

Separate Collection of organic waste – how does it work in Germany?

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1. Introduction

The separate collection of biodegradable waste and the composting or fermentation (anaerobic digestion) of this type of waste has played an important role in the field of waste management in Germany for a few years.

The reason for a dynamic development which began about 20 years ago, was the generation of waste and the landfilling of waste in general. Additionally, we learned about the beneficial use of composts in agriculture and horticulture.

In the eighties, the quantities and volume of household waste and other types of waste were steadily rising but the inhabitants of our country were protesting against the construction of more and more landfill-sites.

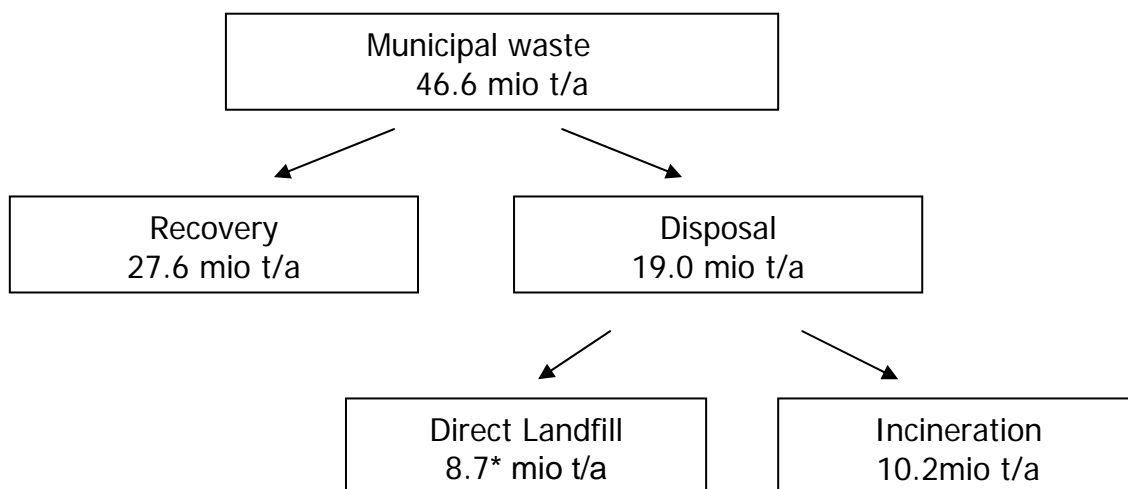
Due to the problems to find sites of finding more landfills, a new policy for the management of waste was created, which was based on the three principles of:

- avoiding
- recycling and
- pretreating waste.

Today, the waste industry in Germany employs more than 200,000 people and the industry has an annual turnover of more than 50 billion Euro. For a few years there has no longer been a need to establish new landfill sites – on the contrary most of the landfill sites have shut down.

Overall, some 50 million tonnes of municipal waste – not only waste from private households – are generated each year.

About 50 % of the municipal waste is recycled; in 1990 the recycling quota was at a level of about 12 %.



*Illegal since June, 1st 2005.

Looking at the major waste streams, we recycle 2/3 of our paper (13.2 million tonnes per year) and 87 % of waste glass – which comes to 2.7 mio tonnes per year.

2. Composting/Fermentation (anaerobic digestion)

As biodegradable materials correspond to about one third of the quantity of municipal waste, it was reasonable to check the possibilities for the reuse of biowaste and not to landfill this type of waste. In addition, it was proved that biowaste, if land-filled, is responsible for emissions of large quantities of methane – a greenhouse gas that is per volume 20 times more significant than CO₂.

On the other hand, there is evidence to support the idea that composted biodegradable waste, has positive effects on soils and plants.

Over the last years, the area of waste utilisation, in particular the separate collection of bio-waste and composting/fermenting them, can be characterised by a particular dynamic. For example, in 1990 less than 1 million tonnes of bio-waste was col-

lected; by 1995 more than 4 million tonnes were collected and, according to estimates from the waste management industry, around 8 million tonnes were collected in 2002 (source: *Bundesgütegemeinschaft Kompost; TU Braunschweig*); nevertheless the treatment-capacity is even higher :

Treatment capacity for bio-waste:

1985 = 0.1 million tonnes

1990 = 1.0 million tonnes

1997 = 7.5 million tonnes

2002 = 12 million tonnes

The number of treatment facilities has also increased correspondingly since 1990 – more than 600 medium-range or large scale composting plants exist in Germany; about 430 are under the control of a private quality assurance organization.

Nearly all inhabitants of Germany have the possibility to make use of separate collection of organic waste nowadays. For example, they can deliver waste from their gardens to central composting plants or central collection places. But not everybody has a separate bin for biowaste: About 39 mio inhabitants (47 %) are equipped with a separate bin for biowaste. This

means that the number of inhabitants who could be supplied with a bio-bin could still be increased.

In addition to the system of the bio-bin combined with a central composting plant, several municipalities give incentives for so called "individual composting" (home-composting), which means that biowaste can be composted in your own garden.

This only works with green-waste which contain the remains of flowers, vegetables and garden waste. This is relevant especially for rural areas and less densely populated communities.

Our statistics show that nearly 100 kg of biowaste (including green-waste) per inhabitant are collected each year – the production of compost thus reaches a quantity of about 4 mio t/year. The figures also show that the collected quantity of about 8 mio t/year is based on a collection of 4 mio t/year of green waste and 4 mio t/year of biowaste – mainly the waste of the bio-bin.

