Waste Management in the EU

- Landfill Ban and the Issue of Biogenic waste -

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WIERT

Fall Meeting 2005

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what is our historical background?
waste disposal in Europe around 1350
Amsterdam (∼1600)

waste disposal around 1600

prisoners collecting waste (Hamburg 1609)
sorting and utilisation on a landfill (Vienna 1910)
three Container System in Berlin (1907)

designed to separate different types of waste: 
- paper, glass, textiles, metals
- ashes, garbage
- kitchen waste
hand sorting of waste in 1907

products
- green glass
- white glass
- bones
- paper
- textiles
- iron
- brass
- cans
- copper
- tin
- leather
- wood

and in 2000
MSW incineration around 1900

Frederiksberg (DK)

Fulham (UK)

Hamburg (D)
where are we today?
waste generation in kg/cap/y

- <300
- <400
- <500
- <600
- >600

J. Vehlow, ITC-TAB (2005)
waste generation and GDP

waste generation in kg/cap./y

GDP in US—$ per capita and year

USA

J. Vehlow, ITC-TAB (2005)
how do we manage our waste problem?
waste management strategies

adoption

reuse

recycling

inertisation & energy recovery

problems

health risk
emissions
economy

benefits
saving of resources by recovering of
- materials
- energy

waste

landfill

saving of resources by recovering of
- materials
- energy

- Landfill Directive 1999/31/EC
- Hazardous Waste Directive 1999/31/EC
- Dec. 2000/532/EC List of Wastes

Regulated waste streams:
- waste oils
- sewage sludge
- batteries accumulat.
- packaging waste
- ELV
- PCBs
- WEEE

EU legislative framework on waste
consequences

• harmonisation of national regulations
  – technical standards
  – emission standards

main targets

• reduction of biodegradable waste disposal
  (standard 1995)
  – 25 % in 2006
  – 50 % in 2009
  – 65 % in 2016

landfill ban in some countries
landfill tax for organic MSW in Europe in €/Mg

J. Vehlow, ITC-TAB (2005)
status of waste management in 2002 - 2004
direct landfilling of MSW in %

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J. Vehlow, ITC-TAB (2005)
material recycling in %
waste composting in %
waste incineration technology and its today’s environmental impact
waste incineration in Europe in %
municipal solid waste incineration plant
### Emission Limits in mg/m³

<table>
<thead>
<tr>
<th>Parameter</th>
<th>EU</th>
<th>D</th>
<th>NL</th>
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<td>Dust</td>
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<td>SO₂</td>
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<td>Dioxins [ng(TE)/m³]</td>
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**flue gas 5000 m³/Mg of waste**

**emission limits in mg/m³**
### PCDD/F emission sources in Germany

<table>
<thead>
<tr>
<th>sources</th>
<th>emission per year in g I-TEQ</th>
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<tr>
<td></td>
<td>1990</td>
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<tr>
<td>metal industry</td>
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<td>domestic stoves</td>
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<td>traffic</td>
<td>10</td>
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<td>crematoria</td>
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source: www.umweltbundesamt.de
what is the biogenic energy inventory and what are the consequences for energy recovery?
Bioenergy NoE

Source: Abfallbilanz der Länder 1998

MSW composition (Hassia, Germany)

- putrescibles 33.7%
- wood 1.8%
- paper 15.4%
- textiles 2.9%
- diapers 6.3%
- composites 8.0%
- plastics 6.3%
- glass 7.4%
- metals 4.0%
- fines 14.3%
- others 14.3%

MSW = 310 kg/cap./d
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Bioenergy NoE

Putrescibles 15.4 %
Wood 2.9 %
Fines 11.6 %
Textiles 4.6 %
Diapers 3.5 %
Composites 16.3 %
Plastics 21.4 %
Paper 24.3 %

LHV\textsubscript{total} = 10 MJ/kg

LHV of total MSW in MJ/kg (Hassia, Germany)
LHV of regenerative MSW in MJ/kg (Hassia, Germany)

- Paper: 24.3%
- Wood: 2.9%
- Putrescibles: 15.4%
- Textiles: 1.9%
- Diapers: 1.4%
- Composites: 3.3%
- Fines: 2.9%
- Plastics: 0%

LHV$_{reg.} = 5.2$ MJ/kg
lower heating value of MSW in MJ/kg
biogenic energy inventory in MSW in %
substitution of primary energy by total MSW in %
substitution of fossil power by residual MSW in %
CO$_2$ from regenerative waste in % of total CO$_2$
conclusions
status in the EU

- recycling established, still increasing
- MBT and biogas potential not yet exhausted
- waste incineration will be mandatory and is partly accepted as biogenic energy source

challenges

- costs (especially for decentralised systems)
- environmental impact of MBT
- management of residues from thermal treatment
  - bottom ash utilisation
  - APC residue management and disposal