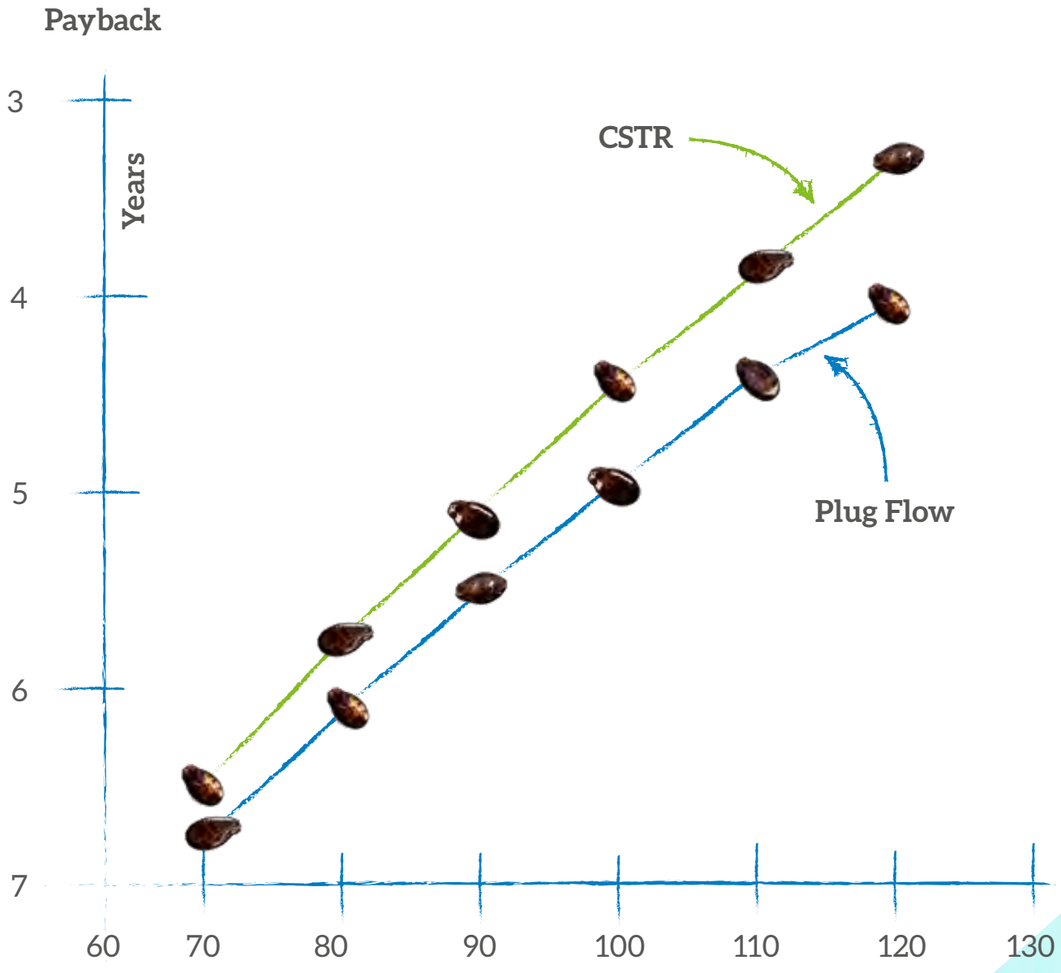
ULTRAFILTRATION MEMBRANES

SYSYEM ADVANTAGES

Taking advantage of the most advanced technological solutions, Anaergia is able to **treat liquid digestate** to obtain clean and reusable water.

The **operation flexibility** of the solutions proposed by Anaergia allows the **recovery of organic fertilizers** from both liquid and solid effluents.

PROFITABILITY



Note:
Estimated values based on the 2020/2021 market, the exact value will be assessed based on the specific project

CASE HISTORY

LECCE

The Lecce plant has been designed to treat up to 24,000 ton/year of SSO.
Anaergia pretreatment system has been installed in this plant, allowing production of clean organic pulp out of SSO, removing all the contaminants in the incoming stream.
This organic fraction is sent to a Plug Flow anaerobic digestion system.
The biogas produced by the plant is sent to a membrane upgrading biogas system; the biomethane produced is then injected directly into the grid. The digestate at the end of the process is treated in an in situ composting plant in order to produce quality compost.

