

Engineering
for **efficient** production.

Waste to Energy

- through the cutting-edge dry fermentation technology

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EISENMANN Anlagenbau GmbH

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Contents

1 This is EISENMANN

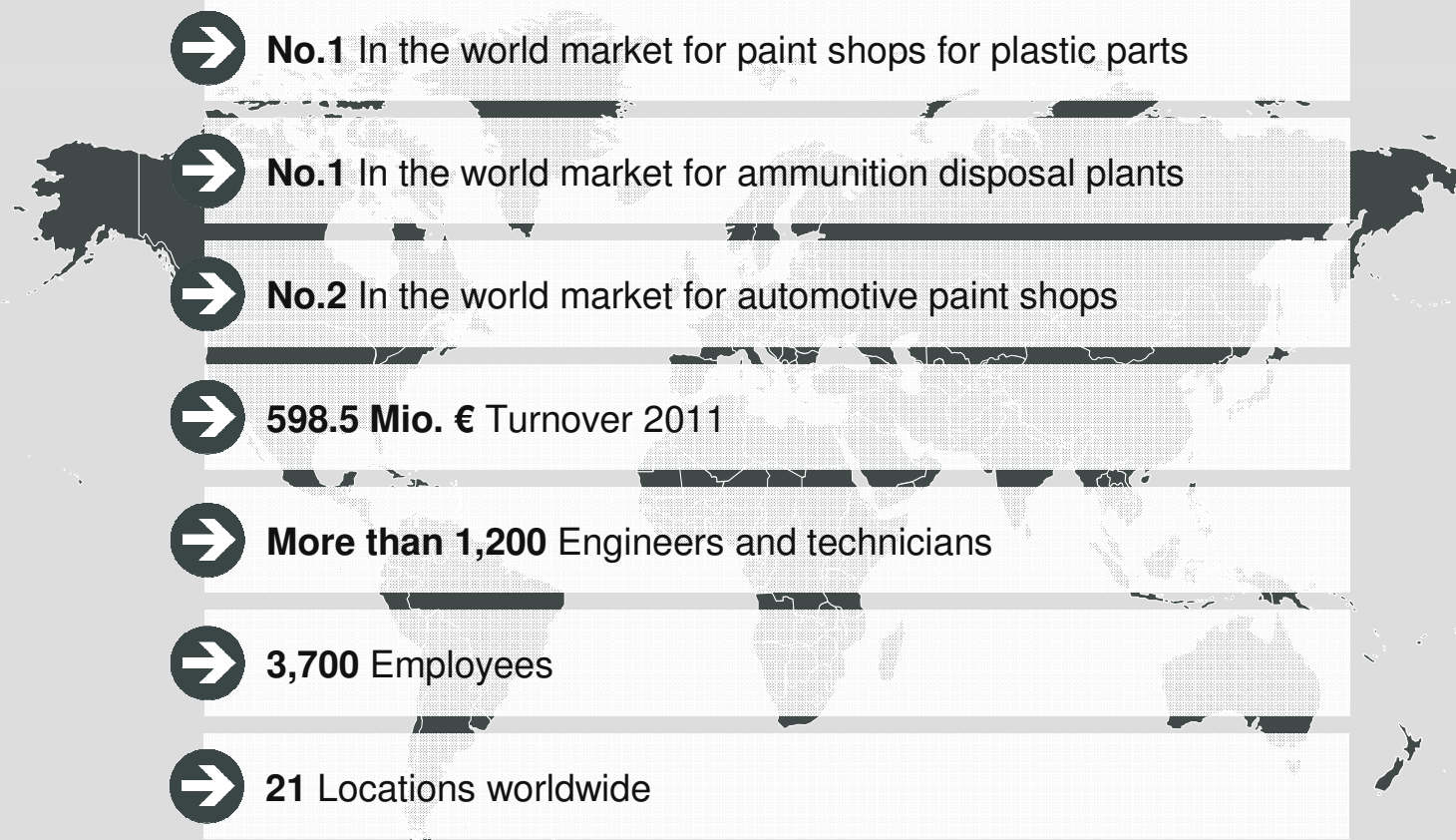
2 Biogas at EISENMANN

3 Input materials

4 Main components of biowaste digestion plant

5 Reference plants

Fact Sheet

- 
- A grayscale world map is centered in the background of the fact sheet. The map shows the outlines of continents and is partially obscured by a series of horizontal white bars that serve as a backdrop for the text. Each bar contains a white arrow pointing to the right, followed by a bolded key figure and a descriptive sentence.
- ➔ **No.1** In the world market for paint shops for plastic parts
 - ➔ **No.1** In the world market for ammunition disposal plants
 - ➔ **No.2** In the world market for automotive paint shops
 - ➔ **598.5 Mio. €** Turnover 2011
 - ➔ **More than 1,200** Engineers and technicians
 - ➔ **3,700** Employees
 - ➔ **21** Locations worldwide

