



Federal Ministry for the
Environment, Nature Conservation
and Nuclear Safety

WASTE MANAGEMENT IN GERMANY

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IMPRINT

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DEAR READERS,

All around the world, energy and raw materials are in ever shorter supply, whilst their consumption is on the increase – and greenhouse gases are speeding up climate change. And so we need to take a quantum leap in terms of efficiently using resources and energy.

The waste industry in Germany has a key role to play in that. Since the first law on waste management came into force in Germany in 1972, waste policy has achieved a great deal: Whilst in the past, waste was simply dumped in landfills, we today have a very high-tech and specialised closed substance cycle. Innovative processes and technologies allow us to fully and efficiently recycle our waste, turning today's trash into tomorrow's treasure-trove.



The closed substance cycle reduces the adverse impacts on the environment and human health. The Ordinance on Environmentally Compatible Storage of Waste from Human Settlements and on Biological Waste Treatment Facilities represents a milestone in that respect. Since 1 June 2005 waste may no longer be dumped in landfills without any pre-treatment, putting an end to storage that is detrimental to the environment. The closed substance cycle is a good example of how environmental policy contributes to more environmental protection, efficient use of resources, climate protection – and thus also to more economic efficiency.

That creates competitive advantages for the economy as a whole in other ways too. Our modern waste policy has triggered the rapid evolution of disposal and environmental technology – an important green market. Some of the companies producing the technology used by the waste industry are among the most successful internationally and are well prepared



to take their place on the lead markets of the future. Today, the waste industry employs over 250,000 people and generates an annual turnover of 50 billion Euros.

We must resolutely pursue the course the waste management concept has set. That means using resources efficiently and processing them in an environmentally compatible manner. Substance management within closed substance cycles is our goal – and also one of the dictates of fairness towards future generations.

A handwritten signature in black ink that reads "Sigmar Gabriel". The signature is written in a cursive style with a large, stylized 'S' and 'G'.

Sigmar Gabriel
Federal Minister for the Environment, Nature Conservation and Nuclear Safety

FROM WASTE TO AN ECONOMIC FORCE

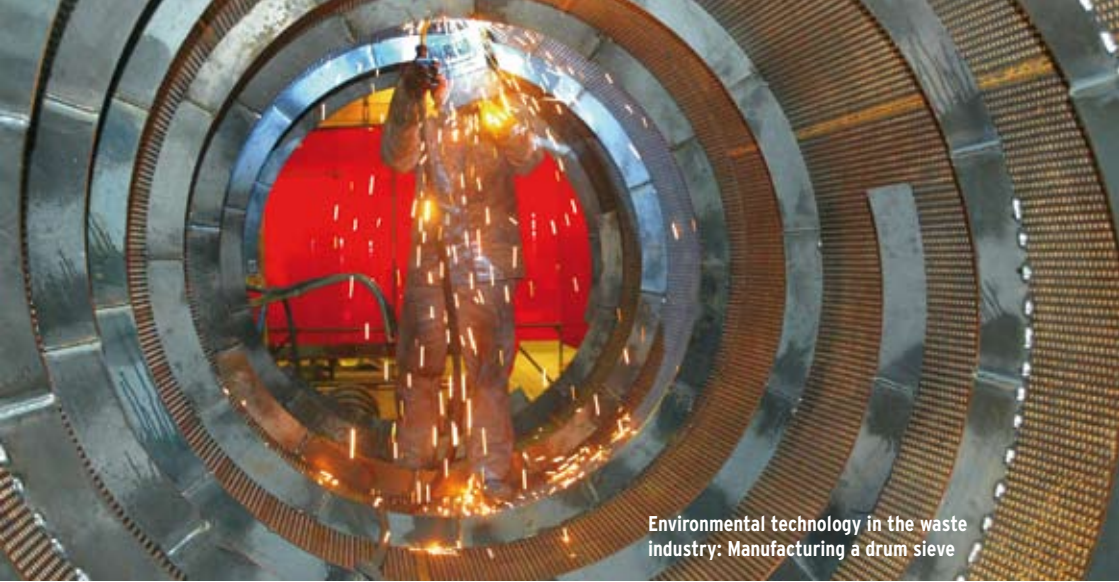
Waste management has evolved substantially since the early 1970s: Before the Waste Management Act of 1972 came into effect, each village and town had its own tip (around 50,000 in the whole of Germany). In the 1980s and 1990s their number dropped to below 2,000, whilst at the same time strict regulations were introduced regarding their construction and operation. Today only 160 landfill sites in Germany handle municipal waste (Class II landfill sites). The number of incineration plants, municipal waste facilities and plants for industrial waste has, by contrast, increased significantly.

In the mid-1980s the political credo of the so-called waste hierarchy – “avoid - reuse - dispose of” – gained acceptance. In addition to the existing recovery of metal, textiles and paper, other recoverable materials were to be recycled by means of separate collection, sorting and reuse. This rationale formed the basis for the Closed Substance Cycle and Waste Management Act which came into force in the mid-1990s.

Today, the waste industry in Germany employs more than 250,000 people – from engineers to refuse collectors to administrative staff. Various universities have Waste Management faculties, and there is a separate vocational qualification in waste disposal. The industry generates an annual turnover in excess of 50 billion Euros.

Today, much more than half of municipal and production waste is recycled. In some areas, for example packaging, around 80% is recycled. 87% of construction waste is now recovered. Figures for the total volumes of waste recovered make impressive reading: 29 million tonnes of municipal waste, 31 million tonnes of production and industrial waste, and 161 million tonnes of construction and demolition waste. Around four tonnes of waste is recovered for each resident in Germany, that's nearly equivalent to the weight of four small cars.

These figures provide impressive proof that environmental protection has developed into a key economic factor, making a significant contribution to an economy's value added chain.



Environmental technology in the waste industry: Manufacturing a drum sieve

THE STATUTORY FRAMEWORK

Waste management legislation is based on European law, German Federal law, the regional laws of the Federal Länder and the statutes of the local authority waste management services.

Environmental protection, and thus by definition also waste legislation, is one of the core concerns within the European Union (EU). Since 1974 the EU has adopted a number of Directives and Regulations and thus decisively shaped the Member States' waste legislation in an attempt to harmonise requirements governing waste avoidance, environmentally compatible waste recovery and disposal within the EU. The European Commission's 2005 Thematic Strategy on the Prevention and Recycling of Waste forms the basis for this.

The 1975 **Waste Framework Directive** is one of the pivotal European Directives. It regulates general aspects of European waste legislation and, along with regulations governing permits and notifications and regulations governing waste management plans, also contains the general obligation for Member States to prevent waste or to recover and dispose of it in an environmentally compatible manner. In order to simplify this framework and to adapt it to current requirements – for instance to move forward in developing a recycling society – the EU Waste Framework Directive was amended. It will enter into force at the end of 2008. This will further strengthen waste avoidance and recovery throughout Europe.



