



BEST

Bioenergy and
Sustainable Technologies



FFG

COMET

Competence Centers for
Excellent Technologies

 Bundesministerium
Digitalisierung und
Wirtschaftsstandort

 Bundesministerium
Verkehr, Innovation
und Technologie



Ein Fonds der
Stadt Wien



Das Land
Steiermark



NEUES DENKEN. NEUES FÖRDERN.

Integrating steam gasification into established infrastructure in the pulp and paper industry

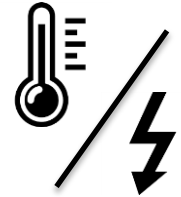
CEBC 2020 Graz, 22.01.2020

Thomas Karel

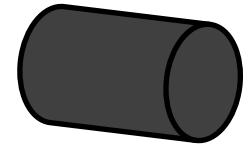


The current process

- Utilization of the bark for
 - providing heat
 - operating steam engines



- Utilization of fossile fuel (gas/oil) for
 - heating rotary kiln for lime processing
 - heating pulp flash dryer



lime kiln



flash dryer



The idea is to ...

- provide Bio-SNG from bark via steam gasification
- use Bio-SNG to fuel rotary kiln and / or flash dryer
- improve the CO₂ balance of the plant
- save fuel costs (???)

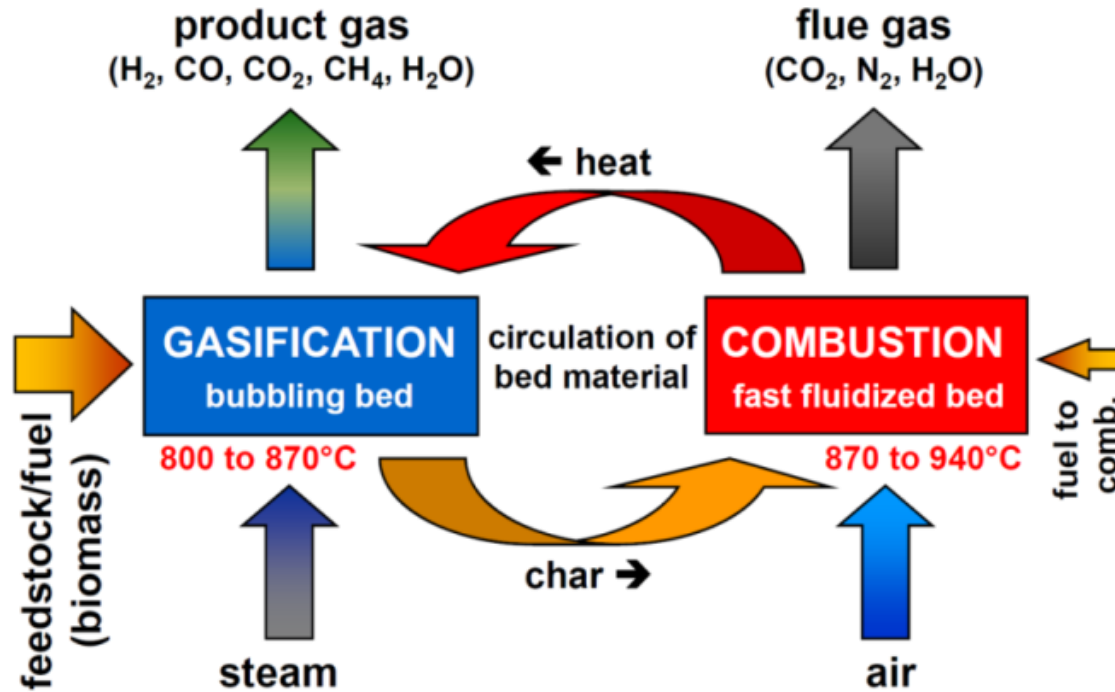


Why steam and not air gasification?

- + Influence of fuel moisture content to syngas quality
- + Syngas free of nitrogen
 - higher heating value of $\sim 13 \text{ MJ/m}^3$ (compared to $\sim 6 \text{ MJ/m}^3$ with air)
 - less power for fans/compressors needed
- Necessity of steam
- Highly endothermic process