Locations



Headquarters in Germany

Böblingen

Eisenmann AG
Eisenmann Beteiligungen
Eisenmann Service



- Production: 15.000 m²
- Storage: 5.000 m²
- Office: 6.600 m²

Holzgerlingen

Eisenmann Anlagenbau



- Assembly 1: 4.200 m²
- Assembly 2: 12.000 m²
- Piping construction: 500 m²
- Office: 9.000 m²

Range of Products and Services



AUTOMOTIVE SYSTEMS

Surface Finishing, Body shell conveyor systems, Final assembly lines



GENERAL FINISHING

Paint shops for metal parts, Paint shops for plastic parts, Paint shops for wooden parts, New materials



ENVIRONMENTAL TECHNOLOGY

Exhaust air purification, Waste water treatment, Waste disposal, Ammunition disposal,
Biogas plants and biogas upgrading plants



PROCESS & HIGH TEMPERATURE TECHNOLOGY

Pretreatment and coating systems, High-temperature technology, Firing lines for ceramics, Heat treatment, Carbon fiber ovens



CONVEYOR SYSTEMS

Electric monorail systems, Electric floor-based conveyors, Power & Free conveyors, Peripheral conveyor systems



SERVICE

Customer service, Spare parts management, Plant renewal, Advisory services, Full service & BOT models

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A history of biogas

Since 2003



Biogas plants in agriculture

Plants in operation:

- Germany, 55 plants
- Italy, 22 plants
- The Czech Republic, 1 plant

Since 2008



Biogas plants in waste management facilities

Plants in operation:

- Sweden, 1 plant
- Switzerland, 3 plants

Since 2012



Biogas upgrading plants

Plants in operation:

- Switzerland, 1 plant



Political and social parameters, EU, German legislation (KrW-/AbfG) on avoidance and recycling of waste

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What is biowaste exactly?

- **Slaughter waste, stomach contents**
- **Agricultural waste materials**
 - Grease trap waste
 - Bleaching earth
- **Food industry scraps**
 - Potato peelings
 - Pomace
- **Municipal waste**
 - Food waste
 - Gardening and landscaping material
 - Organic fraction of residual/household waste
 - Organic waste collected separately in biowaste bins



What does a biowaste bin typically contain?

The composition of a biowaste bin can vary greatly, according to how and where it is collected.

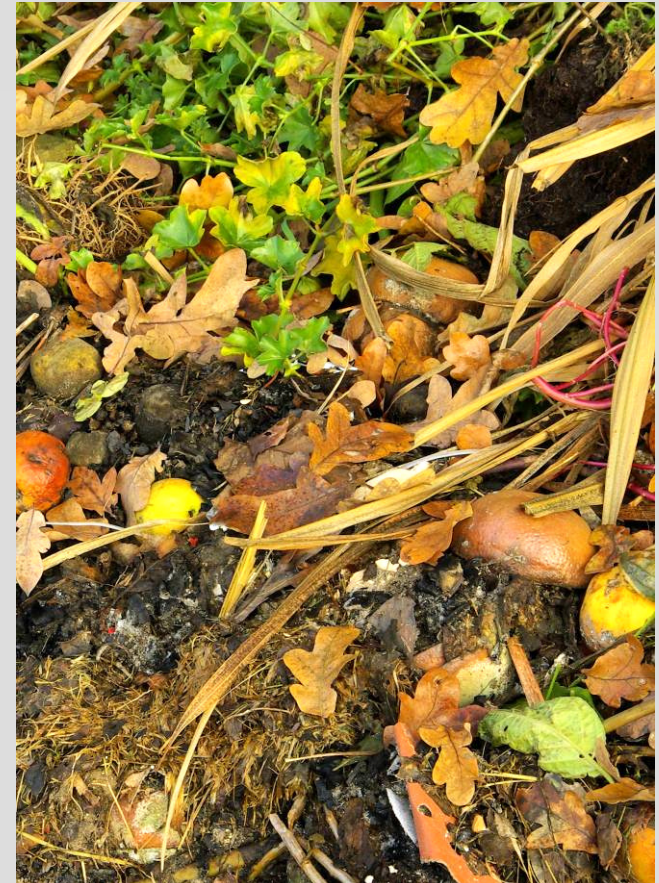
It not only contains...

