



IEA Bioenergy
Technology Collaboration Programme



Country Report Germany

Task 33 Thermal Gasification of Biomass

Update

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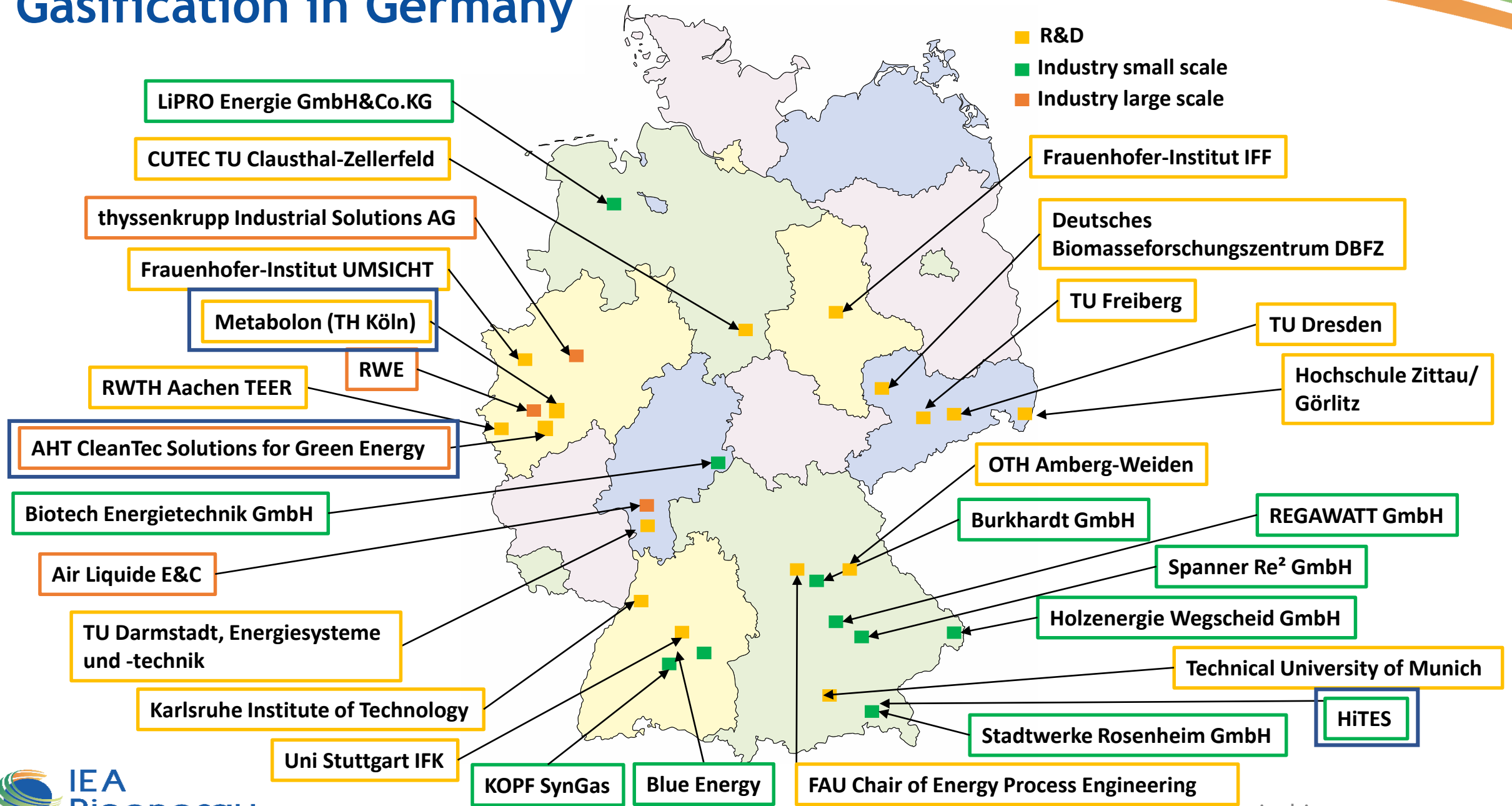
KIT - The Research University in the Helmholtz Association

ENGLER-BUNTE-INSTITUT Fuel Technology, EBI ceb
Institute for TECHNICAL CHEMISTRY, Gasification Technology, ITC vgt

Karlsruhe, June 11, 2024

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Gasification in Germany



Industrial activities

- metabolon Institut
 - Sustainable waste treatment → closing of material cycles
waste-to-value, waste-to-energy
 - Thermo chemical processes
(combustion, gasification, pyrolysis, hydrothermal carbonation, torrefaction)
 - Fixed bed gasifier (AHT CleanTec)
- hiTES: H₂ from biomass
 - Allothermal steam reforming of forest waste / agricultural residues
 - Demonstration plant (2 t/h dry biomass → 200 kg/h H₂) planned, start up 2025
(highly superheated steam (1200 °C) produced by waste energy (tail gas from PSA) used
as gasification medium)
- Sülzle-Kopf Syngas - Fluidized bed gasification of sewage sludge
→ Commercial plant is out of operation due to decision of the owner
Stadtentwässerung Koblenz

