

Waste Management Center Lübeck

New ways of waste management



From the landfill to the waste management Waste is a valuable source of energy and raw materials

In 1963, when the **landfill** Niemark was put into operation, no one spoke of waste recycling by separating various materials. Initially it was used merely as a garbage dump for the Hanseatic city of Lübeck. Fortunately, however, the requirements for deposition of waste have been constantly changing over time. Since 2005, in Germany, waste that does not comply with the deposit limits may no longer be dumped untreated. The streams of material need to be separated and then sent for recycling. Portions no longer usable may be dumped only then.

With the start of the waste management center, Lübeck, waste disposal services of the city have turned out to be exemplary and future-proof. Following the commissioning of the **Mechanical-biological waste treatment plant (MBA)** in 2005 several benefits of the waste recycling were efficiently utilized. By sorting and treating the waste precious landfill space can be saved. Of the original volume of garbage just about a third needs to be stored at the landfill. This is made possible through effective mechanical separation

of recyclable portions primarily in the residual waste, from which substitute fuels are obtained. And by subsequently treating the organic portion biologically valuable biogas is produced. Thus, the disposal services of Lübeck are able to generate a significant portion of their own requirements for heat and electricity self-reliantly with the „Bio-energy plant“ MBA. The MBA also allows mechanical treatment and fermentation of the separately delivered organic waste. In addition, new residues result from the treatment of non-fermentable substances in the local **biomass plant**. Through further treatment compost, which is used in agriculture and partly in horticulture, and substitute fuels for thermal utilization are obtained.

As a subsidiary of Entsorgungsbetriebe Lübeck, the enterprise Entsorgungszentrum Lübeck GmbH is primarily responsible for recovery and disposal of construction and commercial waste. The aim is also to generate usable partial fractions and to minimize fractions for disposal.

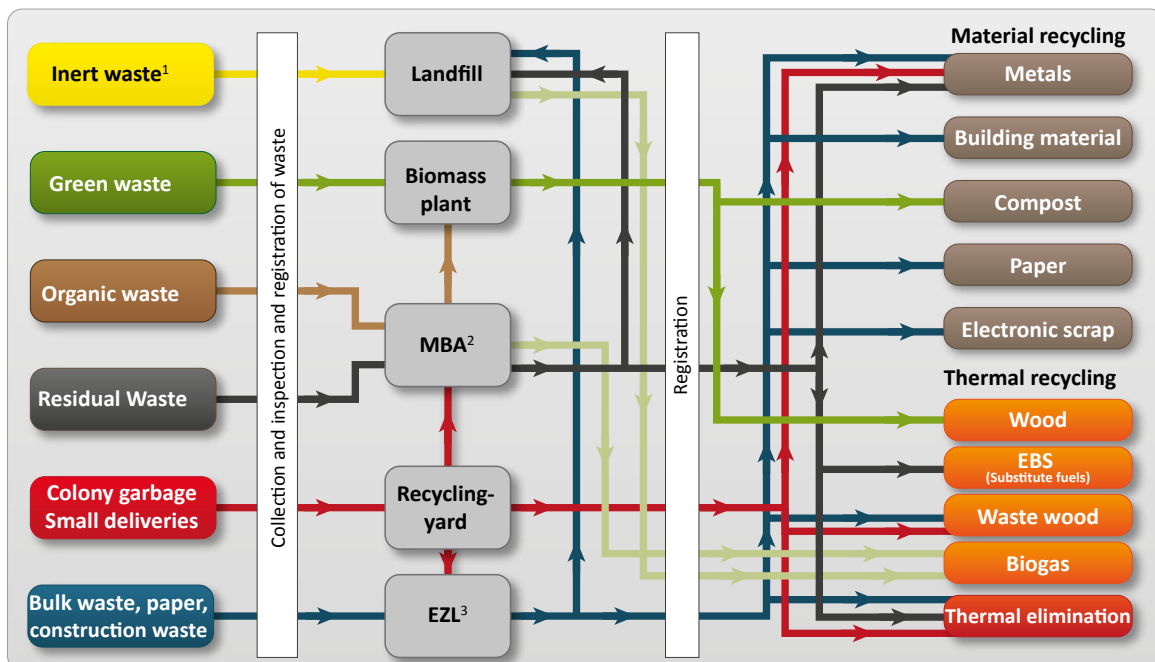
ement center



The **recycling depot Niemark** is one of four recycling depots operated by the WDSL in the Hanseatic city of Lübeck. They collect bulky goods, electrical goods, hazardous wastes, yellow bag materials, metal, waste wood, waste paper, garden waste and so on from the citizens. Before further treatment and distribution to individual plants, all waste arriving at the Waste Management Centre is registered and inspected. The same applies to waste

streams leaving the plant. Extensive measurements to monitor emissions and the qualities of the waste streams complete the installed environmental monitoring of waste disposal services of Lübeck. By closely networking various waste treatment plants of the Waste Management Centre a highly optimized treatment of the individual streams is achieved.