- Organic kitchen waste
- Yard waste
- Street sweepings

but also foreign matter, such as ...

- Sand and grit (2-10 %)
- Plastic packaging (1-3%)
- Metal
- Wood

Foreign matter in biowaste bins poses a particular problem for the plant technology.



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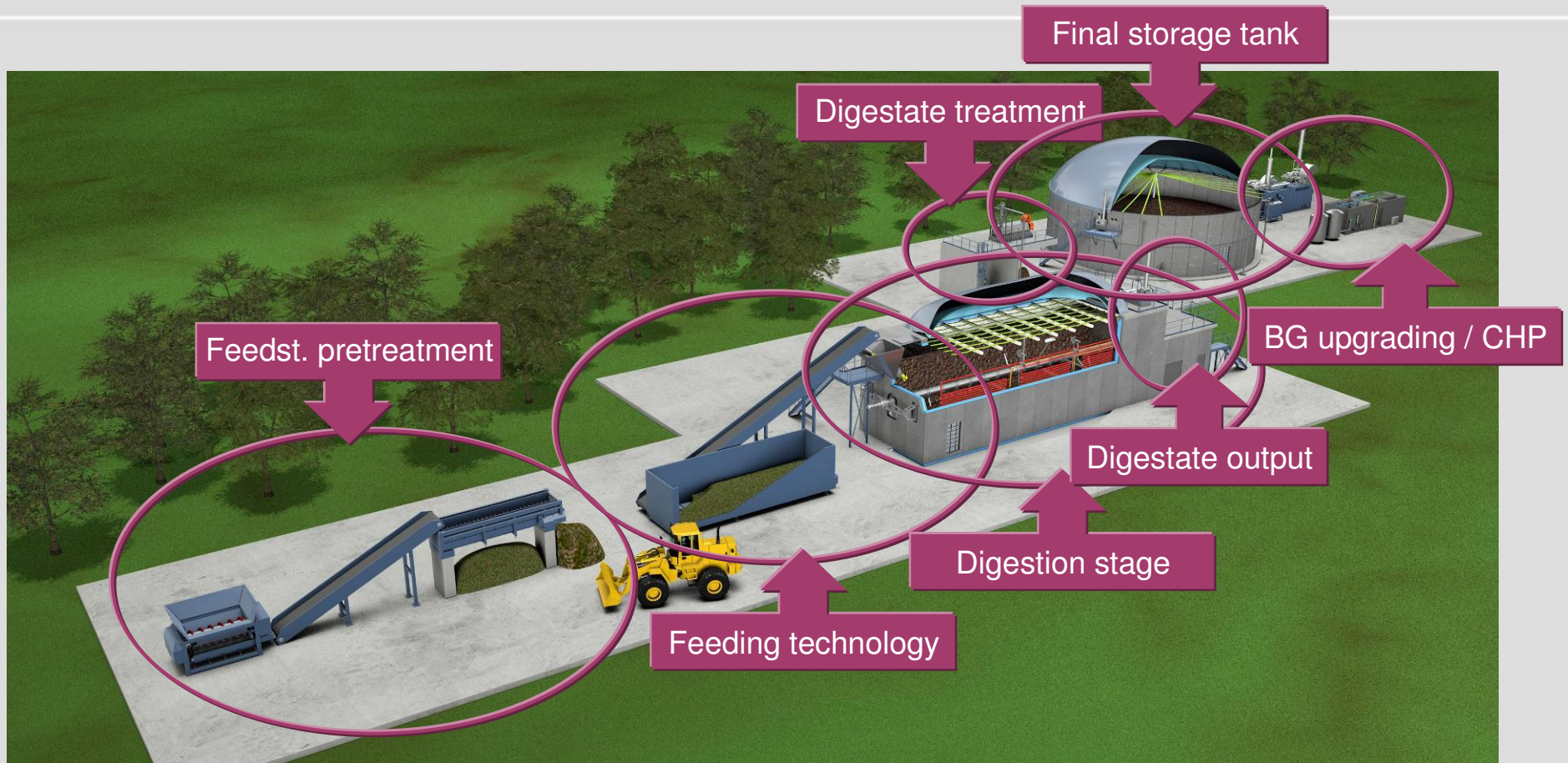
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Biowaste digester



3D modelling of a biowaste digester

Cross-flow shredder



Gentle and rapid breakdown of material by means of fast rotating, wear-resistant chains.



