

## **A. WASTE MANAGEMENT**

### **A.1. INTRODUCTION AND GENERAL ISSUES ON HAZARDOUS WASTES AND SOLID WASTES**

The objective of the German government's policy on waste is to achieve a recycling-based economy that conserves resources and reduces adverse impacts on the environment. The aim is to increase and optimise the efficient use of raw materials, to maximise recovery quotas and to permanently remove from our environment any residual waste that can no longer be used. This will lead to a substance management within closed substance cycles, i.e. turning today's trash into tomorrow's treasure-trove. Activities on waste are part of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety's action programme to increase the productivity of resources.

Waste management legislation is based on European law, German federal law, the regional laws of the federal states and the statutes of the local authority waste management services. It is also based on the precautionary principle, the polluter-pays principle and the principle of co-operation. The main pillar is the Closed Substance Cycle and Waste Management Act. This act will be further developed by the end of 2010 on the basis of the new EU Waste Framework Directive in order to strengthen waste prevention and recovery. Through this act, industry and the commercial sector have been made responsible for the recovery of waste, i.e. they also have to bear the costs. All waste from private households and waste for disposal from other generators has to be passed on to waste institutions subject to public law; for this service, fees have to be paid. For waste destined for disposal, it has been stipulated that priority should be given to disposal within Germany (self-sufficiency principle), whilst waste destined for recovery underlies the free movement of goods within the EU.

The enforcement of waste legislation in Germany is mainly the task of the federal states. It is governed by requirements for waste supervision contained in the Closed Substance Cycle and Waste Management Act and supported by requirements on waste recovery and disposal records, transport licenses and specialised waste management companies.

Modern waste policy in Germany has triggered the rapid evolution of recovery and disposal technologies – an important green market. Today, the waste industry employs over 200,000 people and generates an annual turnover in excess of €40 billion. The infrastructure for all types of waste is in place.

Various activities on capacity-building, education, training and awareness-raising are carried out on Federal level, federal states level and community level and also by the private sector and non-governmental organisations. Trade unions and private-sector businesses are playing an active role in shaping integration of ecological and business concerns in waste management.

The structure of this report is based on the theme-specific issues in the guidelines for national reporting; however the sections on hazardous and non-hazardous waste have been merged.

Further information is available at [www.bmu.de/3865](http://www.bmu.de/3865) (general information on waste management), [www.bmu.de/38067](http://www.bmu.de/38067) (brochure) and [www.bmu.de/42826](http://www.bmu.de/42826) (data).

## **A.2. PREVENTION, MINIMISATION AND ENVIRONMENTALLY SOUND MANAGEMENT OF HAZARDOUS WASTES AND OF SOLID (NON-HAZARDOUS) WASTES AND SEWAGE**

### **A.2.1. PREVENTION AND MINIMISATION OF WASTES**

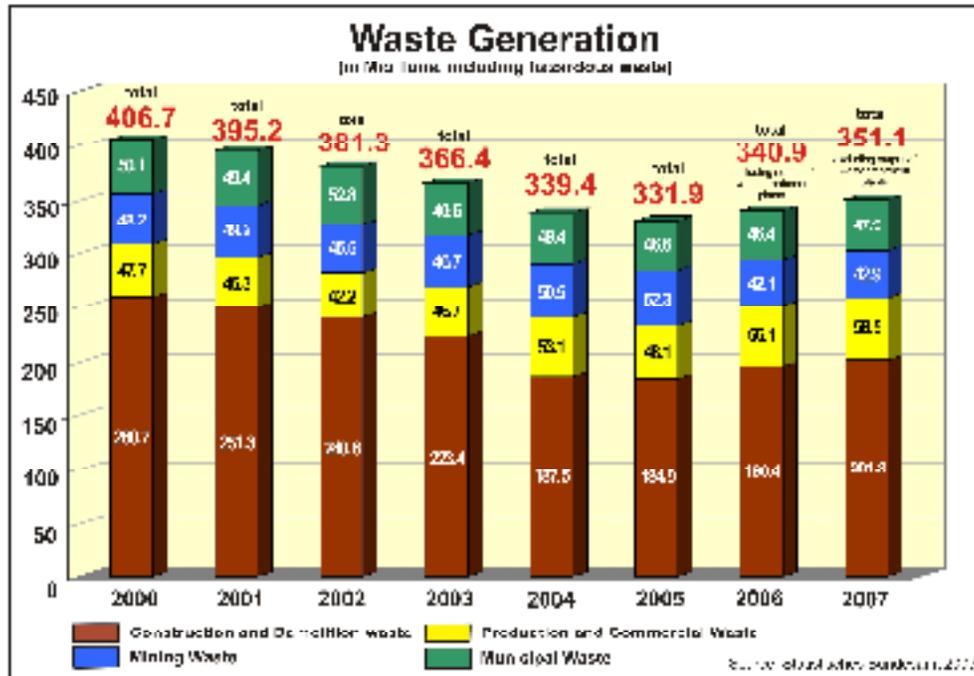
The Closed Substance Cycle and Waste Management Act aims to ensure the complete prevention and recovery of waste, including hazardous waste. Thus, prevention takes precedence over recovery, which in turn comes before disposal. Waste prevention is implemented inter alia through extended producer responsibility, which on the one hand involves developing products and substances with the longest possible service life and, on the other, introducing production techniques that generate the minimum possible volume of waste through best available techniques (BAT) requirements as part of a permitting system for industrial installations. Under extended producer responsibility, producers of a commodity are required to consider the environmental impacts and possible risks of a product during its entire life-cycle (precaution). In collaboration with the other parties involved – producers, distributors, consumers, disposal and recycling companies, government offices (co-operation) – the producer is required to create a system that minimises the adverse environmental impacts and maximises the recovery of resources (recycling, reuse).