LATINA

The Latina plant has been designed to treat up to 42,000 ton/year of SSO.
Anaergia pretreatment system has been installed in this plant, which allows to produce an organic fraction free of contaminants starting from SSO; this organic fraction is then sent to a CSTR anaerobic digestion plant.
The biogas produced by the plant is sent to a membrane biogas upgrading system; the biomethane produced is then injected directly in the national methane grid.
The digestate at the end of the process is dewatered; the liquid phase obtained is treated with a MBR process directly in the plant, resulting in a suitable stream to discharge into surface water; the solid fraction is classified as soil improver material.

BIO SO LIDS

FROM WASTEWATER TREATMENT

WITH OUR
TECHNOLOGY
WE OBTAIN

200 KW OF ELECTRICAL ENERGY

FROM 3.600 TON
TSS/YEAR
OF BIOSOLIDS
PRODUCED BY
A CITY WITH
200.000 INHABITANTS

BIOSOLIDS FROM WASTEWATER TREAMENT

Waste activated sludge is that **fraction of the solid matter contained in urban and suburban wastewater**, which is removed or produced as by-products by the **water treatment process**, having as primary objective the cleaning of the incoming water.

KEY PROCESSES

01
DIGESTATE THICKENING

IMPROVEMENT OF TRADITIONAL ANAEROBIC DIGESTION

OUR PATENTED SOLUTION

The **OMNIVORE®** process has been developed as a cost-effective method to increase the digestion capacity of a treatment plant.
The demand for capacity increase of a digester can be related to multiple causes:

- Increase in served utilities
- Centralization of sludge treatment
- Import of external sludge to increase energy production
- Need for improvement of the performance and stability of the digestion process
- Construction of a new digester to reduce the amount of sludge to be disposed and increase in biogas production

FOCUS

OMNIVORE®

The treatment of municipal waste water is an energy-intensive process. The solid fraction resulting as by-product of the process (sludge) has a high energy content which can be exploited for energy production by anaerobic digestion. For most of the municipal treatment plants, biogas is considered to be a secondary by-product of a process focused on sludge stabilization and quality effluent production. The Omnivore retrofit package allows existing wastewater treatment plants converting the existing digesters into solid-high Omnivore™ digesters, significantly increasing biogas production and ensuring the effectiveness of wastewater treatment.

INPUT: BIOSOLIDS
OUTPUT: BIOGAS,
ELECTRICITY, FERTILIZERS

SYSTEM ADVANTAGES

To transform a wastewater treatment plant into a renewable energy production plant.

To increase the capacity of existing digesters up to three times.

To allow the feeding and co-digestion of flows of different types of waste with high organic content, such as fats, oils or the organic fraction of municipal solid waste.

To optimize process management through a high-performance mixing system.

CASE HISTORY

TERNI PLANT

In Italy, and specifically in **Terni**, we have successfully installed **Omnivore™** retrofitting package, resulting in a high-solid digester which incorporates **advanced mixing and thickening systems** designed by Anaergia to triple the capacity of the existing digester.

> FROM AN ECONOMIC STAND POINT, REALIZING AN **OMNIVORE®** SYSTEM ENDS INTO A **30-40% LOWER** INVESTMENT COST COMPARED TO TRADITIONAL DIGESTION, WHILE THE OPERATING COSTS ARE REDUCED BY **25-35%**

PROFITABILITY

	Improvements	Savings and Profitability
Digester volume	More than 50% reduction	CAPEX reduction
Retention time	Increase up to 3 times	Increased biogas production
Volatile solids destruction	Increase up to 15%	Increased biogas production
Thermal consumption	Reduction of about 55%	OPEX reduction

