

# Regulations on Waste Management

## - The situation in Germany -

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1. The situation of waste disposal has changed totally in Germany over the past 30 years. Until the early 70<sup>th</sup> almost all types of waste have been dumped in an uncontrolled way, leading to approximately 50.000 waste dumps in the outskirts of all larger towns or villages in the Federal Republic of Germany. More or less all type of wastes have been dumped there. However, an increased standard of living not only increased the amounts of waste being generated by households or commercial enterprises and industry, but also increased types and quantities of hazardous substances like heavy metals and a big variety of chemical substances in most of our waste streams. This led to increased environmental problems, e. g. contamination of ground water, surface water and rivers, the sea, as well as air pollution due to landfill gases and emissions from waste incinerators and other waste treatment facilities.
2. The first step towards an environmentally sound waste disposal has been a first Waste Disposal Act in Germany (1972), which aimed to close down all these uncontrolled waste dumps. They had to be replaced by larger, centralized and controlled landfills for domestic wastes, for industrial wastes and for hazardous wastes. Landfills need a license in order to exclude hazards to the environment and the health of citizens; they must not endanger groundwater, land or the atmosphere. Wastes, at least hazardous wastes, must be controlled from cradle to grave.  
These goals were reached within a rather short period of time, reducing the number of landfills to only several hundred larger facilities. In addition, treatment of certain wastes before land filling was introduced, e.g. for hospital wastes, for liquid wastes and others by using chemical-physical treatment or incineration.
3. In the 80<sup>th</sup>, increasing amounts of wastes being generated as well as problems to find and license new landfill sites jeopardized seriously the waste management situation in

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Germany. At that time the increasing awareness of our citizens of environmental problems led to strong opposition against any new waste management facilities in the vicinity of urban settlements – landfills, incinerators, CP-treatment or even composting plants.

4. In order to reduce the amount of wastes which had to be land filled, first priority was given to avoid and second to recycle waste. Land filling was only the third and last priority. This new ranking order – among other regulations - was introduced into a new Waste Act (1986). On this new legal basis some important regulations could be decided. One was the German Packaging Ordinance (1991); at that time 50 % in volume and one third in weight of household wastes has been packaging. The solution of the problem was to shift the responsibility to collect and recycle packaging wastes to producers, fillers and retailers of all type of packaging. The Dual System with its Green Dot became the ancestor of the European Packaging Directive and most of the new packaging regulations in European countries. In Germany up to 80% of sales packaging now are collected separately and recycled.

Even more important are two Technical Guidelines for Hazardous Wastes (1991) and for Solid Household Wastes and Wastes similar to Household Wastes (1993) which laid down stringent requirements for the constructions and the operation of landfills. At that time we realized that the major problem of landfills are organic wastes which lead to long lasting reactions in a landfill which generates landfill gas and leachate. Another problem are soluble hazardous substances which again end up in leachate. This may contaminate ground water, which has to be used for drinking water in large parts of the country. Such contaminations in most cases are not reversible. When looking for a solution to these serious problems, we realized that no technical means are available to prevent the release of hazardous substances from a landfill into the environment, at least not on a long term scale. Engineered storage and barriers of any type will lose their properties and will fail sooner or later. Barrier or liner systems might shift the problem only to future generations. We had to learn, that many landfills of that time had become contaminated sites. The remediation of old landfills – if it is possible at all –is extremely expensive. On the long term, land filling of mixed wastes may turn out to be the most expensive way of waste disposal, because it does not offer an ultimate solution.

5. The solution we found to avoid those problems is pretreatment of wastes in order to make them safe for land filling. This means to destroy and mineralize organic substances in the wastes, and to extract or stabilize soluble hazardous substances. For

that purpose our Technical Guidelines define the properties of wastes which are allowed to be land filled. This includes among others a very low contents of organic matter (TOC < 3% for solid wastes) as well as leachate limit values for a large number of heavy metals and some other substances. As all existing landfills will contain untreated wastes, a system of multi barriers at the bottom and on top of a landfill are requested as well as leachate and landfill gas collection and treatment systems. Obviously, the new high standard of waste disposal will only achieved after the deadline mentioned above.