In addition, laws and ordinances containing provisions on product responsibility for packaging, batteries, electrical and electronic appliances, end-of-life vehicles and waste oil contribute to waste prevention. Furthermore, a comprehensive waste prevention program will be developed until 2013.

The Packaging Ordinance from 1991 was a prototype for legislation designed to close substance cycles. It generally requires manufacturers and distributors to take back packaging and to re-use it or recycle its constituent materials. “Dual systems” organise the collection of waste packaging directly from private households, the sorting of this waste into material groups, and the recycling of these materials. There is a levying of charges, on a scale related to the type of packaging material used. A compulsory deposit of 25 cents on non-reusable drinks packaging has been introduced. This deposit is payable on all non-ecologically favourable packaging containing mineral water, beer, soft drinks and alcoholic mixed drinks. The main objective of the compulsory deposit is to stabilise the proportion of reusable drinks packaging and put an end to the throw-away mentality.

Furthermore, the ambitious requirements for waste recovery and disposal (see below) have indirectly contributed to waste prevention.

Less waste has been produced overall in recent years (see the figure below). 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.



#### A.2.2. RECOVERY, REUSE AND RECYCLING OF WASTES

In Germany, a number of laws and regulations, in addition to the Closed Substance Cycle and Waste Management Act, contain provisions on recovery, reuse and recycling for the following wastes: packaging, batteries, waste electrical and electronic equipment, end-of-life vehicles, waste oil, biodegradable waste, waste wood, sewage sludge, commercial municipal waste, waste going to incineration, waste recovered at surface landfills and waste going to underground stowage.

Glass, paper, old clothes, compost and biowaste, packaging, electrical and electronic waste, batteries, metal, bulky waste and hazardous waste from private households are collected separately before they are recycled by the producers of new products or by private or public sector agencies. For example, in 2006 on average over 8 kilograms of waste electrical and electronic appliances per inhabitant and year was collected from private households, more than twice as many as required by the related EU Directive .

Because of the high standards imposed on recovery, waste that has been separately collected still needs to be further sorted. This sorting is mainly performed automatically using, for example, a refined detector system based on near infrared spectrography in order to separate different types of plastic with a high degree of accuracy.

For example, the Ordinance on Biowaste ensures that only biodegradable waste with a low pollutant content is utilised as a source material for fertilisers or soil improvers, for example, after composting or fermentation. The aim is to recycle organic material and to avoid the accumulation of pollutants in the soil. An average of about 50% of the

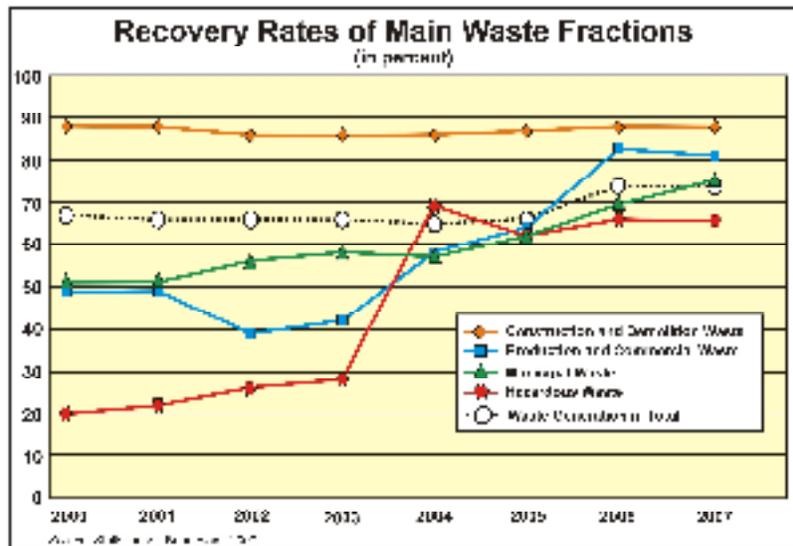
population in Germany collects biowaste by using bio-bins. The separate collection of suitable biowaste should be expanded.