AGRO ZOO TECH NICAL

FROM 33.000 TON PER YEAR (TPY) OF WASTES

IN A FARM WITH 400 HECTARES OF ARABLE LAND & LIVESTOCK

WITH OUR **TECHNOLOGIES** WE OBTAIN

550 M³/h OF BIOMETHANE EQUIVALENT TO **2MW OF ELECTRICAL ENERGY**

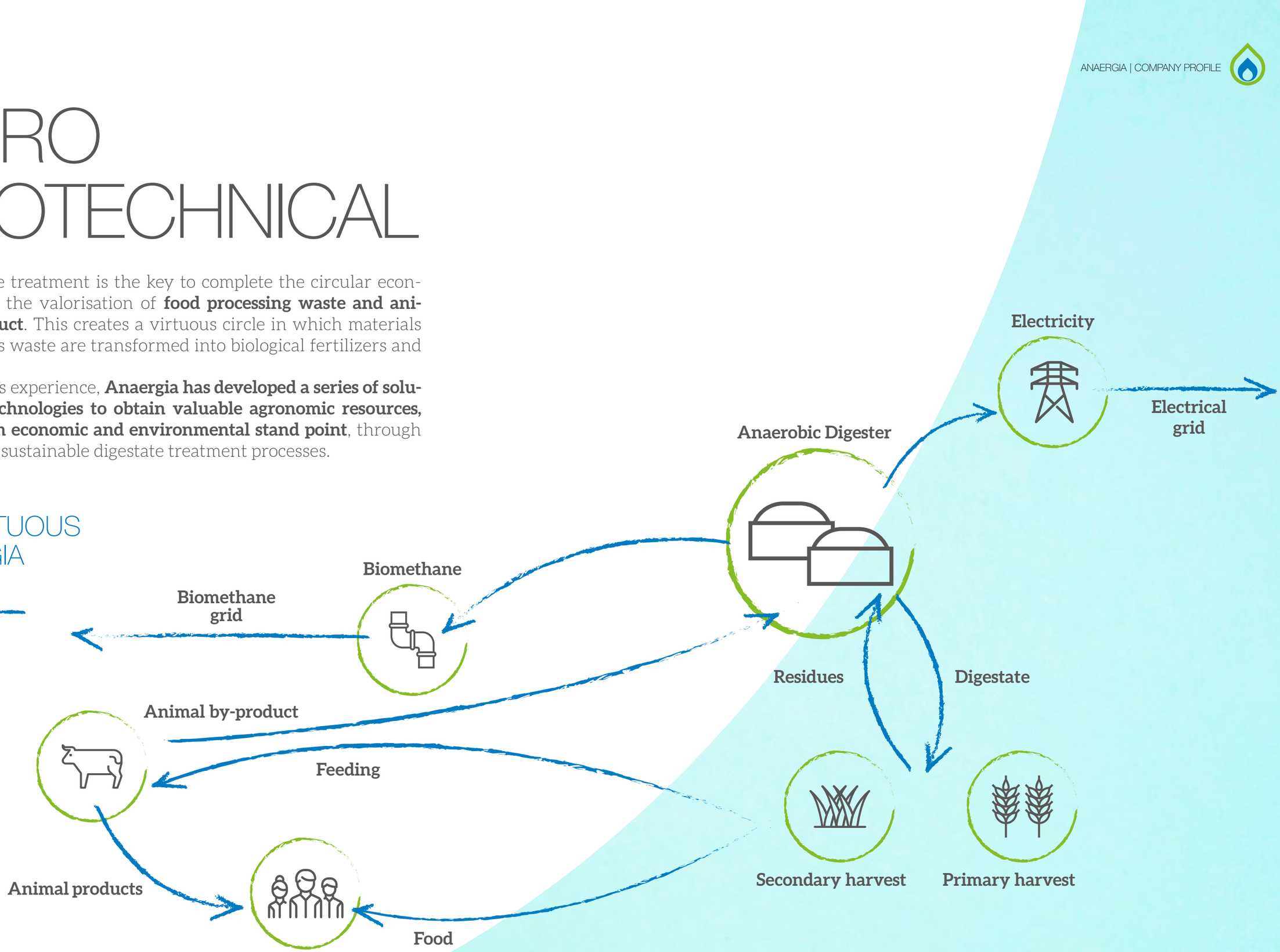
44.000 TPY OF LIQUID FERTILIZER

8.500 TPY OF SOLID FERTILIZER

AGRO ZOOTECHNICAL

The digestate treatment is the key to complete the circular economy path in the valorisation of **food processing waste and animal by-product**. This creates a virtuous circle in which materials considered as waste are transformed into biological fertilizers and clean water.
Relying on its experience, **Anaergia has developed a series of solutions and technologies to obtain valuable agronomic resources, both from an economic and environmental stand point**, through efficient and sustainable digestate treatment processes.

