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**Improvement of the economics of biomass/waste
gasification by
advanced ash management**

GASASH

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**BIO-ENERGY
ENLARGED PERSPECTIVES**

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Project Consortium

VTT Processes/FIN (Co-ordinator)

Foster Wheeler Energia Oy/FIN

Energy Research Centre of the Netherlands (ECN)/NL

Asociación de Investigación y Cooperación Industrial de Andalucía (AICIA)/E

Pohjolan Voima Oy/FIN

EMC Environment Engineering Limited (EMC)/UK

Essent Energie Productie b.v. /NL

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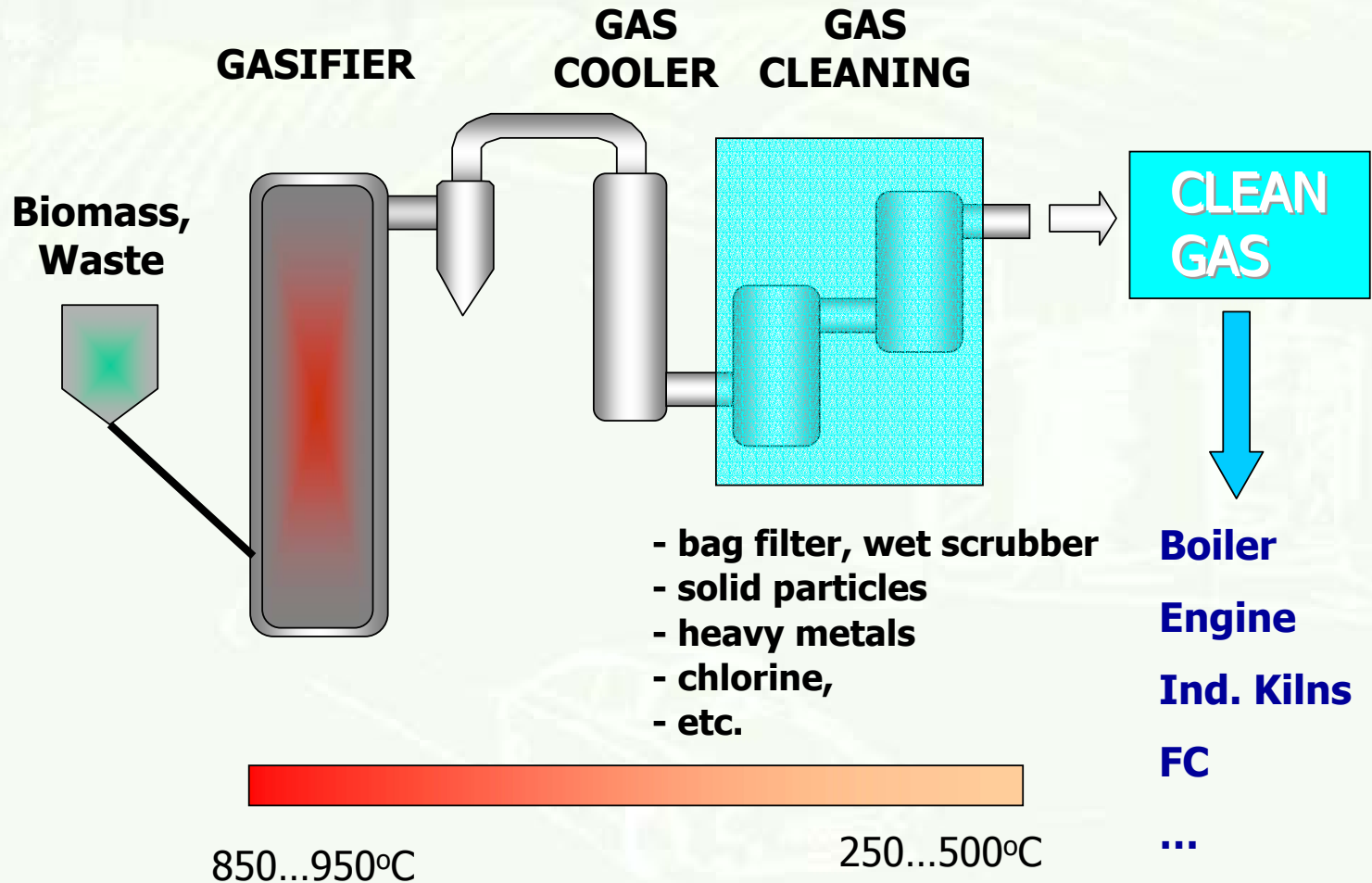
Background & Objectives