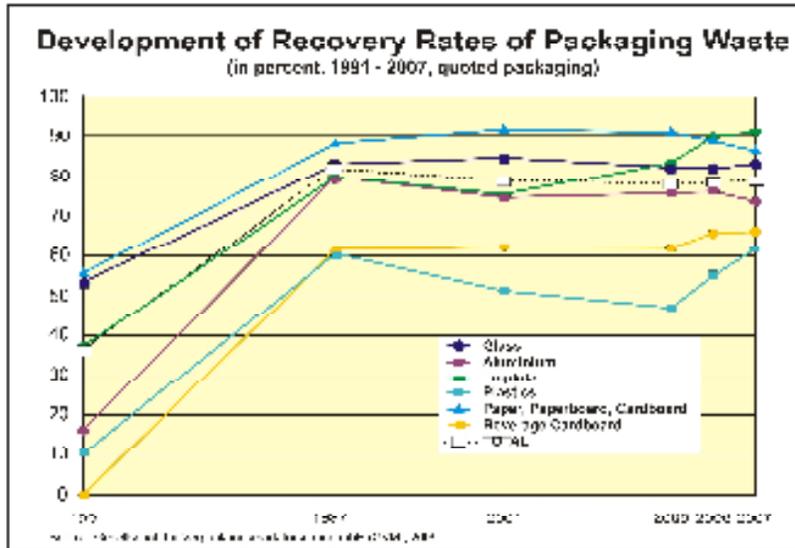
Sewage sludge from local authority sewage treatment plants contains high levels of phosphorous. That is why around 30% of sewage sludge is currently used as a source material for fertilisers. The German government is also promoting techniques for extracting low-pollutant phosphate from sewage sludge and domestic sewage to increase the ratio of recycled phosphor.

The Waste Wood Ordinance sets out concrete requirements governing the recycling, energy recovery and disposal of waste wood and ensures that pollutants are not recycled or do not accumulate during recovery.

In addition, there are voluntary commitments by the industry for construction and demolition waste and for graphic paper.

There has been a clear shift towards more recovery and recycling (see the figure and the table below). The population's willingness to separate its waste has helped to reinforce this trend.





### A.2.3. PHASE-OUT OF TOXIC, PERSISTENT AND BIO-ACCUMULATIVE WASTE

An ordinance covers the disposal of waste containing polychlorinated biphenyl (PCB) and polychlorinated terphenyl (PCT). The EU's Regulation<sup>1</sup> on persistent organic pollutants (POPs) contains a general provision on the destruction of these hazardous substances in wastes. Only if the level of POPs in waste is below strict limits can it be recovered or disposed of in the same way as other waste. In addition, the European chemicals legislation (REACH) and provisions on the content of hazardous substances in electrical and electronic equipment have led to reductions in hazardous waste.

### A.2.4. ENVIRONMENTALLY SOUND WASTE DISPOSAL AND TREATMENT

The Landfill Ordinance sets high standards for landfill sites. It also requires extremely hazardous waste to be disposed of below ground in deep salt mines. Compared to about 2,000 in the 1980s, today only about 160 landfill sites for municipal waste exist in Germany. This number will be further decreased.

The provisions on landfills in Germany are much stricter than required by the EU Landfill Directive. Since June 2005, residual waste from households and industry must be treated in such a way as to prevent biological conversion processes from occurring in landfills. This presupposes that the residual waste is pre-treated. The most part of the residual waste is treated by high-standard waste-to-energy plants; the rest is treated by high-standard mechanical-biological treatment. In this way, the generation of landfill gas is reduced to almost zero. This has led to a reduction of more than 30 million tonnes of carbon dioxide equivalents per year. The substitution of fossil fuels through the non-recyclable biogenic part of residual waste in waste-to-energy plants leads to a yearly

<sup>1</sup> EU Regulations are directly applicable in the EU Member States

reduction of round about 4 million tonnes of carbon dioxide equivalents. Thus sustainable residual waste management makes an important contribution to climate protection in Germany.

There is also the political goal of recovering municipal waste as much as possible and further reducing the number of above-ground landfills by 2020.

The waste incineration ordinance, based on the Federal Immission Control Act, contains high standards for the incineration and co-incineration of waste.

#### **A.2.5. PREVENTING ILLEGAL INTERNATIONAL TRAFFIC IN WASTES**

For transboundary movements of waste, the EU Waste Shipment Regulation transposes the provisions of the Basel Convention. Furthermore, an EU Regulation on the export of non-hazardous waste to non-OECD countries applies. In Germany, a Waste Movement Act, an ordinance on fines and penal law for waste shipments are also in place. Through these provisions and the effective implementation and control of them by the responsible authorities, where appropriate in cooperation with authorities from other countries, illegal waste shipments are reduced to a minimum.