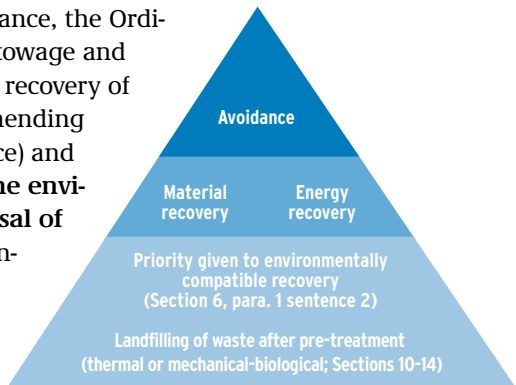
In addition, there are EU-wide regulations governing the treatment of hazardous waste, the binding classification of hazardous waste, requirements pertaining to landfill sites and waste incineration plants, and the transboundary shipment of waste within and outside the EU. Finally, the EU has also adopted various Directives aimed at the avoidance and recovery of specific types of product waste. For example, there are regulations governing packaging, batteries, end-of-life vehicles, and electrical and electronic appliances, as well as selected types of product waste containing pollutants such as waste oil, polychlorinated biphenyl (PCB) and polychlorinated terphenyl (PCT).

In Germany, waste legislation is governed by the Act for Promoting Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal, better known as the **Closed Substance Cycle and Waste Management Act**. The Act entered into force in 1996 and aims to ensure the complete avoidance and recovery of waste. Thus, avoidance takes precedence over recovery, which in turn comes before disposal. Avoidance means extended producer responsibility, which on the one hand involves developing products and substances with the longest possible service life and on the other introducing production techniques which generate the minimum possible volume of waste. Recovery, by contrast, seeks to achieve the maximum possible and most environmentally compatible use of the waste's material and energy potential.



Control room in a waste recovery plant

The general obligations contained in the Act are set out in more concrete terms in a number of statutory ordinances. In particular, these include the **provisions on product responsibility** (packaging, batteries, end-of-life vehicles, waste oil, electrical and electronic appliances), the **requirements governing the environmentally compatible recovery of waste** (e.g. the Ordinance on Biowaste, the Commercial Waste Ordinance, the Waste Wood Ordinance, the Ordinance on Underground Waste Stowage and the Ordinance pertaining to the recovery of waste at surface landfills and amending the Commercial Waste Ordinance) and the **requirements governing the environmentally compatible disposal of waste** (the Ordinance on Environmentally Compatible Storage of Waste from Human Settlements and on Biological Waste Treatment Facilities, and the Landfill Ordinance).



The waste pyramid: Avoidance, reuse, environmentally friendly disposal

GERMANY'S WASTE POLICY: SUCCESSES AND GOALS

We are not fully realising the potential in waste in terms of energy and raw materials. Consumption of primary raw materials is still too high.

That is why today's waste management aims to increase and optimise the efficient use of raw materials, to maximise recovery quotas and to permanently remove from our environment that residual waste which can no longer be used.

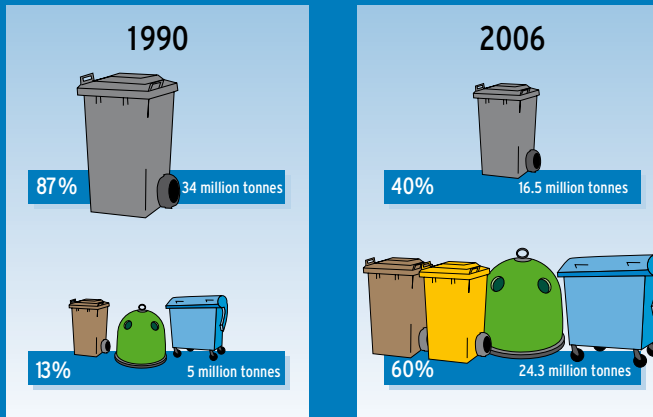
Germany is already on the right track. Regulations governing waste management and modern facilities and technology have led to the following environmental successes over the past 15 years or so in Germany:

- ▶ Less waste has been produced overall in recent years. The total volume of domestic waste has remained virtually constant over many years. The link between economic growth and the volume of waste has thus been severed, given the fact the economy grew by 15% between 1992 and 2004.
- ▶ There has been a clear shift in terms of volumes of waste: in the past greater quantities were disposed of, now more is recovered. The population's willingness to separate its waste has helped to improve possibilities for recycling. Germany therefore remains at the forefront of packaging recycling in Europe. Today (2006), with over 8 kilograms per inhabitant and year, more than twice as many waste electrical appliances are being collected from private households than prescribed in the European Waste Electrical and Electronic Equipment Directive. The recovery rate of municipal waste increased to more than 60% (2005). The figure for production waste is around 65% (2005).



Separating waste makes sense:

More recoverable materials than residual waste in 2006

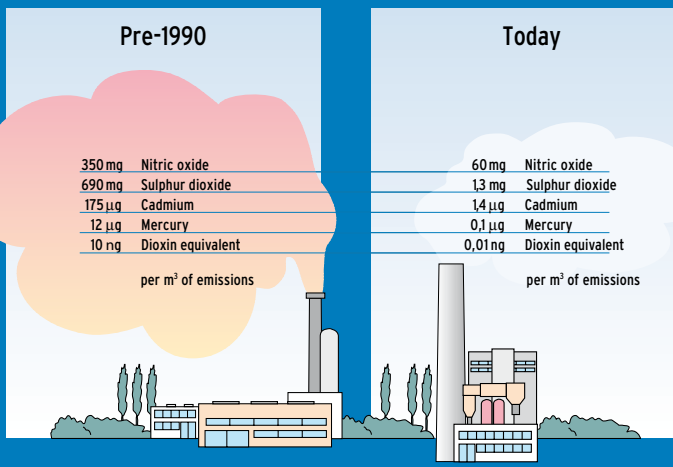


Source: IFEU (Institute for Energy and Environmental Research) 2006 study on household waste, Federal Environment Agency (Umweltbundesamt, UBA)

- Modern waste incineration plants have helped significantly reduce the burden on the biosphere.

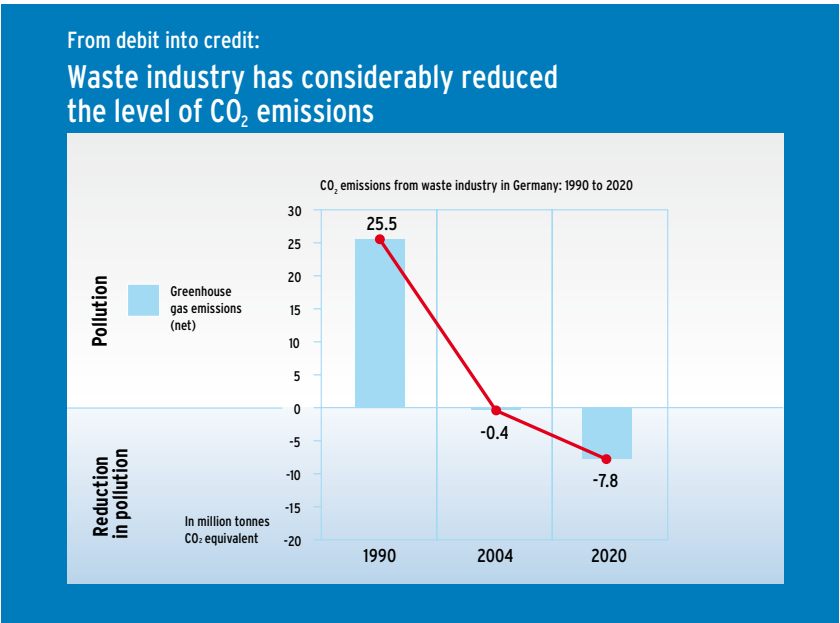
Better than its reputation:

Emissions of pollutants from waste incineration considerably reduced



Source: IFEU 2006 study on household waste, Federal Environment Agency (UBA)

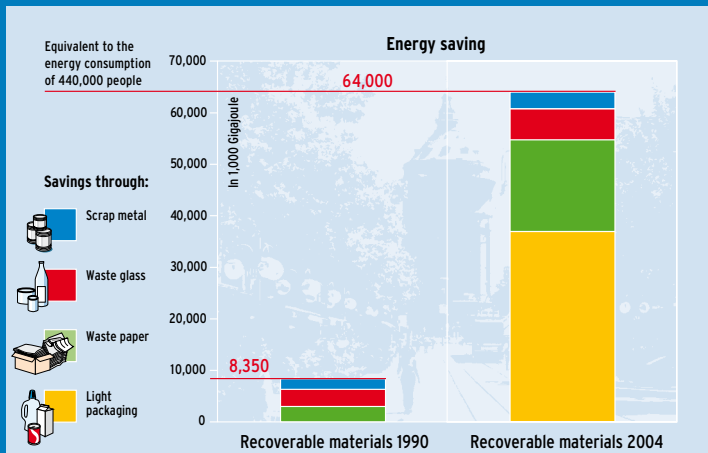
► Greenhouse gas emissions have been considerably reduced. The overall implementation of the Ordinance on Environmentally Compatible Storage of Waste from Human Settlements and on Biological Waste Treatment Facilities in 2005 has alone led to a reduction of more than 30 million tonnes of carbon dioxide (CO₂) per year generated by household waste. The waste management industry is thus responsible for around 12% of Germany's planned reduction in greenhouse gases as required by the Kyoto Protocol. In signing the Kyoto Agreement, the German government obligated itself under international law to reduce greenhouse gas emissions by 21% (compared to 1990 levels) in the period between 2008 and 2012.



Source: IFEU 2006 study on household waste, Federal Environment Agency (UBA)

- There has also been a notable saving of raw materials.
- The increased recovery of energy and substances from waste also means an eight-fold saving of fossil fuels such as oil, gas and coal in comparison to 1990. That is equivalent to the annual energy/raw material consumption of a city with more than 400,000 inhabitants.

Energy efficiency by recovering materials:
Amount saved = energy consumption of one big city



Source: IFEU 2006 study on household waste, Federal Environment Agency (UBA)

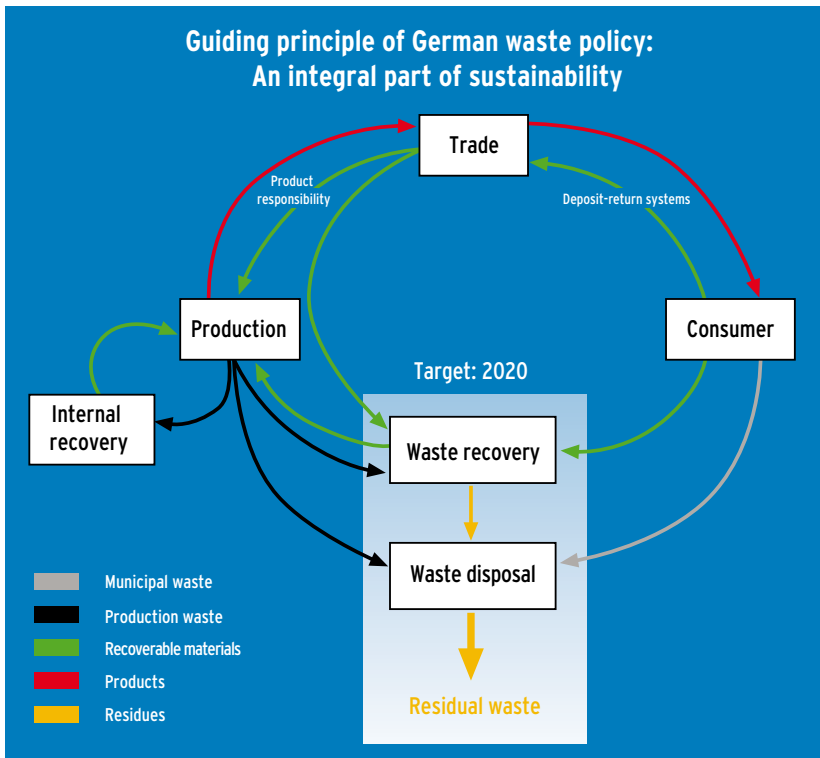
TOMORROW'S TREASURE-TROVE: SUBSTANCE MANAGEMENT

In the medium to long term, primary raw materials such as oil and gas will become scarcer; pollutants in waste will have a negative impact on the environment and human health. That is why our waste policy should focus more on substance flows and substance characteristics. The goal is substance flow management and substance management within closed substance cycles. Resources must be used more effectively and more efficiently. Today's waste must, therefore, be seen as tomorrow's treasure-troves – and, by analogy, today's products are tomorrow's resources. The Federal Environment Ministry is thus working on a programme of action to increase the productivity of resources.

What is “substance flow management” and “substance management”?

The substance flow approach allows the entire substance cycle to be monitored and analysed, from the extraction of raw materials from the environment to production, use and consumption, to collection and re-use or release into the environment. The volume and structure of these substances are thus to be influenced in such a way that the efficiency of resources is increased and the link between the volume of waste and economic growth is severed in the long term.

For substance management to be successful, production and consumption must also be incorporated. The cycle which raw materials undergo must be promoted. Pollutants in waste materials must not be allowed to reappear in new products, rather they must be filtered out in a non-hazardous form.



Source: Federal Environment Ministry (BMU)



Modern waste incineration plant:
Waste is incinerated to produce electricity and heat

WHAT TASKS FALL TO PRIVATE INDUSTRY?

Environmental policy is based on: the precautionary principle, the polluter pays principle and the principle of co-operation. These principles are reflected in **extended producer responsibility**, which the manufacturer and seller of a specific commodity bear. As producers of a commodity they are required to consider the environmental impacts and possible risks of a product during its entire lifecycle (precaution). In collaboration with the other parties involved – producers, distributors, consumers, disposal and recycling companies, as well as government offices (co-operation) – the producer is required to create a system which minimises the adverse environmental impacts and maximises the recovery of resources (recycling, re-use).

For that reason, waste management policy in Germany centres around the concept of extended producer responsibility. In this way, even during the production phase, the foundations are laid for the effective and environmentally compatible avoidance and recovery of waste. Manufacturers and distributors must design their products in such a way as to minimise the amount of waste produced during manufacturing and subsequent use, so as to focus on high-quality and comprehensive recovery of waste, and, finally, to facilitate ecofriendly removal of those components of the waste which can no longer be reused.

Voluntary commitment

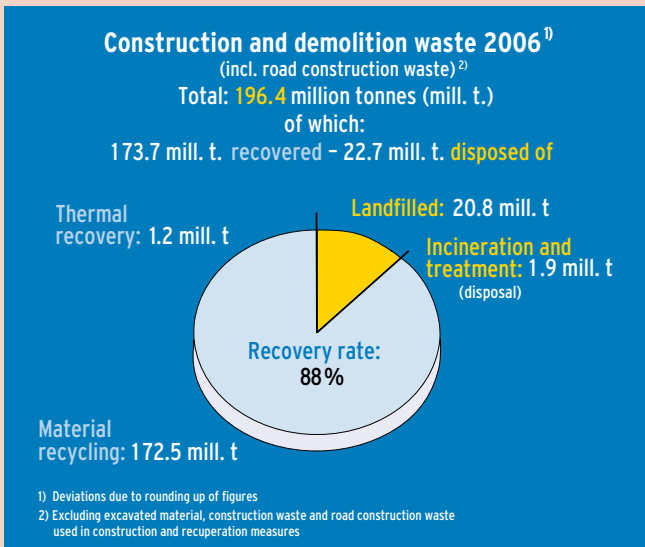
It is the responsibility of industry to make improvements to the development and manufacturing phase of products. First of all that can be done on a voluntary basis, for example in the form of voluntary commitments. This conserves resources and avoids waste.

In 1996 the German construction industry made a commitment to the German Environment Ministry to “halve by 2005 the volume of recyclable construction waste being landfilled” (1995 - 2005). According to the concluding survey carried out in 2005, more than 70% of mineral construction waste (construction waste, road construction waste) was recycled, that is 50 million tonnes. That means the recovery quota set out in the voluntary commitment was more than fulfilled.



An example: Construction and demolition waste

Along with mining waste, construction and demolition waste represents the largest waste segment in terms of volume. Often it comprises a mix of mineral waste, wood, metal, paper and plastics which are sometimes contaminated with hazardous substances.



Source: Federal Statistical Office 2006, Federal Environment Ministry (BMU)



RETURN AND RECOVERY OBLIGATIONS

It is not necessary to introduce legislation until voluntary commitments are no longer sufficient to meet the demands of extended producer responsibility – or until the EU introduces specific requirements.

Packaging

To counter the steady increase in the volume of packaging, the German government in 1991 enacted the Packaging Ordinance. This was the first comprehensive regulation to be based on the concept of substance cycles. The Packaging Ordinance aims to put extended producer responsibility into practice by extending the manufacturers' and distributors' responsibility for their products. That responsibility now begins when the product is manufactured and ends when it is disposed of in an environmentally compatible manner.

The Packaging Ordinance has proved to be an effective instrument. The annual increase in packaging consumption has been halted. Whilst in 1991 15.6 million tonnes of packaging waste was produced, that figure dropped to 13.7 million tonnes in 1997. Since 2000 the figure has levelled out at between 15.1 and 15.5 million tonnes. Overall the link has been severed between consumption of packaging and economic growth. The population is helping to create better recycling opportunities through its willingness to collect waste.

Recovery of used packaging has been continuously increased: 6.1 million tonnes were recovered in 1991, 12.7 million tonnes in 2006.

Modern waste technology: Success sorting waste

In Germany, glass, paper, old clothes, compost and biowaste, packaging, metal, bulky waste and specialist waste are collected separately by private households before they are recycled by public-sector or private-sector disposal agencies.

Because of the high standards imposed on these recovery processes, even retail packaging, for example, that has been separately collected still needs to be further sorted. Originally, this sorting was done manually and with the aid of magnetic separators, air classifiers and vortex separators. Since 1997, however, more and more automatic sorting systems have been introduced.

It is now possible to separate different types of plastic using a refined detector system based on near infrared spectrography (NIR), which is capable of identifying the type, size, shape and colour of materials. The system is linked to a computer with such a high processor speed that separation of the individual pieces via precise compressed air jets occurs in real time. As a result, different types of plastic are separated with a high degree of accuracy.

**Waste sorting and treatment:
The Cröbern Central Landfill Site near Leipzig**



Recovery quotas for waste packaging (1991-2006)
 (in %, for those types of packaging for which quotas have been introduced)

Material	1991	2001	2002	2003	2004	2005	2006
Glass	53.7	85.1	86.2	85.9	81.5	82.6	82.4
Aluminium	16.6	75.3	73.1	71.2	72.9	76.2	76.6
Tinplate	37.1	75.7	77.2	81.0	81.7	83.8	90.2
Plastics	11.6	51.8	50.3	55.0	48.8	47.6	55.7
Paper	55.8	91.9	88.8	88.1	91.0	91.1	89.4
Liquid containers	0.0	62.8	63.4	62.2	62.5	62.4	66.4
Total quotas	39.2	79.3	77.9	78.1	78.4	78.5	78.8

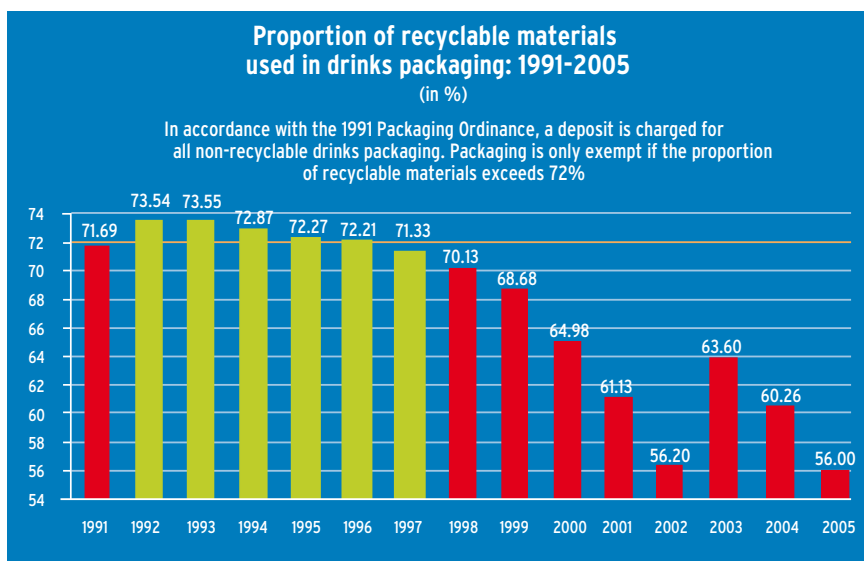
Source: Federal Statistical Office 2008, Federal Environment Agency (UBA), Federal Environment Ministry (BMU)

Deposit-return systems for drinks make a significant contribution to reducing the volume of waste because the packaging can be recycled. But these systems were in an increasingly critical condition after 1995. At the end of 2002 only around 50% of packaging was being recycled. However, below a certain market share, deposit-return systems are no longer viable. Examples from neighbouring European countries (e.g. Belgium, Austria and Switzerland) show that without effective protective provisions, deposit-return systems will be forced out of the market within a very short time.



