

Clean energy from waste



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Herhof GmbH

The fundamental challenges of our time are, first of all, the huge piles of waste of which nobody really knows what to do with. And secondly, the fact that fossil energy resources that have grown over millions of years will run irreversibly low within the next 50 years. This affects every single one of us. Worldwide.

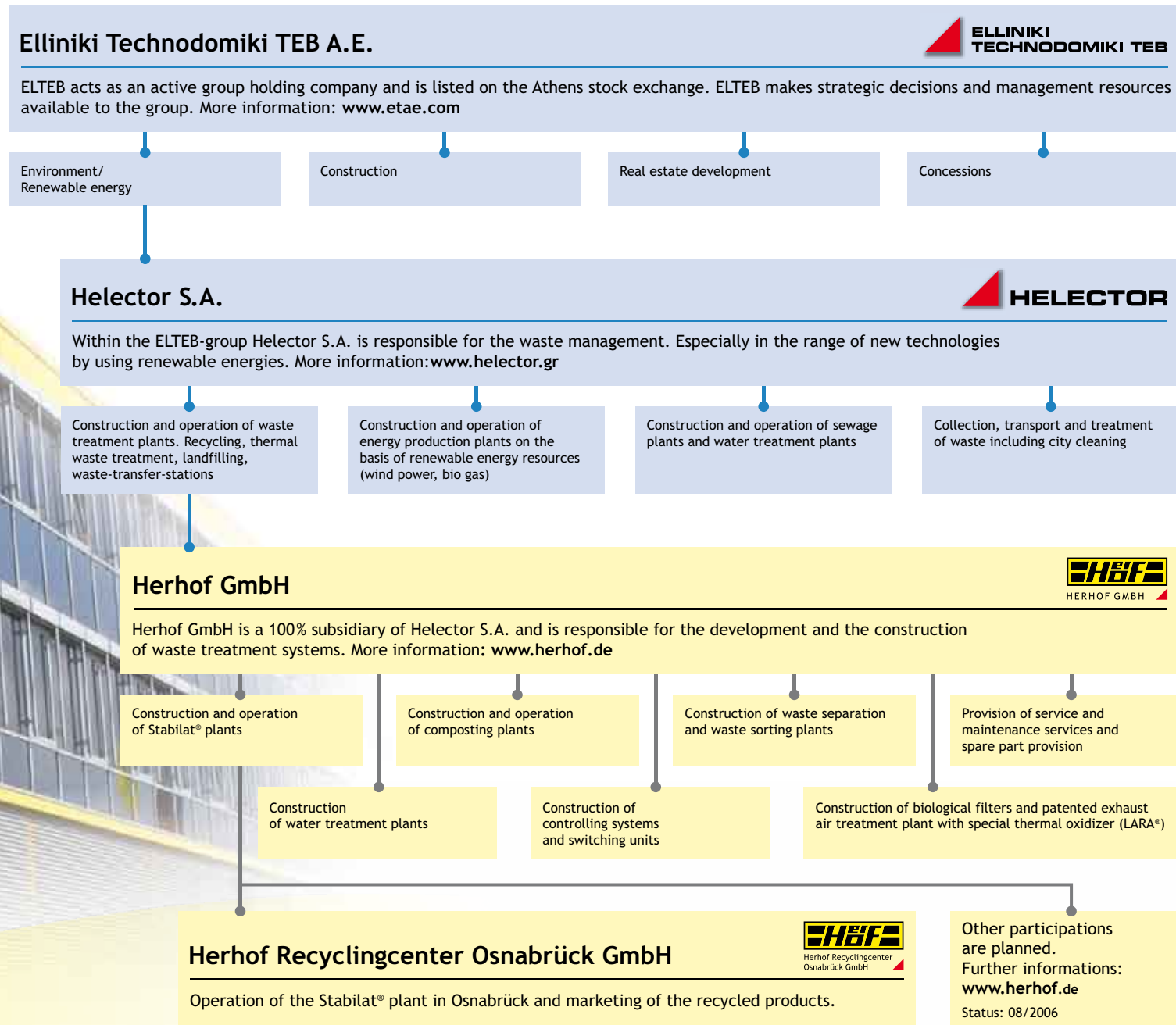
We have taken our cues from nature.

