New WtE projects in Europe and worldwide

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ESWET
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1. Statistics on WtE - Market in Europe

European Market Share Analysis of Thermal Waste Treatment Plants
Martin GmbH

2010 Edition

Vaccani, Zweig & Associates
European Plants / Awards 2000 - 2009

Average: 11'626 tpd

EUROPEAN SUPPLIERS OF WASTE TO ENERGY TECHNOLOGY

07/07/2010
European Plants / Awards 2000 - 2009 (Countries)

total = 116,264 t/d

Germany 27.0%
France 12.2%
Italy 9.2%
United Kingdom 11.0%
Sweden 7.4%
Netherlands 6.0%
Spain 2.0%
Austria 3.8%
Switzerland 3.6%
Norway 2.9%
Denmark 2.5%
Russia 1.9%
Qatar 1.3%
Azerbaijan 1.4%
Finland 1.2%
Hungary 1.2%
Other: Czech Republic, Ireland, Slovakia, Luxembourg, Andorra

* Other: Czech Republic, Ireland, Slovakia, Luxembourg, Andorra
European Plants / Awards 2007/2008/2009 (Countries)

2007
- Switzerland: 3.5%
- Austria: 3.6%
- Belgium: 5.4%
- United Kingdom: 5.3%
- Sweden: 6.1%
- Norway: 8.1%
- Spain: 9.7%
- France: 9.7%
- Netherlands: 17.2%
- Germany: 29.5%

Total = 15,288 t/d
Number of awards: 29

2008
- Switzerland: 3.8%
- Sweden: 2.7%
- France: 6.4%
- Netherlands: 10.6%
- Norway: 15.4%
- Germany: 23.8%
- United Kingdom: 37.4%

Total = 8,107 t/d
Number of awards: 14

2009
- Switzerland: 5.9%
- Italy: 4.8%
- France: 30.1%
- Finland: 7.0%
- Ireland: 7.6%
- Germany: 9.3%
- UK: 16.0%
- Azerbeidschan: 19.4%

Total = 8,180 t/d
Number of awards: 9
European Order Backlog 2009 (Countries)

Total = 32,285 t/d

United Kingdom 20.8%
Germany 13.7%
France 13.3%
Italy 13.3%
Norway 6.6%
Netherlands 6.0%
Switzerland 5.3%
Azerbaijan 4.9%
Spain 4.0%
Austria 2.8%
Czech Republic 2.0%
Ireland 1.9%
Finland 1.8%
Luxembourg 1.5%

European Suppliers of Waste to Energy Technology

07/07/2010
Development of Order Backlog 2001 - 2010
(Suppliers)

Average: 34'981

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<thead>
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<th>Year</th>
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<tr>
<td>2010</td>
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2. WTE - Market in Europe / General Statements (1)

- In general, the market dynamics are relatively slow.
- The German market had a complete breakdown - only one project has been awarded in 2009 (IGNIS-Spremberg).
- Many new plants have been built in D during the last years, mainly to burn RDF.
- New plants in D caused overcapacities with the result of reduced tip fees on the market.
- Overcapacities in D might also influence waste flows to and from neighboring countries.
2. WtE - Market in Europe / General Statements (2)

- In Netherlands a moratorium has been put in force not to build new WtE plants til 2020
- Norway is saturated
- Sweden is also facing overcapacities (but still some projects for new installations existing)
- Some market volume expected in Finland as well as in Austria and Switzerland
- Denmark shows good prospect for new projects
- East Europe is moving ahead very slowly (mainly Poland)
- Markets with good volumes for the coming years are UK and Italy
Order backlog in the books of key market players decreasing.
Number of competitors stable.
Price level remains low, mainly in Germany, Italy, Scandinavia and UK.
Future energy and material costs hard to predict.
Sub-suppliers raise price level after a drop in 2009.
Boiler manufacturers suffer from overcapacities and remain aggressive.
Increasing risks / influences by currency exchange rates.
Grate incineration is - by far - the leading technology for WtE

Some fluidized bed plants have been installed, but operational experience is not always satisfactory

Some (but few) gasification activities (mainly UK)

Funding of gasification/conversion technologies in UK
2. WtE - Market in Europe / General Statements (5)

Technology-trends:
- High Efficiency plants => high energy output
- Extensive use of Inconel (complete furnace / first pass, superheaters)
- Shower cleaning
- Explosive (gas) cleaning
- Low temperature catalysts
- High dust / high acid catalysts
- Dry bottom ash discharge (Switzerland)
3. WtE - Market in Europe / Countries

WTE project Stockholm Brista
Germany
- Only one project awarded in 2009
- No award expected in 2010
- Maybe replacement in existing plants in future

Austria
- Vienna-Spittelau (retrofit of two existing lines; rfp expected 2010)
- Some projects in early development stage

Switzerland
- Buchs / Aargau (retrofit of existing line; rfp expected 2010)
- Replacement of/in existing plants in development
Netherlands

- Moratorium in Dec. 2009 not to build new WtE until 2020

Denmark

- Roskilde / KARA and Kjellerup / L90 in bidding procedure
- Vestforbraending (new line; rfp expected 2011)
- Projects in earlier stages of development (Amagerforbraending, Arhus, Nordforbraending)
Finland
- Helsinki (400,000 t/y; operator selected; bidding procedure)
- 2 plants recently ordered
- Several other projects under development

Norway
- 2 plants/lines recently ordered
- Other projects under discussion

Sweden
- 2 plants recently ordered
- Other projects under development
Italy

- Bolzano, Parma and Torino recently ordered / begun construction
- Milano Sud (2nd plant in Milano; rfp expected in 2011)
- Many projects under discussion
- Delays are ‘normal’
- Cancellation of projects, new rfp is ‘normal’
- Projects in the north more likely to be realized; in the south entirely unpredictable
France

- Market is fairly quiet
- If at all, projects are rather small
- Replacement of Paris-Ivry (rfp in 2011/12?)
- Several projects in early stages of development
Great Britain

- Most active market in Europe
- Many developers (operators) are present
- Procedure for PFI projects is rather complex / long
- Latest DEFRA list for PFI projects contains > 30 projects
- Most projects are BOO
- Several rounds of bidding necessary with substantial cost for developer
- Some merchant plant developments
- Plant construction expected to start 2011/2012

Ireland

- One plant under construction, one under permitting
- Severe resistance from locals and politicians
- Development of more projects difficult/questionable
**Greece**

- No serious projects at the moment
- Plants needed, but hardly feasible considering the financial situation

**Portugal**

- Extension of existing plant(s) under discussion
- New projects difficult

**Spain**

- Have built many Ecoparc’s
- Several new projects / extensions under discussion; time frame for realization unclear
East European Countries (1)

- **Bulgaria:**
  - Some projects in early stage of development

- **Croatia:**
  - Some projects in early stage of development

- **Hungary:**
  - Some projects in early stage of development

- **Romania:**
  - Projects in Bucarest and Timişoara in early stages of development

- **Slovenia:**
  - Some projects in early stage of development
East European Countries (2)

- **Czech Republic:**
  - Some projects in early stage of development

- **Estonia:**
  - Tallinn awarded

- **Lithuania:**
  - Klaipeda awarded
  - Other projects under discussion
East European Countries (3)

- **Poland:**
  - Total of 12 projects on so-called ‘indicative list’
  - Financed by the EU up to 60%
  - Deadline for financial support is 30.6.2010; will be met by very few (if any)
  - Some other projects also under development
  - First order???

- **Slovakia:**
  - Some projects in early stage of development
4. WTE - Market in America / General Statements
WTE in America

- Market activities (if any) in Canada and USA
- Still low recycling quotes in USA (i.e. ≈ 30%)
- Market share of WTE in USA ≈ 7%
- After more than 10 years standstill in USA, some new WTE projects can be expected (mainly expansions of existing facilities, but also some „greenfield-projects“)
- 2 companies dominate the market: Covanta and Wheelabrator (market share > 2/3)
- Some interest in South America, but no serious project development at this point
EfW Role in Global Waste Management

EfW 0.2 billion tons  Recycling 0.5 billion tons  Landfill 1.0 billion tons

- U.S.
  ~ 90 EfW facilities
  ~ 30 million TPY

- Western Europe
  ~ 400 EfW facilities
  ~ 65 million TPY

- Asia
  ~ 325 EfW facilities
  ~ 55 million TPY
Energy-from-Waste’s (EfW) Vital Role in the United States

Annual U.S. Renewable Generation = 105,238,000 megawatt hrs (excluding hydro)

- Energy-from-Waste: 8%
- Wood & Other Biomass: 38%
- Geothermal: 14%
- Wind: 32%
- Solar: 1%
- Other: 7%