■ The flow chart of the material flows illustrates the integration of individual plants.



¹ = End-treated waste

² = Mechanical biological waste treatment plant

³ = Entsorgungszentrum Lübeck GmbH



The Mechanical Biological Waste Treatment Plant MBA

The Bioenergy Power Plant MBA - Core of Waste Management Center

The mechanical-biological waste treatment is a sophisticated, efficient waste recycling technology with awareness for the environment. In this process the incoming domestic or organic waste is divided separated from each other by mechanical treatment into individual fractions and subsequently fed to the respectively adapted treatment and recovery processes.

The garbage trucks of the waste disposal services of Lübeck no longer bring the residual and organic waste to the landfill, but to the receiving hall at the MBA. In the processing hall, after pre-shredding the

waste, metals, alternative fuels with a high calorific value, organic fine fraction for fermentation and impurities are separated. Metals are extracted, among other things, by a magnet. Impurities which would hinder the following biological treatment are automatically sorted out in several steps.

The aim of the mechanical treatment is to separate valuable materials, residual and organic waste to be treated further and direct wastes to be disposed of as accurately as possible. Waste separated more according to its category, so is the energy balance during recovery even better.

The bioenergy power plant MBA

The mechanical pre-treatment is followed by the biological processing of a portion of the waste, the so-called organic fine fraction. In the biological waste treatment, four mixers and three digesters / bioreactors ensure generation of a total of about 4 million cubic meters of biogas per year. The energy generated from our combined heat and power plant (CHP) covers a significant portion of the demand for heat and electricity of the MBWTP of Lübeck. Surplus electricity is fed into the grid.

The CO₂ balance ensures relief to the climate and protection of the environment. With a CO₂ credit of more than 200 kg per

ton of waste, the MBA of Lübeck is well above the national average of incinerators. In a treated waste of about 100,000 tons per year, this is a major contribution to sustainability and conservation of resources. But not only can the amount of biogas obtained be recycled energetically. Even the alternative fuels produced from residual waste and the coarse material from the treated organic waste (wood) are sent for recovery of energy in various power plants.

The digestate produced during biological treatment of organic waste and sorting residues freed and crushed from impurities are further processed in the local biomass plant.

■ *Huge bio-reactors outline the exterior view of the MBA*



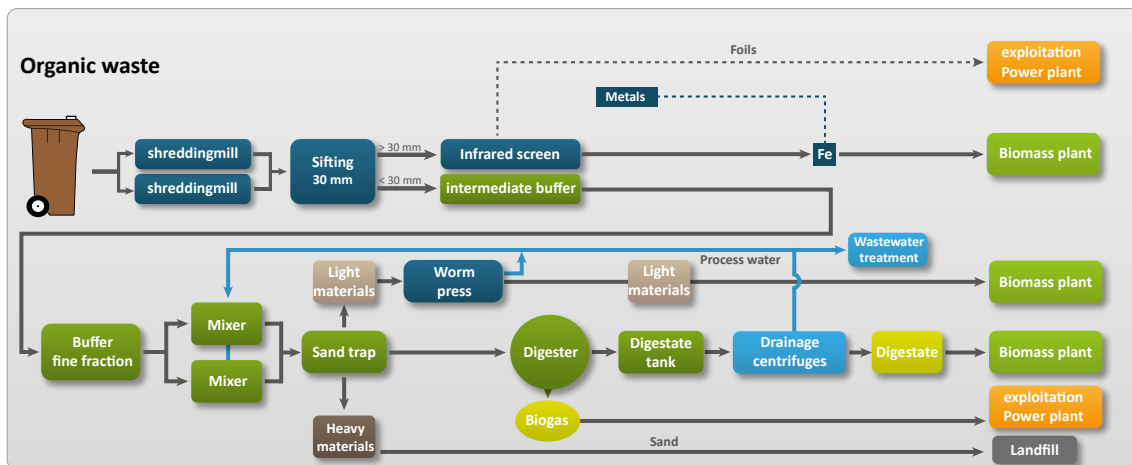


■ 5 ventilated aerating tanks ensure that the residual waste is further degraded organically.

