



Mechanical and Biological
Waste Treatment



The Eggersmann Philosophy

As an active contributor to the recycling industry, we support the global fight for the environment and climate protection - with our systems and special machines as well as with many years of experience and well-founded know-how and passion.

We have made it our task to recycle all kinds of waste as high quality as possible.

With our special machines and systems, we separate as many recyclables as possible from the material before it is incinerated or landfilled. Landfill masses are thereby highly reduced, which in turn significantly reduces CO₂ emissions and fewer pollutants and microplastics enter the environment.

In our own biological waste treatment plants, we generate renewable energy from biomass, thereby saving greenhouse gases and fossil fuels. At the same time, we produce quality fertilizers for agriculture. In contrast to soil-damaging mineral fertilizers with high nitrate levels, this natural soil improver supplies the soil with rich humus.

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The General Contractor for Waste Management

Eggersmann is a leading general contractor for municipal and private waste management. Increasing waste treatment requirements result in ever larger and more complex plants – we are happy to take on this challenge.

With an extensive portfolio of our own waste treatment technology, supplemented by components from strong partners, we offer our customers the waste treatment plant from a single point of contact. The advantages are obvious: minimization of interfaces, streamlining of the schedule and cost security for the customer.

In its role as general contractor, Eggersmann builds public and commercial projects and is responsible for all work involved in planning and implementing recycling facilities.

Especially in waste management, it is often necessary to expand an existing plant or to integrate it into a new plant - and this, of course, without interfering with operations as much as possible. Here, customers can rely on Eggersmann's know-how and experience.

This includes:

- › Implementation planning
- › Construction work
- › Construction work
- › Production and delivery of machinery and conveying technology
- › Assembly
- › Commissioning
- › Trial operation
- › Turnkey handover of the plant

Particularly effective and in close coordination with the specialists of all disciplines, we thus guarantee the highest degree of reliability in all phases of construction. Recycling plants from Eggersmann are thus optimally coordinated in the entire process technology, in the design of their infrastructure and in control and regulation technology.

To ensure a smooth handover, our specialists accompany the plant up to the start of regular operation and, if desired, beyond that as part of service and maintenance assignments.



The ESA app: Digital Plant Management

Reliable conveyor technology, powerful machines and sophisticated control technology monitored by experienced employees – none of this guarantees maximum plant performance. Fine-tuning all these components to work together is crucial. With the ESA app, you can harness the full potential of digitalisation and AI-based data analysis to raise the processes in your plant to the highest level.

All Processes at a Glance

All your plant data is not only recorded but also evaluated in real time and presented visually using the most important parameters, such as availability, output and quality. This not only allows you to identify bottlenecks, performance fluctuations and malfunctions at an early stage, but also to validate your optimisations live.

Greater Efficiency through Digital Management

Administrative tasks are an essential part of day-to-day business. With the ESA app, you can record all relevant events digitally, seamlessly and easily. You can use this information to automatically generate shift and maintenance logs as well as downtime lists. Thanks to the centralised document storage in multiple languages and integrated AI agents, all your employees are always well informed.

Higher Plant Availability

Don't let malfunctions take you by surprise any longer. AI-based models continuously evaluate your plant data. This allows trend deviations in quality or output and material blockages to be detected at an early stage. Your team receives notifications and can react immediately.



Smart Maintenance Planning

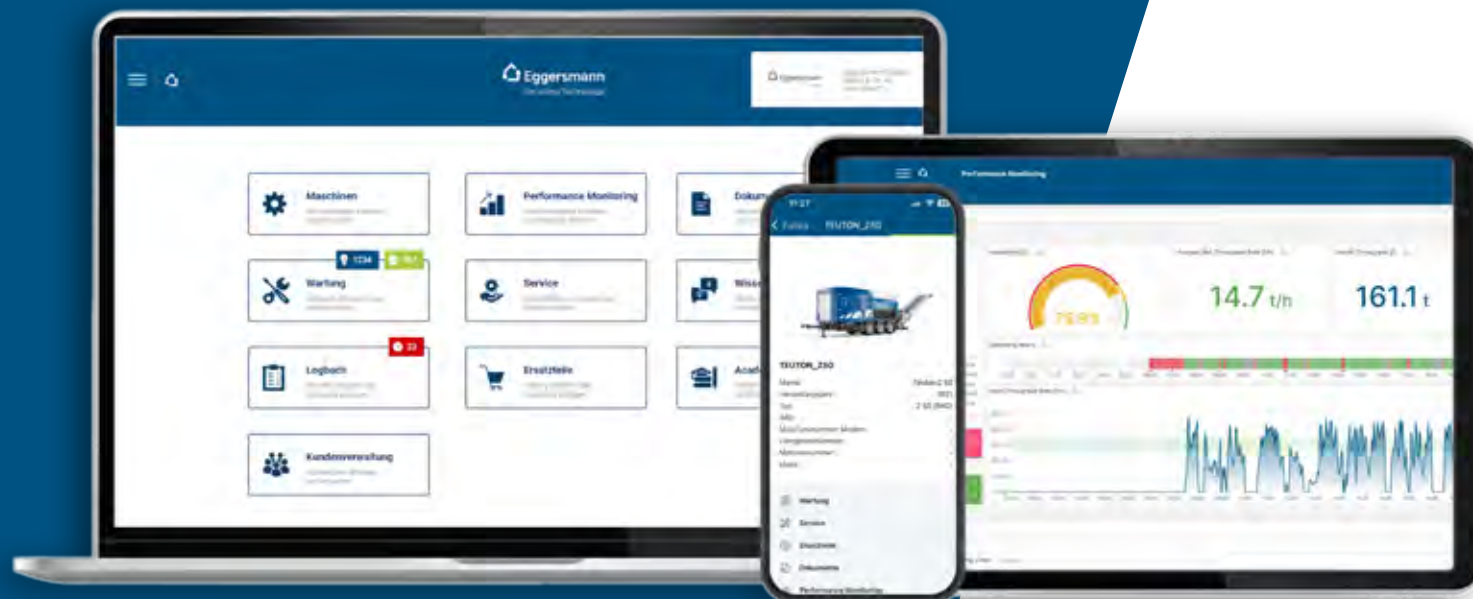
Machines, conveyor technology, air filters – everything in your plant needs regular maintenance. The ESA app not only offers you a comprehensive status overview but also allows you to distribute tasks digitally and store the corresponding instructions. This saves up to two hours of administrative work per day.

