# Cluck cluck cluck

# Electricity from chicken litter

Short presentation about work executed on behalf of the Biomassa Centrale (BMC) Moerdijk/Netherlands

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IEA Task32 workshop Lyon, 4 May 2010

# BMC Moerdijk

BMC MOERDIJK
Poultry Litter fired Power Plant

1. Introduction
2. Explanation of project/installation
3. Questions
4. Answers
5. Recommendations/challenge
6. Results

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# 1. Introduction

First **initiative originates from 1998**

## Groene stroom uit kippenmest

VELDHOVEN - Winning van biogas uit kippenmest kan in Nederland per jaar 260 miljoen kubieke meter (circa een half procent van het binnenlands verbruik) aardgas uitsparen. Dit blijkt uit onderzoek van de Kema voor het mestverwerkende bedrijf Mestac. Het bedrijf wil 110 miljoen gulden uittrekken voor een fabriek die 200.000 ton kippemest per jaar aankan, ongeveer een vijfde van de totale productie in Nederland. Omdat het geproduceerde gas duurder is dan aardgas zal er geld bij moeten: 38 gulden per ton kippenmest.

# Participants, organisation and consortium

BMC Moerdijk BV

- 4 stockholders
  - Delta N.V.
  - ZLTO/NCB (agriculture sector)
  - Cooperation DEP (620 Poultry Farmers)
  - Austrian Energy & Environment AG

- Consortium EPCOM contract: AE&E and Siemens
- Scope AE&E: fuel reception/storage, boiler, flue gas treatment + 3 years O&M contract
- Scope Siemens water/steam cycle, steam turbine

# 2. Project timeline:

| | |
|---|---|
| • February 1998 | Stock-taking interest |
| • April 1998 | Foundation corporation DEP |
| • April 2006 | Financial close project |
| • May 2006 | Start building (engineering/procurement) |
| • December 2006 | Completion piling, start concrete works |
| • April 2007 | Start installation boiler parts |
| • October 2007 | End assembly |
| • November 2007 | Start cold commissioning |
| • February 2008 | Start warm commissioning |
| • May 2008 | Completion Power Station |
| • May-September | Trial run period |
| • September 2008 | Official take-over |

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# Location industrial area Moerdijk