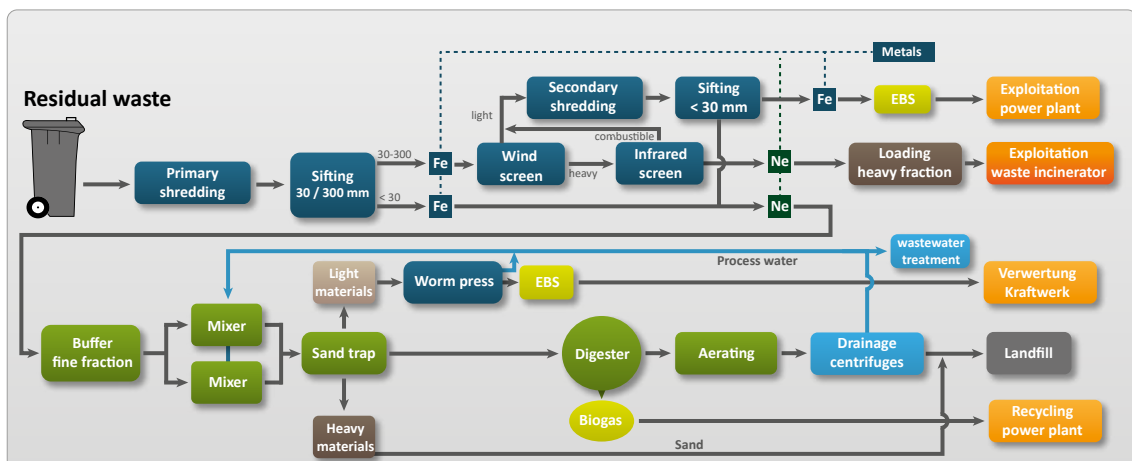
Only about one-third of the residual waste (waste that is biologically no longer responsive) on the landfill of waste management center, Lübeck. will eventually be dumped as inert waste.

■ The graphs illustrate the different processes involved in the mechanical and biological treatment of organic waste and residual waste.

The path of organic waste in the MBA (Mechanical Biological Waste Treatment Plant)



The path of residual waste in der MBA (Mechanical Biological Waste Treatment Plant)