Individual and Flexible

The ESA app has a modular structure, so you can tailor it to your individual needs. New machines and sensors can also be integrated into the system at any time. Use on all common devices, from desktops to smartphones, also gives you maximum flexibility in your everyday work.

Would you like to learn more about the individual modules of the ESA app or download it directly?

Then simply scan the QR code:



Intelligent Sorting with Data Analysis

The purity of the recovered recyclable fractions also increases their marketability. This is a factor that should not be neglected when it comes to operating a sorting plant economically and remaining competitive. Investments in new digitally networked plants as well as corresponding modernizations of existing plants are worthwhile!

Eggersmann sorting plants produce single-sort recyclable fractions according to your customer-specific requirements. Digital networking in a central system and fully automated management systems ensure an optimized and continuous state-of-the-art sorting process.

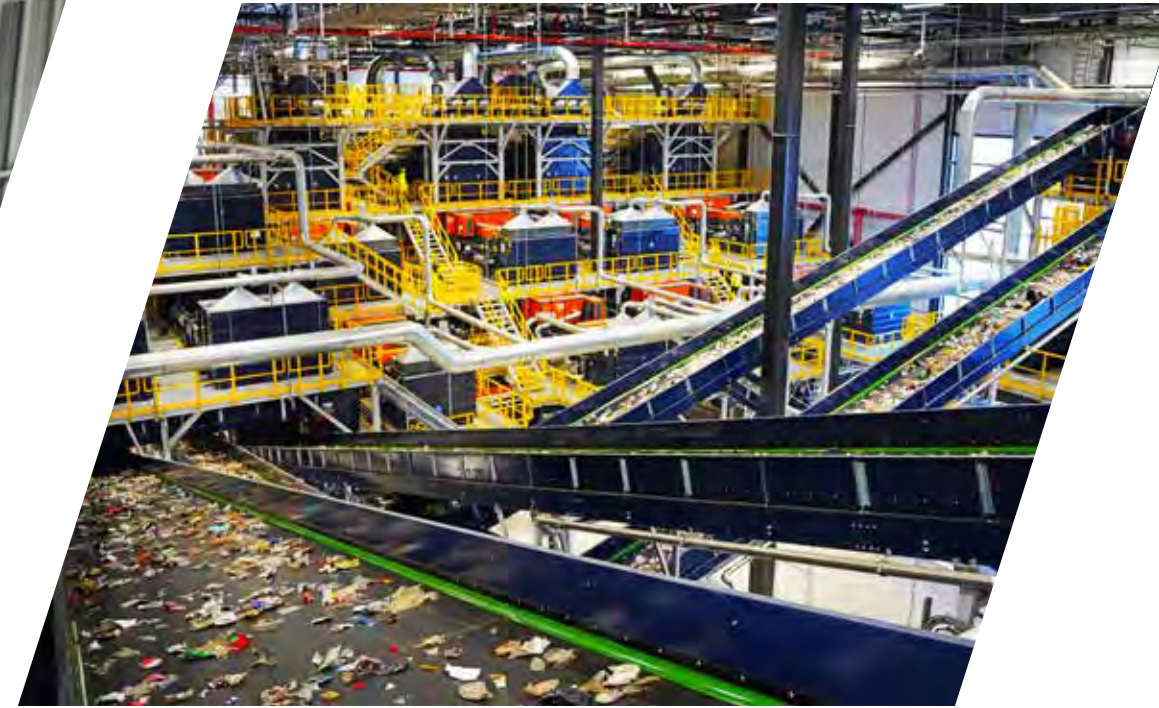
Based on the incoming data, regulations are created between the various machines and plant sections to adapt them as quickly as possible to different material quantities and material compositions. With this fully automated system, the material flow is self-regulated.