Coarse comminution, unpacking, prevention of over-comminution
Suitable for: standard biowaste bin

Two shaft shredder



Fast comminution of lumpy, inhomogeneous and packaged materials by means of roller cutters.



Comminution, unpacking

Suitable for: standard biowaste bin, gardening and landscaping material

Star screen



Star elements mounted on shafts loosen the material, separate out the fine material and remove the coarse material.



Loosening, screen, separation of foreign matter, conveying

Suitable for: standard biowaste bin, gardening and landscaping material

Hammer mill – Comminution of household waste and food waste



Fine grinding and homogenization by means of free-swinging steel hammers mounted on a rotor.



Fine grinding, pre-milling, can separate out foreign matter

Suitable for: waste material from the food and agricultural industry, food and slaughter waste

Sliding-floor container



Sliding floor system for pre-storage and continuous material feeding.



Pre-storage, buffer storage, scales, material feeding system
Suitable for: all kinds of solid and bulk biowaste

Pre-storage tank



Pre-storage tank for receiving, storing and continuous material feeding.



Receipt, intermediate storage

Suitable for: all biowaste that can be pumped

Plug-flow digester



Eisenmann plug-flow digester for substrates with high solids content.



Range of sizes, precast concrete elements or in-situ concrete, insulated, internal heating system, access doors, horizontal agitator shaft, double membrane gas holder

Horizontal agitator shaft

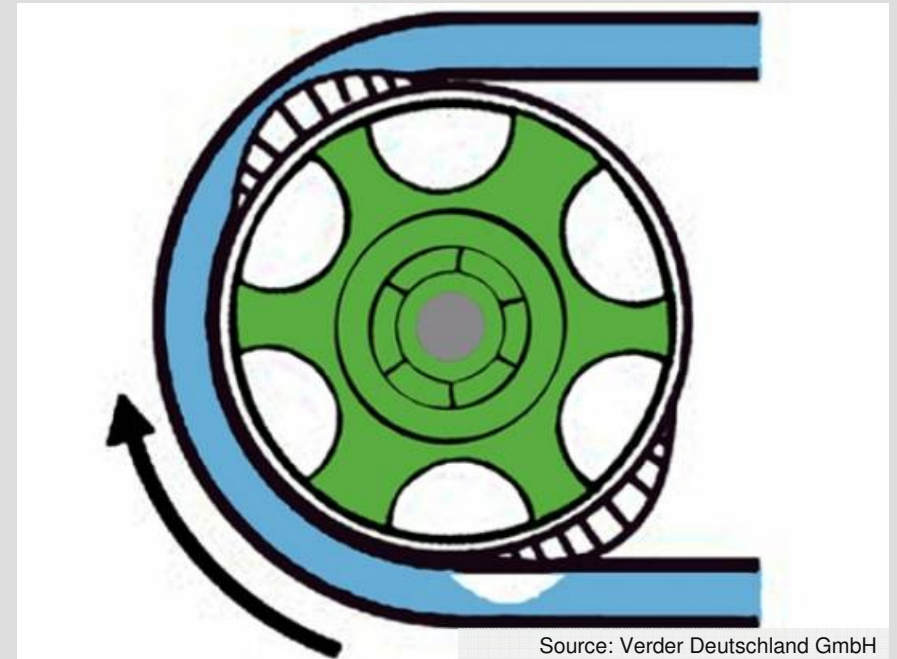
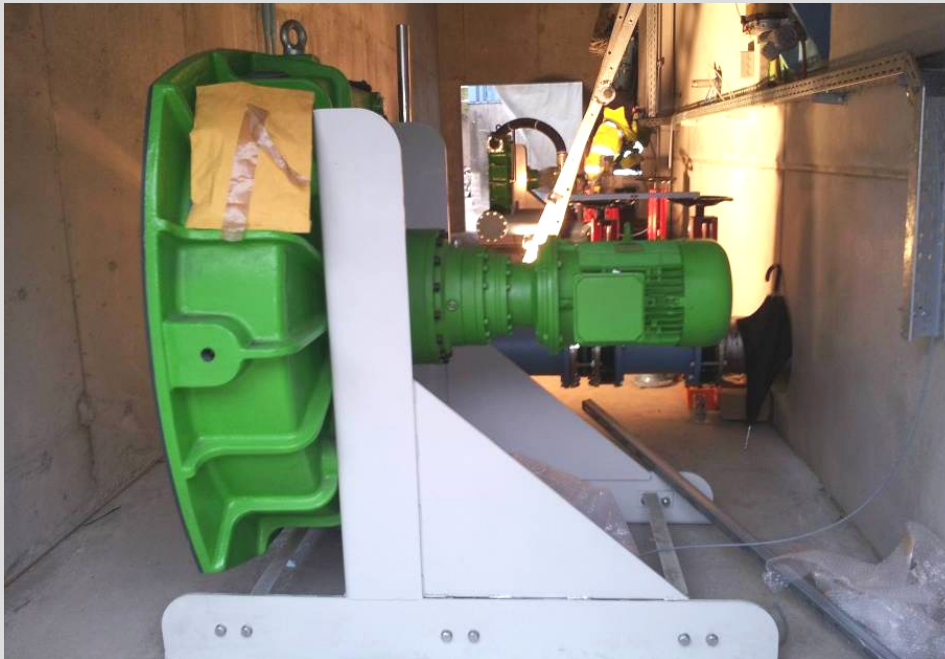


