



WASTE TREATMENT TECHNOLOGIES

- Residual Waste Treatment
- Waste to Energy
- Stabilat® Plants
- Dry Fermentation/Biogas
- Composting of Organic Waste
- Construction of Sanitary Landfills

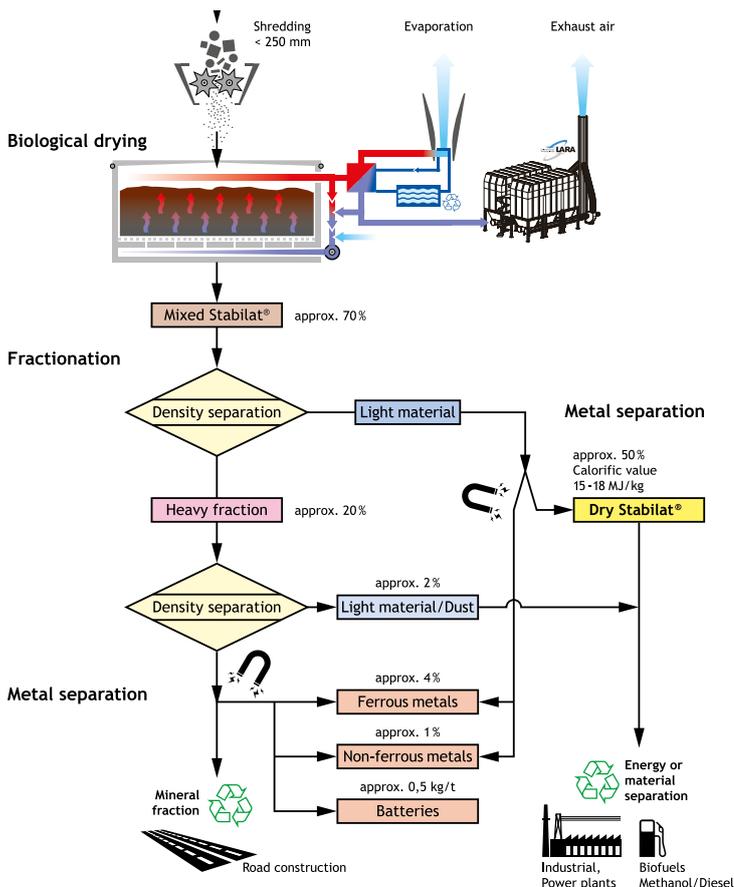
Utilise waste instead of dumping it!

By using Herhof's Stabilat® technology, the volume of residual waste is organically reduced through dewatering. At the end, the water content lies below 15 percent, which significantly improves the mechanical separability of the material.

This distinguishes Herhof's Stabilat® process from all other conventional treatment techniques. Reusable material is separated during the process and can be sold as a genuine high-quality raw material and returned into the material cycle. The remaining organic waste fraction is pressed into hygienic, nearly odourfree energy resources known as pellets.

Herhof Stabilat® process in 3 phases:

- 1. Pretreatment:** Extraneous matter and harmful substances are removed from the waste and the latter is then shredded to a maximum grain size of 250 mm and then transported via a fully automatic crane system into the Herhof bio box.
- 2. Stabilisation:** In the Herhof bio box, the waste is dewatered through biological means. This is the vital step to the subsequent pure source separated break down of the waste mixture into reusable material and energy as well as for the storability of the fuel generated.
- 3. Mechanical treatment:** Removal of the mineral fraction (stones, glass, ceramics), the metals, separated into ferrous and non-ferrous, as well as other recyclables.



Waste is a mixture of very different raw materials. The Herhof Stabilat® technology enables selective separation and utilisation of raw materials.

Herhof box composting system

The Herhof box composting system is globally recognized in installations around the world. Over 50 Herhof composting plants operate successfully in all climatic zones.