6. On this new legal basis new landfills were designed, licensed and built and started operation. Taking into account the state of the art in technology, the only solution to cope with the stringent input criteria for those landfills was to use thermal pretreatment of wastes, like solid waste incineration, this can be done in an environmentally friendly way because since 1990 very stringent regulations on air pollution control from waste incineration are in force in Germany. In order to allow our communities and municipalities to adopt the new regulations for landfills, a rather long transition period from the early 90<sup>th</sup> until the deadline June 1<sup>st</sup>, 2005 was decided.

Alternatives to incineration are allowed since 2002 by using mechanical and biological treatment techniques; however, the high calorific fraction is not allowed to go to landfills but must be incinerated. The treatment facilities must cope with requirements which are similar stringent like the air pollution control for incinerators.

7. In the meantime, European regulations for waste landfills entered into force. The European Landfill Directive (1999) contains similar requirements like valid in Germany. The Landfill Directive requests minimization of wastes to be land filled, pretreatment of solid wastes and reduction of land filling of wastes which contain biodegradable material (in three steps until 2015 to one third of the previous amounts) and in addition, input criteria as well as input control requirements.

And, what is important in order to avoid air pollution by waste incineration, the European Waste Incineration Directive (2000) requests very high standard for air pollution control, limiting the release of heavy metals and even dioxins and furans to a very low value. This new European directive harmonized the standards for waste incineration in Europe, based on boundary values which were already fixed in the 17. Ordinance to the German Air Pollution Control Act in the year 1990. Filter dust and off gas treatment residues from German waste incineration plants are disposed of in underground salt mines, which practically allow an exclusion from the bio sphere. Ashes are mostly treated and used/recycled as a secondary construction material.

8. Within the last years the need for landfills could be reduced significantly in Germany. Major reasons are the increasing amounts of wastes which go for recycling and recovery, like packaging materials, waste paper, construction and demolition wastes, scrap cars, electric and electronic equipment and last not least the separate collection of bio wastes, which go for composting and digestion and substitute fertilizers in agriculture as well as secondary fuel from digestion. The remaining solid wastes go for waste incineration (presently 61 facilities in Germany), for co-incineration in coal-fired power-stations, cement kilns (especially sewage sludge), other industrial incinerators and for mechanical and biological treatment. The amount of solid wastes which go for land filling has been reduced significantly after the above mentioned deadline in 2005. After May 2005, only the low calorific fraction from mechanical biological treatment facilities, slag/ashes from waste incineration and inert wastes like excavation wastes as well as construction and demolition wastes are allowed in landfills (if recycling is not the priority option).

This development has led to a situation that in praxis no new landfills are necessary in Germany. On the contrary, we have to close down several hundred old landfills which are no longer necessary or which do not cope with the new requirements for landfills. Closing down old landfills and organizing the aftercare for many decades are complicated and even expensive tasks. Therefore, the operators of landfills have to accumulate the necessary amount of money (financial security) during the life time of a landfill.

9. Environmental requirements for landfills are only as good as they are implemented and enforced. In Germany we have the principle that landfilling is a task and responsibility of public services. Therefore our larger communities or counties are responsible for landfilling and operate landfills, either by themselves or by public private partnership. But, they can also bring in third parties to act on their behalf, which are private waste management companies. Communities can also exclude certain wastes from their responsibility, depending on quantity or quality of the wastes. In such cases the waste producer like industry or commercial enterprises are obliged to dispose of their wastes within their own responsibility or by giving a contract to a private waste management company. Of course, all legal requirements must be met also in such cases.

10. On the long term we intend to avoid land filling of solid wastes totally in Germany. This means to avoid or to recycle or to treat all solid wastes in a proper way. Strategies, concepts and technical solutions are to be developed now. The time forecast to achieve such an ambitious goal has been laid down already in the year 1999 and

goes towards the year 2020. Then, waste management policy shall contribute significantly to sustainable development of our society; it will be able to substitute a large portion of our consumption of primary resources in an environmentally sound way. At the same time the German waste policy contributes significantly to achieve our ambitious goals to reduce the emissions of climate damaging gases. Avoiding methane emissions from landfills and using organic wastes as a secondary energy source has avoided the emission of 40 million CO<sub>2</sub> equivalents since the year 1999, which is the biggest contribution among all other activities like wind or solar power or use of biomass. This adds another quality to the achievements of our waste policy in Germany.