Arnoldstein – November 9’th 2006

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Amount of Bottom Ash Utilized

<table>
<thead>
<tr>
<th>Country</th>
<th>Amount (tonne)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>0</td>
</tr>
<tr>
<td>Denmark</td>
<td>500,000</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1,000,000</td>
</tr>
<tr>
<td>France</td>
<td>1,500,000</td>
</tr>
<tr>
<td>Germany</td>
<td>2,000,000</td>
</tr>
<tr>
<td>Norway</td>
<td>2,500,000</td>
</tr>
<tr>
<td>U.K.</td>
<td>500,000</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Portugal</td>
<td>1,500,000</td>
</tr>
<tr>
<td>Switzerland</td>
<td>2,000,000</td>
</tr>
<tr>
<td>Sweden</td>
<td>2,500,000</td>
</tr>
</tbody>
</table>
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Utilization rate of Bottom Ash

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>100%</td>
</tr>
<tr>
<td>Denmark</td>
<td>90%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>80%</td>
</tr>
<tr>
<td>France</td>
<td>70%</td>
</tr>
<tr>
<td>Germany</td>
<td>60%</td>
</tr>
<tr>
<td>Norway</td>
<td>50%</td>
</tr>
<tr>
<td>U.K.</td>
<td>40%</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>0%</td>
</tr>
<tr>
<td>Portugal</td>
<td>0%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>0%</td>
</tr>
<tr>
<td>Sweden</td>
<td>0%</td>
</tr>
</tbody>
</table>

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- **Aim of report**
  
  *'Position paper' on bottom ash management*

  *Establish a scientific based knowledge on MSW/ Bottom Ash*

  *Important contribution to discussions within the ISWA countries for*

  - Plant owners and operators
  - National and local authorities
  - EU Commission
Headlines

Summary
Introduction and scope of report
Bottom ash legislation
Bottom ash management
Barriers for utilization
Annex list

Focuses

1. Bottom ash Legislation
   Description of national legislation in most European countries and of upcoming legislation in EU, with criteria for utilization

2. Bottom ash Management
   Description of management methods and utilization and disposal practices in most European countries

3. Barriers for utilization
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### Well described

- Denmark
- France
- Germany
- The Netherlands
- Switzerland
- Italy
- Sweden

### Also described

- Austria
- Belgium
- Czech Republic
- Finland
- Norway
- Portugal
- Spain

### Well described parts

- Legislation
- Management

### Subjects to be deepened

- Market trends and future management
- Future strategies
  - How are we going to meet the future barriers with more stringent criteria, political obstacles etc.
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Interesting findings
- Utilization of bottom ash is a question of easy and cheap access to natural gravel
- All countries have criteria for utilization based on leaching tests
- But
  - Different leaching criteria for utilization
  - Different testing methods
  - Different leading principles of assessing the environmental allowable impact

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Interesting findings
- Regulatory bodies in Germany, France, Netherlands and Denmark all have the same double folded aim to enhance utilization of secondary materials preserving natural resources and to protect the environment
- The Netherlands up till now aim to ensure marginal soil burdening, the leading principle being maintenance of the average soil quality – a principle that will be left and replaced by new legislation expected in 2007 judging the environmental impact
- Denmark relies almost exclusively on ground water as a source of drinking water, and therefore has a strong need for strict protection of the ground water quality
Interesting findings

Testing methods

- Common test judging the environmental impact of utilization of MSW-bottom ash is needed
- Denmark Batch test L/S=2
- The Netherlands Column test L/S=0,1-10
- Germany/France Batch test L/S=10
- Italy Sequential Batch test L/S=5

THANKS

Thank you for your efforts
Subgroup
» Robert Morin / Francis Angotti
» Frans Lamers
» Martin Brünner
» Jörn Franck
• coordinating authors (sub-subgroup)
  » Kim Crillesen
  » Jørgen Skårup
  » Kirsten Bojsen
“Management of Bottom Ash from WTE Plants”
An overview of management options and treatment methods

The new report on Management of Bottom Ash from WTE plants is now available at the ISWA Online Bookshop www.iswa.dk

The report, written by a team of experts from various international institutions, provides an overview of the current situation and recent developments in the management of bottom ash from waste-to-energy (WTE) plants. It includes case studies from different regions, highlighting the challenges and solutions. The report concludes with recommendations for further research and policy development to improve the management of bottom ash.

The report can be downloaded for free on the ISWA website. It is intended for anyone interested in waste management, energy recovery, and environmental protection.