THE VIRTUOUS ANAERGIA CIRCLE



FOCUS

ANAERGIA FOR THE **AGROZOOTECHNICAL SECTOR**

OUR TECHNOLOGIES

HYDRAULIC AND ELECTRICAL MIXERS

SERVICE BOX

SEPARATORS

PUMPS

HELIOS®

TRITON®

MIXERS

HELIOS SYSTEM'S ADVANTAGES

Flexibility

Modularity

Expandability

Standardised Module

TRITON SYSTEM'S ADVANTAGES

Ring-in-ring configuration of the two tanks

Optimal design for big plants

Compact size

Easy plant design

HELIOS™

The Helios™ digester is a proven and robust digestion technology, flexible to meet operation requirements and with sufficient retention time to guarantee maximum biogas yield. Ideal for easily biodegradable organic waste streams.

TRITON™

The Triton™ digester is ideal for materials that need primary and secondary digestion such as energy crops. This double-ring-tank is a solution with two-stage digestion, with a compact footprint and reduced thermal energy demand.

CASE HISTORY & PROFITABILITY

STERKSEL PLANT

In the Netherlands we have built a plant that includes the anaerobic treatment of 260,000 TPY of raw material, with an installed biogas upgrade capacity of 4100 Nm^3 / h of biogas (equal to 10.6 MWele).
In this site, we built a total of 11 digesters for the biogas pro-duction (4 primary, 4 secondary and 3 as a third stage which operate in thermophilic regime). The resulting digestate is partially separated into solid and liquid fractions. While the solid fraction provides a particularly nutrient-rich agricultural fertilizer, part of the liquid fraction is used for dilution within the process. Most of the digestate is used as it is out f the process and applied for agriculture purposes. Regarding biogas utilisation, this is conditioned by removing moisture, H2S, NH3 and VOC, before being converted into biomethane and injected into the grid.

INPUT

260.000 TPY
OF RAW MATERIAL

- **55.000 TPY** OF SILAGE
- **40.000 TPY** OF PIG MANURE
- **105.000 TPY** OF PIG SLURRY
- **34.000 TPY** OF CONCENTRATED SLURRY
- **26.000 TPY** OF VARIOUS SOLID AND LIQUID WASTE MATERIALS FROM FOOD PROCESSING

ANAEROBIC
DIGESTION
biogas upgrading to treat
4100 Nm3/h of biogas
(equal to 10.6 MWele)

11
DIGESTERS

4 primary, 4 secondary
and 3 as third stage

OUTPUT
BIOGAS
AND FERTILIZER

STERKSEL PLANT IN **HOLLAND**

MSW

WITH OUR
TECHNOLOGY
WE OBTAIN

2.4 MW
OF ELECTRICITY

6.000 TPY
OF ORGANIC
FERTILIZER

60.000 TPY
OF RDF

20.000 TPY
OF RECYCLABLES

200.000 TPY
OF MSW

MUNICIPAL SOLID WASTE

In many countries of the world, separate waste col-lection is not a common practice; as a result, the unsorted waste is mainly landfilled.
Anaergia has developed a very innovative technological solution that allows the separation - highly effective - of each contaminant contained in municipal solid waste (MSW), and in pre-consumer organic waste (WCW).

WHAT **ANAERGIA** DOES IN THIS SECTOR

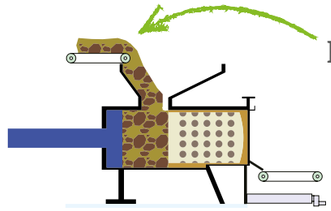
- Recyclable material recovery
- Energy and biogas production
- Biological stabilization of the organic fraction
- Reduction of the waste dumped into landÿll
- Reduction of emissions into the atmosphere

FOCUS

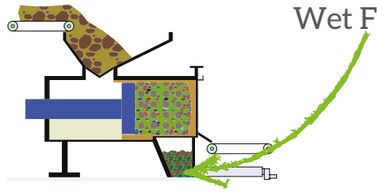
OREX™

OREX™ machines are the key to unlocking the largest organic waste feedstock in existence, the MSW. Through a process of **extrusion at high pressure, OREX™ easily separates the waste flow into two fractions: organic matter and inert.**

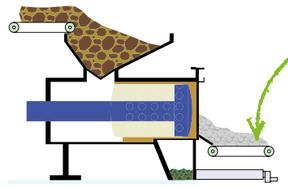
OREX™



Feeding Phase (Low pressure)



Compression Phase (High pressure)



Discharge Phase (Low pressure)

SYSTEM ADVANTAGES

Flexible process capable of treating any incoming waste, regardless the contamination level.
Pre-treatment of waste by extrusion without water dilution.

Very low contamination level and high concentration of organic matter in the separated organic fraction.