# Week 44 2006


Mestgedreven energie centrale ten noorden van WKCM in aanbouw 18okt2006

# Week 10 2007

# Week 12 2007

# Week 16 2007

# Week 21 2007

# Week 25 2007

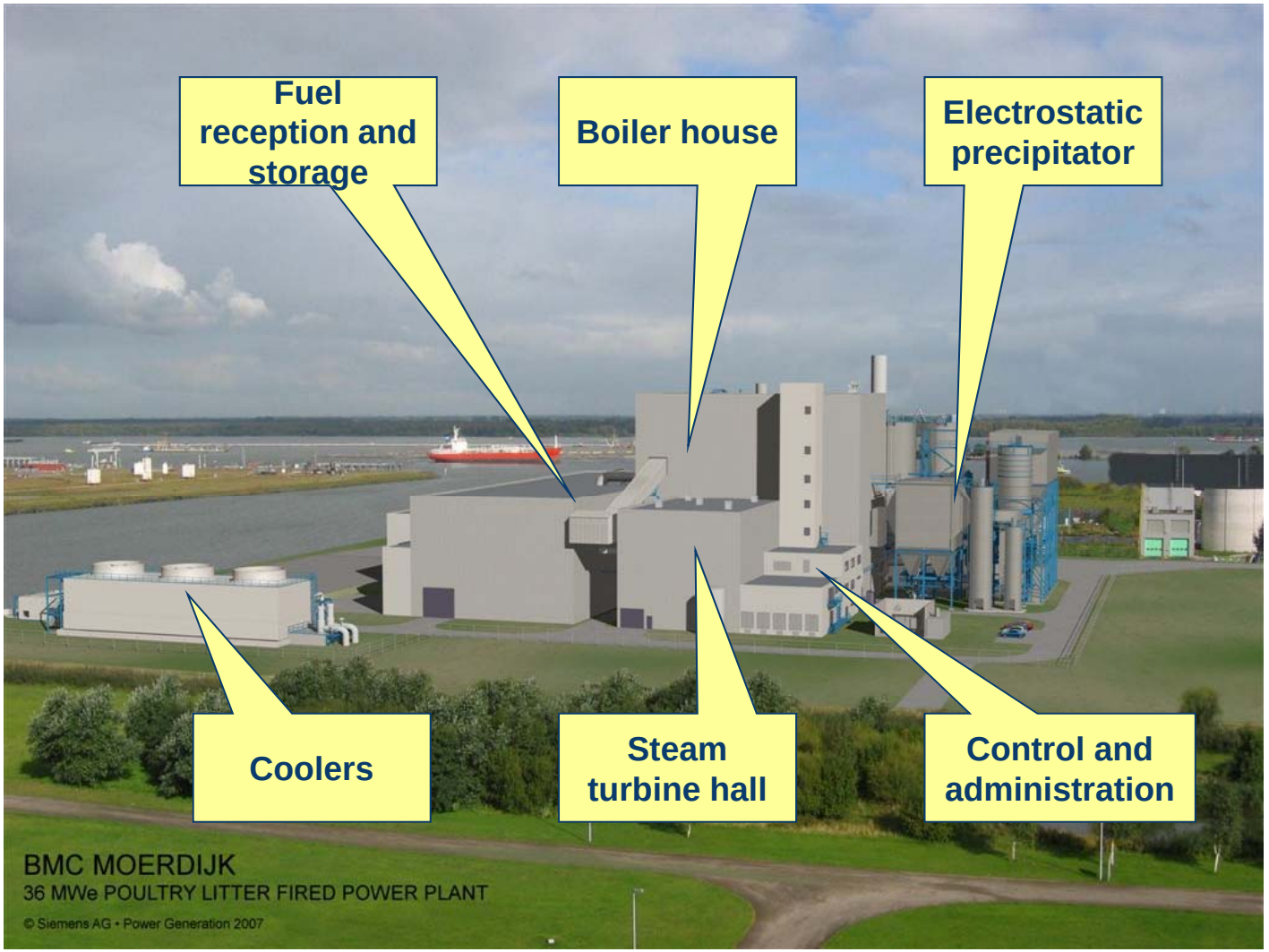
# Week 36 2007

# Week 41 2007

# End 2007

# Week 10 2008

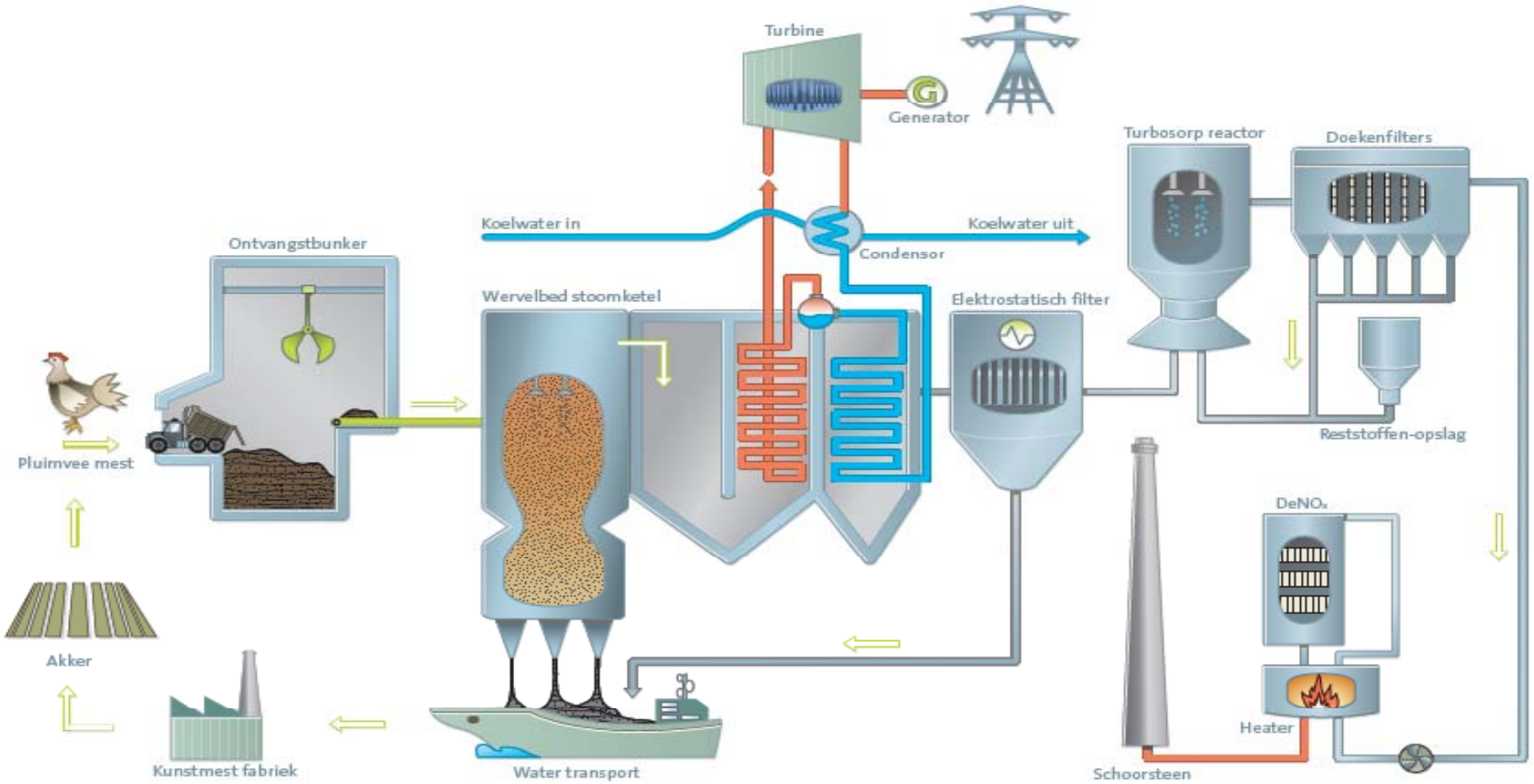
# The final result



# Major components of the installation

- Reception chicken litter, storage, internal transport
- Incineration  installation (bubbling fluidised bed+boiler)
- Steam Turbine / AC generator
- Flue Gas Treatment
  - Electrostatic precipitator
  - Turbosorp reactor (lime + active carbon + water)
  - Fabric filter
  - SCR unit (de$NO_x$)
- Ash transport (P + K)