Annual U.S. Waste Generation = 413,014,732 Tons

- Recycling: 29%
- Landfill: 64%
- Energy-from-Waste: 7%

Source: 2008 Joint Study by Biocycle and Earth Engineering Center of Columbia University
5. Update on WtE - Projects in America

USA / Canada (Orders / Awards)

- Projects awarded on Hawaii and in Maryland; realisation pending

USA / Canada (Competition / Projects) (1)

- Durham / York Region, Greater Toronto (ON), CDN (2 x 218 t/d; Covanta preferred bidder; county decision in June 2010)
- Gold River, Vancouver Island (BC), CDN (2 x 1,500 t/d; expansion of existing RDF-plant)
- Hempstead (NY), USA (1 x 1,100 t/d; expansion of existing plant)
- West Palm Beach (FL), USA (3,000 t/d plant to complement existing 1,800 t/d plant; bidding procedure)
USA / Canada (Competition / Projects) (2)

- St. Lucie Cty. (FL), USA (3,000 t/d plasma arc gasification plant; proposal of GEOPLASMA LLC to scale back to 200 t/d demonstration plant)
- Tulsa (OK), USA (reactivation of Tulsa # 3 or expansion of existing plant)
- Tynes Bay, Bermuda (1 x 7 t/h, expansion of existing plant; bidding procedure)
- Vancouver Metropolitan / 22 municipalities of the GVRD (BC), CDN (plans for 3 big or 6 small EFW plants under discussion; 400 t/d Plasco-plant considered)
6. WTE - Market and Projects in Asia

- In Asia market activities are limited to China and Japan
- China has become - by far - the largest market for WTE worldwide
- In Hong Kong bidding procedure is expected in early 2011 for a 3,000 t/d plant
- Some, but limited, market volumes in Japan
- Other Asian markets are either saturated (Singapore, Taiwan) or not mature yet (India, Malaysia, Pakistan, Thailand, Vietnam, ....)
Some Facts about China

- Generation of household waste 2009: ≈ 250 Mio. t
- Generation of household waste 2030: ≈ 550 Mio. t (estimate by World Bank)
- Number of WTE plants 2009:
  - in operation: 60-70
  - under construction/in concrete planning stage: 60-70
  - in earlier stages of planning: > 100
- Market price for 500 – 1,000 t/d turnkey plant: 150 - 250 EUR/installed t/y capacity
- Price for a complete plant with 500 t/d capacity ≈ EUR 30 Mio. !! (incl. complete balance of plant, turbine/generator, civil work, ...)

European Suppliers of Waste to Energy Technology
WTE plant Tongxing in Chongqing
Tongxing WTE Plant in Chongqing

- Start up: 2005/2006
- Waste throughput: 1,320 t/d
- 2 grate units with semi dry flue gas treatment, 1 turbine
- Total invest: RMB 350 Mio. (≈ EUR 35 Mio.)
- Tipping fee: RMB 60 / t (≈ EUR 6 /t)
WTE in China

- Projects for new plants with a capacity ≤ 500 t/d are not open for international bidders - only Chinese companies are qualified.
- In general, international bidders have severe disadvantages because of their higher cost for any non-Chinese deliveries / engineering.
- Some „localised“ grate systems existing.
- Chinese sites are - by far - not in accordance with international standards (safety, site organisation, ....)
WTE in Japan

- Waste generation relatively stable: 50 - 55 Mio. t/y
- Market volume has shrunk with only few awards
- Discussion about definition of state-of-the-art technology
- Until end of the 90's grate incineration (> 2/3) and fluidised bed incineration dominated the market (< 1/3)
- After 2000 gasification systems became more popular until peak market share of 2/3 in 2006, whereas fluidised bed system disappeared completely
- Today grate systems experience a renaissance while gasification is being selected for smaller units only
Asia

- **India:**
  - Bangalore (feasibility study)
  - Delhi (1 x 700 t/d; feasibility study)
  - Ghazipur (1 x 400 t/d; budgetary proposal)

- **South Korea:**
  - Asan (1 x 220 t/d; order)
7. Summary

- Difficult situation for some European markets due to overcapacities and unpredictable waste flows
- Markets in Europe are changing
- Best market volumes to be expected in UK and Italy
- Poland is about to develop (some) realistic projects
- Financial crisis makes projects unlikely in countries like Greece, Portugal, Spain....
- China, as the largest market worldwide, is not interesting for non-chinese companies due to low market prices and use of ‘local’ technology
- USA is waking up again, but very slowly
- Grate technology is still most widely used technology
Thank you very much for your attention!

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