No further pre-treatment of the wet fraction needed before anaerobic digestion.

Feeding the Digester with a high concentration of solids.

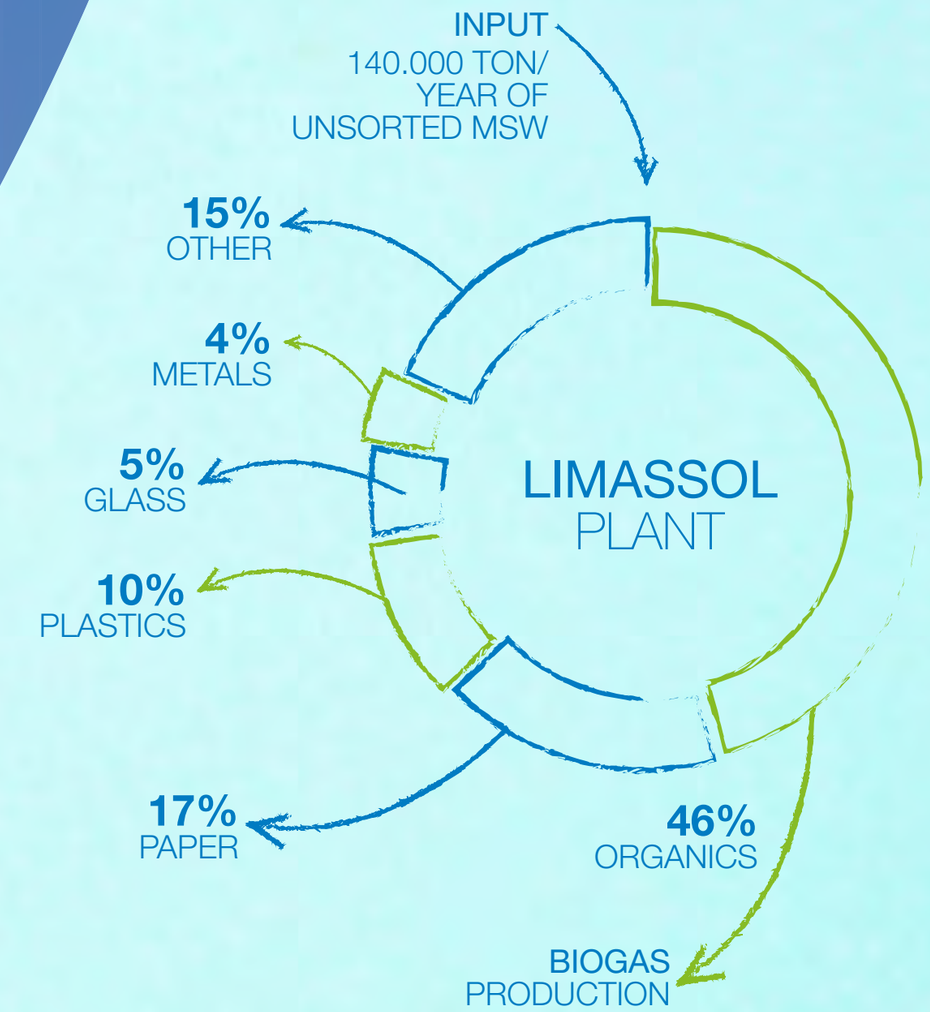
High levels of biogas productions thanks to the effective disintegration of the putrescible organic fraction obtained by pressurized extrusion process.

CASE HISTORY

LIMASSOL PLANT

he process is designed to treat 140,000 ton/year of unsorted MSW. The organic fraction is separated from the incoming material by the organic extruder press system patented by Anaergia. The organic pulp obtained is sent to two anaerobic digesters for the production of biogas that is valorised by two cogeneration engines, with rated output of 1.2 MWel each.
The digestate is dewatered by centrifuges and the solid fraction is dried for the production of SRF.
The residual liquid fraction is treated in a dedicated MBR plant on site.
The separated dry material is treated in a MRF section, with the recovery of valuable materials and the production of RDF, that is then disposed for the use of an external cement plant.

PROFITABILITY



OUR NUMBERS

MORE THAN
30
years of experience in plant design, construction and management

3
certifications
ISO 9001 - ISO 14001
OHSAS 45001

+1600
digesters built with a capacity of more than 700 MW

133
deposited patents

14
headquarters in the world

+250
employees

Anaergia
Fueling a Sustainable World™

anaergia.com

Anaergia

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