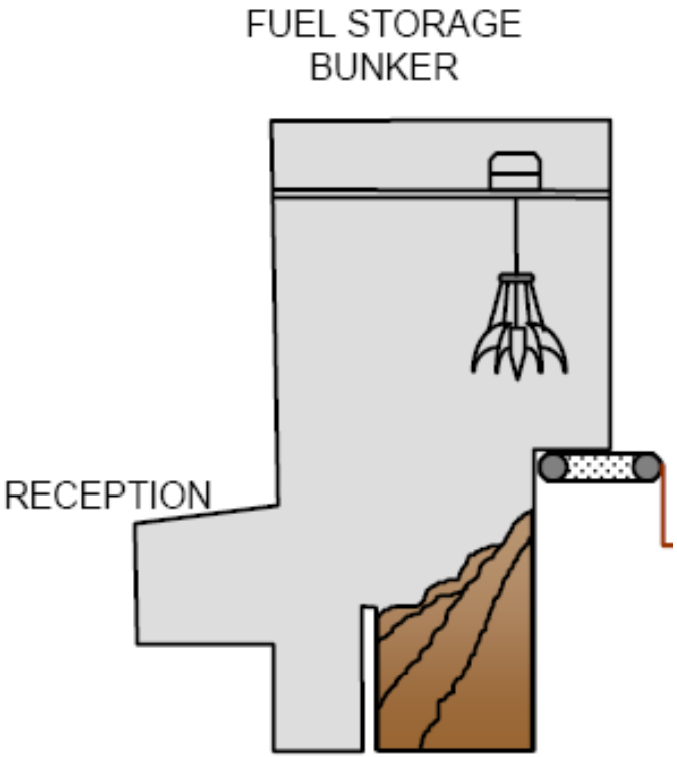
# The process of BMC



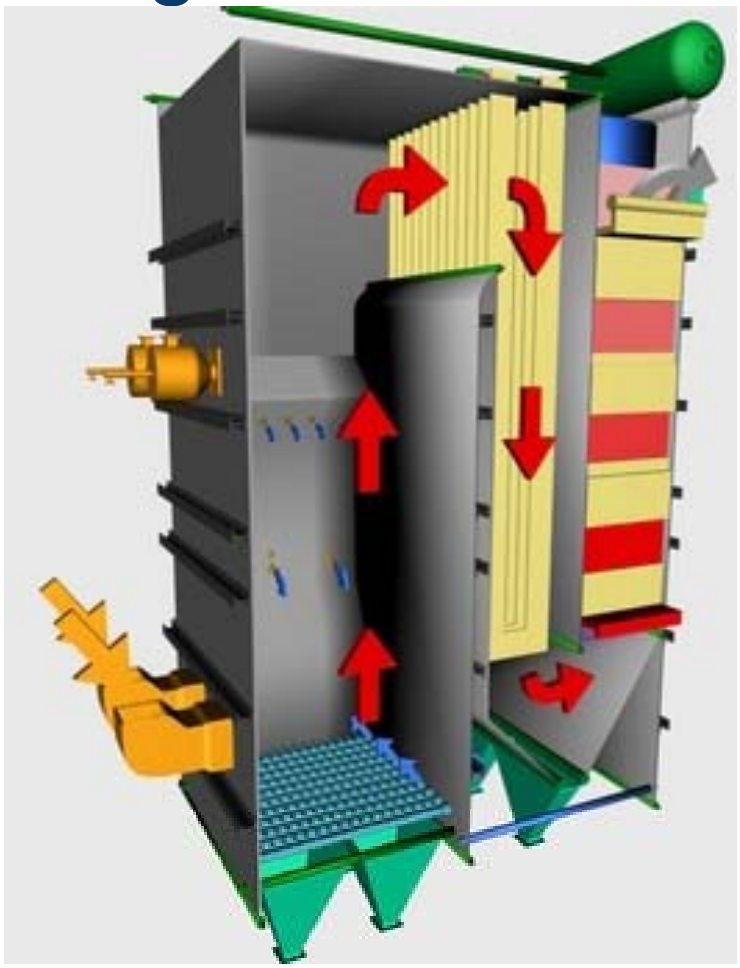
# Main characteristics installation

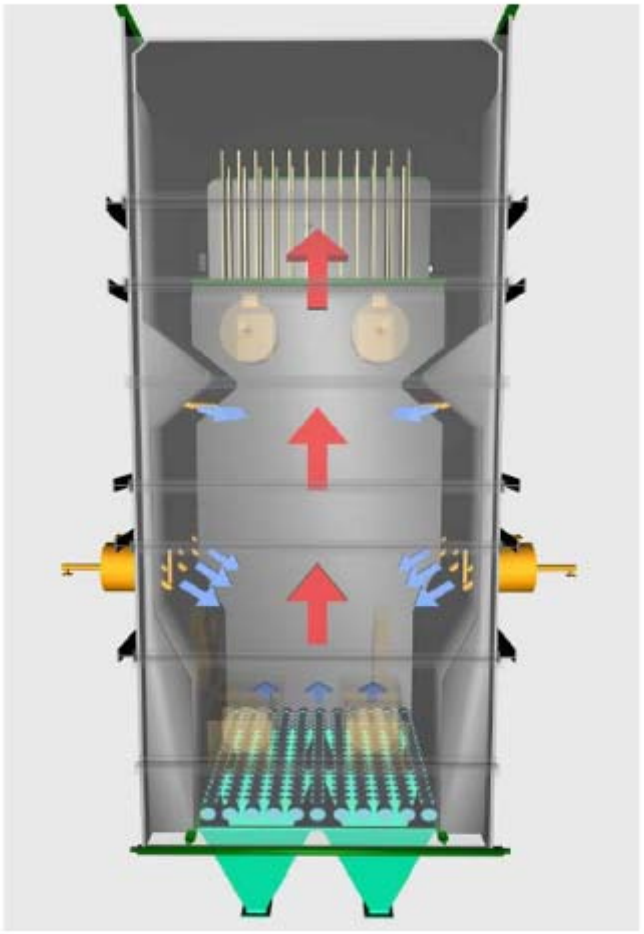
- 440.000 ton poultry litter per year (total amount in The Netherlands 1,2 million ton). 60 trucks/day
- 36,5 $MW_e$, 270.000 MWh per year
- More than 36 kg/s steam of 67 bar and 478 ˚C
- Total Investment ~145 million EUR