Eggersmann Hopper Management – We don't do half bales

Thanks to digital networking and the technology used, Eggersmann's hopper management system detects the volume of material at every position within the recycling plant. Even the material flows on the feed belts are taken into account, so that in the end only as much material winds up in the respective hoppers as can or should currently be pressed. As soon as a bunker contains enough material for baling, the material is automatically conveyed to the baler. The result is whole bales of exactly the same length. Returning half bales to the sorting process, for example, becomes obsolete with the bunker management system.





Plants for the Treatment of Lightweight Packaging and Plastics

From planning, construction and assembly to turnkey handover of the plant, Eggersmann implements complex projects for the waste disposal industry.

Eggersmann sorting plants for the treatment of lightweight packaging waste (LWP) or plastics are tailor-made solutions, always adapted to the operator's requirements.

The aim is to recover clean-fraction recyclable materials with the lowest possible sorting losses. Largely automated processes with flexible material flows are implemented.

The proven machines from the Eggersmann portfolio,

such as bag openers, screening machines, ballistic separators, and the conveyor technology form the basis of every sorting plant. Other units such as nearinfrared (NIR) separators, air classifiers and balers are typical elements of the plant.

In addition to the processing technology itself, the high requirements of fire protection and air pollution control are implemented.

The separated light fractions can be pressed into bales. These are usually the various types of plastic such as LDPE, HDPE, PET, PP, HDPE and beverage cartons. Metals are also separated out and can be pressed.

Plants for the Treatment of Commercial and Household Waste

All collected waste fractions contain valuable materials that can be sorted out. The plant concepts are as diverse as the composition. Eggersmann sorting plants meet these requirements worldwide. The challenge is to recover clean-fraction recyclables from an inhomogeneous input fraction.

Raw materials are becoming increasingly valuable. It is therefore worth sorting out metals and plastics and feeding them into a material recycling process. High-calorific fractions for effective thermal recycling are also produced in Eggersmann plants.

Often, the plants are used together with Eggersmann systems for biological treatment. These mechanical-biological plants can dry fractions, compost the, or use them for biogas production.





Plants for the Treatment of Paper and Cardboard

Eggersmann sorting plants for paper, cardboard and paperboard packaging ensure clean-fraction end products in the required qualities.

As soon as the waste paper fraction is fed onto the sorting line, the BRT HARTNER dosing hopper with moving floor ensures an even feeding of the downstream process.

The compact disc and rotor screens separate the material stream in several stages into a fine fraction, a mixed paper fraction, and a cardboard/paperboard

fraction. The rotor elements, each consisting of an axle with oval discs, set the material in a kind of "floating" motion by moving the discs up and down.

Ballistic separators are used as a supplement or alternative. Due to the multi-dimensional motion sequence, impurities are separated from the deinking fraction particularly effectively.

For high purities in the product and for further classification, e.g. into gray, brown and printed cardboard, near-infrared detection systems are used which separate the pre-programmed fractions by means of compressed air.

Plants for the Treatment of Grate Ash

The incineration of household waste produces considerable quantities of bottom ash (slag). The recovery of the metals contained in the grate ash is desirable from an ecological and economical point of view.

A variety of different screens, different types of magnetic separators and eddy current separators adapted to the respective grain size are usually used in the treatment process.

The high pH value, abrasiveness and moisture of the input material demands special requirements when it comes to the technology to be used, especially the conveyor belts.

Another challenge is the very high fines content and, at the same time, few but very large and heavy parts. Eggersmann has the know-how to meet these requirements.



Organic Waste and Compost Treatment Plant

The purpose of treating the organic waste is to prepare the material for subsequent biological waste treatment processes, such as fermentation and composting. A shredder or bag opener, metal separator and sieves will be used in the treatment process. Debris that will affect the biological process and contaminate the compost product will be removed.

The compost will be screened by a fine sieve. Overs from the screening process can be returned to the composting process. Light fractions, mainly plastics, will be removed by an air separator. The plastics will be fed by a material separator, for example, via a press container.

The Eggersmann CO₂ MPOST CLEANER separates light and heavy fraction of compost in its compact sorting unit. The multi-stage sifter produces high-quality compost with low throughput losses.



Aerobic Waste Treatment in Intensive Composting Tunnel

Composting in Tunnel and Biological Drying

The intensive composting tunnel is an enclosed process which meets the highest requirements in terms of emissions from waste treatment. The process goals will be reached in the shortest time possible no time by optimizing the process conditions.

Closed tunnel with active aeration and ventilation

- › Enclosed Batch-System
- › Optimization of oxygen supply by aerating the material
- › Fully automated process control
- › Treatment of waste air from the process and from the treatment hall

For composting of digestate, we recommend using a digestate mixer to produce an ideal mixture before the material input into the intensive composting tunnel.

