

Influence of EHS measures on economic performance of bioenergy conversion processes

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Topics

- Examples of EHS measures
- Motivation for EHS measures (active, passive)
- Example “biomass ORC CHP plants”
- Presentation of Harrie Knoef on EHS and Economy with wood gasifiers.

- Conclusions

Some examples of EHS measures

- Additional systems (end of pipe) as filters, sound absorbers, combustors, detoxicators etc.
- Primary measures as technology adaptation or change.
- Hazard reducing systems as building structure able to avoid explosion pressure build up.
- Structural measures as proper choice of construction site
- Risk analysis and risk management
- Organizational measures as safety rules and procedures, evacuation plans etc.

Passive motivation for EHS-measures

To avoid hazards and risks

- for health and safety not accepted by society (explosion, emission etc.)
- of environment damage not accepted by society (water pollution, acidification, GHG-emission (?) etc.)
- for clients (interruption of production, unexpected cost, damage of plants and image etc.)
- to evade drawbacks in the market place and a loss of market position (example biomass ORC-process)

Active motivation for implementing EHS measures

- Get an advantage compared to competitors using SOTA technology (e.g. Diesel particle filters)
- Reduce cost and effort of maintenance and even operation (e.g. steam plants)
- Help your client to make a proper risk assessment and to show, that all EHS risks are covered.

Example Small Scale Wood Gasifiers

- Contribution by Harrie Knoef

Realising EHS-measures in practice

- How is it done in industrial practice?
 - Standards and regulations to be followed
 - Is there done more than necessary for getting permits etc?

Please state your experience

Example biomass ORC-CHP plants

- Technology: biomass thermo oil boiler, ORC unit.
ORC units usually implemented in geothermal CHP plants.
- Two incidents in the last two month
 - Sittard (NL), May 2007: spectacular explosion of the whole plant (including building). Reason: wrong emergency procedures and management.
 - Admont (AUT), September 2007: fire in the thermo opl, evacuation of the whole industrial plant and the surroundings (including schools etc.) because of suspected toxicity of thermo oil gases. Little damage, only burning 300 l thermo oil.
- Consequence: Technology provider fears, that the ORC technology in combination with biomass will be stopped for maybe 20 years!

Example Wood combustion (fine particles)

- Fine particles emission is intensely discussed. Wood combustion generates high emission of fine particles. In some regions (health resorts etc.) a ban of wood boilers and stoves is discussed.
- Fine particles can be reduced significantly using electrostatic precipitators (ESP) also with small scale boilers.
- Cost comparisons by Thomas Nussbaumer (CH) show that boilers with added ESP-systems are competitive (from 1 MW up) compared to oil boilers. ESP systems will increase the cost of heat production by 20% (200 kW) to 6% (2 MW)
- For better technology image and market stability, investment in ESP-development for small integrated or added systems will be decisive.

Assessment of significance

- **EHS measures required by laws or permit procedures:**
 - What are the measures?
 - How much can they contribute to EHS quality
 1. essential
 2. helpful
 3. formally necessary
- **EHS to achieve a competitive advantage for the technology-provider**
 - What are the measures, cost
 - What is the cost/benefit relation (benefit is higher competitiveness)
 1. Very high
 2. good
 3. No benefit

Conclusions of the workshop (to be completed)

- EHS measures cost effort and money and but are often basis of operation permission or CE certification procedure.
- From the economical point of view complete and documented EHS measures have positive aspects:
 - Better standing in relation to clients (risk assessment and mitigation, improved trust in technology)
 - Chance to decrease operation and maintenance cost
 - Helping to create a stable technology image and avoiding the risk of unforeseen image disasters.
 - Better implement more EHS measures as is SOTA in order to get an advantage compared to competitors.