- large scale gasification + gas cleaning is technically feasible way to utilise biomass/waste fuels in energy production
- high disposal cost of solid residues
 - bottom ash, cyclone ash, filter dust, etc.
- improved carbon conversion
 - => reduction in volumes of solid residues
- improved quality of solid residues
 - => recycling, further utilisation, etc.

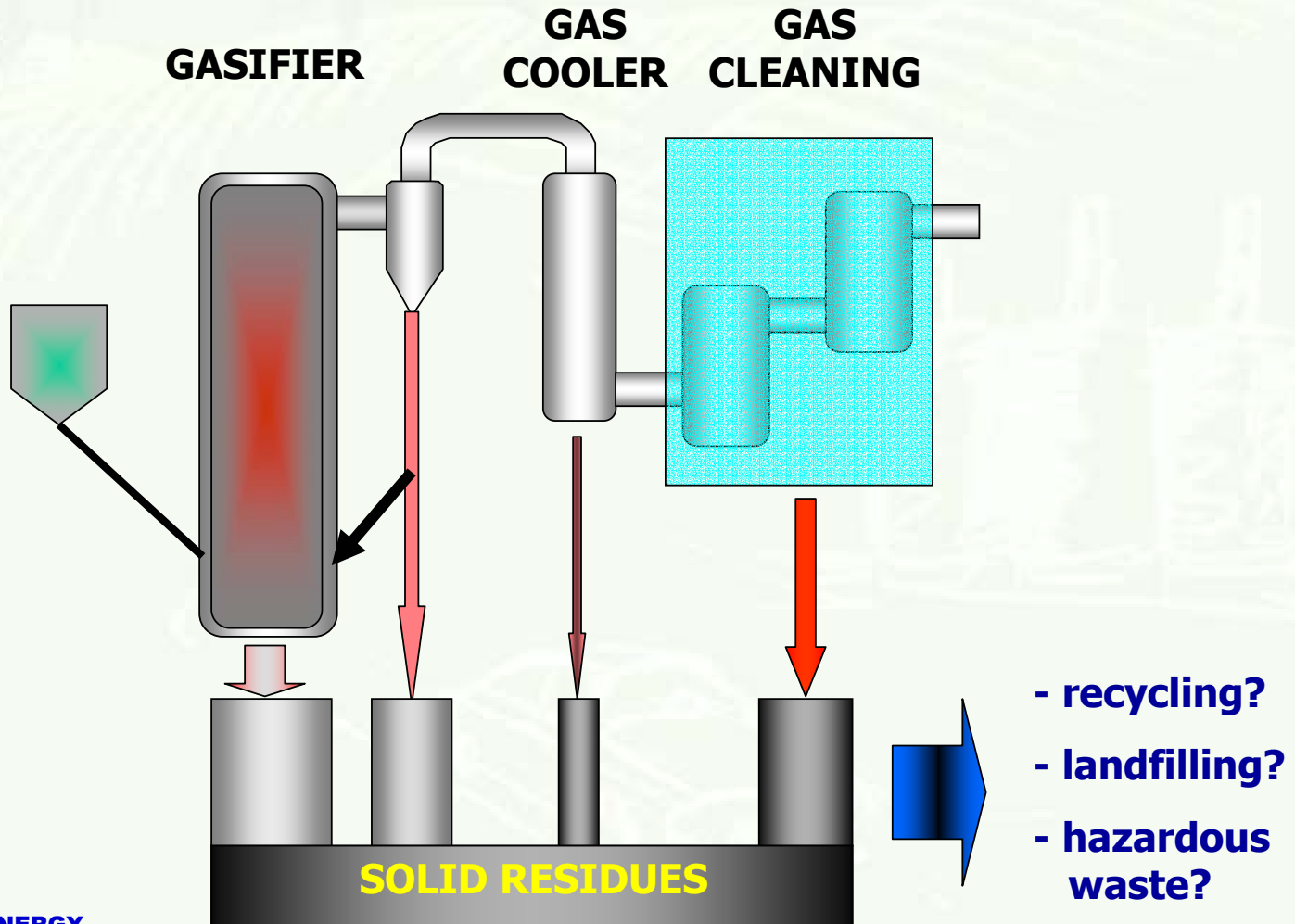
Overall objective:

Advanced ash management => Improved economy

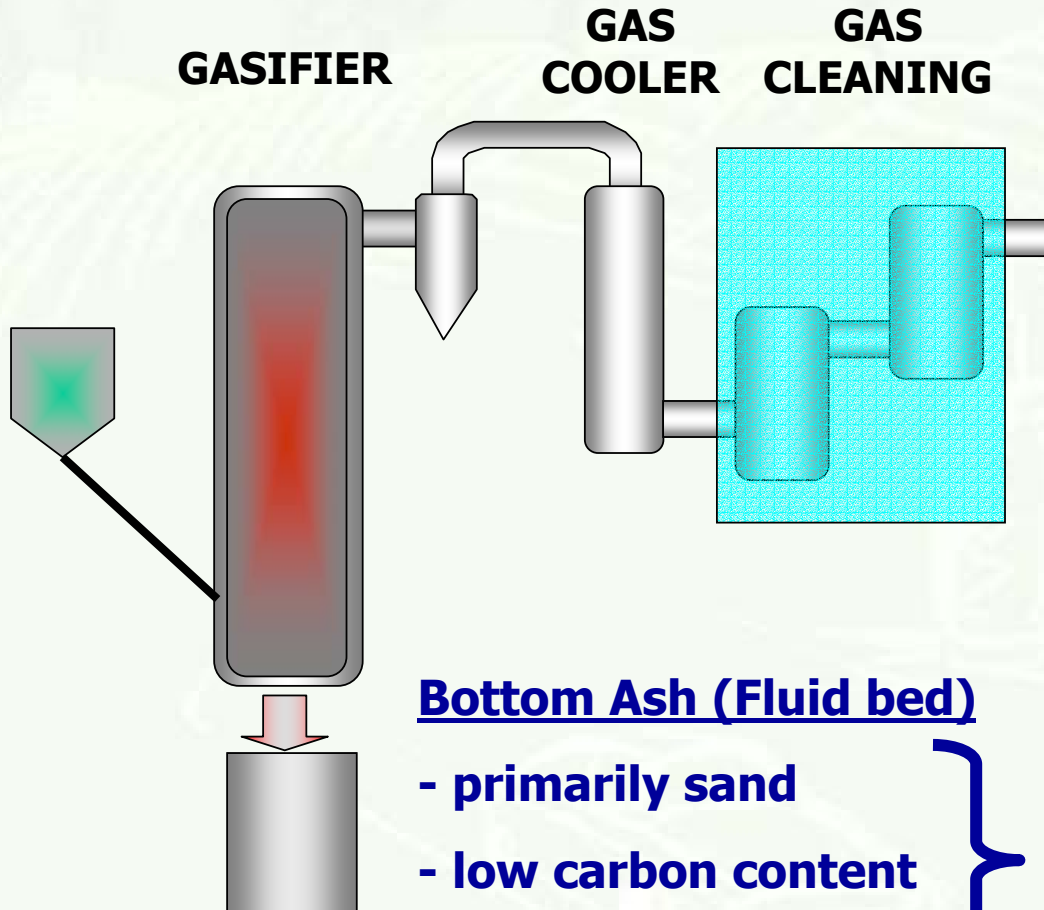
GASIFICATION & GAS CLEANING PROCESS