At Herhof, we develop the efficient technologies to meet these challenges adequately. We tackle the second one by keeping the first one in check. Our example in the process is taken from nature because nature knows no waste. Nothing has no value, everything is part of a cycle. Even what we throw away as being useless: "Wastes" are high-quality raw materials for energy production. And since every one of us generates new waste day after day, it is these resources that grow again and again.

Herhof's advanced technology makes it possible to produce a clean secondary fuel - the so called Stabilat® - from ordinary household waste. The fuel value of this energy source is comparable to brown coal - but much more environmental-friendly!



Herhof GmbH, a member of Elliniki Technodomiki TEB-group:



Herhof has strong networks

Herhof GmbH is a subsidiary of the Greek waste management company Helector S.A.. The majority position in Helector is held by the Greek conglomerate Elliniki Technodomiki TEB. Elliniki Technodomiki TEB is active in the areas of renewable energy and environmental technology. In addition it is a leader in the construction sector, real estate development and in privately-financed infrastructural projects. The publicly traded company ranks among the largest in Greece.

With this strong relationship as our foundation, we are in the position to design your project in an optimal manner with careful attention to all important details in the engineering, construction and operation stages. At the same time, we will customise our services to meet each customer's special needs.

Our philosophy and areas of business

Landfilling has always been a temporary solution and it cannot be justified ecologically and economically. Valuable raw materials were taken away from the economic cycle and the consequential costs and ecological hazards were shifted to following generations. Herhof is committed to meeting this challenge.

In view of increasingly scarce fossil energy resources the so-called Herhof Stabilat® technology offers an outstanding commercial and ecological alternative. We promote the balance of nature through recirculation of its resources into the natural cycle. We use the Stabilat® process to produce a storable and environment-friendly source of energy.

The use of Stabilat® substitutes fossil fuels such as coal, crude oil and natural gas. Due to its high organic content, Stabilat® releases 80 % less CO₂ during the energy production than conventional fuels.

As a result innovative waste management becomes an active climate protection measure.

Air, water, soil.

These are three elements that are worth thinking about innovatively and working for hard.

Protecting the environment and its resources is the main factor that links all our ideas and concepts. It is not only based on the Herhof Stabilat® process, it is also the fundamental idea underlying all of our composting plants. The Herhof box composting system transforms organic waste quickly into nutrient-rich compost for farming or soil improvement in other areas.

When you use Herhof equipment to exploit waste for the production of energy or compost, the exhaust air is purified in the process - either with the LARA® air treat-

ment and air purification system or with biofilters. These filters do not only absorb dirt but odours as well. We always recycle condensation water as well as sewage and reutilise them.



Herhof GmbH - economical, logical !



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Construction and operation of composting plants



Construction and operation of Stabilat® plants



Construction and operation of waste separation and sorting plants



Implementation of support and maintenance services, supply of spare parts



Construction of water treatment plants



Construction of controlling and switching systems



Construction of biofilters and thermal air purification plants (LARA®)

Herhof has a wide spectrum of services. Apart from designing, constructing and operating composting and Stabilat® plants, we also offer carefully thought-out and customised waste separation and sorting equipment. These also include services in the areas of support and maintenance as well as different services for water treatment, controlling systems, switching systems, biofilters and thermal air purification equipment.

One stop - competent and reliable.

Composting of organic waste

The Herhof box composting system is globally recognized in installations around the world. Over 40 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 space-saving. 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, nuisance 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 and kitchen waste as well as from sewage sludge. 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.

The advantages of the Herhof box composting system are:

- It is independent to ambient temperature
- Controlled composting process
- Short processing periods
- Homogenous compost quality
- Lesser land utilisation
- Less deployment of manpower
- Automated process
- Lower transport and implementation costs

Herhof composting plants are being operated successfully in the following countries:

- Germany
- Austria
- Italy
- Spain
- Belgium
- Poland
- Canada
- Scotland



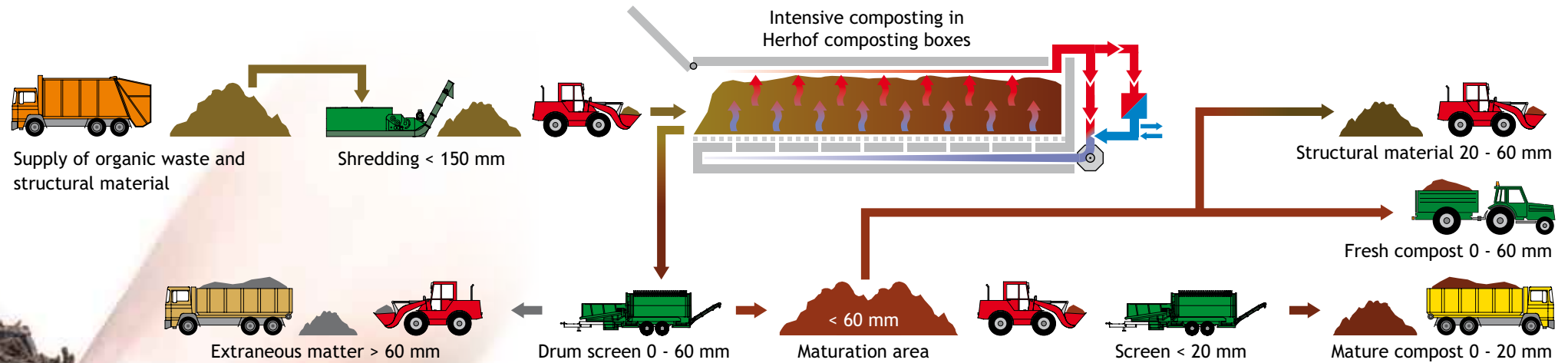
Intensive composting in Herhof composting boxes





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Herhof box composting system



Filling of Herhof composting box through wheel loader



Processing of compost by means of screening technology



The use of compost as fertiliser for soil improvement

The Stabilat® technology



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

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 distinctly 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 odour-free energy resources known as pellets.

Herhof Stabilat® process in 3 phases:

1. Processing: 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. Inert separation: This means the removal of the mineral fraction (stones, glass, ceramics) and the metals, separated into ferrous and non-ferrous metals.





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The core of our ideas: The Herhof bio box

The Herhof bio box has proven to be successful for years. We have transferred this method to the rest of the waste recovery. The bio box is specially-controlled for dry stabilisation.

After the Herhof bio box is filled, the waste mixture is dewatered in a seven-day maximum aerobic composting. The humidity is discharged with the air in circulation. This is done with the natural organic heat that develops during composting. At the end, the waste mixture contains less than

15 percent moisture. That is the ideal condition for separating it very efficiently into reusable material and energy resources.

At the same time, we strictly observe EC emission limits or even go below them markedly. That is why the entire material flow within the system takes place via encapsulated, fully automatic transport systems. The exhaust air created in the process is extracted and purified.

The final step is the pure source separation into mineral and metal fractions as well as the separation of the combustible elements in form of a new fuel.

Stabilat[®] plant in Osnabrueck



The Herhof Stabilat[®] plant in Osnabrueck was built turnkey in 2005 and started commercial operation at the beginning of 2006. It currently represents the most modern control, regulation and visualisation technology and processes all municipal solid waste of the city and the district of Osnabrueck. The annual throughput amounts to about 90,000 t collected on five delivery days (350 t per day).



Exhaust gas purification via LARA[®]



