Waste Management in Austria
- How to Avoid Wasting Waste

Dublin, London, Edinburgh
08.-10.06.2009

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Table of contents

- Problems and developments
- Objectives & Rules
- Waste Management Strategy
- Achievements
- The future
Austrian waste arisings

- 6,800 kg waste/capita.a
- 448 kg household waste/cap.a
Problems: waste growth

- GDP
- Total waste
- Household waste

Growth in Austria 1996 to 2007 in %
Further problems

- Over 25% of fresh food => rubbish bin
- Electronic products with hazardous substances increasing
- Imported products with unknown composition increasing
Austrian metal consumption

1980 to 2006:
- Domestic metal extraction -43 %
- Metal imports +640 %

Chromium: security of supply?

- Range of known economic reserves: 8 years

- Market share of extraction companies:

<table>
<thead>
<tr>
<th>Company</th>
<th>Year 2003 market share in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xstrata</td>
<td>20</td>
</tr>
<tr>
<td>BHP Billiton</td>
<td>10</td>
</tr>
<tr>
<td>Tata Iron and Steel</td>
<td>9</td>
</tr>
<tr>
<td><strong>Top 3: Total</strong></td>
<td><strong>39</strong></td>
</tr>
</tbody>
</table>

- Market share of extraction countries:

<table>
<thead>
<tr>
<th>Country</th>
<th>Year 2008 market share in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa</td>
<td>45</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>17</td>
</tr>
<tr>
<td>India</td>
<td>15</td>
</tr>
<tr>
<td><strong>Top 3: Total</strong></td>
<td><strong>77</strong></td>
</tr>
</tbody>
</table>

Waste strategy objectives

Minimise impact of waste and waste strategy on public health and the environment without introducing excessive costs

- Minimise emissions
- Reduce hazardous substances in the economy
- Minimise distribution of hazardous substances
- Minimise primary resource and energy consumption
- Increase resource efficiency

Waste Management Rules

- Separate waste fractions
- Waste disposal only to sanitary landfill sites
- Only inert waste sent to landfill (Total Organic Carbon (TOC) < 5 %)
- All reactive waste must be treated

### Emission limits for waste incineration

Half-hour-average limit values for waste incineration in mg/Nm³ from
- EU directive DIR 2000/76/EC,
- Austrian Waste Incineration Ordinance AVV
- Licensing of current projects

(Selected parameters)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>EU-Directive 2000/76/EC</th>
<th>AVV</th>
<th>License of plant Linz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust</td>
<td>30</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Organic Carbon</td>
<td>20</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>HCl</td>
<td>60</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>HF</td>
<td>4</td>
<td>0.7</td>
<td>0.3</td>
</tr>
<tr>
<td>SO₂</td>
<td>200</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>NOₓ as NO₂</td>
<td>400</td>
<td>100</td>
<td>60</td>
</tr>
</tbody>
</table>

Quality-assured recycling of construction material

- The concentration of hazardous substances in the material and in the aqueous extract (eluate) define the quality class and the field of application
- Example nickel

<table>
<thead>
<tr>
<th></th>
<th>Class A+</th>
<th>Class A</th>
<th>Class B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Nickel-concentration in material (mg/kg dry matter)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>55</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>Max. Nickel-concentration in the eluate (mg/kg dry matter at a liquid/solid ratio of 10/1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.4</td>
<td>0.4</td>
<td>0.6</td>
<td></td>
</tr>
</tbody>
</table>

- Compliance is audited by independent third party

Organising the Waste Management Strategy
Historic development

• Phase 1: All waste is collected and sent to legal landfills
• Phase 2: Separate collection of paper, glass, metals and plastics
• Phase 3: Ban on landfilling reactive waste => treatment or recycling of most waste
• Phase 4: Waste prevention and recycling revisited
## Administrative Organisation of Austria

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>National (Federal level)</td>
<td>1 The State</td>
</tr>
<tr>
<td>Regional level</td>
<td>9 Federal Provinces</td>
</tr>
<tr>
<td>Local level</td>
<td>2,359 Regional Authorities → aggregated to 85 Waste Management Associations</td>
</tr>
</tbody>
</table>
Responsibilities

• Federal level
  - Regulation and monitoring of hazardous waste
  - General rules for collection and treatment
  - Transboundary shipment

• Regional level
  - Regulation and monitoring of non-hazardous waste
  - Licensing

• Local communities
  - Collection and treatment of household/municipal waste

• Industry
  - Collection and treatment of industrial waste
## Waste Collection Strategy: Households
(+industries ≤ 240 l/week)

<table>
<thead>
<tr>
<th></th>
<th>Separate Household Bins</th>
<th>Recycling Bank Sites</th>
<th>Reuse &amp; Recycling Centres</th>
<th>In-Store Recycling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual waste</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper</td>
<td>X</td>
<td>(X)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Biodegradable</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hollow plastic packaging</td>
<td>X</td>
<td>(X)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Metal packaging</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glass</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Textiles</td>
<td></td>
<td>(X)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Batteries</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric/electronic equipment</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lamps</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Recycling Bank Site
Reuse & Recycling Centre
Reuse & Recycling Centres - Location

approx. 7,500 people/centre
Waste Recovery and Disposal Systems
(only main streams shown)

- Residual waste
  - High calorific value waste
    - Thermal Treatment
    - Mechanical - Biological Treatment
      - Mechanical Separation
      - Biogas
      - Composting
      - Landfill
      - Recycling
      - Special Treatment:
        - Chemical – Physical Treatment (Emulsion splitting, neutralisation)