Solid residues of gasification process



Solid residues of gasification process

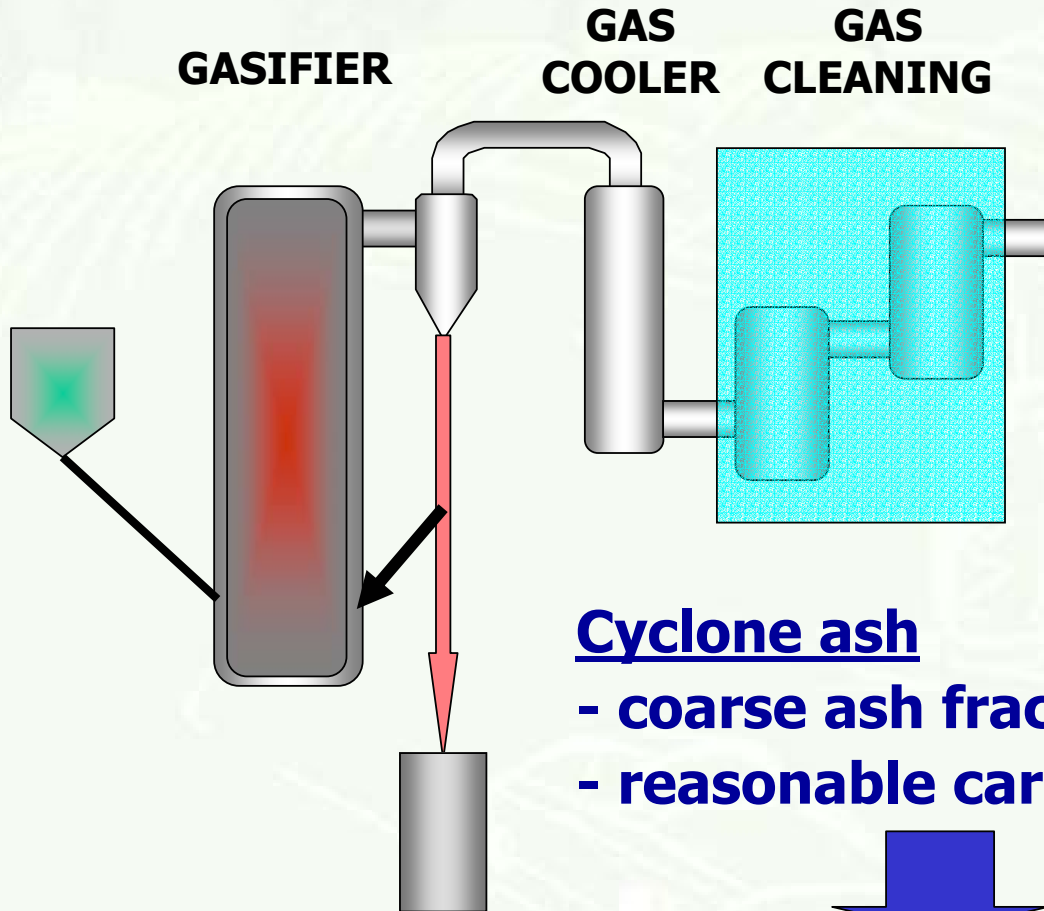


Bottom Ash (Fluid bed)