The biomass plant

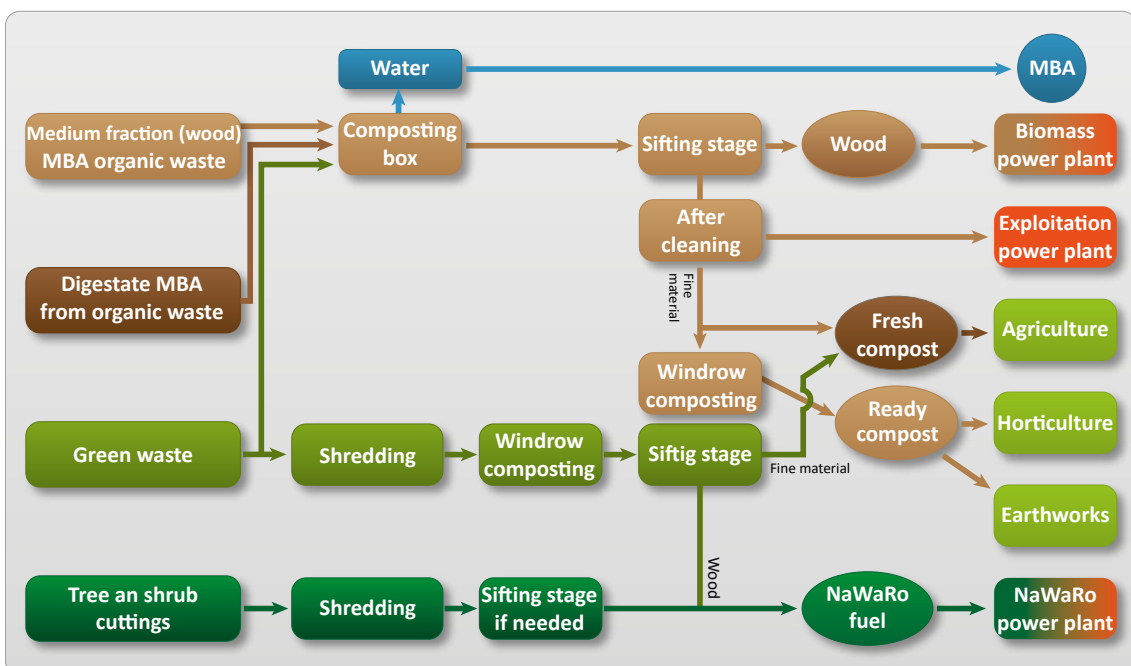
Fuel and compost supplier

In the biomass plant, the non-fermentable (woody) components of the organic waste are treated following mechanical treatment in the MBA and green waste. In this, the treated material is filled in composting boxes made of concrete. During the subsequent intensive composting microorganisms degrade, within a short time, first the easily degradable and odorous organic components. A computer monitors the composting process and ensures supply

of oxygen, water and the temperature profile, so that the composting process does not turn into decaying process. At the end of the process the resulting heat is used to dry the material.

The green waste is treated through an open windrow composting. The secondary raw material produced after screening / grading is used to energetic utilization in power plants or as fresh and finished compost essentially in agriculture, horticulture and earthworks.

The biomass plant in the waste management center Lübeck





The Landfill

Modern waste disposal including power supplying

The landfill on the site of the waste management center, Lübeck is in operation since 1963. In a deposition area of 400,000 m² of waste from Lübeck was deposited and incorporated untreated until 2005.

As of 2005, special stipulations were introduced on deposition of waste by law. By commissioning of mechanical-biological waste treatment plant (MBWTP) and the resulting enormous reduction of waste to be dumped it has become possible to reduce the landfill space and thus the landfill can be used for a longer period.

Leachate treatment

From the moisture of the landfill waste and rain water leachate is formed which has pollutants. This leachate is collected through an elaborate drainage system and pumped by a pumping station to a leachate treatment plant. The core of the leachate

treatment is an activated carbon unit with upstream gravel filter. Here, adsorption takes place, i.e. enrichment of organic substances. After complete loading the activated carbon is regenerated externally. After this pretreatment, the water is led into the public sewer system for further processing.

Sealing the landfill area

To safeguard the environment, waste disposal services, Lübeck started in 1999 to seal the surface of the landfill into several sections. By this action, the amount of leachate and landfill gas emissions is significantly minimized.

The sealing method used in the current section of construction is carried out in several steps. On the surface of a two-layer waste gas draining and leveling layer is installed.

Then a smectite mat is laid out that consists



■ *Leachate treatment, surface sealing, acquisition and utilization of landfill gas. Environmentally safe, sustainable, eco-friendly - the landfill of the Hanseatic city of Lübeck.*

of clay powder capable of swelling. A second sealing panel, a 2.5 mm thick plastic waterproofing membrane, is laid out. The individual panels are welded together in a complex procedure. Thereafter, a 30 cm thick drainage layer of gravel is placed. A root layer of soil and final landscaping closes the area.

Landfill gas for power generation

Waste that is deposited in a landfill decomposes. Over the years, valuable landfill gas (mainly methane) is formed.

The collected gas is used economically and eco-friendly to produce heat and electricity in a combined heat and power plant (BHKW).

Today, up to 70 active gas wells provide for the collection of gas. Approximately 4 million m³ of landfill gas are accumulated in a year. The amount of energy that is generated from it is about 5,800 MWh of electricity and 10,000 MWh of heat. It is possible to recycle about 4,000 MWh of the generated heat.

Entsorgungszentrum Lübeck



Recycling of construction and commercial waste

Entsorgungszentrum Lübeck GmbH is a subsidiary of Entsorgungsbetriebe Lübeck. On the site of the waste management center of Lübeck, the certified waste management company operates on approximately 4 ha of ground, a construction waste treatment plant. Lübeck's waste paper is also received here.

Distribution of recycled building material

The recycled building materials are regularly monitored internally and externally and are a sought-after product in road maintenance and construction.

Through inspection, it is ensured that only quality-controlled and environmentally compatible products enter the economic cycle.

Container Service

The container service provided as a service is active for both private and commercial customers in Lübeck and the surrounding areas. Trucks for pressed garbage dispose of the waste for commercial customers for recovery from the transfer bins (1.1 m³ and 4.4 m³). Likewise containers of 9 m³ to 33 m³ can be ordered.



■ Waste Disposal Center Lübeck GmbH operates on its 4-hectare grounds a construction waste treatment plant and accepts commercial waste, bulk garbage and construction dump.



Recycling depot Niemark

Waste disposal for citizens of the Hanseatic city

The recycling depot Niemark is one of four recycling depots in the Hanseatic city of Lübeck, operated by Lübeck's waste disposal services. The recycling depots are distributed all over the city of Lübeck and available to its citizens for the delivery of bulk goods, electrical appliances, Yellow bag material, metal, waste wood, waste paper, garden waste, and so on. As an additional service, each recycling depot accepts private deliveries of hazardous substances from the urban area. A mobile for hazardous substances goes around once a month in various parts of the city and collects hazardous substances on the spot. When delivering waste the waste is classified and the appropriate containers are assigned to the citizens. Separation of different types of waste also helps to minimize the amount of waste for disposal and ensures high usability of the incoming waste.

Lübeck's Recycling depots and their business hours

Recycling depot Herrenwyk

Masselbett 2a • 23569 Lübeck

Summer (April 1st to October 31st)

Monday to Wednesday 7 am – 5 pm

Thursday 8 am – 6 pm

Saturday 8 am – 2 pm

Winter (November 1st to March 31st)

Monday to Friday 8 am – 5 pm

Saturday 8 am – 12 pm

Recycling depot St. Lorenz

Schwartauer Allee 52 • 23554 Lübeck

Monday, Wednesday, Friday 8 am – 5 pm

Saturday 8 am – 1 pm

Tuesday, Thursday closed

Recycling depot Niemark

Raabrede • 23560 Lübeck

Monday to Friday 7 am – 5 pm

Saturday 8 am – 1 pm

Recycling depot Altstadt

Kanalstraße 7 • 23552 Lübeck

Tuesday to Friday 8 am – 5 pm

Sonnabend 8 am – 1 pm

Monday closed



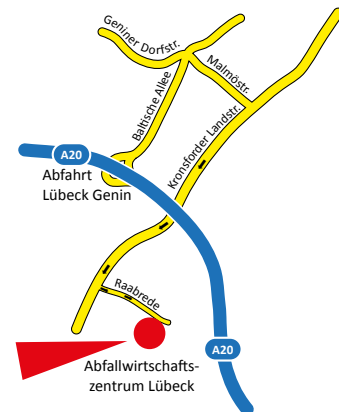
Waste Management Center Lübeck

Facts & figures

Location: Raabrede | 23560 Lübeck

Mechanical-Biological Waste Treatment Plant

- | **Commissioned:** 2005
- | **Process:** Wet fermentation with biogas production
- | **Treated waste p.a.:**
 - Residual waste approx. ca. 50,000 Mg
 - Organic waste approx. ca. 50,000 Mg
- | **Generated biogas volume p.a.:** 5 mill. m³



Biomass plant

- | **Commissioned:** 1996
- | **Treated waste p.a.:** up to 47,500 Mg
- | **Process:**
 - Box composting
 - Windrow composting
 - Grading by mobile sifting
 - Mobile pre-shredding
 - Fuel preparation
 - compost aftercleaning

Entsorgungszentrum Lübeck GmbH

- | **Commissioned:** 1991
- | **Treated Waste per year:** 80,000 Mg
- | **Paper/cardboard from Lübeck's households per year:** 12,500 Mg
- | **Acceptance of:** commercial waste, bulk garbage, construction dump
- | **Sale of:** recycling construction materials

Landfill

- | **Commissioned:** 1963
- | **Dumping area:** 400,000 m²
- | **Height of waste:** up to 50 m
- | **Volume of waste per year:** approx. 10,700 Mg
- | **Filling volume:** 10.3 mill. m³
- | **Collected volume of biogas:** 3,5 mill. m³

Recycling Depot Niemark

- | **Commissioned:** 1995
- | **Volume of waste per year:** approx. 2,700 Mg (approx. 8,000 Mg total volume of all recycling depots)

Energy facts

- | **Capacity of the BHKW per year:** 4,7 MW electrical, 5,8 MW thermal
- | **Generated power:** ca. 15,000 MWh
- | **Amount of used heat:** ca. 10,000 MWh

Publisher and Contact

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