Eggersmann offers the complete aerobic treatment system including waste air collection and purification. Material input and output can be automated to a great extent with automatic tunnel filling or tunnel emptying device

Applications:

- › Composting of organic waste (intensive composting and post composting)
- › Stabilization of residual waste
- › Biological drying of residual waste
- › Composting of digestate from plug flow digesters or tunnel fermentation
- › Drying of RDF or overs from screening



CONVAERO - Membrane Covered Composting & Biological Drying

The CONVAERO system is a waste treatment system for composting and biological drying of organic waste with aeration and membrane cover. The process offers great flexibility in terms of budget, space availability and process time schedule and is ideal for either small or large plant throughputs as well as very large throughputs.

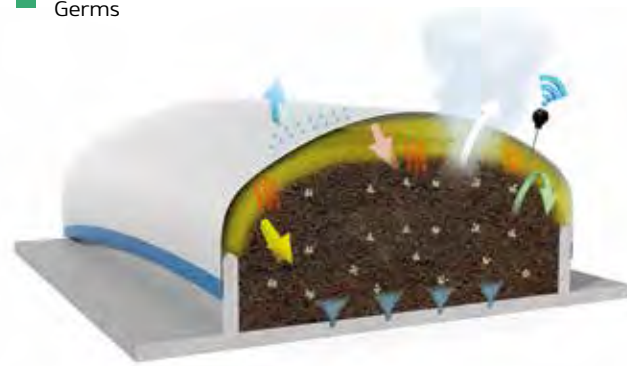
The CONVAERO system is suitable to treat household waste, green waste, organic waste from organic waste bins and from food processing, sewage sludge and fermentation digestate.

In comparison to opened waste treatment process, the CONVAERO system has a high level of emission control and a very low power consumption. In addition to this, a relatively short process time and reliable hygienisation process are other characteristics of the CONVAERO system.

- > Emission minimisation
- > Shorter process time
- > Low energy consumption
- > Robust and proven Technology

In combination with the specially adjusted turner, the CONVAERO CON, the process can be automated to a great extent and is therefore ideal for cost-effective treatment of large volumes of waste.

- Wind & rain
- Odor & Volatile Substances
- Warmth
- Air & water vapour
- Germs



Aerobic Treatment in Windrow Composting

Aerobic treatment in windrows with active ventilation and a turner is suitable for organic waste, green waste, residual waste, sewage sludge as well as contaminated soils.

- > Windrow width 4.5 - 5.0 m
- > Automated input and output
- > Automated ventilation
- > Continuous or batch process
- > Self-drive turner
- > Hassle-free maneuvering between rows

Aerobic Treatment in Opened Heap Composting

The BACKHUS turner is ideal for opened windrow-post-composting after enclosed intensive composting process in a composting tunnel. There is the correct turner available for every plant throughput.

- > Windrow widths from 3.0 - 7.5 m
- > Highly flexible
- > Self-drive turner
- > Throughput capacity from 700 to 7,000 m³/h



BEKON Dry Fermentation

BEKON is the global technology leader in the construction of biogas plants for generating energy from waste. The plants are known for their particularly high efficiency as well as their simple and robust operation. Only a fraction of the energy generated flows into the plant's own energy consumption. Together with the high biogas yield, this makes the process particularly efficient. BEKON is the only supplier to offer either a continuous or discontinuous process to suit customer requirements. The large number of national and international references and the high level of customer satisfaction reflect the success of the processes.

BEKON Discontinuous Dry Fermentation – Batch Fermenter

Discontinuous fermentation is a safe and biologically stable process. In this single-stage process, the fermenters are filled either with a wheel loader or automatically using a tunnel feeder. All processes within the fermenter run automatically as standard. By feeding the tunnels at different times, a constant energy supply is guaranteed. To start the fermentation process immediately, the substrate is heated in an aerobic start phase and then inoculated with process liquid (percolate). No further mixing or feeding of additional substrate is necessary, as the fermenter is a closed circuit. The cell liquid that escapes during the process is collected by a drainage system, fed to the percolate fermenter and sprayed back into the fermenter from there. At the same time, wall and underfloor heating systems ensure a constant temperature so that the microorganisms involved in the process have perfect living conditions at all times. The fermenters are then emptied using a wheel loader.

The process offers the following advantages:

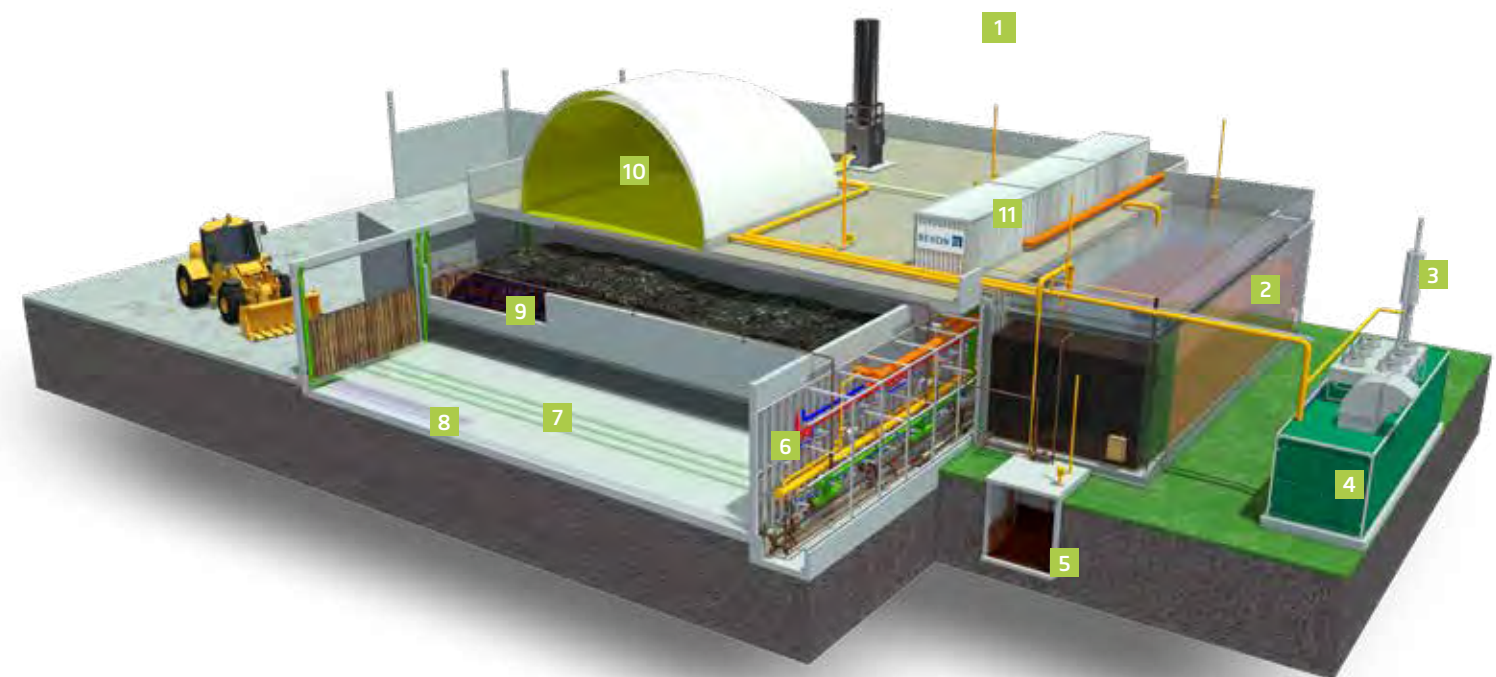
- › Fermentation of separately collected biowaste and organic fraction from household waste possible
- › High biogas production
- › High economic efficiency
- › High degree of automation
- › High safety standard
- › Highest plant availability
- › No/hardly any pre-treatment of the substrate necessary
- › Simple operation
- › Base load-capable energy generation
- › Low energy requirement
- › Nearly wastewater-free
- › No dewatering of the digestate

Perfect Structure for Composting

The discontinuous process produces digestate with very good structural properties and a comparatively low water content. As a result, the digestate can be stacked immediately after fermentation and are therefore ideal for aerobic conditioning and further processing into compost or fertiliser. The plants therefore set completely new standards for the production of biogas and compost.

Flexible With Modular Plant Concepts

The name „batch fermentation“ refers to the fermentation of individual batches in different tunnels. The number of these fermenters is determined according to the expected throughput volume per year. The same principle applies to the downstream intensive composting tunnels. If the volume of waste increases at a later date, new digesters can simply be added. The modular concept therefore enables us to build customised plants. At the same time, it also ensures a high degree of flexibility during operation: it is also possible to ferment the organic fraction from household waste, whereby the tunnels can be used for either source-separated organics or household waste without the need for conversion. The process is therefore ideal for regions where there is no separate collection of organic waste yet or where this is to be introduced in the foreseeable future. Plant sizes from 10,000 to 150,000 tonnes per year can be realised.



- | | |
|------------------------|------------------------------|
| 1. Flare | 7. Purging air / Exhaust gas |
| 2. Percolate fermenter | 8. Floor heating |
| 3. Exhaust stack | 9. Wall heating |
| 4. CHP | 10. Biogas storage |
| 5. Pump sump | 11. Technical containers |
| 6. Technical walkway | |