Research activities - KIT ITC - HP-EFG



Slagging high-pressure entrained flow gasifier

- $p_{\text{reactor}} = 40 / 80 \text{ bar (abs)}$
- $P_{\text{th}} = 5 \text{ MW}$
- $\dot{m}_{\text{fuel,max}} = 1000 \text{ kg/h}$ (liquid and suspension fuels)
- $\eta_{\text{liq,max}} = 1000 \text{ mPa s}$
- Gasification medium: O_2 / steam
- Optical access to flame zone

Status June 2024

- Successful test campaign in March 2024
- Characterization of fuel conversion / data for scale-up:
 - Model and technical slurries
glycol + beech wood char
pyrolysis oil + beech wood char
- Flame characterization with high speed camera

Outlook

- Test with plastic waste based pyrolysis oil planned for end of 2024
- Characterization of fuel conversion and flame structure

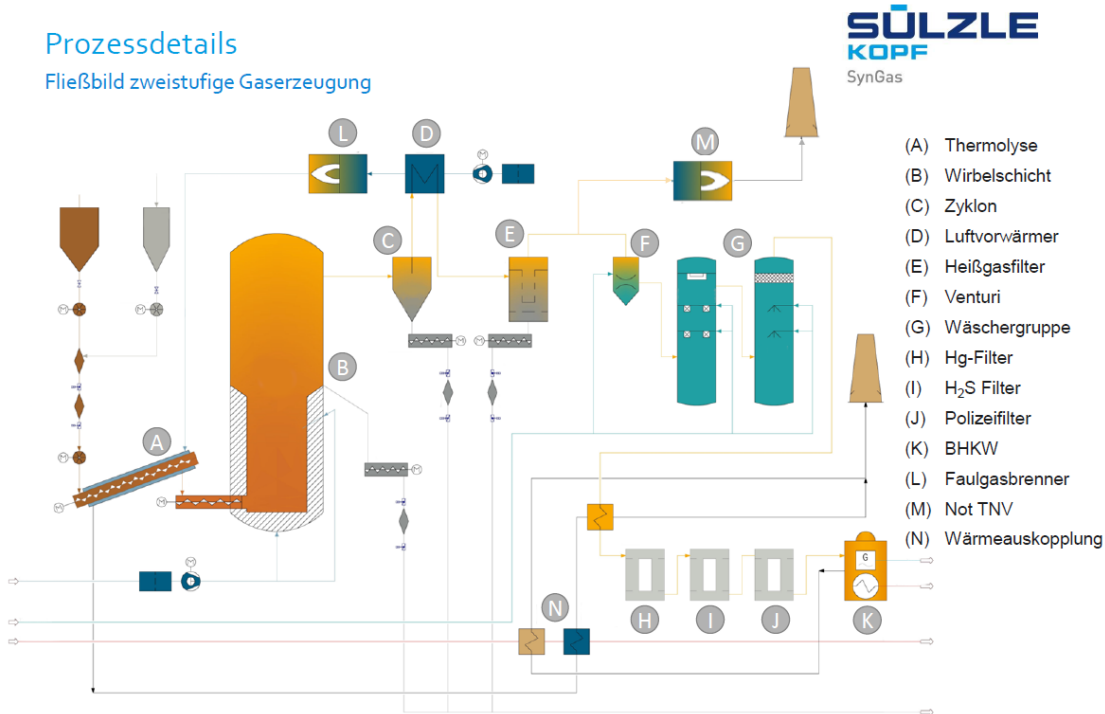


Thanks for your attention!

Industry Activities - Sülzle Kopf Syngas

Prozessdetails

Fließbild zweistufige Gaserzeugung



**Fluidized Bed Gasifier for Sewage Sludge with CHP via Gas Engine
Commercial plant for Sewage Sludge in Koblenz**

- 525 kW heat
- 440 kW power

Status June 2024:

- After Buy Off plant in batch operation.
Contractual relationship:
Stadtentwässerung is owner of the plant
Kopf SynGas responsible for maintenance, service and plant operation with own personnel
- Deficiency of precipitant as consequence of Ukraine crisis and generally reduced amount of sewage sludge lead to deficiency of fuel and discontinuous operation.
- Plant shall be adapted for acceptance of external sewage sludge to meet with the fuel deficiency

→ **Plant out of operation due to decision of owner
Stadtentwässerung Koblenz**