Meath Waste-to-Energy
Next Generation of Waste Fired Power Plants

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Director Technology & Marketing
Agenda

- Introduction
  - B&W Vølund
  - GMAB
- Proven technology – but still improving!
  - DynaGrate®
  - Water cooled wear zone
  - Modern design tools CFD
  - Boiler design
  - Corrosion and Inconel
  - ACC advanced combustion control systems
- Meath Tour
- Summary
About us

- Founded in 1898
  - 1931 First WTE Plant
  - 1938 License agreement with Von Roll
  - 1972 Cooperation with NKK/JFE, Japan
  - 1980 First biomass fired plant, Denmark
  - 1991 Cooperation with Halla Group, Korea
  - 2000 The Babcock & Wilcox Companies
  - 2001 Purchase of B & S grate technology
  - 2007 Grantop, license agreement, China
  - 2010 Acquisition of Götaverken Miljö AB
- Headquarters and workshop in Esbjerg, Denmark
- Branch offices in Copenhagen and Århus, Denmark
- 400 employees worldwide
A provider of solutions within flue gas cleaning, energy recovery and other Cleantech applications based on proprietary technologies

- 100% Subsidiary of Babcock & Wilcox Vølund A/S
- Based in Gothenburg, Sweden, the company has been active within its product areas since 1988 and in present form since 2003

SYSAV, Malmö
Flue gas cleaning & Condensation
Meath
Waste to Energy
Capacity Diagram

Thermal Waste input

(WM)

Waste input

(ton/h)

76.2 MW 110%

69.3 MW 100%

41.6 MW 60%

Air preheating:
A-G-E-F => 150°C
else => 120°C

Peak load
Set point equal or less than 100%
thermal waste input at all time
outside design criteria for boiler and boiler equipment
A new name to a new generation of WFPP
Advanced Technology • Best Value Solution

Evaluation Committee
February 16, 2011
DynaGrate® - Combustion Grate
DynaGrate®

The grate is based on unique design
- Inter locked motion mechanism between bars
- Transport is created by the force of gravity
- Movement created by the 60° rotating of the grate bars

Modular design
- 1 or 2 combustion lanes
  - 3 – 20 t/h
  - 20 – 44 t/h
- 4 individual combustion sections in each lane
  - Speed control
  - Excess air control
  - 4-6 bars in each section
  - Water cooled
  - Air cooled
DynaGrate® – Air cooled Combustion Grate

- Driving mechanism is situated outside the furnace
  - Not exposed to aggressive environment
  - Easy to access for maintenance
- High quality heat-resisting cast steel
# DynaGrate®

**The Dynamic Movement of Combustion**

<table>
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<tr>
<th>Plant</th>
<th>Country</th>
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<th>Max. fuel capacity t/h</th>
<th>Commissioning Year</th>
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DynaGrate® – Water cooled Combustion Grate

- Cooling system integrated in shaft
  - Ready for upgrading from air to water cooling
- High quality heat-resisting cast steel
Strategy = High Energy Efficiency

- Low excess air number
  - $\lambda < 1.5$
  - Low flue gas loss after boiler

- Increasing flue gas temperature
  - $T_{adi} > \Delta 300^\circ$

Technology = high temperatures

- Tailoring the boiler design
  - On line cleaning of the radiant drafts in the oiler
    - Control the inlet temperature to the convection part < 600°C
  - Inconel® boilers
    - Evaluation of corrosion protection
    - Minimum of refractory in the boiler
  - CFD Design
    - Uniform boiler temperature
    - VoluMix™
Flue gas temperatures before evaporator screen and super heater section

Røggastemperatur [°C] ved MCR før EVAP.

Røggastemperatur [°C] ved MCR før overheder2, den første overheder i røggasretningen.
Temperature distribution – load A

Controlled mixing:
- Homogeneous temperature profile in boiler
- Homogeneous flue gas distribution

Residence time above 850°C about 4 s
Corrosion in Incinerators

- Corrosion caused by:
  - Increasing:
    - Steam temperature.
    - Flue gas temperature.
  - Particle impact.
  - High velocity.

- Reduce corrosion by:
  - Ceramic tiles.
  - New materials.
  - Co-flow super heaters.
  - CFD modeling.
Inconel® and MSW Boilers

- Inconel 625 welding
  - Thickness 2-3 mm
    - Two layer
    - Cold Metal Transfer
  - Corrosion rate
    - 0.1 mm/10,000 h
    - Fe content << 10%
  - Less refractory
    - Longer operation
    - Low maintenance cost
    - Life time
  - Residence time 2 sec
    - Refractory inlet PCC