TRENDS IN WASTE INCINERATION AND RESIDUE MANAGEMENT

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goals of waste incineration

- aftercare free disposal
  - inertisation
  - mass and volume reduction

- side conditions
  - protection of human health
  - environmental compatibility

- actual trends in Europe
  - improvement of energy recovery
  - improvement of material recovery
MSW 1000 kg

bottom ash

utilisation in building sector

boiler

filter

APC

wet scrubbing 12 kg

dry scrubbing 40 kg

15 kg filter ash

160 kg

200 kg

20 kg metals

20 kg for disposal

mass flow in a modern MSWI
conventional bottom ash utilisation

- **main drivers**
  - increasing landfill gate fees
  - *stringent landfill access standards*

- **pretreatment**
  - size classification
  - metal separation
  - aging / maturation

- **markets**
  - construction (roads, noise protection walls, ...)
  - *aggregate (concrete, ...)*
treatment of bottom ash for utilisation (Hamburg)

(source: Zwahr 2005)
bottom ash management in Europe 2009/2010
management of German bottom ash in 2008

- total: 4,762,000 Mg
- metals ≈ 8%

source: ITAD 2009
metal content in bottom ash in kg/Mg
over band magnet separator
Metal separation as part of bottom ash treatment (Hamburg)
metal separation equipment (I)

magnetic drum separator

eddy current system

metal separation equipment (I)
sensor operated system

metal separation equipment (II)
metal separation equipment (III)

hydraulic belt separator

coarse fraction

feeding chute

belt pressure control

adjustable rollers

water with fine fraction
metal separation from bottom ash with classification

source: Bunge 2010
dry deslagging – concept SATOM Monthey

source: Koralewska 2010 (modified)
M = motor
P = pressure
T = temperature

**Dry deslagging – concept KEZO Hinwil**
potential of metal recovery in Germany
potential of metal recovery in Germany and its value
mass flow in a modern MSWI

MSW 1000 kg

- boiler
- filter
- APC

- 15 kg filter ash
- 40 kg dry scrubbing
- 12 kg wet scrubbing

utilisation in building sector

- 160 kg
- 200 kg
- 20 kg metals
- 20 kg for disposal

1000 kg MSW

160 kg bottom ash

20 kg for disposal

20 kg metals

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metals in filter ashes

- Cu: 1,300 g/Mg
- Zn: 45,000 g/Mg
- Cd: 600 g/Mg
- Sn: 1,500 g/Mg
- Pb: 16,000 g/Mg
scheme of the 3R Process
extraction efficiency in the FLUWA and 3R Process
potential of metal recovery and its value in Germany
potential of metal recovery from WtE residues in Germany
conclusions

bottom ash management

- utilisation as building material is widely used in Europe
- metal recovery is actually more important
  - ferrous scrap recovery is common practice
  - non-ferrous metals gain in interest (Al and Cu)

filter ash management

- inertisation by extraction and Zn recovery in Switzerland

APC residue management

- disposal prevails, only few cases of recovery
outlook

- Future of bottom ash utilisation as building material unclear

- Rising prices will push metal recycling
  - Dry bottom ash discharge may expand for better metal separation from fine fractions
  - High sophisticated separation techniques will be applied
  - Focus will be on heavy non-ferrous metals

- Zn recovery from filter ash becomes attractive

- Eventual consequences
  - Wider application of FLUWA/3R like processes
  - Return to wet scrubbing

- APC residues remain a problem
  - Final sink for watersoluble salts is missing
  - Future of recovery of components?