Eisenmann agitator shaft for continuous movement and optimum gas yield from the substrate.



External bearing, no central bearing, low speed
Suitable for: substrate mixtures with high solids

Hose pump



Source: Verder Deutschland GmbH

Hose pump for discharging and transporting the fully fermented substrate.



Suction effect, hose is the only wearing part, easy to change
Suitable for: highly viscous and lumpy digestate

Dual piston pump



Piston pump for discharging and conveying the fully fermented substrate.



Quasi-continuous conveying by means of S transfer tube
Suitable for: highly viscous and lumpy digestate

Screw press separator



Screw press separator for reliable separation of solids and liquids.



Press cake (solids content 30-35 %)

Press water (solids content 8-20 %)

Final storage tank



Covered tank for storage of press water and biogas.



Range of sizes, precast concrete elements or in-situ concrete, access doors, submersible agitators, double membrane gas holder

Combined heat and power (CHP) plant



Biogas-driven combustion engine power generators that produce electricity.



Electricity – to be fed into the power grid

Waste heat – for heating the digester and other uses

Biogas upgrading plant



Upgrading of biogas to natural gas quality (methane content $\geq 98\%$) using membrane technology.



Feeding into gas network
Utilization as vehicle fuel

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Västblekingemiljö AB – Mörrum, Sweden

Year of construction: 2012
Substrate: Biowaste, yard waste
Substrate throughput: 20,000 t/year

Digester volume: 2 x 800 m³
Nominal biogas flowrate: 260 Nm³/h



3D model



Double rectangular digester with sliding floor

Kelsag Biopower AG – Liesberg, Switzerland

Year of construction: 2010
Substrates: Cattle slurry, biowaste,
yard waste, food industry scraps

Substrate throughput: 12.000 t/a
Digester volume: 800 m³
Nominal biogas flowrate: 150 Nm³/h



Main digester and final storage tank



Biogas pipeline

Bioenergie Bätterkinden AG – Bätterkinden, Switzerland

Year of construction: 2010
Substrates: Cattle slurry, cattle dung, yard waste,
fruit and vegetable waste,
food industry scraps

Substrate throughput: 8,000 t/a
Digester volume: 800 m³
Nominal biogas flowrate: 150 Nm³/h



Aerial view of entire plant



Biogas pipeline

Patens s.r.l. – Cremona, Italy

Year of construction: 2010
Substrates: Slurry, chicken manure, silage,
olive press cake, animal feed waste,
liquid organic waste

Substrate throughput: 12,000 t/a
Main digester volume: 2 x 325 m³
Post-digester volume: 2,000 m³
Nominal biogas flowrate: 150 Nm³/h



Main digester with solids dosing and post-digester



Inspection walkway for gas dome

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