Dedusting of the box hall

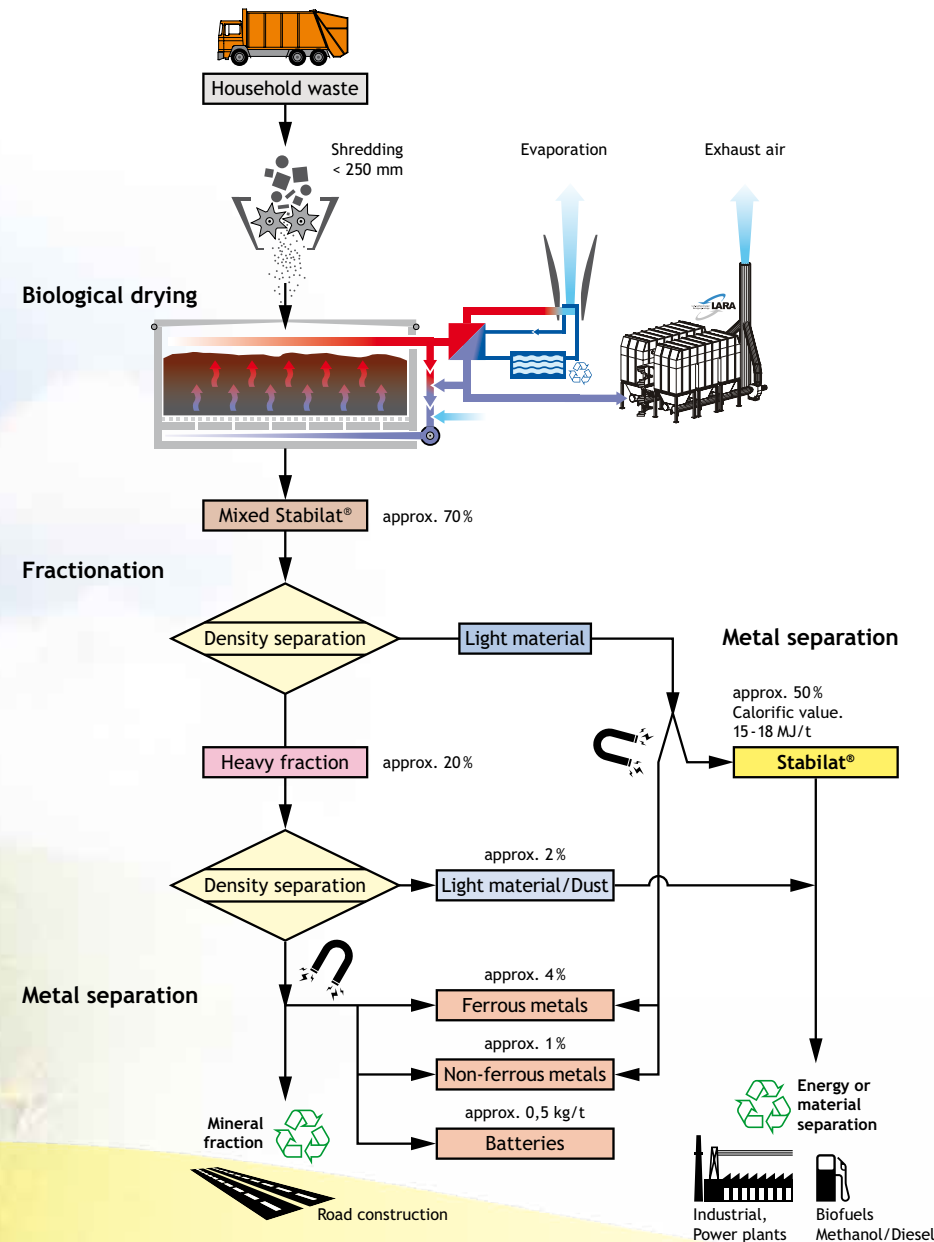


Dedusting of the machinery hall





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Machine data

- Collection bunker
- Fully automated crane for filling the shredder
- Pre-shredding
- 5 Herhof bio boxes that are filled and emptied by the automated process crane
- Completely closed conveyor and machine technology
- Organic drying process according to Herhof System guarantees moisture content below 15 percent
- Ventilation system to assist the organic processes with heat exchangers and cooling towers
- Separation using air-tables and air-separators
- Magnets and eddy current separators separate ferrous and non-ferrous metals
- Postshredding to 40 mm
- Pelletising for soft pellets
- Press for loading trucks
- Dust pelletising
- Water treatment plant for condensate cleaning
- Exhaust gas purification with LARA® (thermal regenerative process)

Stabilat® reference plants

The Herhof technology has been successful for more than 20 years and was developed by Herhof-Umwelttechnik GmbH which is no longer in operation. Herhof GmbH took over its essential business operations and kept on a large number of the employees. Using the Herhof patents it is therefore able to continue benefitting from the Herhof patent rights and technical experience. There are more than 40 Herhof com-

posting plants and seven Herhof Stabilat® plants worldwide. Each one of these plants works reliably, efficiently and economically. Yesterday, today and tomorrow.

In addition to five plants in Germany there are also two comparable MBS plants in Geel, Belgium and in Fusina, district of Venice, Italy. In Fusina, a Herhof composting plant was combined with a Herhof-

Stabilat® plant. Since the beginning of 2002, 80,000 t of separately collected organic waste from the lagoon city of Venice are processed there annually, and 150,000 t residual waste are mechanically and biologically treated there as well. Another MBS plant went into operation in Belgium in the middle of 2006 and processes 150,000 t of waste every year.