On 1 January 2003 Germany thus introduced a compulsory deposit on non-recyclable drinks packaging. The compulsory deposit is payable on all non-ecologically favourable non-recyclable drinks packaging between 0.1 to 3 litres in volume containing mineral water, beer, soft drinks and alcoholic mixed drinks. The deposit has stabilised the proportion of recyclable drinks packaging and put an end to the throw-away mentality. The compulsory charge is 25 cents.

Fruit and vegetable juices, milk and wine, as well as ecologically favourable non-recyclable drinks packaging – such as cartons, polyethylene bags and stand-up bags – are deposit-free.



Source: Gesellschaft für Verpackungsmarktforschung GmbH (GVM, Society for Packaging Market Research, reg'd society)

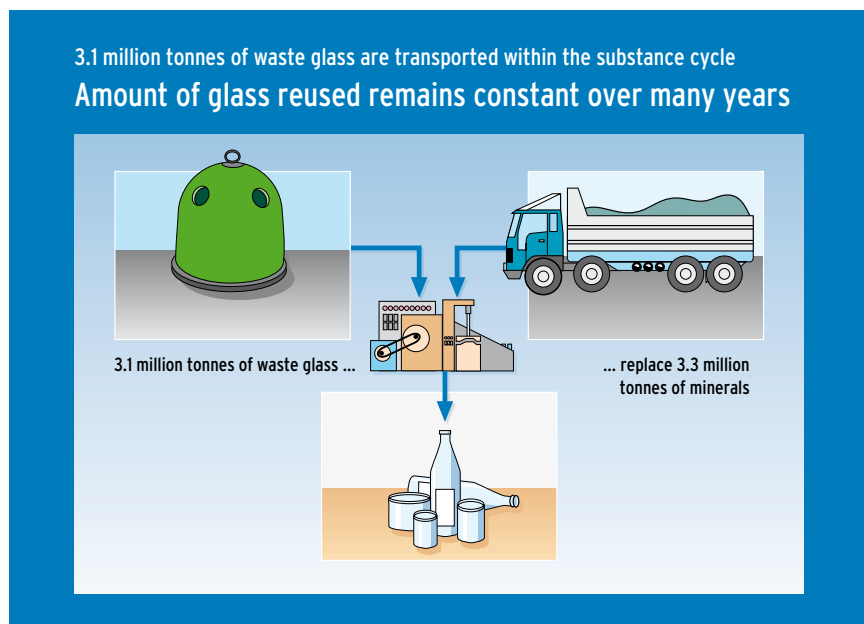
The concept and implementation of the 1991 Packaging Ordinance received a great deal of international attention. The German ordinance prompted neighbouring countries such as Austria, the Netherlands, Belgium and France to introduce their own national measures. It then also formed the basis for the adoption of the European Directive on packaging and packaging waste of December 1994, which is now binding for all EU Member States.

Recycling fluorescent tubes:
Once the poisonous mercury
has been removed the glass
is recycled



Waste glass

In Germany, container glass is used primarily by the food and drinks industry in the packaging of drinks, vegetables and yoghurt. Glass lends itself particularly well to recycling as it can be melted down and processed into new products any number of times. The recycling of waste glass helps to conserve raw materials and reduces energy requirements: 0.2 to 0.3% less energy is required per percentage point of waste glass added.



Source: IFEU 2006 study on household waste, Federal Environment Agency (UBA)

In Germany a minimum recycling quota of 42% was introduced for glass with effect from 1993 by the Packaging Ordinance, which was increased to 72% in 1995 and to 75% in 1999. These quotas have regularly been exceeded. In 2006, 2.38 million tonnes of glass were collected across Germany, with a recycling quota of 82.4%. However, non-recyclable glass bottles are not an ecologically advantageous form of drinks packaging. Reusable bottles, which can be refilled around 40 times, are significantly more favourable, as they save even more raw materials and energy than can be achieved by recycling glass.

End-of-life vehicles

There are 46 million passenger cars on Germany's roads. Every year, some 3.2 million cars are taken off the roads. Between 450,000 and 500,000 of these are recovered.

The End-of-Life Vehicle Ordinance of 2002 allows consumers to return end-of-life vehicles to their manufacturer or importer free of charge. Authorised dismantling and shredder facilities and other facilities dealing with end-of-life vehicles can be found on the internet at www.altfahrzeuge.de. Since 2006 those involved in this sector must ensure that at least 85% of the average weight of an end-of-life vehicle is recovered, and that at least 80% of that material is recycled or reused. Germany is a pioneer in Europe with a reuse and recycling quota of around 87 percent of end-of-life vehicles.



Container for waste batteries (labelled):
Only waste batteries - no other waste



Batteries

Each year in Germany around 1.5 billion batteries and accumulators enter the market. The Battery Ordinance regulates their recovery. The quota recovered has risen steadily from initially 19% to 92% today, thus conserving resources. The increase was possible on account of the development and use of innovative sorting technology. The EU's new Battery Directive was adopted in 2006 and obligates all EU Member States to separately collect and recover all waste batteries. The Directive has been implemented in Germany via the Second Ordinance Amending the Battery Ordinance.



Recycling mobile phones

Electrical and electronic scrap

Industrialised countries in particular are faced with a growing mountain of used appliances. The volume of electrical and electronic scrap is growing three times more rapidly than municipal waste. Experts estimate that around 1.8 million tonnes of used appliances accumulate in Germany every year. 27 million mobile phones were sold in Germany in 2004, but the average service life is only around three years. Worldwide, 400 million mobile phones are discarded every year. Similar figures apply to larger appliances such as personal computers (PCs). Unfortunately, many of these appliances are still being disposed of without any of their components being recycled. The hazardous substances they contain also have adverse environmental impacts.

The EU has put in place the legal framework containing regulations governing producer responsibility by introducing the Waste Electrical and Electronic Equipment (WEEE) Directive and the Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

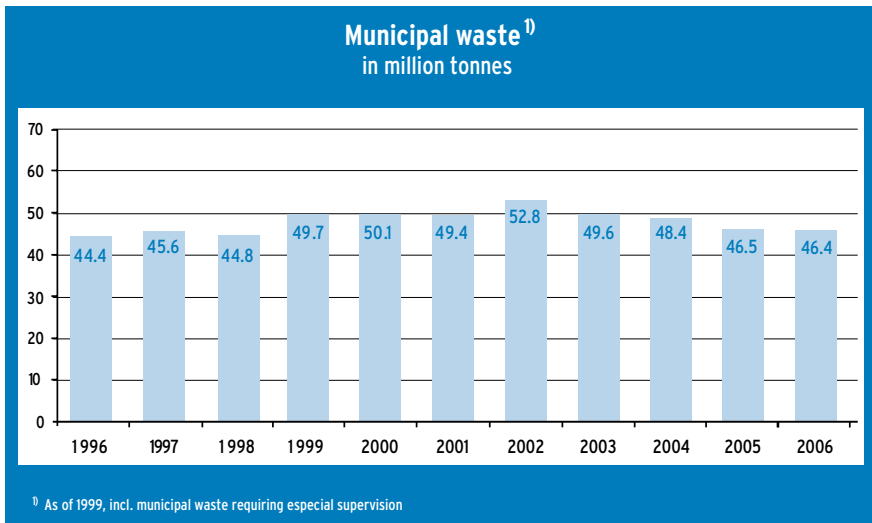
These Directives were implemented in Germany by means of the **Electrical and Electronic Appliances Act**. In accordance with this legislation private consumers in Germany have been able, since 24 March 2006, to return old electrical and electronic appliances free of charge to local authority collection points. Manufacturers are now obliged to accept the returned appliances and to recycle them in an environmentally compatible manner. Since 24 March 2006 extended producer responsibility also applies to end-of-life appliances used for commercial purposes. In addition, since 1 July 2006 producers have been prohibited from using particularly hazardous substances such as lead and cadmium in electrical and electronic appliances.

It is hoped that as a result of this legislation consumers will in future be able to purchase more environmentally friendly, readily recyclable new appliances with a particularly long service life and that it will be possible to remove pollutants in a targeted fashion.

HIGH STANDARDS IN WASTE DISPOSAL AND RECOVERY

Municipal waste

Municipal waste comprises waste from private households and similar institutions, as well as domestic-type waste produced by trade and industry. Municipal waste includes, for example, household waste, biowaste, bulky waste, road-sweeping, market waste and separately collected recoverable materials such as glass and paper. In total, 46.4 tonnes of municipal waste was produced in 2006. Of this, more than 60% was recovered.



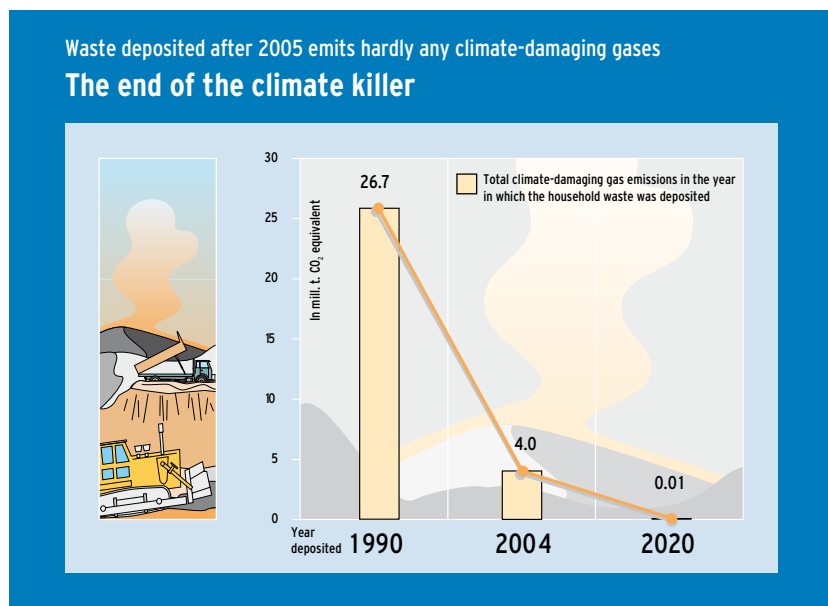
Source: Federal Statistical Office 2008

The **Commercial Waste Ordinance** of 2002 stipulates that commercial municipal waste and certain construction and demolition waste should be stored separately if at all possible and that as much commercial waste be recovered as possible.

In accordance with the Ordinance on Environmentally Compatible Storage of Waste from Human Settlements and on Biological Waste Treatment Facilities of 2001, as of June 2005 residual waste from households and industry is to be treated in such a way which prevents biological conversion processes from occurring in landfills. This presupposes that the residual waste

is pre-treated by thermal or high-end mechanical-biological methods. This pre-treatment turns fermenting, rotting and foul-smelling residues into slag or a substance resembling soil which is no longer harmful to the environment. The generation of landfill gas will be reduced to almost zero.

This is not only of exceptional importance as regards the protection of land and groundwater, but in particular as regards climate protection, as the methane gas produced is particularly harmful to the climate – 21 times more so than carbon dioxide (CO₂).



Source: IFEU 2006 study on household waste, Federal Environment Agency (UBA)

Germany's new Ordinance on waste storage goes far beyond the goal set out in the EU's Landfill Directive, which envisages reducing to 35% the volume of biodegradable municipal waste deposited – but not until 2016.

By 2020 as much municipal waste as possible is to be recovered in Germany and the number of above-ground landfills for recyclable materials is to be further reduced. In order to achieve that goal, among other things, residual waste processing procedures need to be developed so that only such substances are produced as do not need to be stored but can be recycled, thus conserving raw materials.

Biowaste fermentation plant:
The resulting gas is used to
generate heat and electricity



Biowaste

The **Ordinance on Biowaste** ensures that only biodegradable waste with a low pollutant content is utilised as a fertiliser or soil improver after composting or fermentation. The aim is to eliminate the accumulation of pollutants in the soil. In addition, composted or fermented and subsequently composted biowaste is an important source of humus.

Biodegradable substances must be collected separately if they are to be turned into biowaste composts and fermentation residues with low levels of pollutants. If farmers were to use composted waste as a fertiliser, up to 10% of mineral fertilisers could be replaced.

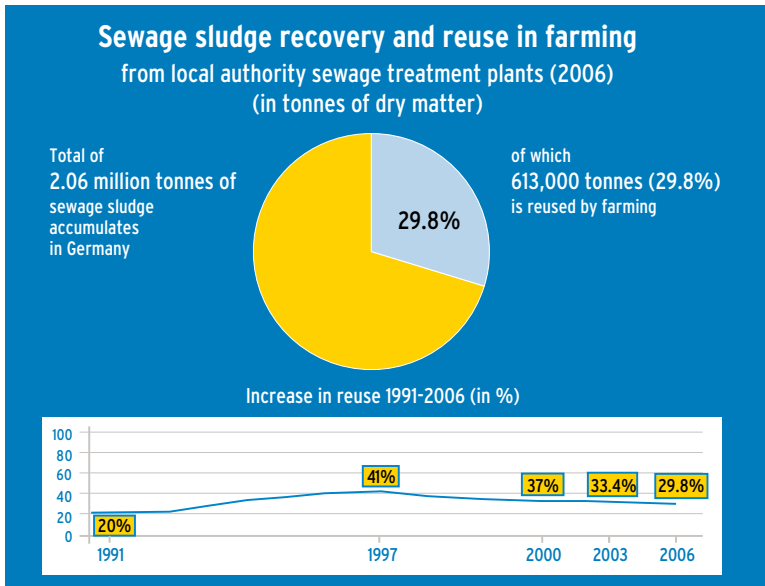
Around twelve million tonnes of biowaste is currently collected separately in Germany each year and processed into composted products and fermentation residues. An average of around 50% of the population in Germany collects biowaste using bio-bins. The separate collection of biowaste thus needs to be expanded.

The German government – together with the governments of Austria, Spain, Portugal and eight other countries – is committed to the creation of a European regulation on biowaste. According to a proposal put forward by the German Federal Environment Ministry, there is also to be a transitional phase across Europe after which only biodegradable waste from separate collection may be used in the manufacture of compost fertilisers. In addition, minimum requirements are to be imposed on pollutants and foreign materials in compost.

