



# State of the Art for Waste Combustion using Fluidised Bed Technology

Siegmond Böhmer



# Isn't it simple?

State of the Art for waste combustion using  
fluidised bed technology  
=  
operate a plant according to the relevant laws

24.05.2004 | Folie 2

# Isn't it simple?

- it's a long list of relevant laws
- which law is the most relevant (e.g. IPPC, WID)?
- law ≠ permit ≠ operation of the plant
- state of the art / best available techniques: "open" definition, dynamic, allows interpretation
- emission limit values: restrictive (minimum standards), static
- some kind of contradiction in itself: ...a plant should be operated according to state of the art AND has to observe the following ELVs...
  - ➔ periodically update of ELVs is necessary!

# Isn't it simple?

## Example

Waste Incineration Plant, commissioned 1995;  
throughput: 110.000 t/a

- Clean Air Ordinance for Steam Boiler Units:  
ELV for PM = 20 mg/Nm<sup>3</sup> (hmv)
- Permit: ELV for PM = 8 mg/Nm<sup>3</sup> (hmv)
- Emission value: 0.5 - 2 mg/Nm<sup>3</sup> (hmv)

**State of the Art???**

# Isn't it simple?

State of the Art for waste combustion using  
fluidised bed technology  
is not only to  
operate a plant according to the relevant laws

24.05.2004 | Folie 5

## EU

- Waste Incineration Directive (2000/76/EC)
  - requirements for operation of waste incineration plants
  - limit values for emissions of pollutants into air
  - limit values for the discharge of waste water from flue gas cleaning

# Important laws

## EU

- IPPC-Directive (1996/61/EC)
  - general principles governing the basic obligations of the operator
  - protect the environment as a whole through application of the best available techniques
  - follows an integrated approach
  - prescribes no emission limit values
  - wide range of industrial activities
- ... energy is used in the most efficient way
- ... existing plants are operated according to state of the art from the year 2007 on
- ... permit conditions are periodically reconsidered and updated
- ... use of low waste technology
- ... recovery and recycling of waste, where appropriate

24.05.2004 | Folie 7

# IPPC-Directive (1996/61/EC)

➔ The Commission shall organize an exchange of information between Member States and the industries concerned on best available techniques, associated monitoring, and developments in them.



# Exchange of Information

- ➔ Exchange of information: BAT Reference documents (BREFs)
- ➔ Responsible: The European IPPC Bureau: <http://eippcb.jrc.es/>
- ➔ BREF should
  - offer information to the competent authorities of Member States, industrial operators, the Commission and the public at large
  - should serve as a driver towards improved environmental performance across the European Union
- ➔ BREFs do not prescribe techniques nor emission limit values
- ➔ Specific Technical Working Group
  - BREF for Waste Incineration: current state = second Draft (March 2004); finalisation: end of 2004

# General BAT for Waste Incineration (2nd Draft: March 2004)

→ 75 techniques are identified as general BAT

- Waste input/storage/pre-treatment
- Combustion conditions
- Furnace design
- Energy efficiency
- Fluegas treatment including BAT associated Emission levels
- Discharges of waste water including BAT associated Emission levels
- BAT concerning solid waste from incineration

# General BAT for Waste Incineration (2nd Draft: March 2004)

- Fluidised Bed Combustion is not separately addressed, but combustion of different types of waste:
  - municipal waste
  - pretreated or selected municipal waste
  - sewage sludge
  - hazardous waste
  - clinical waste
- There is not one BAT but a variety of possible combinations of techniques

# Austrian contribution to the BREF

- Study: "State of the Art for Waste Incineration Plants" (BMLFUW/Umweltbundesamt, 2002)
  - Technologies for flue gas cleaning
  - Description of single Plants
  - Estimation of costs
  - State of the art
  - ...

# BAT associated Emission Levels – Air Pollutants

Pollutant	Unit	2. Draft (Proposal for BATAEL; hmv)	Austrian Proposal (BMLFUW/Umweltbundesamt; hmv)
Total dust	[mg*Nm <sup>-3</sup> ]	1 - 15	< 0.1 - 2
SO <sub>2</sub>	[mg*Nm <sup>-3</sup> ]	1 - 50	< 10 <sup>(1)</sup> , < 50 <sup>(2)</sup>
HCl	[mg*Nm <sup>-3</sup> ]	1 - 30/20 <sup>(6)</sup>	< 1 <sup>(1)</sup> , < 5 <sup>(2)</sup>
N <sub>2</sub> O	[mg*Nm <sup>-3</sup> ]	< 15	-
NO <sub>x</sub>	[mg*Nm <sup>-3</sup> ]	30/40 <sup>(4)</sup> - 220/200 <sup>(6)</sup>	< 50
CO	[mg*Nm <sup>-3</sup> ]	1 - 100 <sup>(4)</sup> , 2 - 50	< 30
Hg	[mg*Nm <sup>-3</sup> ]	< 0.03/0.02 <sup>(5)</sup>	< 0.002 (3)
PCDD/F	[ng*Nm <sup>-3</sup> ]	< 0.05	< 0.05
(1) raw gas concentration of ≤ 600 mg*Nm <sup>-3</sup> for SO <sub>2</sub> and ≤ 1000 mg*Nm <sup>-3</sup> for HCl			
(2) raw gas concentration > 600 mg*Nm <sup>-3</sup> for SO <sub>2</sub> and > 1000 mg*Nm <sup>-3</sup> for HCl			
(3) using a wet scrubber and an activated coke filter			
(4) municipal waste (5) sewage sludge (6) pretreated municipal waste			

24.05.2004 | Folie 13

# BAT associated Emission Levels – Austrian Plants

- Dust
  - ESP in combination with
  - wet scrubbers or
  - fixed bed adsorbers or
  - flow-injection process + bag filter
- NOx
  - SCR
- Hg
  - wet scrubber, sometimes in combination with
  - activated coke filter or
  - flow-injection process
- CO
  - Firing system (waste feeding)

- ➔ Determination of State of the Art/BAT:
  - complex
  - dynamic
  - whole chain of waste incineration
  - integrated approach (all media)
- ➔ BAT is to:
  - prevent or control emissions to achieve a high general level of protection of the environment as a whole
  - use energy efficiently
  - consider technological advances

Thank you  
for your attention!

Dr. Siegmund Böhmer  
Abt. Integrierte Anlagentechnologien  
Umweltbundesamt  
Spittelauer Lände 5  
A-1090 Wien  
Tel: ++43-1-31304-5514  
Fax: ++43-1-31304-5400

24.05.2004 | Folie 16