Asslar (Germany)

Capacity	160,000 t/y
Start of operation	July 1997
Number of affiliated residents	518,000
Contractor	Lahn-Dill-Kreis, Abfall- und Energiewirtschaft Lahn-Dill



Rennerod (Germany)

Capacity	100,000 t/y
Start of operation	April 2000
Number of affiliated residents	620,000
Contractor	Westerwaldkreis Abfallwirtschaftsbetrieb



Dresden (Germany)

Capacity	100,000 t/y
Start of operation	January 2001
Number of affiliated residents	480,000
Contractor	SR-Stadtreinigung Dresden GmbH





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Osnabrueck (Germany)

Capacity 90,000 t/y
Start of operation February 2006
Number of affiliated residents 521,000
Contractor Entsorgungsgesellschaft
Stadt- und Landkreis Osnabrueck



Geel (Belgium)

Capacity 150,000 t/y
Start of operation June 2006
Number of affiliated residents 745,000
Contractor Intercommunale
IOK / IVAREM



Niederlehme (Berlin, Germany)

Capacity 150,000 t/y
Start of operation June 2006
Number of affiliated residents 515,500
Contractor ZAB Zweckverband
Abfallwirtschaft Nuthe-Spree



Venice (Italy)

Capacity 150,000 t/y
Start of operation February 2002
Number of affiliated residents 300,000
Contractor AMAV, Venice



The design of the household waste composting plant in Almagro, Spain, that began operation in 1999, deserves special attention. Herhof compost as well as Stabilat® is produced there from 28,000 t of household waste.

Waste to Energy

By the term “waste to energy”, we mean recycling of energy from waste and residual material. Household and industrial waste as well as biomass is suitable for the process.

The new EC guideline 1999/31/EC was already put into national law in Germany in June 2005. This made the subject “waste to energy” become more important. Ever since then, only pre-processed waste such as residual material from waste incineration or from waste fermentation can be disposed of permanently in landfill sites. For communities and business establishments which produce huge quantities of waste, the need to look for alternative possibilities of disposal created a big challenge.

Under the title “Energy recovery from waste”, there are now a few thermal processes for waste treatment. They all have the aim of extracting energy from

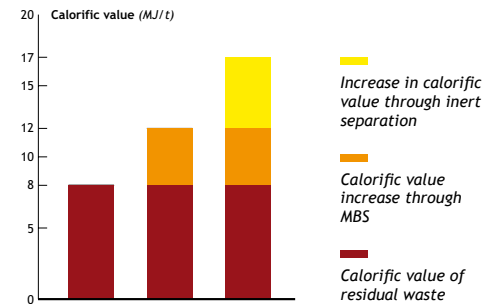
residual material. The quality however depends on the respective flexibility and energy efficiency. With the Herhof Stabilat®, we produce a storable substitute fuel that can be used in a flexible manner both temporally and spatially. Always and anywhere where energy is needed.

While in the conventional process, the “raw material” waste is destroyed with its energy content, Stabilat® builds a base for other utilisation steps. As such, Herhof is working on procedures to produce gas, methanol or even hydrogen from Stabilat®.

We are now already developing the technologies for energy production of tomorrow!

The process that extracts the largest amount of energy from waste provides the highest quality. By doubling the calorific value of Stabilat® in the Herhof

Stabilat® process, high energy exploitation is guaranteed on a long term because we do not burn any water and we first of all remove all incombustible matter for positive use.



The result is high energy recovery from renewable resources. Since we are substituting fossil fuels, we also spare ourselves the atmospheric killer CO₂. This makes Herhof’s Stabilat® process an unique “waste to energy” process that refines waste to energy with the highest standard of quality.





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Three alternative processes are under consideration for the remaining residual matter:

- 1. Conventional MBT (...)*
- 2. MBT with fermentation (...)*
- 3. Mechanical biological stabilisation plant (MBS) with drying of the entire input in a short composting period, mechanical separation of the dried waste into one or two secondary fuel fractions, metals and inert chemicals if necessary.*

(...) We can proceed on the assumption that MBS will gain acceptance - under the premise of not dumping any more residual waste.(...).

Excerpt from: Status report on the contribution of the waste industry towards climate protection and feasible potentials by the Öko Institut e.V. und ifeu Heidelberg GmbH (Institute for Applied Ecology), Aug. 2005, commissioned by the Federal Environment Office

The storage of untreated household waste in municipal landfills should end as soon as possible...

Until 2020 at the latest, the treatment techniques are supposed to be so advanced and developed that all municipal landfills in Germany will be utilised to the fullest and in an environmental-friendly way.

Excerpt from the design paper of the Federal Environment Office



Herhof GmbH

**We move with the times.
Come and join us!**

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