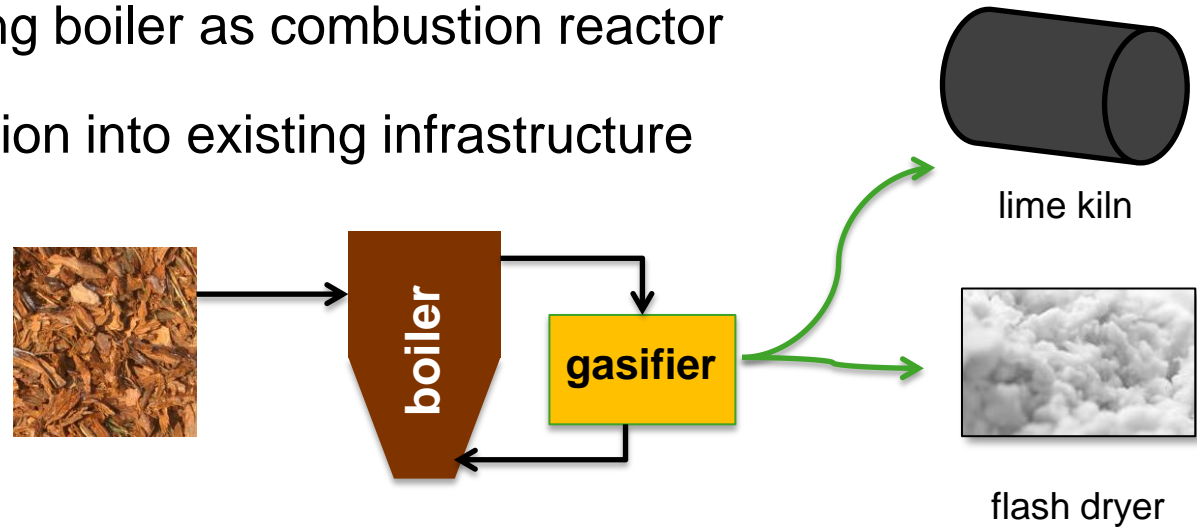
Operating principle of a DFB steam gasifier





Fully integrated system

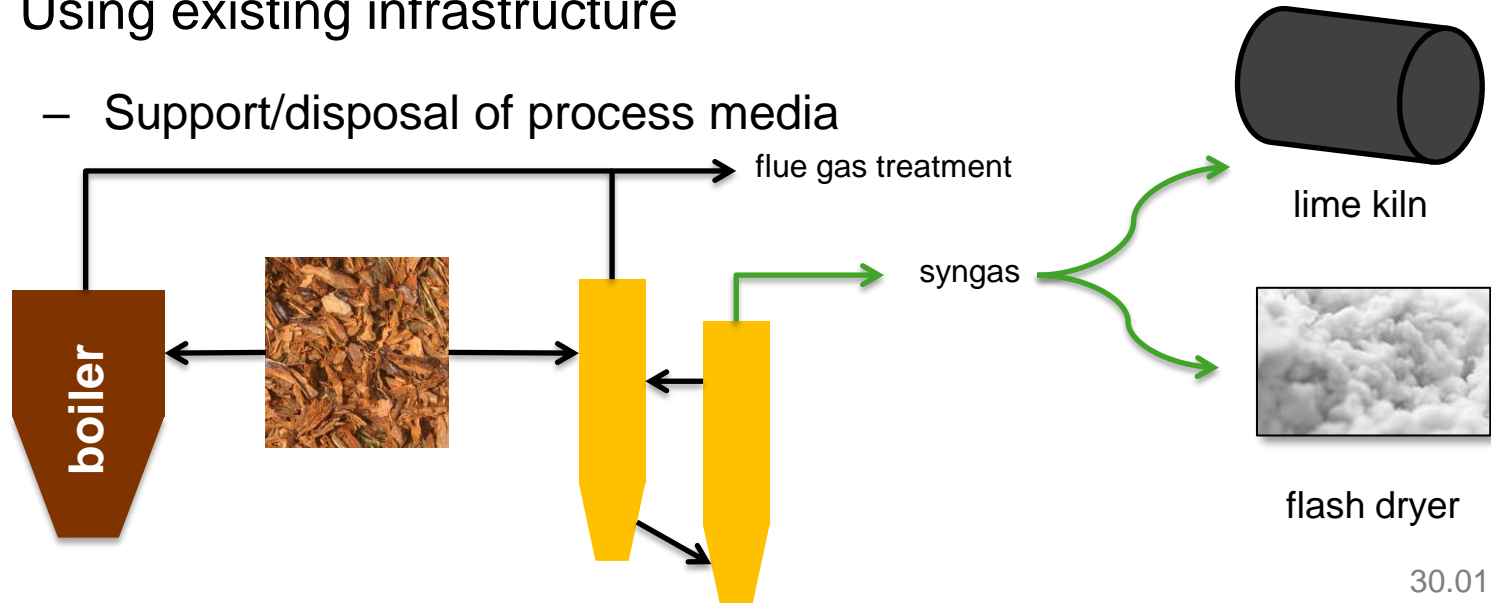
- Add-on gasification reactor
- Using existing boiler as combustion reactor
- Implementation into existing infrastructure





