Presentation Advanced Bioenergy Lab in Zeltweg & barriers in gasification.

BioTheRos
12. März 2025

Simmeringer Haide

DI Dr.
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ABL Advanced Bioenergy Lab eGen

How are research findings implemented?

Test Rig (TRL 4)

Güssing

Demo Plant (TRL 6)

Güssing

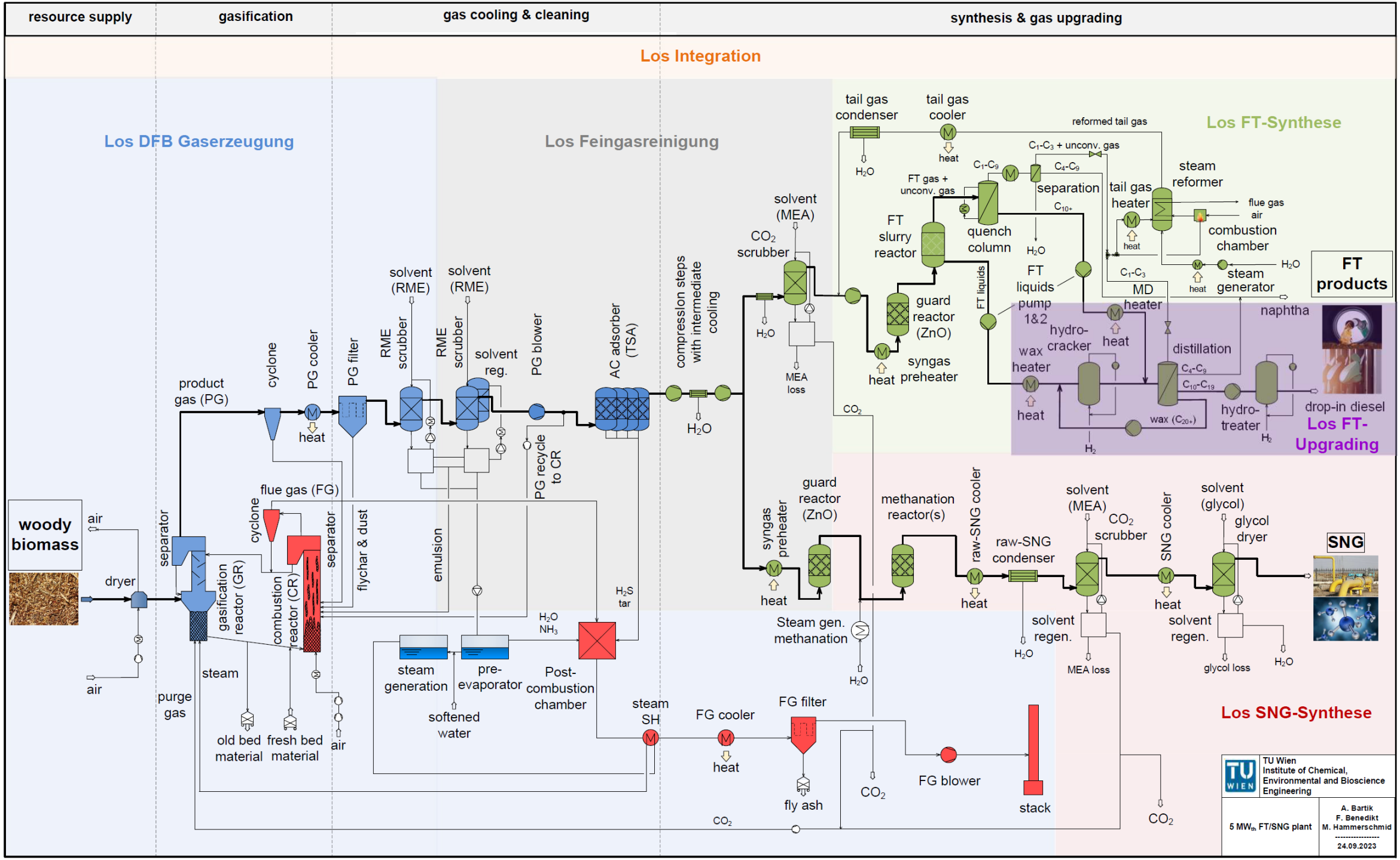
Industrial Plant (State-of-the-Art: TRL 9)

Göteborg - GoBiGas

2002 2006 2010 2014

ABL1 – F&E Infrastructure (Reallabor, TRL 7-8)