BEKON Continuous Dry Fermentation – Plug-Flow Fermenter

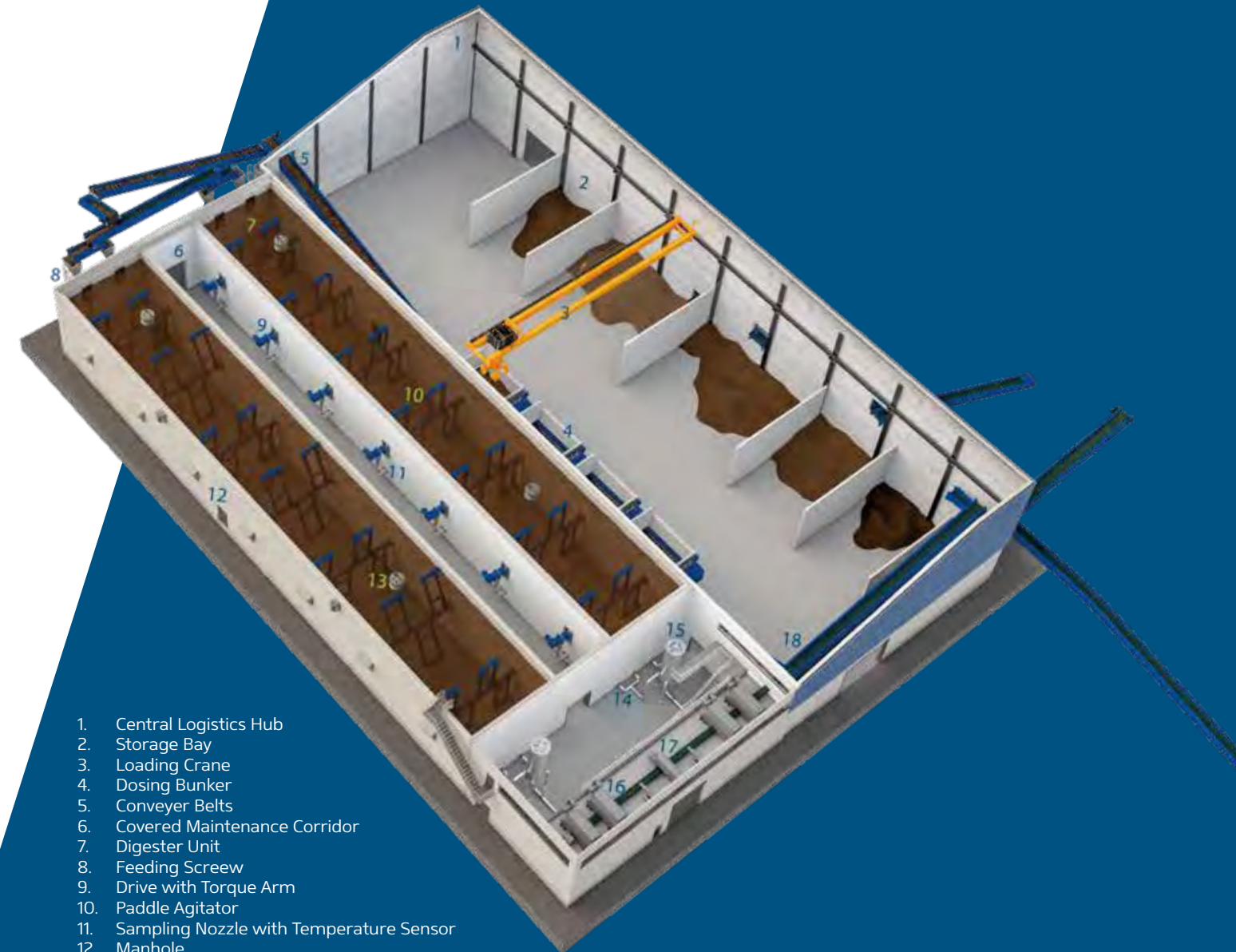
Continuous fermentation is a robust process in which particularly large quantities of biogas are constantly produced. Pre-shredded biomass is fed into the digester by means of a feeding screw, where it decomposes into a liquid slurry under anaerobic conditions. As only the process water contained in the biomass is used for liquefaction in this process, it is a dry fermentation process – for wet fermentation, additional water must be added. In the fermenter, the material is regularly mixed by stirrers, thereby stimulating the exchange of substances and the release of gas. Mixing mainly takes place vertically in order to avoid the formation of layers of sinking and floating components. The substrate is optimally homogenised by the stirrers and uniform fermentation is achieved. The finished fermented substrate is discharged using a vacuum or piston pump. Exactly as much fresh biomass is added to one end of the elongated fermenter as fermentation residue is removed from the other end. As a result, the substrate automatically moves from the input to the output, creating a continuous fermentation process with a particularly high biogas yield.

The process offers the following advantages:

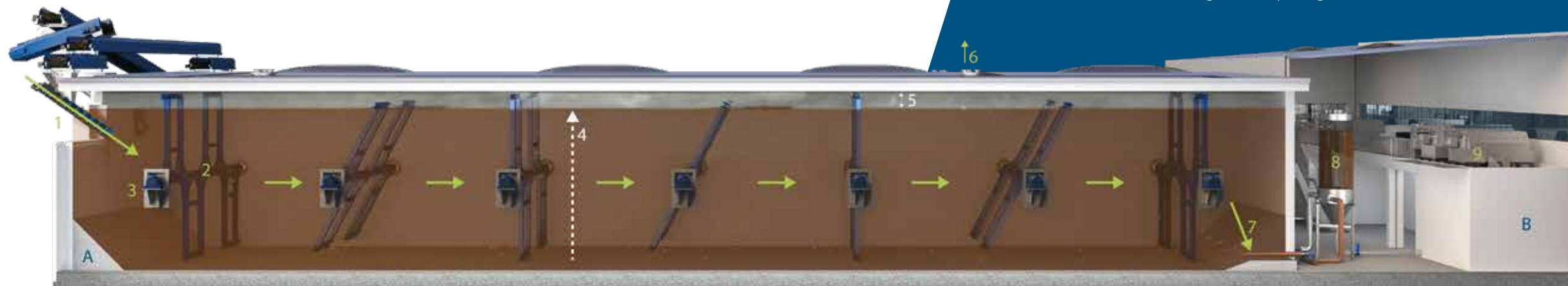
- › Highest biogas production
- › Highest economic efficiency
- › High degree of automation
- › High safety standard
- › Highest plant availability
- › Simple operation
- › Base load-capable energy generation
- › Low energy requirement

Customised Solutions

Similar to discontinuous fermentation, the continuous process also allows the creation of customised solutions according to the required plant capacity. This means that the fermenter size can be adapted to the substrate quantity. Fermenters with a capacity of 25,000 to 50,000 tonnes per year are reasonable – beyond this, the construction of additional fermenters parallel to the first is recommended. This means that there are no limits to the plant capacity. New fermenters can be added in the event of an increased volume.



