THE EUROPEAN PERSPECTIVE

Bettina Kamuk, Rambøll Market Director WtE
RAMBOLL IN BRIEF

- Established in 1945
- Ramboll consulting group: close to 9,000 employees
- Leading waste-to-energy consultant with >50 specialists within WtE
- Independent consulting services
The 5 step waste hierarchy helps to achieve sustainable waste management. Energy recovery from waste is defined as recovery.
SUSTAINABLE SOLUTION - WTE

- Biodegradable municipal waste to landfills reduced to 35% in 2016 (base 1995)
- Energy recovery
- Substitution of fossil fuels
- Reducing transportation - close to generation
- Inert bottom ash reused or disposed of
- Reduction of GHG emission (CO₂ neutral)
- Do not leave problems to next generations
TREATMENT OF MSW IN EU27

A large part of the EU27 waste is still wasted by disposed of on landfills!

Waste is a precious resource which should be recovered.

Treatment of Municipal Solid Waste in the EU 27 in 2006.
250 M tpa
Source: EUROSTAT
TREATMENT OF MSW IN THE EU 27 IN 2006
Source: EUROSTAT


[Bar chart showing percentages for each country]
CEWEP – CONFEDERATION OF EUROPEAN WASTE TO ENERGY PLANTS

- Represents 338 of the 420 EFW facilities in Europe
- Treats 56 million tonnes MSW per year
- Supplies electricity for 7 million households
- Supplies heat for 13.4 million households
- Avoids emission of 23 million tonnes CO₂ eq comparable to emission of 11 million cars
- When the landfill ban is fully implemented 45 million tonnes CO₂ eq could be avoided -corresponds to 6% of EU’s reduction target
IS ENERGY RECOVERY FROM WASTE EVOLVING IN EUROPE?

• Yes - absolutely!
• Suppliers order book 2000-2011 counts more than 100 WTE lines (upgrading, replacement, green field)
• More plants are going to come in the countries where there is no/few WtE facilities today (e.g. Poland, Ireland)
• Ramboll involved in more than 30 projects (e.g. 6 in UK)
TECHNOLOGY USED FOR WTE IN EUROPE

- Almost all new facilities are modern, high efficient grate technology (mass burn)
- Few or no alternative technologies
  - Promising for many years
  - Failed operation
  - Requires pre-treatment
  - Less energy output
  - Small scale plants
  - Expensive investment and operation
  - Difficult to obtain bank loans (German MBT plants)
STATE-OF-THE-ART TECHNOLOGY WTE IN EUROPE
## EMISSION LIMITS - EU DIRECTIVE 2000/76/EC

<table>
<thead>
<tr>
<th>Compound</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust</td>
<td>10 mg/Nm³</td>
</tr>
<tr>
<td>HCl</td>
<td>10 mg/Nm³</td>
</tr>
<tr>
<td>HF</td>
<td>1 mg/Nm³</td>
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<tr>
<td>NOₓ</td>
<td>200 mg/Nm³</td>
</tr>
<tr>
<td>Cd + Tl</td>
<td>0,05 mg/Nm³</td>
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<tr>
<td>Hg</td>
<td>0,05 mg/Nm³</td>
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<tr>
<td>Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V</td>
<td>0,5 mg/Nm³</td>
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<tr>
<td>SO₂</td>
<td>50 mg/Nm³</td>
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<tr>
<td>TOC</td>
<td>10 mg/Nm³</td>
</tr>
<tr>
<td>Dioxin</td>
<td>0,1 ng/Nm³ TEQ</td>
</tr>
</tbody>
</table>

*(dry, 11% O₂)*
ENERGY RECOVERY

- Electricity (2/3 MWh per tonne of waste - 700 KWh/t)
- Heat (district heat, cooling, steam) (2 MWh per tonne of waste – 2,000 kWh/t)
- Thermal efficiency close to 100% (high electricity performance, heat production, flue gas condensation)
- In Copenhagen (Denmark) more than 1/3 of district heating from WtE – 50 km net connecting 3 WtE facilities
ASM BRESCIA, ITALY

- Operates 3 lines 800 tpd each (800,000 tpa). Electricity and district heating
- Won WTERT award at Columbia University
  - Energy performance
  - Air emission
  - Architecture
ASM BRESCIA, ITALY

- Located close to the city of Brescia
- Open public communication programme
- Nice and clean
- Continuous improvement (emission, energy efficiency)
LOCATION CLOSE TO ENERGY CONSUMERS
SPITTELAU, VIENNA - AUSTRIA

- Most Famous Energy Recovery Facility – located in the City Center.
- Tourist Attraction!
- Electricity, District Heating and Cooling
- Open Public Communication Programme
ENERGY RECOVERY FROM WASTE

- UK HPA: "The evidence suggests that any potential damage to health of those living close to incinerators is likely to be very small, if detectable. The Agency therefore does not believe that studies of public health around individual incinerators are scientifically justifiable."

- UK EPA: Millennial celebrations in London the emissions from 15 minutes (35 ton firework) equalled 120 years of dioxin emissions from one single WtE plant

- German EPA: WtE reduces CO2 emission and reduces the use of fossil fuels. WtE does not prevent recycling

- Swiss University: PM2.5 from WtE is insignificant – transport and industry the main source

- Danish EPA: only 1% of the dioxin emission is from WtE (50% private fire places). Only 3.5% of NOx-emission is from WtE

Source: APSWG briefing on Energy from Waste; UK Environment Agency 2000
LESSONS LEARNED

• Choose well-proven, modern technology
• Improve energy efficiency – also district heating/cooling where possible
• Low emissions
• Combine with landfill ban – or political incentives
• Spend money for improved architectural appearance
• Open public communication strategy
• WtE does not create health problems
• WtE contributes to GHG reduction
CONTACT DATA

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