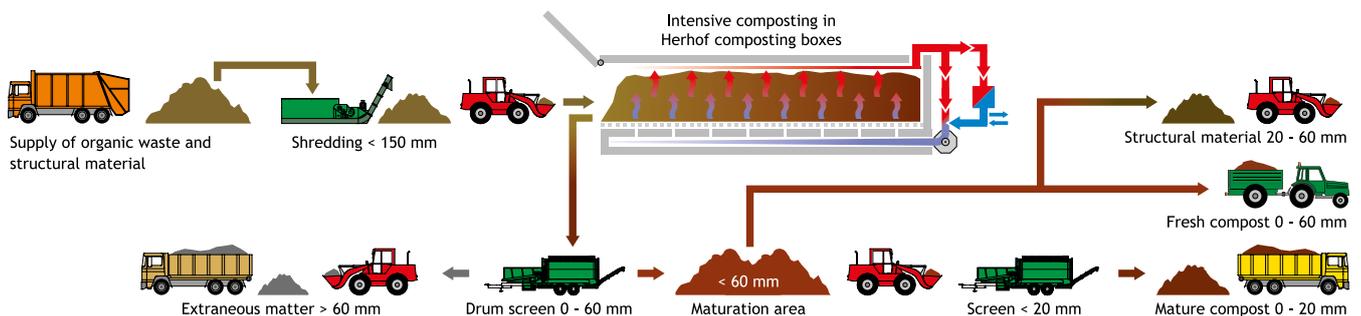
This is a testament to the high quality of the Herhof box composting system. This computerised system processes organic waste into a hygienically sound product within the shortest period of time (about 7-10 days) and it is spacesaving. At the same time, the composting process and time are regulated using different control and regulation parameters. In order to be able to ensure a complete hygienic material, the composting material is heated up to 65 °C / 149 °F in the Herhof composting boxes. In this process, negative weather factors are dealt with. In addition, odours and groundwater pollution are managed within the closed system.

Although this sounds simple, it is an engineering feat! There are decades of developmental work behind it.

The Herhof box composting system can be used to produce compost fast and reliably from organic, garden, kitchen waste and from sewage sludge as well as from digestate coming from anaerobic digestion plants. It can be ideal for use in farming or for soil improvement in other areas. We have commissioned independent labs to monitor the nutrient-rich Herhof compost. The RAL quality seal is a proof of its high quality.

Herhof compost – Your soil is alive!

Herhof composting is unique in the world. Its core piece is the computer-controlled, optimised ventilation of the Herhof composting boxes.



Intensive composting in Herhof composting boxes



Filling of Herhof composting box by wheel loader



Processing of compost by means of screening technology

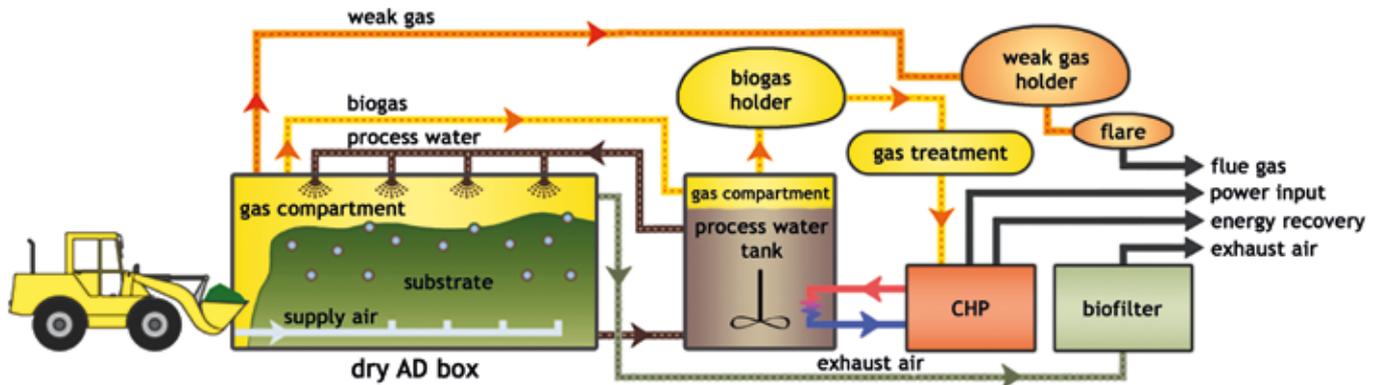


The use of compost as fertiliser for soil improvement

The advantages of the Herhof box composting system are:

1. **It is independent to ambient temperature**
2. **Controlled composting process**
3. **Short processing periods**
4. **Homogenous compost quality**
5. **Less land utilisation**
6. **Less deployment of manpower**
7. **Automated process**
8. **Lower transport and implementation costs**

The process (dry-wet-simultaneous) has been developed as a dry fermentation process in order to generate biogas out of biomass with high dry matter content, associated with marginal energy requirement and material wear. The procedure is a discontinuous percolation process where the required material conditions are verified by substrates which are provided by process water circulating through the system.



The dry fermentation process is efficient and established in many cases

- Weak gas management system
- Optimal biogas yield at low retention time
- High annual throughput of substrates
- Minimal electric energy requirement
- Low thermal energy requirement
- Secure degasification and greatest possible deodorisation of fermentation residues
- Maturity level of the digestates III to IV
- No excess water
- Flexible integration in existing plants at low fixed costs

The advantages of dry fermentation in comparison to wet fermentation

- Less water demand, no mashing required
- Lower process energy, no mixing device required
- Less material wear, because of fewer movable machine parts
- Lower susceptibility to impurities and acidity
- Modularly upgradeable plants
- Smaller digesters because of higher energy contents of the used substrates
- Synergy effect in using waste collection and agricultural equipment
- Easier stackable storage of the digested material

The process steps:

Optional substrate preconditioning (e.g. milling, mixture in relation to the substrates)

1. Disposal of the substrates into the empty dry fermenter (e.g. wheel loader)
2. Optional pre-aeration at closed dry fermenter to increase the temperature
3. Anaerobic treatment by percolation with process water
 - 3.1. Primarily hydrolytic phase
 - 3.2. Primarily methanogenic phase
4. Post-aeration
 - 4.1. Deaeration of the biogas, aerobisation of the digested material, deodorisation
 - 4.2. Optional aerobic posttreatment to reduce the water content
5. Removal of the digested material (wheel loader)
6. Optional posttreatment of the digested material (e.g. maturation, screening depending on application of final product)

Our ideal solution for biowaste

The most advanced product of the Herhof GmbH is the combination of the two renowned products:

- Dry anaerobic digestion box (dry AD box) and
- Herhof-Rottebox® (box composting system)

into one matching system: Production of energy-rich biogas as well as nutrient-rich compost. Arising synergy effects further increase the efficiency and environmental sustainability of the overall facility.

The concept - „Innovation through Combination“

The delivered biogenic waste is loaded batchwise into the dry AD boxes of the system, where it is fermented for approximately 3 weeks. During this period biomass is irrigated with process water from the process water tank in order to guarantee optimal milieu conditions for a productive digestion throughout the process.

The biogas that is produced simultaneously in both dry AD boxes and process water tank is used to generate electrical and thermal energy.

In the next step, the digestate is removed from the dry AD boxes and placed into the Herhof-Rottebox® for composting. Depending on the desired dry matter content and the compost quality of the end product, the waste is processed for approximately one

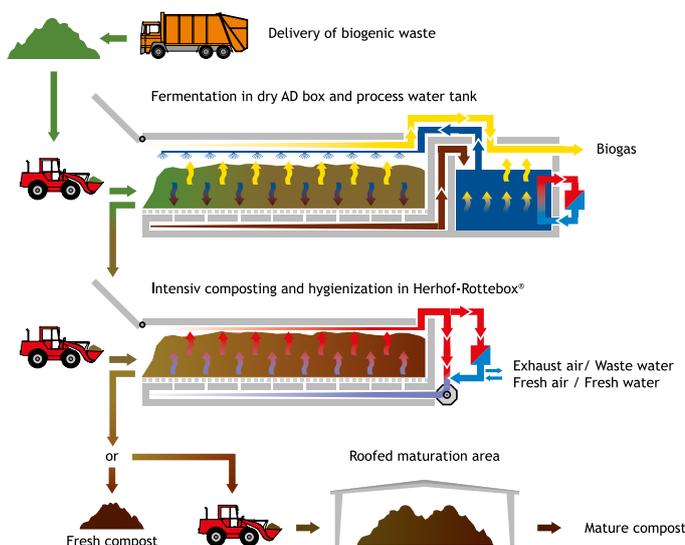
to two weeks. Usually, hygienization and conditioning take place in this time period.