- primarily sand
- low carbon content
- ash oxidised

Good quality

Solid residues of gasification process

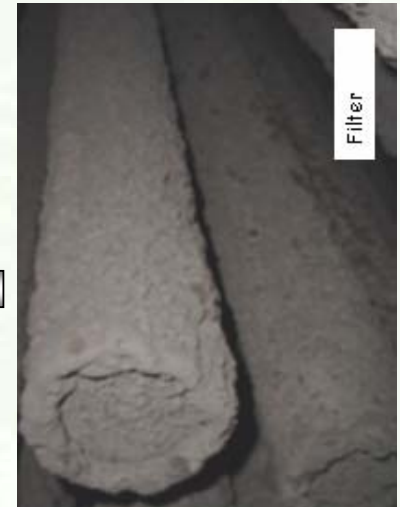
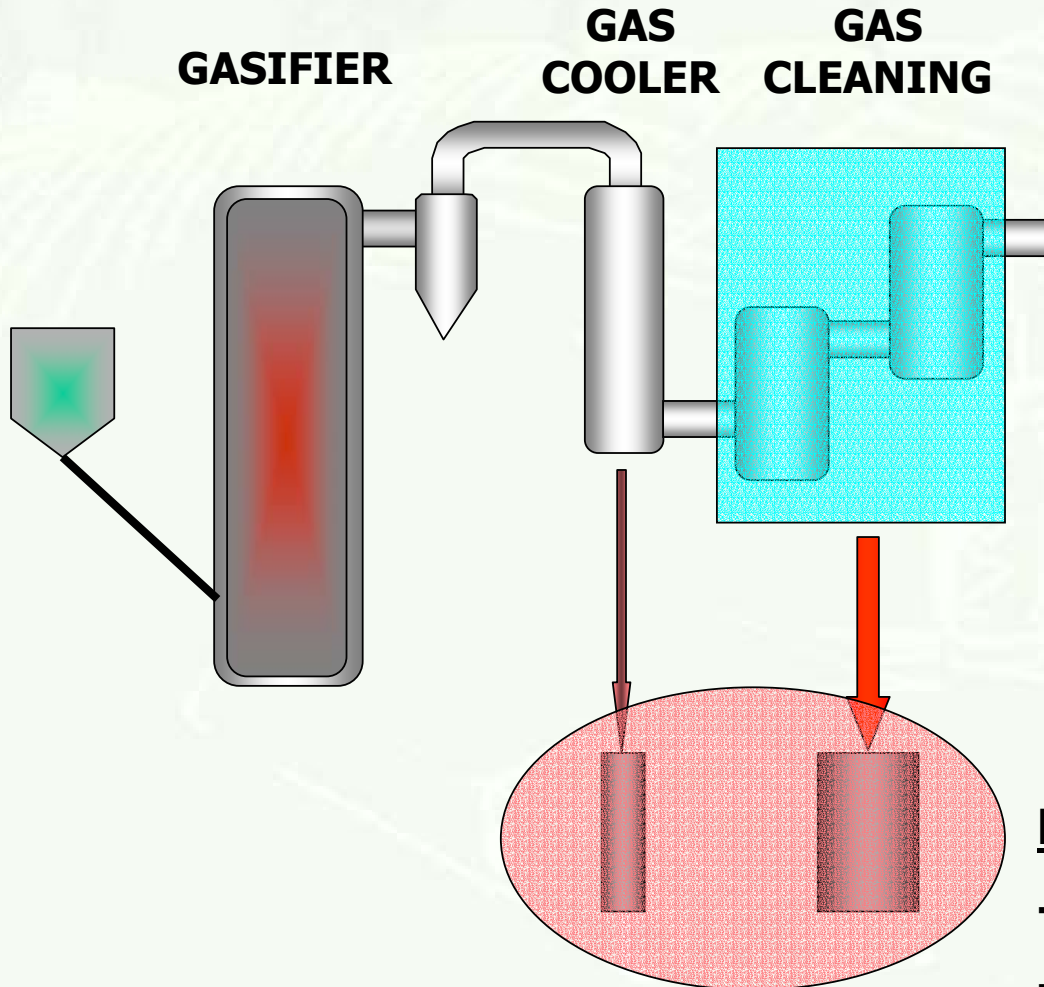


Cyclone ash

- coarse ash fraction
- reasonable carbon content

Reasonable quality

Solid residues of gasification process



Filter dust

- carbon
- heavy metals
- chlorine



Poor quality

- high solubility
- hazardous waste?