The advantages for crop production of the application of compost are as follows:

- * Increase of soil crumb stability
(Protection of Compaction)
- * Increase of field capacity
(Higher moisture reserves during drought)
- * Improved soil biology (Activation of earth life)
- * Bulk density of soil is reduced (improved aeration and drainage)
- * Erosion protection
- * Application of organic matter leads to increase of humus content in soils
- * Supply of nutrients and lime
- * Economic advantage of 30 – 80 €/ha annually.¹

In the area of bio-degradable wastes, the separate collection has become a reality. Generally speaking, the pollutant content of composts from separately collected bio-wastes lies approximately 95% below the pollutant content of composts produced from mixed household waste.

¹ Forschungsprojekt der Deutschen Bundesstiftung Umwelt : Nachhaltige Kompostverwertung in der Landwirtschaft, November 2003

Table: Separate collection makes the difference in compost quality (mg/kg DM)

	Compost from	
	... mixed waste (average of 207 composts)	... biowaste
Lead (Pb)	513	50
Cadmium (Cd)	5,5	0,5
Chromium (Cr)	714	30
Copper (Cu)	274	30
Nickel (Ni)	45	20
Mercury (Hg)	2,4	0,1
Zinc (Zn)	1570	200

Source: Sachverständigenrat für Umweltfragen, Sondergutachten 1990.

In addition, waste fermentation (anaerobic treatment) for the treatment of separately collected bio-waste has become much more common in recent years. The advantage of fermentation is that the methane gas produced by this process can be used to generate electricity. Composting does not generate any usable energy - on the contrary, composting requires an influx of energy. The treatment capacity of fermentation facilities had reached an amount of about 2.4 mio t in 2002 (fermentation of biowaste and co-fermentation of biowaste with manure from farm-animals. The figures do not include the fermentation plants which use nothing else but manure from farm-animals).

This number also doesn't include the capacity of fermentation-plants which were built to treat residual waste before landfilling.

The capacity of fermentation –plants has significantly increased since 2002 in Germany.

The disadvantage of fermentation are the high treatment costs.

3. Quality Assurance

Since 1 October 1998, the provisions of the Ordinance on Bio-Waste have applied to the utilisation of bio-waste (compost, etc).

The Ordinance contains inter alia comprehensive provisions concerning human, animal and plant health protection levels that are to be maintained when handing over or applying bio-waste. In doing so it should be ensured that no pathogens or germs from plant diseases are spread when utilising compost and fermentation residues. (The ordinance on Biowaste can be downloaded from: <http://www.bmu.de/3379> or <http://www.bmu.de/35501.php#abfall>)

Together with the health protection considerations, the central elements of the Ordinance are the provisions for heavy metals.

As a rule tests for heavy-metals must be carried out as a rule for every 2000 tonnes of bio-waste used, or every 3 months.

Depending on the pollutant levels, 20 or 30 tonnes of bio-wastes (calculated as dry matter) can be applied within 3 years per hectare of land, used for agricultural purposes.

In contrary to sewage sludge, it doesn't seem to be necessary to set provisions for organic micropollutants for composts.

Quality Standards – Heavy metals – (mg/kg DM)

	Germany		EU-working paper	
	I	II	Class 1	Class 2
Lead (Pb)	150	100	100	150
Cadmium (Cd)	1,5	1	0,7	1,5
Chromium (Cr)	100	70	100	150
Copper (Cu)	100	70	100	150
Nickel (Ni)	50	35		
Mercury (Hg)	1	0,7	0,5	1
Zinc (Zn)	400	300	200	400

More important than the organic micropollutants are the hygienic requirements. The Ordinance on Biowaste thus demands direct and indirect process controls and end-product-tests (for example absence of salmonella senftenberg in 50 g of compost or fermentation residue). The temperature level has to be above 55° Celsius for more than two weeks or 65° Celsius over one week in open composting systems and more than 60° Celsius for more than one week in closed systems.

There are also limit values for phytohygienic parameters which must be met.

In contrast to the situation in the sector of the use of sewage-sludge we have no problems with the distribution of compost – all compost which is produced can be sold.

Most of the compost is sold to farmers (40 %), 24 % is sold to professional gardeners and for horticultural uses and 17 % is sold to individual, non professional gardeners (“household gardens”). Small quantities (3 %) go to vineyards – the production of wine doesn't play a very important role in Germany.

A central role in the marketing of composts plays a well - working private quality – controlling system which was established a long time before our ordinance on biowaste became effective.

This quality assurance system demands additional control ele-

ments in comparison to the Ordinance on Biowaste. Nearly 70 % of the compost and residues from digesters are distributed under the label of this quality assurance organisation.

4. Microorganisms from Composting plants

If you are planning to establish a composting plant, you should not forget to take the emissions from composting – plants into account. These emissions, if too high, can be harmful to persons with diseases of the immune system. For example, you should not establish a composting plant too close to a village, especially if the wind blows towards the village. You can compare the problems of microorganisms from composting plants with the problems of an agricultural establishment.

(compare: www.bacterium.de)

5. Conclusion

In the future the composting or fermentation of biodegradable materials will increase within the European countries. One reason for this is the Landfill-Directive (1999/31/EC) which demands that the landfilling of biowaste has to be reduced – with the following steps in comparison to 1995:

- by 25 % until 2006
- by 50 % until 2009
- by 65 % until 2016

The landfill directive also says that biowaste should be composted or fermented as a priority.

Last but not least, it makes sense to compost or ferment biowaste instead of landfilling with reference to greenhouse effects: Studies show that landfill sites are one of the major methane- producers worldwide and that pre-treatment as well as separate waste-collection can contribute a great deal to the reduction of emissions of greenhouse gases.

In order to harmonize standards across Europe, Germany requests a European-wide biowaste – directive, which was in the preparation by DG Environment of the European Commission but has been recently dropped. This is why our Federal Minister Trittin sent a corresponding letter to Commissioner Stavros Dimas and to the ministers for the environment of the other member-states.