Partially integrated system

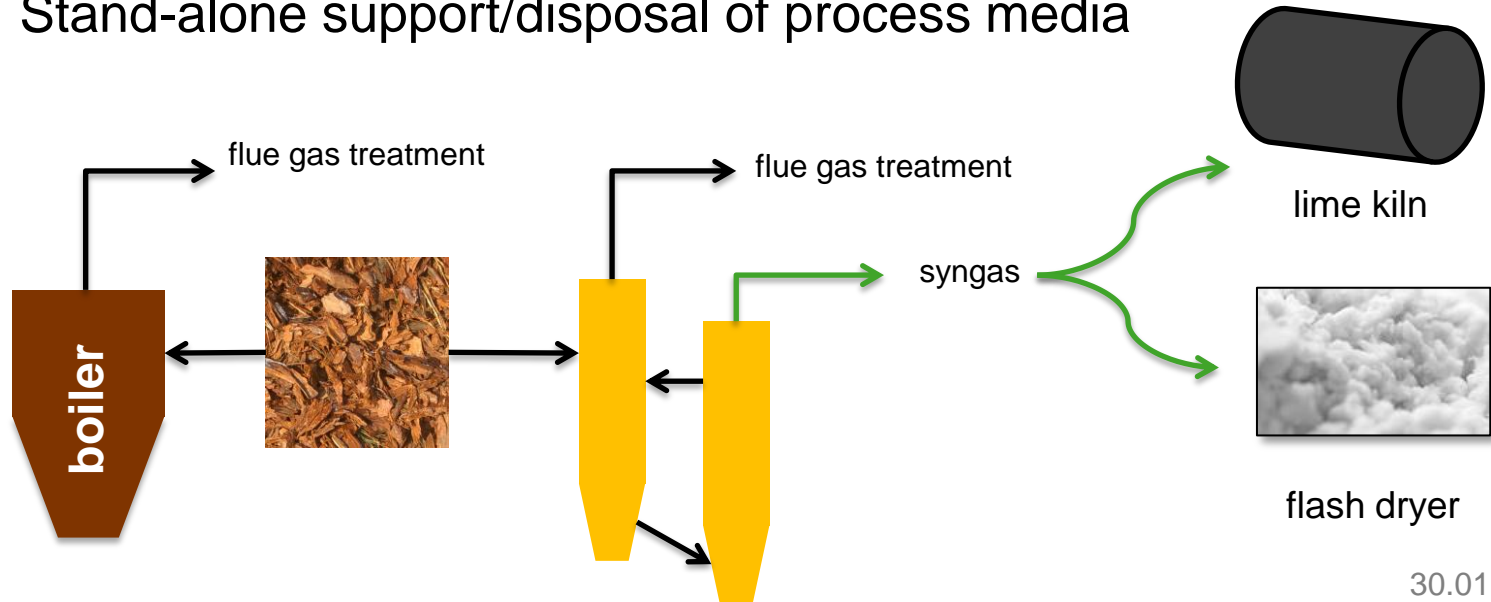
- Stand-alone DFB-gasifier
- Using existing infrastructure
 - Support/disposal of process media





Stand-alone system

- Stand-alone DFB-gasifier
- Stand-alone support/disposal of process media



Case study – Size of bark boiler and gasifier



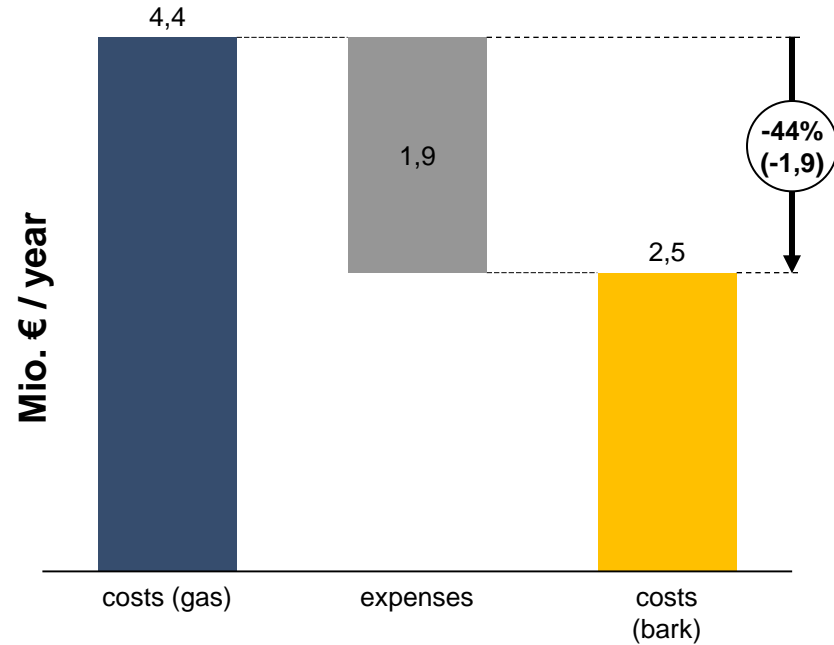
- Annual production capacity of ~260`000 t paper
 - 150 MW bark boiler for energy production
 - ~ 15 MW for the lime kiln
 - (~ 7 MW for the flash dryer)
- Gasifier capacity of ~ 18MW necessary*





Case study – feasibility

- Assumptions
 - 500'000 GJ for lime kiln p.a.
- Expenses to be determined
 - capex
 - opex
 - efficiency loss





Case study – preliminary results

- Fully integrated system
 - best / economically most feasible model
- Partially integrated system
 - depends significantly with the degree of implementation
- Stand-alone system
 - economically not feasible at the moment

Thank you for your attention !



Project partners:

