



Basic Knowledge Waste

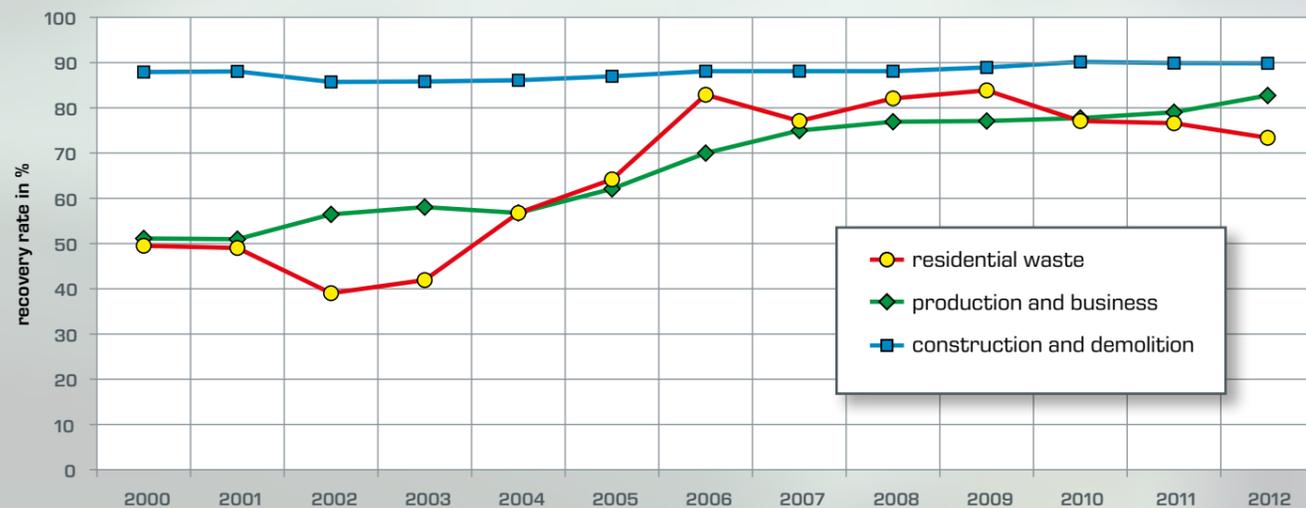
Waste in the economic cycle

Every resident in Germany produces approximately 500-600 kg of domestic waste each year. This waste consists of a wide variety of materials and represents an important resource for the procurement of raw materials for the economy. Waste legislation in Germany is regulated by the Waste Management Act. The main objective of the law is to promote conservation of natural resources by reusing and recycling waste, and to ensure protection of human health and the environment in the production and management of waste.

1	Waste prevention
2	Preparation for reuse of waste
3	Recycling waste
4	Other recovery of waste (e.g. energy)
5	Disposal of waste

The 5-stage waste hierarchy

A key aspect of the Waste Management Act is the 5-stage waste hierarchy. According to this hierarchy, prevention of waste has top priority (1). If production of waste is unavoidable, then reusing the waste through cleaning or repair should be strived for (2). If direct reuse of used products is not possible, these have to be recycled, sorted in accordance with material properties (3). If this is not possible or uneconomical, the waste is exploited in other ways (4), such as for energy. The bottom of this hierarchy is the disposal of waste (5), which usually takes place in landfills.