For the latter, significant amounts of water are stripped from the substrate due to the continuous aeration in the Rottebox®

If requested, it is possible to add a downstream roofed maturation area to obtain further quality improvements retaining the highest quality standards.

The benefits of a combined system

- Optimally harmonized system
- Maximization of potential income
- Simple and clear plant control in a combined and interworking process control system
- Optimized operation procedure:
 - › defined retention times
 - › low specific space requirements
 - › low-emission due to exhaust air system and weak gas management
- Cascade use of biowaste (energy and material utilization of the full potential)
- CHP-waste heat used to support actively the hygienization step
- Modular design with extension possibilities
- Synergy effects for wheel loader operations



Reference

Our progressive concept, arranging our biogas production in series with our Rottebox®-process, has been successfully implemented at the plants in **Doerpen, Heppenheim and Croeborn**.

Through our R&D policy the system is permanently under research for improvement and optimization. A very high demand of our latest product is currently shown by a remarkable number of customers worldwide.

„Biogas and Compost“ will be our highest selling product the following years.

WASTE TREATMENT FACILITY SOFIA (BULGARIA)



The facility handles the MSW produced in the region of Sofia, Bulgaria. The average amount of MSW going into the facility is **410,000 Mg/a.**

Types of products produced

RDF, compost, metals and other recyclables

Facts and Figures

In operation since:	September 2015
Total footprint:	~ 33.5 ha
Surface area building:	~ 24,200 m ² (all Buildings)
Surface area building:	~ 7,000 m ² (Biodrying Building)



General technology description

The waste-treatment-technology is an automated sorting facility for paper, cardboards, PET, metals and films combined with a biological composting/drying process with the target of creating a RDF and a compost. By means of a computerized biological composting process plus a subsequent fully automatic separation system the waste is completely split into:

- RDF as secondary fuel
- Compost
- Metals and non-ferrous metals
- Paper and cardboards
- PET, PVC and films
- Process water is cleaned and reused as cooling water
- Exhaust air is cleaned in biofilter system

Technology utilized

- Reception bunker with negative pressure for air cleaning
- Grab crane for bunker management and charging the bag openers
- Drum screens for sorting the correct sizes
- Ballistic separators for sorting in heavy and light fraction as well as cubic and flat fraction
- Separation of specific materials with infrared sorting machines
- Eddie current separators and magnets remove ferrous and non-ferrous metals from the fuel fraction
- 26 Herhof Boxes with air and liquid tight lids with feeding/dischage by automated crane for biodrying
- 1 CLO box with 6,500 t/a capacity for compost production
- Ventilation to assist the biological processes by heat exchangers and cooling towers
- Dust removal with baghouse filters
- Exhaust air treatment with biofilters and acid scrubbers
- Maturation area with windrow turner
- Refinery with screens and packing station for marketable compost products

Name and Location

Solid waste treatment facilities of Sofia | Municipality
Gara Yana 1800, Sofia | Sadinata landfill site

Client

Mayor of Sofia Municipality, Bulgaria

Operator

Municipality of Sofia, Bulgaria | Moskovska St. | 1000 Sofia

WASTE TREATMENT FACILITY KOZANI (GREECE)



The facility handles the municipal waste produced in the region of Kozani, Greece. The average amount of MSW going into the facility is **120,000 Mg/a**.

Types of products produced

Recyclable material (plastic, paper, metals, glass), fuel from waste (SRF), biodegraded organic material.