# Stackable Poultry Litter

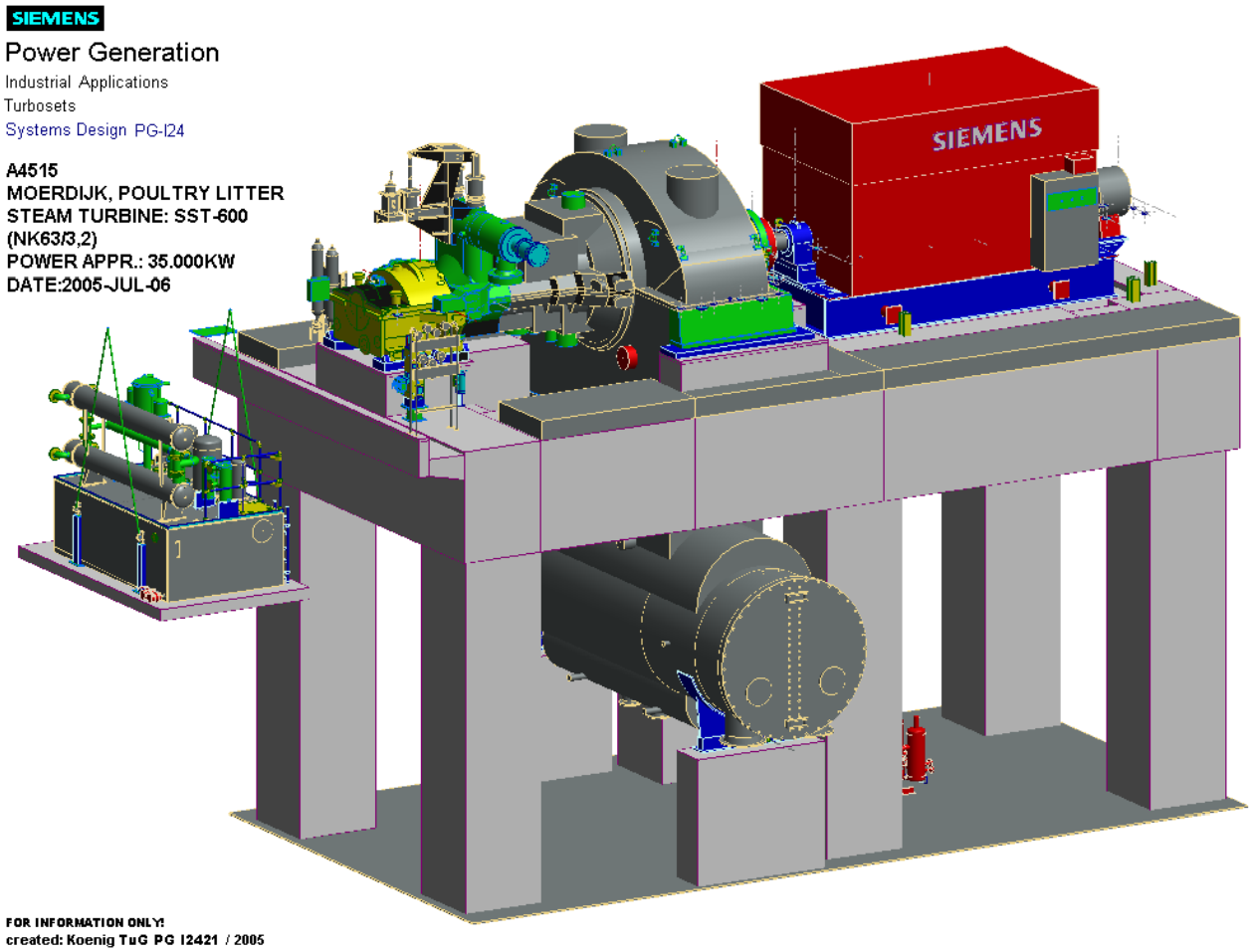


# Bubbling Fluidised Bed (700 °C) 4 draughts boiler





# The Steam Turbine



# Some impressions



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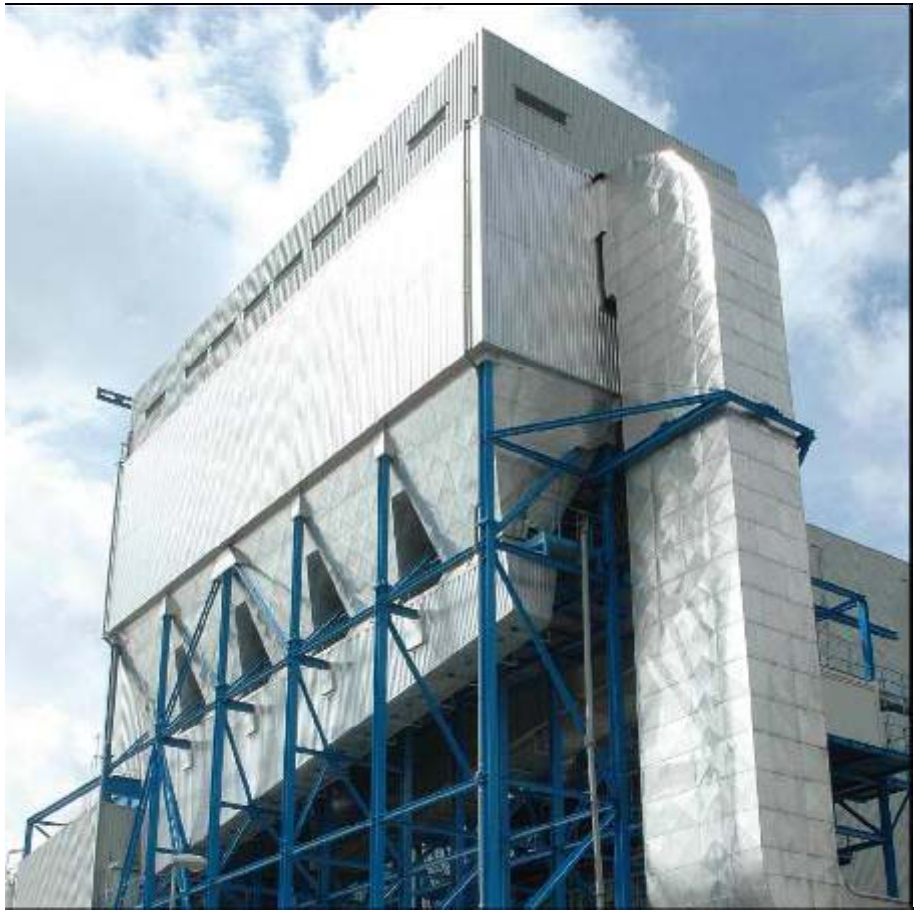



SCANIA
SUPER

# 3. Questions

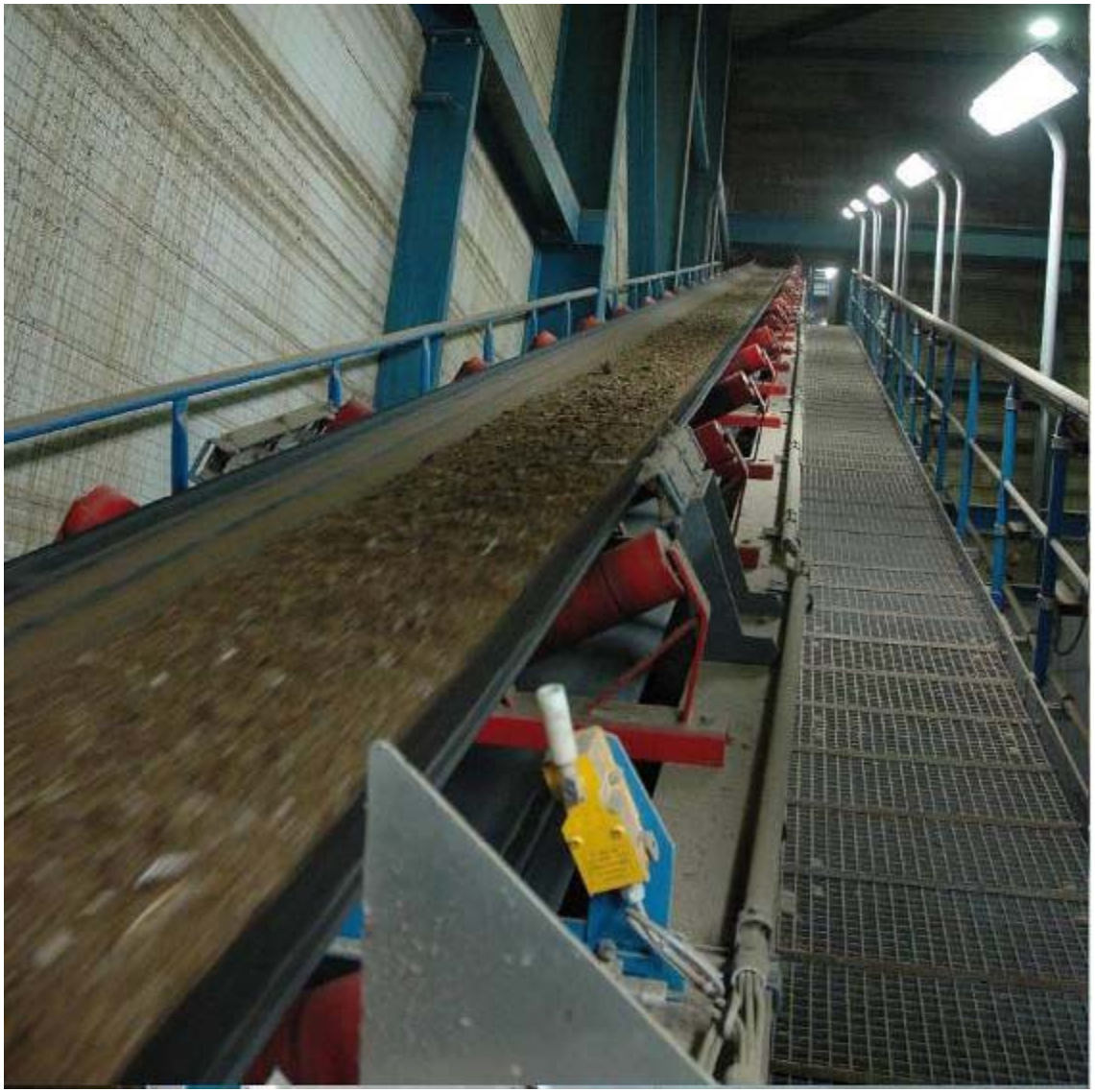
1. Poultry litter mixing with wood chips