- Inert waste
  - Landfill

- (Separate) Collection
  - Transport
    - Mechanical Separation
    - Subsurface Landfill Germany

- Bio-waste
  - Bio-waste
  - Construction residues, Vehicles, WEEE...
  - Special Treatment:

- Emulsions, acids...
  - Special Treatment:

- all about Austria
Location of MBT and waste incineration plants

- Waste incineration plant (operational)
- Waste incineration plant planned/under construction
- Mechanical-Biological-Treatment-(MBT)-Plant operating
- MBT-Plant planned/under construction
## Recovery and Disposal Plants

<table>
<thead>
<tr>
<th>Plant Type</th>
<th>Capacity in Mt/a 2005</th>
<th>Number of Plants 2005</th>
<th>Change till 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sorting Plants</td>
<td>1</td>
<td>123</td>
<td>+10</td>
</tr>
<tr>
<td>Municipal Solid Waste incineration</td>
<td>1.7</td>
<td>9</td>
<td>+1</td>
</tr>
<tr>
<td>Other Incineration</td>
<td>2.9</td>
<td>180</td>
<td>+7</td>
</tr>
<tr>
<td>Mechanical-Biological Treatment (MBT)</td>
<td>0.8</td>
<td>16</td>
<td>+1</td>
</tr>
<tr>
<td>Composting + Biogas</td>
<td>1.4</td>
<td>780</td>
<td>Composting +13</td>
</tr>
<tr>
<td>Physical-Chemical Treatment</td>
<td>0.5</td>
<td>37</td>
<td>+0</td>
</tr>
<tr>
<td>Treatment of Construction Waste</td>
<td>5.5</td>
<td>293</td>
<td>+48</td>
</tr>
<tr>
<td>Landfills</td>
<td></td>
<td>666</td>
<td>-118</td>
</tr>
<tr>
<td>Special Treatment + Recycling</td>
<td>2.4</td>
<td>190</td>
<td></td>
</tr>
</tbody>
</table>

## Key Austrian Waste Management Indicators

<table>
<thead>
<tr>
<th></th>
<th>Private companies (including privatised public companies)</th>
<th>Municipal and public institutions</th>
<th>Total sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Turnover in million €</td>
<td>4,000</td>
<td>1,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Employees</td>
<td>25,000</td>
<td>6,000</td>
<td>31,000</td>
</tr>
<tr>
<td>Number of companies</td>
<td>850</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: denkstatt 2009
Example of an Austrian waste collector/treater

<table>
<thead>
<tr>
<th></th>
<th>Austria</th>
<th>Other countries</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual turn-over in million €</td>
<td>200</td>
<td>94</td>
<td>294</td>
</tr>
<tr>
<td>Employees</td>
<td>1,405</td>
<td>2,049</td>
<td>3,454</td>
</tr>
<tr>
<td>Sites</td>
<td>22</td>
<td>53</td>
<td>75</td>
</tr>
<tr>
<td>Customer communities</td>
<td>504</td>
<td>1,140</td>
<td>1,644</td>
</tr>
<tr>
<td>Customer companies</td>
<td>17,245</td>
<td>15,783</td>
<td>33,028</td>
</tr>
</tbody>
</table>

Source: denkstatt 2009, www.saubermacher.at
Achievements
Flow & distribution of lead in Austria (2005)

- **Waste Management Sector**
  - Stock + 3 kt
  - 14 kt

- **Private Households**
  - Stock + 1 kt
  - 20 kt

- **Industry Commerce Services**
  - Imports 8 kt
  - 2 kt

- **Water**
  - + 0.01 kt

- **Air**
  - + 0.05 kt

- **Exports**
  - 4 kt

Source: Umweltbundesamt (2009): RUSCH
Separate collection of household waste 2007

Household waste arisings:
- 167 kg/cap (37.4 %) residual waste
- 281 kg/cap (62.6 %) separately collected.

Old-materials (160 kg/cap):
- 80 % recycled
- 17 % used for energy recovery.

Source: Federal Waste Management Plan Statusbericht 2008
Recycling material for construction

- 5 million t/a recycled as quality-assured construction material (= 63 % of the potential)

- 39 companies qualify for the quality label
Reasons for success

- Environmental concerns are important => most people want to do something for the environment
- Good working relationship between waste managers, public authorities and interest groups
- Waste is of value
Objective: All reporting obligations (e.g. hazardous waste) should be fulfilled via internet by waste producers and waste managers

Status: partly realised
Federal waste prevention and recycling strategy

**Groups Measured**

- Construction and demolition waste
- Input-/output-optimization of incineration
- Hazardous substances in products
- Full Ban on cadmium in batteries
- Multi-trip packaging
- Services instead of products

**Development/implementation of a building pass**

- Promotion of waste saving construction
- Lifetime extension
  - Selective (recycling oriented) demolition
  - Promotion of recycling
Lifecycle-Management

Material Extraction

Integrated Material Flow Management for meeting a Sustainable Demand

Consumption

Production

Economic Sphere

Environmental Sphere

Safe Sink for hazardous substances

Primary Material Resources

Emissions from Consumption

Emissions from Production

Emissions from Integrated Material Flow Management
Further Information

www.umweltbundesamt.at/en/umweltschutz/abfall/

www.bundesabfallwirtschaftsplan.at/article/
articlevicapita/52746/1/13192/