
A Successful Experience in Germany

Marlene Sieck

Federal Environment Agency
Germany
Federal Environment Agency

Department

Waste technology
Technology transfer
Focus on the linkage of waste management and greenhouse gas emission
GMI Partnership-Wide Meeting Krakow 2011

Waste Arisings
(in Mio Tons, including hazardous waste)

- **2000**: 406.7 total, 260.7 Construction and Demolition waste, 47.7 Mining Waste, 48.2 Production and Commercial Waste, 50.1 Municipal Waste
- **2001**: 395.2 total, 251.3 Construction and Demolition waste, 45.3 Mining Waste, 49.4 Production and Commercial Waste, 49.2 Municipal Waste
- **2002**: 381.3 total, 240.8 Construction and Demolition waste, 42.2 Mining Waste, 45.5 Production and Commercial Waste, 52.8 Municipal Waste
- **2003**: 366.4 total, 223.4 Construction and Demolition waste, 46.7 Mining Waste, 46.7 Production and Commercial Waste, 49.6 Municipal Waste
- **2004**: 339.4 total, 187.5 Construction and Demolition waste, 53.1 Mining Waste, 48.4 Production and Commercial Waste, 50.5 Municipal Waste
- **2005**: 331.9 total, 184.9 Construction and Demolition waste, 52.3 Mining Waste, 46.6 Production and Commercial Waste, 52.3 Municipal Waste
- **2006**: 340.9 total, 196.4 Construction and Demolition waste, 56.1 Mining Waste, 42.1 Production and Commercial Waste, 46.4 Municipal Waste

Source: Statistisches Bundesamt 2008
Composition of Household Waste 2006

Total: 40.8 Mio Tons

Other separately collected fraction
8.1 Paper,
4.5 Plastic/ Light Packaging

16.5

Household Waste, Commercial Waste
(similar in composition to household waste)

14.3

Bulky Waste

4.0

Garden and Park Waste, Biological Fraction

3.8

Biowaste
(separately collected from private households)

2.2
Separate collection of

- Paper
- Glass
- Packaging Waste
- Biowaste
- Waste Batteries
- Electronic Waste
More Recyclables than Residues in 2007

Household Waste

1990
- Residues: 87%, 34 Mio Tons
- Recyclables: 13%, 5 Mio Tons

2004
- Residues: 42%, 18 Mio Tons
- Recyclables: 58%, 25 Mio Tons

2007
- Residues: 38%, 16.1 Mio Tons
- Recyclables: 62%, 25.7 Mio Tons

Source: Statistisches Bundesamt 2009
Landfill ban for untreated waste

- Waste Storage Ordinance – June 2005: waste can no longer be landfilled without pre-treatment
- 70 WIP – 20 Mio. t. cap.
- 50 MBWTP – 7.0 Mio. t. cap.
Landfills for Household Waste
(2005 - Ban of landfilling of un-treated waste)

„Shrinkage goes on“

Source: Umweltbundesamt
Changes in pathways for management of household waste
Significant increase of waste treatment capacities
Waste incineration plant in Hamburg 1895
GHG Reduction Goals:

- **Kyoto Protocol:**
  - total cut of at least 5% by 2012 (baseline of 1990)
  - European Union: 8 %
  - Burdon Sharing; differentiated reduction goals
  - Germany: reduction goal by 21%

- **Post-Kyoto-Process:**
  - further development by 2020

- European Union: 20 (30) % by 2020

- Germany: 30 (40) % by 2020
Greenhouse gas emission targets of EU Member States for 2008–2012 relative to base-year emissions under the EU burden-sharing decision

- Spain +15.0 %
- Greece +25.0 %
- Portugal +27.0 %
- Ireland +13.0 %
- Sweden +4.0 %
- France 0 %
- Finland 0 %

- Luxembourg -28.0 %
- Austria -13.0 %
- Belgium -7.5 %
- The Netherlands -6.0 %
- Denmark -21.0 %
- Italy -6.5 %

- Germany -21 %
- United Kingdom -12.5 %
# National Climate Protection Programme

Reduction contributions of the individual sectors up to 2012

<table>
<thead>
<tr>
<th>Measures and instruments</th>
<th>Reduction potential (in mill. t CO₂ equivalent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecological tax reform</td>
<td>20</td>
</tr>
<tr>
<td>Renewable energy sources</td>
<td>20</td>
</tr>
<tr>
<td>Measures in household and building sector</td>
<td>18 to 25 (by 2005)</td>
</tr>
<tr>
<td>Measures in industry</td>
<td>15 to 20 (by 2005)</td>
</tr>
<tr>
<td>Measures in transport sector</td>
<td>15 to 20 (by 2005)</td>
</tr>
<tr>
<td>Measures in energy sector</td>
<td>20 (by 2005)</td>
</tr>
<tr>
<td>Contribution by waste sector</td>
<td>20</td>
</tr>
<tr>
<td>Measures in the agricultural and forestry sector</td>
<td>not quantified</td>
</tr>
</tbody>
</table>
Status Report on the Waste Sector’s Contribution to Climate Protection and Possible Potentials

by

commissioned by the Federal Environment Agency

in co-operation with
## Possible substitute processes, taking waste incineration plants as an example