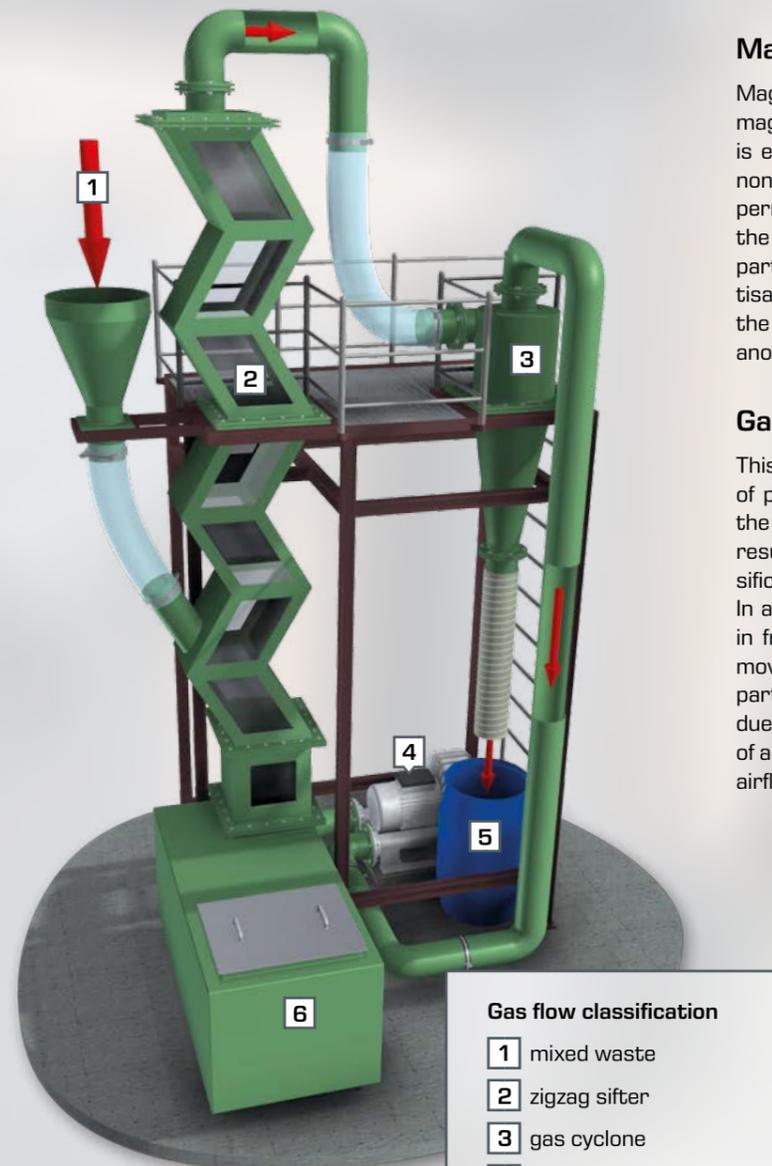


Recovery rates of the most important types of waste in Germany

Source: Federal Statistical Office, Wiesbaden, waste balance, various years; Federal Environment Agency, own calculations

Comminution: prerequisite for effective recycling

The comminution of waste plays a key role in waste management. Comminution reduces the particle size of the waste materials. Simultaneously, comminution leads to an increase of the specific surface area of the particles. Comminution is normally a pre-treatment which is followed by subsequent process steps. For example, the melting of plastics is made easier by a small particle size. Various technologies are used for comminution of waste, such as ball mills.



Magnetic separation

Magnetic separation is a separation process in which the magnetisation of components (e.g. iron) of a waste mixture is exploited. The waste mixture is conveyed to a rotating, non-magnetic drum. In one area of the drum there is a permanent magnet that sticks the magnetisable parts to the drum and carries them along. The non-magnetisable parts fall into a collection tank due to gravity. The magnetisable parts are detached from the drum once they leave the permanent magnet's sphere of influence and drop into another collection tank.

Gas flow classification

This separation process uses the different settling velocities of particles in an airflow. The settling velocity depends on the size, density and shape of individual particles and on the resulting flow resistance and weight forces. Gas flow classification primarily uses what are known as zigzag sifters. In a zigzag sifter, the waste mixture to be separated is fed from the side of the zigzag channel in which an airflow moves upward. Depending on geometry and density, the particles are taken along by the airflow or fall downwards due to gravity. Often, a zigzag sifter is located downstream of a cyclone. This separates the fraction carried along by the airflow so that the air can be fed back into the cycle.

Gas flow classification

- 1 mixed waste
- 2 zigzag sifter
- 3 gas cyclone
- 4 fan
- 5 tank for fine material
- 6 tank for coarse material

Subject Areas Waste



Subject Areas

Products

Comminution

The comminution of waste materials plays a key role in waste management and is a prerequisite for many recycling processes. Comminution prepares waste materials for subsequent process steps. Ball mills are a traditional method for the comminution of solids. Our CE 245 experimental unit clearly demonstrates this process.

Separation processes

Separation processes are used to divide mixed waste into separate fractions. The separation can be carried out according to material characteristics (materials) or geometrical characteristics (particle size).

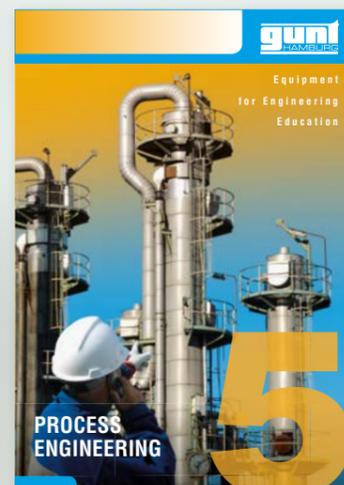
One classic example is separation of metals for subsequent feeding into a recycling process. The separation of metals is usually carried out with magnetic separators. Our CE 280 trainer allows you to clearly demonstrate this separation process in the laboratory.

In gas flow classification, however, the individual fractions of a waste mixture are separated in terms of their geometric characteristics. We have developed our CE 275 zigzag sifter in order to clearly teach the fundamentals of this process.

Comminution

CE 245
Ball Mill

Separation processes

CE 280
Magnetic Separation
CE 275
Gas Flow Classification


Many processes used in waste management have their origins in conventional process engineering. Separation processes, especially from mechanical process engineering, are put to use. Other devices of interest from this field of process engineering can be found in our catalogue 5.