- Utilisation and mobilisation of waste and by-product potential (biomass)
- Construction of a 5-8 MW synthesis gas reactor at location in Zeltweg
- Demonstration of the production of Fischer-Tropsch fuel (wood diesel) and renewable gas (bio-SNG, biomethane = wood gas)
- Decarbonisation of the entire agriculture and forestry sector
- Preparation of future development steps: Hythane, hydrogen, alcohols, CO2 removal from the atmosphere (BECCS, BECCU); integration of surplus electricity...
- Continuous expansion of the co-operative


resource supply
gasification
gas cooling & cleaning
synthesis & gas upgrading
Los Integration
Los DFB Gaserzeugung
Los Feingasreinigung
Los FT-Synthese
Los FT-Upgrading
Los SNG-Synthese
woody biomass
air
dryer
product gas (PG)
cyclone
PG cooler
heat
PG filter
RME scrubber
solvent (RME)
RME scrubber
solvent (RME)
solvent reg.
PG blower
PG recycle to CR
AC adsorber (TSA)
compression steps with intermediate cooling
H_2O
solvent (MEA)
CO_2 scrubber
MEA loss
CO_2
tail gas condenser
tail gas cooler
reformed tail gas
C_1-C_3 + unconv. gas
C_1-C_9
C_4-C_9
separation
FT gas + unconv. gas
FT slurry reactor
quench column
C_{10+}
tail gas heater
steam reformer
flue gas
air
combustion chamber
steam generator
FT products
FT liquids
FT liquids pump 1&2
guard reactor (ZnO)
heat
syngas preheater
C_1-C_3
MD heater
hydro-cracker
wax heater
distillation
naphtha
C_4-C_9
C_{10}-C_{19}
wax (C_{20+})
hydro-treater
H_2
drop-in diesel
flue gas (FG)
cyclone
separator
gasification reactor (GR)
combustion reactor (CR)
separator
flychar & dust
emulsion
H_2S tar
H_2O NH_3
steam
purge gas
old bed material
fresh bed material
air
steam generation
pre-evaporator
softened water
Post-combustion chamber
steam SH
FG cooler
heat
FG filter
fly ash
CO_2
FG blower
stack
CO_2
syngas preheater
guard reactor (ZnO)
methanation reactor(s)
raw-SNG cooler
heat
raw-SNG condenser
solvent regen.
H_2O
Steam gen. methanation
H_2O
solvent (MEA)
CO_2 scrubber
MEA loss
SNG cooler
heat
solvent regen.
solvent (glycol)
glycol dryer
glycol loss
H_2O
SNG
TU Wien
Institute of Chemical, Environmental and Bioscience Engineering
5 MW_{th} FT/SNG plant
A. Bartik
F. Benedikt
M. Hammerschmid
24.09.2023

ABL-press conference, 13.09.2024

Link to Video (german): https://www.youtube.com/watch?v=KXpGEV9OloE&t=187s

Summary IEA

- Current status of gas generation and synthesis gas applications
- Annex 4 – Fuel Synthesis – Demonstration plants
- Annex 5 – other gasification technology – operational or planned
- Annex 6 – other gasification technology – closed projects
- Status report on thermal gasification of biomass
- and waste
- Worldwide overview Gasification projects

non-technical barriers

- Increase in investment costs from 2019 to 2024 >50%Product revenues unclear and cannot be planned for:
  - FT products: Wood diesel
  - Biomethane: wood gas
  - GHG savings: Revenues from CO2 certificates
- Biogenic residues are in demand at the moment: poor planning security for fuel
- References available on an industrial scale, but further plants would increase confidence

non-technical barriers

- Currently no mass production, e.g. for grate firing systems
- For mass production (learning curves) and reduction of investment costs through an economy-of-scale, secure framework conditions are required for a medium-term horizon
- Optimisation of the entire value chain from biomass production to refuelling will increase planning security and improve economic efficiency

Technical optimisation potential

- PtX, BECCSU concepts can be integrated very efficiently and seamlessly into existing technology and would improve economic efficiency, but are at a technology readiness level of <5
- Individual components need to be further developed for the utilisation of very low-quality residual materials
- Gas purification: is ready for the market, but further research can reduce costsDrop-in products @site: centralised processing would reduce costs
- Catalyst costs are very high due to the small quantities produced (200,000 EUR/t), comparable catalysts cost around 6,000 EUR/t in mass production

Summary

- No significant barriers exist
- Construction of numerous systems on an industrial scale is possible
- Open innovation creates synergies for all parties involved
- Numerous optimisation potentials along the entire value chain can be exploited
- Austria's technology leadership can be expanded

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