<table>
<thead>
<tr>
<th>Waste incineration plant without energy utilisation</th>
<th>Waste incineration plant plus power</th>
<th>Waste incineration plant plus power and heat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debit (plus): CO₂ emissions from waste incineration plant due to combustion of fossil components in waste</td>
<td>Debit (plus): CO₂ emissions from waste incineration plant due to combustion of fossil components in waste</td>
<td>Debit (plus): CO₂ emissions from waste incineration plant due to combustion of fossil components in waste</td>
</tr>
<tr>
<td>Credit (minus): CO₂ emission savings due to avoidance of power generation in power plants</td>
<td>Credit (minus): CO₂ emission savings due to avoidance of power generation in power plants</td>
<td>Credit (minus): CO₂ emission savings due to avoidance of power generation in power plants</td>
</tr>
<tr>
<td>CO₂ emission savings due to avoidance of heat generation by a typical household heating system</td>
<td></td>
<td>CO₂ emission savings due to avoidance of heat generation by a typical household heating system</td>
</tr>
</tbody>
</table>
Greenhouse effect due to municipal waste

<table>
<thead>
<tr>
<th>Year</th>
<th>Basis I</th>
<th>Basis II</th>
<th>Optimised</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>-7.7</td>
<td>-10.7</td>
<td>-13.2</td>
</tr>
<tr>
<td>2005</td>
<td>37.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Credits (CR)
- CR Waste incineration
- CR Co-incineration
- CR Biowaste
- CR Lightweight packaging
- CR Waste paper
- CR Waste glass
- CR Bulky waste/waste wood
- CR Metals
- Scrap recovery
- Bulky waste/waste wood recovery
- Waste glass recycling
- Waste paper recycling
- Lightweight packaging recovery
- Biowaste treatment
- Landfill
- MBT
- Waste incineration plant
- Collection

Carbon dioxide equivalent (CO₂ equivalent)
Methane emissions from landfill sites in Germany in Gg (IPPC-FOD)
Selected results of a study by Öko-Institute and IFEU on behalf of

Federal Environment Ministry
Federal Environment Agency
Federation of the German Waste, Water and Raw Materials Management Industry

January 2010

http://www.uba.de/uba-info-medien-e/4049.html
Methodology

• GHG-balances following **LCA standard ISO 14040**

• **No waste reduction or increase** was assumed for the scenarios to show only the effects of the waste handling

• Calculations for **each** separated collected **waste type** and for **residual waste** to
  - incineration (MSWI plants) and
  - mechanical-biological treatment/stabilisation (M(B) plants)

• Assumption for potential scenarios: using existing technology of the current situation in Germany

• Assumption for material recycling of paper and cardboard: wood saved due to material recycling is used for energy production in Scandinavia (baseline)
**Scenarios**

2006 current situation

GHG impacts and credits for recycling, incineration and treatment of residual waste on the basis of current technology ➔ recycling rate about: 62 %

2020 Technology

Improvement in the technical standards with unchanged waste flows. It is assumed that net efficiencies of plants and the gas yields of anaerobic digestion plants increase and highervalue secondary products are produced ➔ recycling rate about: 62 %

Scenario 2020 Abfall (waste)

Change in the waste flows with increased collection and more recycling with unchanged technical standards. It is assumed that 50 % of the recyclable materials still in the mixed residual waste in 2006 are additionally collected and utilised. ➔ recycling rate about: 72 %

Scenario 2020 AT

The combination of the scenarios 2020 T and A. ➔ recycling rate about: 72 %
GMI Partnership-Wide Meeting Krakow 2011

Greenhouse gas emissions according to material flows

- Net emission: 38 million t
- Total saving: 65 million t
- Net credit: -27 million t
**Conclusions**

To exploit the Climate Protection Potential of an effective waste management we need

- landfill ban
- increasing recycling rates
- waste-treatment with the best available technology
Technology Transfer

Bewährte Verfahren zur kommunalen Abfallbewirtschaftung

Best Practice Municipal Waste Management

Meilleures pratiques en maîtrise des déchets des communes

Испытанные методы муниципального менеджмента отходов

Funded by Umwelt Bundes Amt
Produced by intecus
Thank you for your attention!

marlene.sieck@uba.de

Further information: www.umweltbundesamt.de