Facts and Figures

In operation since:	March 2017
Contract duration:	turnkey delivery to holding company Helector S.A, which operates the facility for 25 years
Total footprint:	~ 200,500 m ²
Surface area building:	~ 19,300 m ²
Surface asphaltic area:	~ 71,000 m ²



General technology description

The Kozani facility is the first PPP project in Greece using extremely advanced automated technologies for waste sorting and recovery of useful recyclables, both from green and from blue garbage disposal bins. Helector S.A. provided the technology as well as financing and is responsible for the operation of this facility for 25 years. Herhof was responsible for the design, planning, delivery, erecting and commissioning of the biological treatment system.

Technology utilized

- Reception bunker with negative pressure for air cleaning
- Bag opener
- Grab crane for bunker management and charging the shredder
- Pre-Shredding with pre-screening
- 10 Herhof Boxes with air and liquid tight lids with feeding / discharge by automated crane
- Ventilation to assist the biological processes by heat exchangers and cooling towers
- Exhaust air treatment with biofilters and acid scrubbers
- Maturation area
- Refinery for compost production
- Eddie current separators and magnets remove ferrous and non-ferrous metals
- Optical sorters
- Dust removal with baghouse filters

Name and Location

Solid Waste Management Facility Kozani
Kardia, 502 00 | Kozani, Western Macedonia | Greece

Client

DIADYMA S.A. (Solid Waste Management Company of Western Macedonia S.A.)
6 km Kozani- Ptolemaida | PO Box 155 | 50100 Kozani | Greece

Contractor

Helector S.A. | 25, Ermou Str. | GR 145 64 Nea Kifissia | Greece
Phone: +30 210 81 84 700



BIOMASS FACILITY HEPPENHEIM (GERMANY)



The facility handles the separate collected bio waste (kitchen and garden waste) of the region Heppenheim/Bergstrasse, Germany. The design capacity of the facility is **31,000 Mg/a**.

Facts and Figures

In operation since: October 2014
Total footprint: ~ 28,400 m²
Surface area building: ~ 6,700 m²
Surface asphaltic area: ~ 2,900 m²

General technology description

The public authority wanted to construct an AD facility combined with intensive composting in order to get first out the methane and then to produce compost as fertilizer without the need for a further treatment of the compost on a maturation area. This leads to a specific small footprint of the facility.

The facility is equipped with our weak gas management system and a facility for the hygienisation of the liquid percolate water. The energy produced at the facility in Heppenheim covers the electricity needs of around 1,000 households and the heating needs of around 200 households in the region.

Name and Location

BGA Heppenheim an der Kläranlage Heppenheim
Ratsäckerweg 14 | Weidequerweg
D – 64646 Heppenheim (Bergstrasse)

Client and Operator

Zweckverband Abfallwirtschaft Kreis Bergstrasse
Am Brunnengewännchen 5
D – 68623 Lampertheim-Hüttenfeld



COMPOSTING FACILITY BAYREUTH (GERMANY)



General technology description

After being awarded with the delivery for the turnkey construction for the composting facility by the public authority Herhof designed, constructed and commissioned 9 bio boxes for intensive composting and 5 maturation boxes for the post-treatment of the organic material.

For the first time the bio boxes are equipped with a spigot system, instead of our rotting plates, for aeration of the material. Furthermore there is a solar power system to generate electricity and to cover the basic power load of the facility. In addition to that the facility has a heat recovery system in order to heat the premises with the heat coming from the biological process.

The facility handles the separate collected bio waste of the region Bayreuth, Germany. The average amount of bio and green waste going into the facility is **14,000 Mg/a.**

Facts and Figures

In operation since:	September 2021
Total footprint:	~ 31,500 m ²
Surface area building:	~ 3,800 m ²
Surface asphaltic area:	~ 3,400 m ²

Name and Location

Composting Facility Bayreuth
Kompostierungsanlage „Am Buchstein an der St. 2163“
D – 95511 Bayreuth-Mistelbach

Client and Operator

Bio-Kompost und Entsorgung GmbH & Co Bayreuth-Pegnitz KG
Markgrafenallee 5
D – 95448 Bayreuth