2. How does the process stability relates to the lower calorific value of the fuel?

3. The importance of the chlorine content in fuel

4. How does the process stability relates to the moisture percentage of the fuel?

# 4. Answers



# Ad 1: Fuel mixing with wood?

- No technical constraints if mixed properly with maximal 30 % (weight) wood
- No logistic hindrances if particle size meets the demands
- As long as the fuel specifications are kept and the fuel is mixed properly no insurmountable problems are expected (fans are large enough, bed agglomeration remains a business risk)

# Ad 2: How does the process stability relates to the lower calorific value of the fuel?

Results fuel and process analysis during 3 months

- LCV within target range and stable operation : 12%
- Low LCV (outside target range) and stable operation : 18%
- Low LCV (outside target range) and unstable operation : 5 %
- LCV within target range and unstable operation : 65 %

Automatic operation of the incineration installation shall be possible taking into account a correction for variations in the LCV without manual interruption. When this is not the case it seems that the installation (furnace/boiler) or the firing control does not function properly.

# Ad 3: The importance of the chlorine content in fuel

- From technical point of view very realistic (too much chlorine increases chance of corrosion)
- In 99% of the cases the S/Cl ratio exceeds the specification (> 0.5). The actual value is about 1
- No signs of corrosion found during boiler inspection
- Literature: S/Cl-ratio > 4 no corrosion problems, between 2 and 4 acceptable corrosion, < 2 high chance for fast corrosion if metal temperature > 420 °C, also determined by other elements, for example K)

# 4. Assessment unstable process

- Without demonstrable reason the incineration process is unstable. The cause is, for the time being, the furnace/ boiler or the firing control
- Request to find out whether the installation has certain limits which restricts the incineration process and/or the other processes within the installation of BMC
- Process interpretations made by help of MagicCorr
- 110 signals (1 sec base) out of 360 signals during 2 months validated

# 6. Results and conclusion

- No striking events detected
- Acceptable responses found
- Influence of $NO_x$ on the $NH_3$ emissions is unclear
- Sudden CO-emissions cannot be explained without knowing fuel quality
- The plant has sufficient potential
- Improvements to be made to create a wider operation window
- Regarding control of CO-emissions more detailed information from the incineration process is needed

# Current status

- Current status after one year operations:
  - The installation runs stable at design capacity without technical problems seriously influencing the electricity production
  - Testing co-firing alternative fuels has been completed successfully.

**Questions??**

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# Thank you  for your attention