The EU's supplemented, amended Waste Framework Directive strengthens biowaste recovery through a separate provision (Article 22). According to this, the Member States must promote the separate collection and environmentally sound recovery of biowaste. Furthermore, the European Commission is called on to carry out an evaluation of environmental policy regarding biowaste management and to elaborate provisions for the treatment of biowaste and quality standards for composts and fermentation residues. If appropriate, a proposal for a separate EU Biowaste Directive will be presented.

Sewage sludge

Sewage sludge from local authority sewage treatment plants contains high levels of phosphorous. That is why around 30% of sewage sludge is currently used as a fertiliser. The German government is also promoting techniques for extracting low-pollutant phosphate from sewage sludge and domestic sewage. During this parliamentary term the Federal Environment Ministry aims to amend the Sewage Ordinance of 1992 in order to better safeguard the interests of precautionary soil protection.



Source: Federal Environment Ministry (BMU)

Waste oil

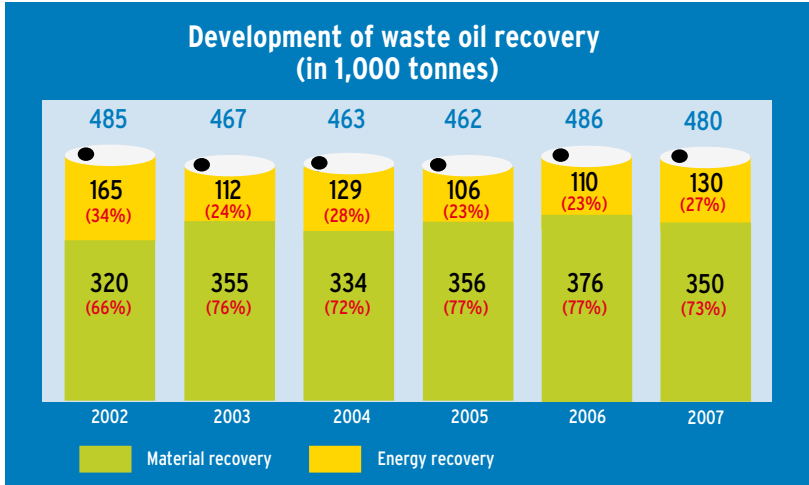
End-of-life lubricants such as are used, for example, in machines, engines, transmissions, and turbines and which need to be disposed of in an environmentally friendly manner are classified as waste oil. Since they are extremely dangerous for groundwater and soil, Germany in 1979 introduced regulations governing the complete collection and correct storage of waste oil.



Fermenter in a sewage treatment plant

In Germany the waste oil market is purely market-economy-based. Since the provisions of the Waste Oil Ordinance came into effect in 1987 this system has been running smoothly. In 2007 480,000 tonnes of waste oil was collected and completely recovered, 73% materially and 27% energetically.

Since the Waste Oil Ordinance was amended in 2002 reprocessing of waste oil has top priority. Thus, separating the hazardous substances from the waste oil produces base oil which can be returned to the lubricant substance cycle.



Source: Federal Environment Ministry (BMU)

Waste wood

The Waste Wood Ordinance of 2002 sets out concrete requirements governing the material and energy recovery and disposal of waste wood. The Ordinance thus ensures that the environmentally compatible recovery of waste wood is promoted in Germany and that pollutants are not recycled or do not accumulate during recovery.

The Ordinance covers production residues from the dressing and treatment of wood and wood materials, as well as end-of-life products such as wooden packaging, pallets, furniture and demolition wood, provided that it constitutes waste.

Overall, the Ordinance guarantees a binding standard for the disposal of waste wood that applies across Germany. It thus creates identical competitive conditions in particular for small and medium-sized disposal companies, since they are the ones primarily active in this area.





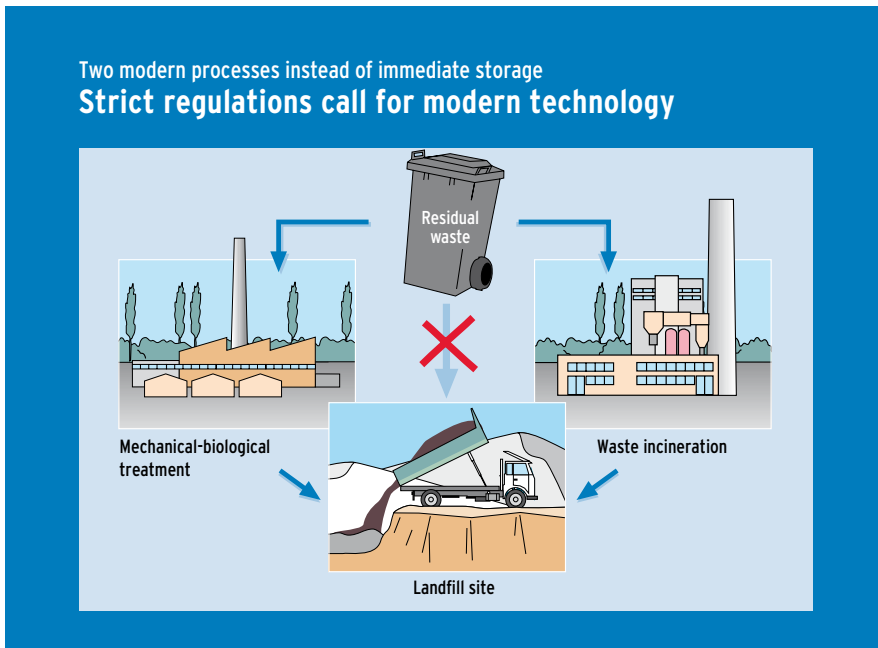
Persistent organic pollutants

Persistent organic pollutants (POPs) are organic materials which biodegrade with difficulty and can accumulate in organisms. These substances are so dangerous because they are disseminated via the water, the soil and air and thus take on global significance. POPs include, among others, pesticides, industrial chemicals such as PCBs, and dioxins and furanes.

The EU's Regulation on POPs of 2004 introduced a general prohibition on the destruction or conversion of these hazardous substances. POP waste must be treated in such a way that this prohibition is complied with. Only if the level of POP in waste is below strict limits can it be disposed of in the same way as normal waste. In adopting this Regulation the EU has taken an important step towards reducing the environmental burden caused by extremely hazardous organic substances.

Production waste

Some 48 million tonnes of production waste accumulates in Germany each year. Production waste comprises waste produced by the industrial and commercial sector as well as in agriculture and forestry. In principle the producers of the waste bear sole responsibility for its disposal. They must either dispose of the waste themselves or commission a disposal company with carrying out this task in a professional manner. In some Federal Lander this obligation has been transferred to regional companies which ensure the waste is disposed of in an environmentally compatible manner. This ensures that the waste is either recycled (currently some 64%) or removed in an environmentally compatible manner by means of chemical/physical treatment or in incineration plants, or that it is landfilled in line with strict allocation values.