#### **A.2.6. PROCEDURES FOR ENVIRONMENTAL IMPACT ASSESSMENT, TAKING INTO ACCOUNT THE CRADLE-TO-GRAVE APPROACH**

Environmental Impact Assessments (EIA) are required for all projects with particular environmental relevance.

#### **A.2.7. ESTABLISHMENT OF COMBINED TREATMENT/DISPOSAL FACILITIES FOR WASTES IN SMALL AND MEDIUM-SIZED INDUSTRIES**

The provision of facilities for waste treatment and disposal is led mainly by the private sector, including for small- and medium-sized industries.

#### **A.2.8. TRANSFER OF ENVIRONMENTALLY SOUND TECHNOLOGIES AND KNOW-HOW ON CLEAN TECHNOLOGIES AND LOW-WASTE PRODUCTION**

German development policy supports a number of technical and financial assistance projects to further the environmentally sound management of hazardous wastes as well as non-hazardous wastes and sewage systems. The German government also promotes environmentally sound waste management technologies and know-how through special funding programmes, capacity building, bilateral cooperation and participation in international conferences and fairs. In addition, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety is conducting the initiative "Recycling and Efficiency Technologies" (RETech) in order to foster the transfer of German recycling and waste disposal technologies ([www.retech-germany.net/english](http://www.retech-germany.net/english)).

Under the research programme of the Federal Ministry for Education and Research (BMBF), a number of waste-related projects are being carried out.

#### **A.2.9. INVENTORIES OF WASTE PRODUCTION, THEIR TREATMENT/DISPOSAL, AND CONTAMINATED SITES**

Information on waste production, waste treatment/disposal and contaminated sites can be found e.g. on the websites of the Federal Environment Agency ([www.umweltbundesamt.de](http://www.umweltbundesamt.de)) and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety ([www.bmu.de](http://www.bmu.de)).

#### **A.2.10. DISSEMINATION OF SCIENTIFIC AND TECHNICAL INFORMATION DEALING WITH VARIOUS HEALTH AND ENVIRONMENTAL ASPECTS OF WASTES**

Scientific and technical information dealing with health and environmental aspects of wastes is available at various levels, including the website of the Federal Environment Agency ([www.umweltbundesamt.de](http://www.umweltbundesamt.de)) and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety ([www.bmu.de](http://www.bmu.de)).

#### **A.3. RADIOACTIVE WASTES AND THEIR ENVIRONMENTALLY SOUND MANAGEMENT (SAFE STORAGE, TRANSPORTATION AND DISPOSAL OF RADIOACTIVE WASTE)**

According to national legislation and regulations (Atomic Energy Act - AtG), the waste producer has to present to the competent Federal State regulatory authority a waste concept indicating what plans are in place to avoid or reduce the arising of radioactive waste. Spent fuel from nuclear power plants is to go to on-site interim storage, with the aim of disposal in deep geological formations together with the highly active waste from reprocessing. Since July 2005, the shipment of spent fuel from nuclear power plants to reprocessing facilities has been prohibited.

The *Konrad* repository, which will have a maximum waste package volume of 303 000 m<sup>3</sup>, is expected to be commissioned in 2014 for German radioactive waste with negligible heat generation (low- and intermediate-level waste). This represents about 90% of total radioactive waste from the operation of nuclear power plants, nuclear industry and the radioactive waste from research activities, hospitals and medical practices and industry that needs to be disposed of, but only about 0.1% of total expected radioactivity.

Germany is a contracting party to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management and participated in the third review meeting in May 2009. The report submitted under the Joint Convention by the Government of the Federal Republic of Germany for this review meeting, dealing with the environmentally sound management of radioactive waste and spent fuel, is available at [http://www.bmu.de/files/pdfs/allgemein/application/pdf/3nationaler\\_bericht\\_atomenergie\\_en.pdf](http://www.bmu.de/files/pdfs/allgemein/application/pdf/3nationaler_bericht_atomenergie_en.pdf). The report includes Germany's policy and strategy on the management of radioactive waste and spent nuclear fuel management, inventories of radioactive waste

and spent nuclear fuel, the facilities for the treatment of the wastes and a comprehensive description of the legal basis.

Furthermore, Germany supports the efforts being made by the International Atomic Energy Agency (IAEA) and the European Union to harmonise regulations and standards concerning the management of radioactive waste. For several years now, Germany has been a member of the *Western European Nuclear Regulators' Association* (WENRA).

The regulations for the transport of radioactive material (including radioactive waste and spent nuclear fuel) is in accordance with the international transport regulations TS-R-1 (Transport Safety Requirement) specified by the IAEA and laid down in the different ordinances for the transport of dangerous goods.