1. Central Logistics Hub
2. Storage Bay
3. Loading Crane
4. Dosing Bunker
5. Conveyor Belts
6. Covered Maintenance Corridor
7. Digester Unit
8. Feeding Screw
9. Drive with Torque Arm
10. Paddle Agitator
11. Sampling Nozzle with Temperature Sensor
12. Manhole
13. Gas Venting Connection
14. Dewatering Hall
15. Digistate Pumping System
16. Dewatering Presses
17. Decanter
18. Material Discharge for Composting



- A. Digester unit
- B. Dewatering hall

1. Gas-tight feeding screw
2. Paddle agitators
3. Agitator drives (outside)
4. Substrate level
5. Headspace
6. Gas venting connection
7. Discharge piping
8. Digistate pumping system
9. Dewatering presses

Eggersmann FUEL



Eggersmann FUEL is the solution for waste treatment in emerging and developing countries. With Eggersmann FUEL it is possible even with low tipping fees, to operate an efficient and high quality waste recycling facility and thereby prevent greenhouse gas emissions from landfill. Waste will be shredded before going through the biological drying process. The biological drying process will be carried out by CONVAERO System in combination with the specially adjusted turner, CONVAERO CON

Series. The turner rolls up the membrane with its front roller and at the same time turns the material and covers the material again with the membrane from its rear roller. Hence the material bay stays closed during the turning process and emissions are drastically reduced.

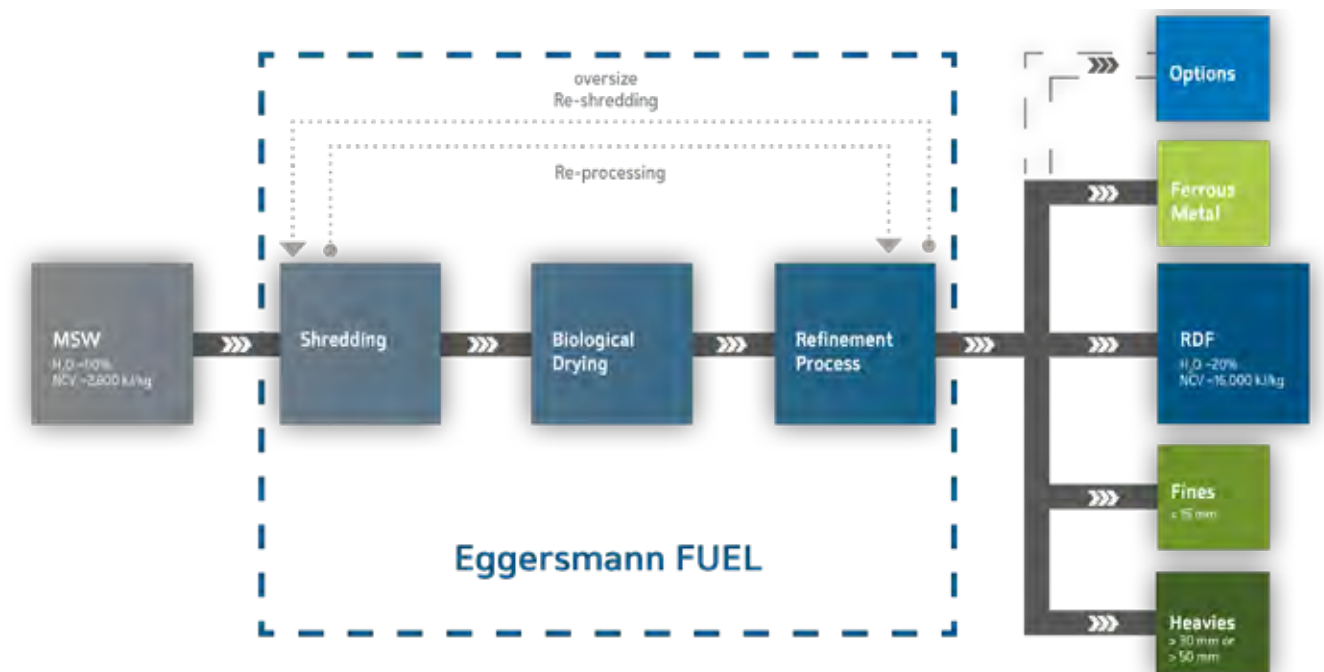
After the material is dried down to 20% water content, it will be processed according to the requirements of alternative fuel. The alternative fuel can be used for example cement production to replace fossil fuel.