Source: IFEU 2006 study, Federal Environment Agency (UBA)

Landfill site in 2003:
Such storage became a thing of the past in May 2005

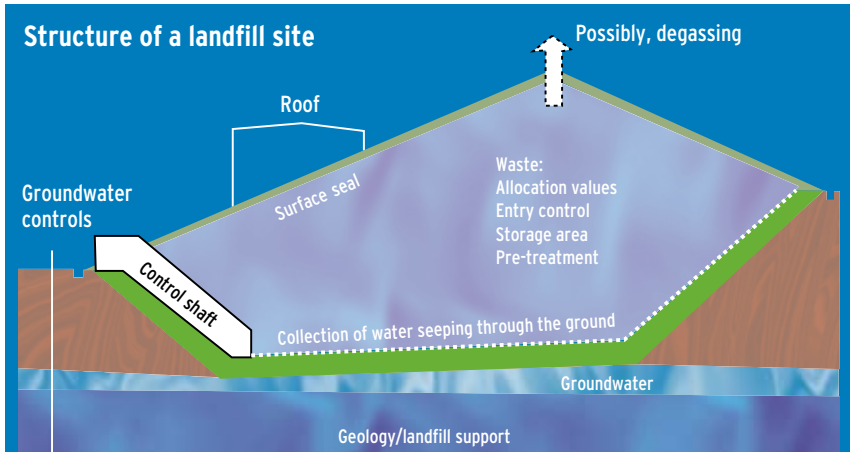


Landfilling

The **Landfill Ordinance** of 2002 which implemented the EU Landfill Directive in Germany, sets out legally binding, high standards for landfill sites depending on the type of waste deposited there and the concomitant risks for the environment. By 2009 at the latest all landfill sites must fulfil these requirements. Those landfills which are incapable of meeting the requirements are being gradually decommissioned since 2005.

The Landfill Ordinance requires that especially **hazardous waste** be disposed of below ground in deep salt mines. This ensures that such waste and the pollutants it contains will be permanently sealed from the biosphere.

The **Ordinance pertaining to the recovery of waste at surface landfills**, which came into effect in 2005, contains provisions governing the conditions under which waste may be used as substitute construction materials in above-ground landfills. Comparable regulations were introduced for underground waste processing in the **Underground Waste Stowage Ordinance**, which came into effect in 2002.



Source: Federal Environment Ministry (BMU)

Controls

The **Ordinance on Waste Recovery and Disposal Records** came into force in 1996. It enables the responsible monitoring authorities to control whether waste is being properly disposed of. Every year the authorities charged with monitoring waste management examine approximately 125,000 disposal records, 2.5 million accompanying certificates and around 14 million return receipts.

However, this procedure (which necessitates the filling in of various forms) was very time-consuming. The **Act** and the **Ordinance to Simplify the Monitoring of Compliance with Legislation on Waste Management** assist in this process. Both entered into force in February 2007. They have made sure the procedure is more efficient and simpler. German waste management legislation is being harmonised with EU regulations and modern communication technology is being introduced in the monitoring of waste management legislation. This simplification will benefit environmental protection and the economy in equal measure.



Pretreatment of waste



TRANSBOUNDARY SHIPMENTS OF WASTE

Germany is one of the around 170 signatories to the Basel Convention of 1989. The Convention aims to control the transboundary shipment and disposal of hazardous waste worldwide, as well as to prevent the undesirable export of waste. The new EC Regulation on the supervision and control of shipments of waste came into effect in July 2007. It applies directly to Germany.

Within the EU waste which is being transported to the place where it is to be recovered is classified as “goods”. Generally speaking transboundary movement of waste involves secondary raw materials. The shipment of waste which is to be disposed of or which is classed as risky must first be authorised by the competent authority.

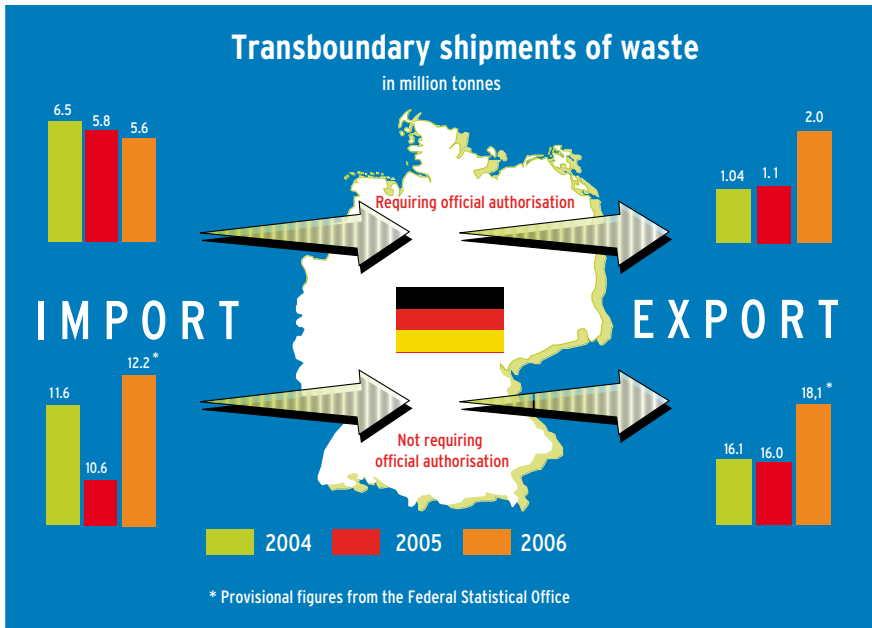
Germany is economically integrated into the EU and, with nine immediate neighbours, lies in the heart of Europe. National borders no longer constitute obstacles to goods traffic within Europe. This promotes the exchange of goods.

How much waste is imported and exported?

For 10 years there was an increase in the amount of waste subject to authorisation imported into Germany, that is waste with hazardous components. The transport of waste that is subject to authorisation must first be approved by the responsible authority.

In 2005 the number of such imports for the first time dropped below 6 million tonnes. In 2006 it dropped to 5.6 million tonnes. Whilst there has been a recognisable change in the trend as regards waste imports, exports will presumably increase. The decrease in imports and the increase in exports are mainly due to the Waste Storage Ordinance, which came into effect in June 2005 and which prohibits the storage of untreated municipal waste in Germany.

The export of waste subject to authorisation – such as waste iron and waste paper – increased slightly in 2006 to a total of around 18 million tonnes. Around 12 million tonnes was imported in 2006.



Source: Federal Statistical Office

INFORMATION AVAILABLE ON THE INTERNET

The Federal Environment Ministry's website includes pages with lots of additional information, links and references, in particular regarding the information offices of the various waste industry and environmental associations:

- ▶ www.bmu.de/3865: Up-to-date information and press releases on the German government's waste management policy
- ▶ www.bmu.de/2950: Exports of waste
- ▶ www.bmu.de/3168: Construction waste
- ▶ www.bmu.de/3226: Waste packaging
- ▶ www.bmu.de/3015: Electrical and electronic scrap
- ▶ www.bmu.de/3009: Waste batteries
- ▶ www.bmu.de/6928: End-of-life batteries
- ▶ www.bmu.de/35459: Waste oil
- ▶ www.bmu.de/3151: Waste paper
- ▶ www.bmu.de/3157: Waste glass
- ▶ www.bmu.de/3162: Biowaste
- ▶ www.bmu.de/3198: Sewage sludge
- ▶ www.retech-germany.net/english: Information Portal for Export Initiative Recycling and Efficiency Technologies

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