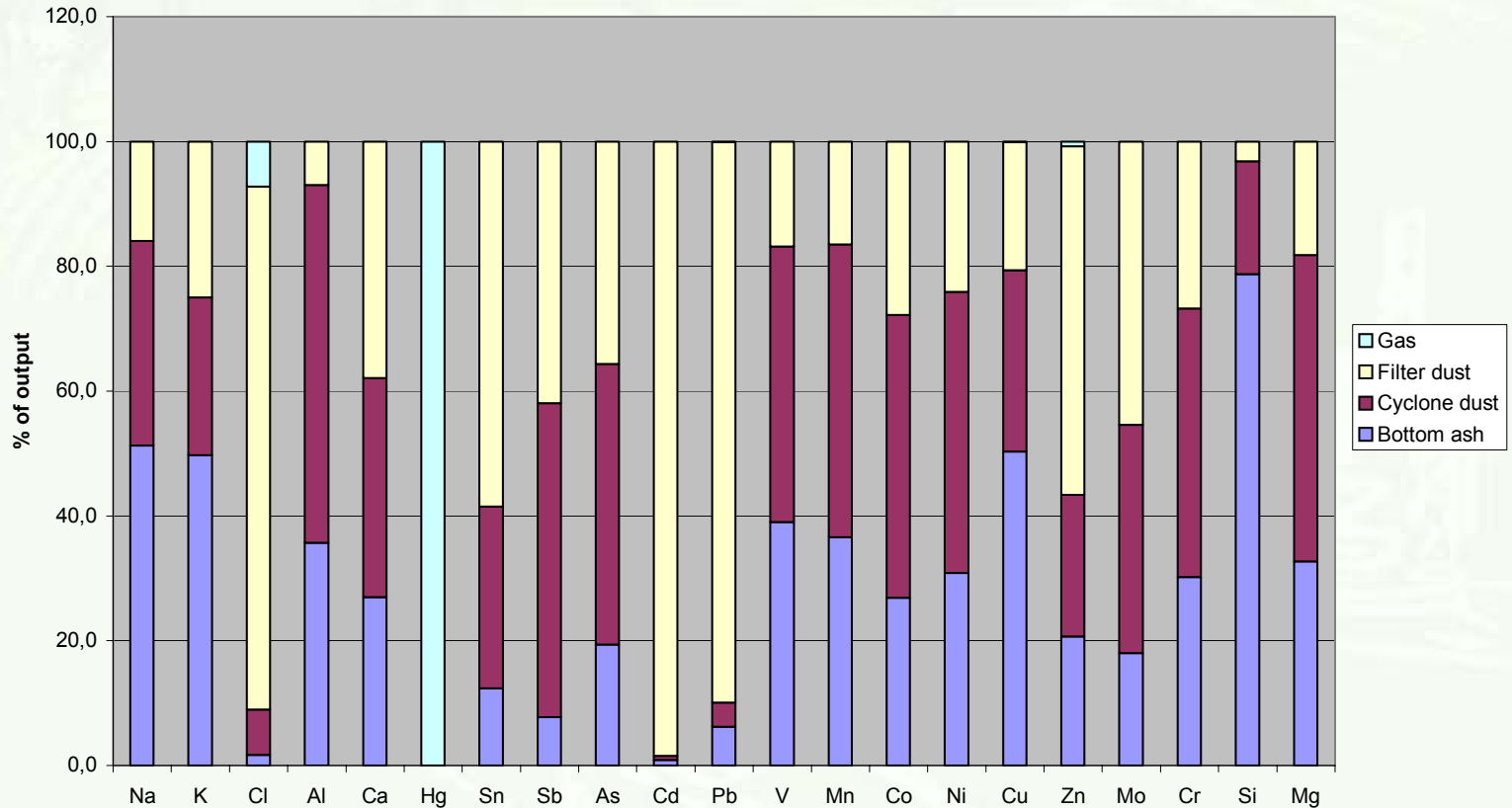
Fly ash and bottom ash, biomass/wood residue



Challenges

- focus on medium...large scale gasification
 - biomass
 - waste derived fuels (RDF, SRF,...)
- hot/dry gas cleaning => fly ash, used sorbents, etc.
- gasification fly ash chemically different compared to combustion
 - carbon content
 - reducing conditions => metals not (completely) oxidised
 - enrichment of chlorine, lead, zinc, tin, cadmium, etc.
 - high solubility

DISTRIBUTION OF METALS (% OF OUTPUT)



Wood+SRF/CFB gasification/Hot cyclone + bag filter (395 °C)

Tasks

1. Reduction of carbon in fly ash by optimisation of gasification conditions => improved quality and reduced volume of ash
2. Improvement of ash quality by
 - oxidation (stand alone/integrated)
 - chemical treatment
 - selective dust separation
3. Further utilisation of treated/untreated ashes
 - material recovery, construction materials, etc.
4. Economy of different routes

EXPECTED RESULTS/ FINAL GOALS

- ◆ **Optimised operation of the gasifier, treatment of ashes and utilisation of (treated) ashes results in improved economy of the plant.**
- ◆ **Improved feasibility of biomass/waste fuelled gasification technology in heat and power production.**