Contribution to Socio-Economic Development:

- › Generation of jobs for all qualifications
- › Landfill diversion > 80%
- › Utilisation of energy inherent in waste (energetic recycling)
- › Fuel production in your own hands

Contribution to Sustainability:

- › Substitution of fossil fuel by RDF
- › Reduction of greenhouse gases from landfill
- › Reduction of leachate
- › Saving natural resources for future generations



Know-how and Vertical Integration of the Eggersmann Group

Our experts in development, implementation and maintenance of modern plant technologies for mechanical and biological waste processing are always at our customers' disposal.

If desired by the customer, a complete package can be provided. Our range of services covers beside engineering, detailed planning, design and procurement, also the production delivery and installation of the entire system technology. We also undertake the commissioning of the mechanical and electrical equipment and the visualization.

Know-How

The experience of our employees is our greatest asset and the cornerstone for successfully planning and implementation of our projects. Through new developments of devices and processes as well as through strategic expansions of the group of companies, we develop the branch of waste management further.

Plant Control and Programming

The controls for all systems are programmed by our own electrical department, with that we ensure the projects are implemented efficiently and we are constantly developing new processes and components.

Intelligent Networking

Intelligent networking within the plant and with data centers provides an AI-based parameter adjustment and offers the operator a complete process overview at all times.

Manufacturing Facilities

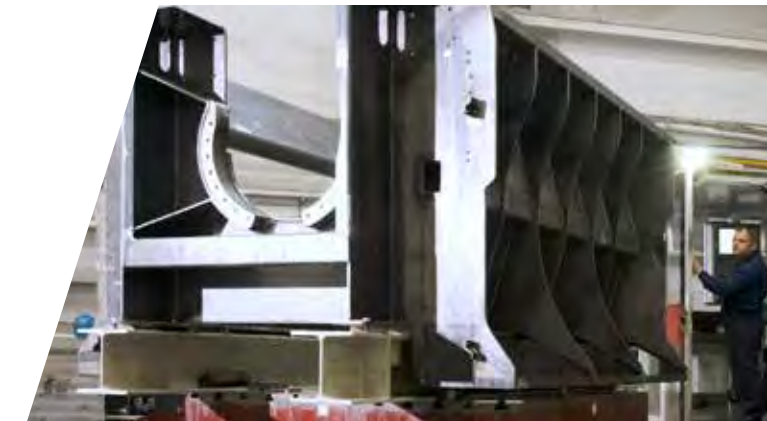
Through the production facilities of our group of companies in Bad Oeynhausen (DE) and Sepolno (PL), we guarantee the highest quality for all our components and machines. Our own production capacities also enable us to produce custom-made products thus finding the ideal solution for every application.

Research and Development

With our own biogas and composting plants, the Eggersmann Group possess considerable operator know-how. The experiences from daily operation goes into the optimization of components and leads to new developments.

Service and Consultation

The Eggersmann service staff not only attend to the customer's problems but also give specific recommendations to improve operational safety, to increase process efficiency and to lower operating costs.



References

1



Dry fermentation for household waste and organic waste
Santa Barbara (US)
67,000 t/a
Year of construction 2020

2



Composting plant with composting tunnel and mechanical treatment for organic waste, green waste and compost
Anröchte (DE)
43,000 t/a
Year of construction 2020

9



Eggersmann FUEL RDF Production for cement industry
Cilacap (IDN)
40,000 t/a household waste
Year of construction 2018

10



Mechanical treatment plant for light packaging
Marl (DE)
200,000 t/a
Year of construction 2019

3



Dry fermentation and composting for organic waste and green waste
Soltau (DE)
25,000 t/a
Year of construction 2021

4



Composting plant with composting tunnel and mechanical treatment for organic waste, green waste and compost
Lünen (DE)
75,000 t/a
Year of construction 2019

11



Mechanical slag treatment plant
Singapore (SG)
600,000 t/a slag from household waste incineration
Year of construction 2015

12



Composting plant for residual waste, sewage sludge and digestate
Ibiza (ES)
60,000 t/a
Year of construction 2021

5



Processing plant for waste wood
Lengede (DE)
180,000 t/a
Year of construction 2023

6



Eggersmann FUEL RDF Production for cement industry
Suleymaniya (IQ)
380,000 t/a
Year of construction 2020

13



Treatment plant for business and industrial waste
Tel Aviv (IL)
660,000 t/a household waste and 90,000 t/a C&I
Year of construction 2015, expansion 2021

14



Mechanical treatment for household waste
Bargeddie (UK)
190,000 t/a
Year of construction 2019

7



Continual Fermentation of Waste
Kirchberg (DE)
15,000 t/a organic waste
Year of construction 2021

8



Recycling plant for industrial, business and household waste
Dubai (UAE)
150,000 t/a
Year of construction 2019

15



Sorting plant for light packaging
Rostock (DE)
60,000 t/a
Year of construction 2020

16



Mechanical treatment plant for light packaging
Esbjerg (DN)
152,000 t/a
Year of construction 2024



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