

CLARA - Chemical Looping Gasification for Sustainable Production of Biofuels

EUBCE, 29.05.2019, CCL Lisbon



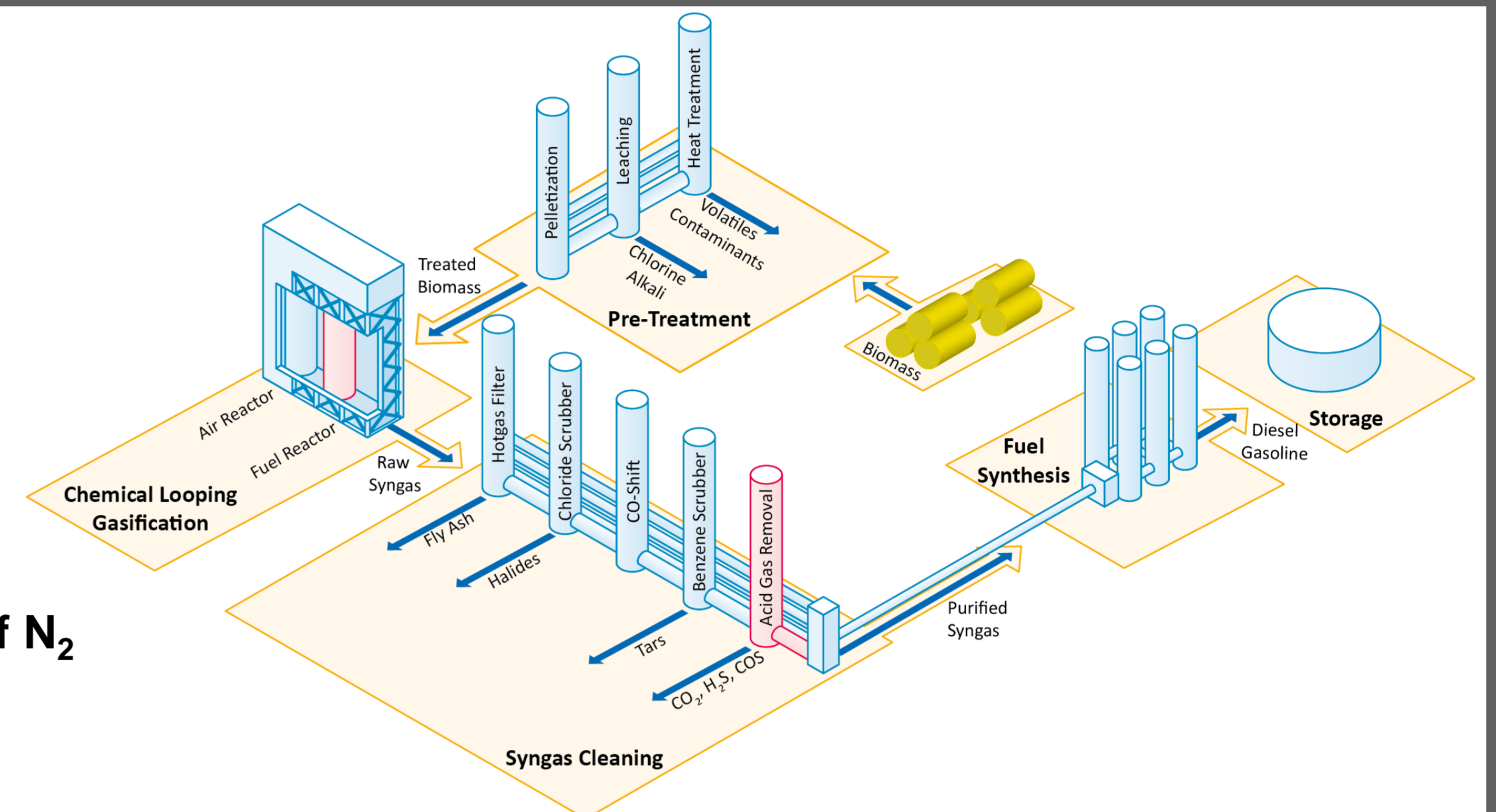
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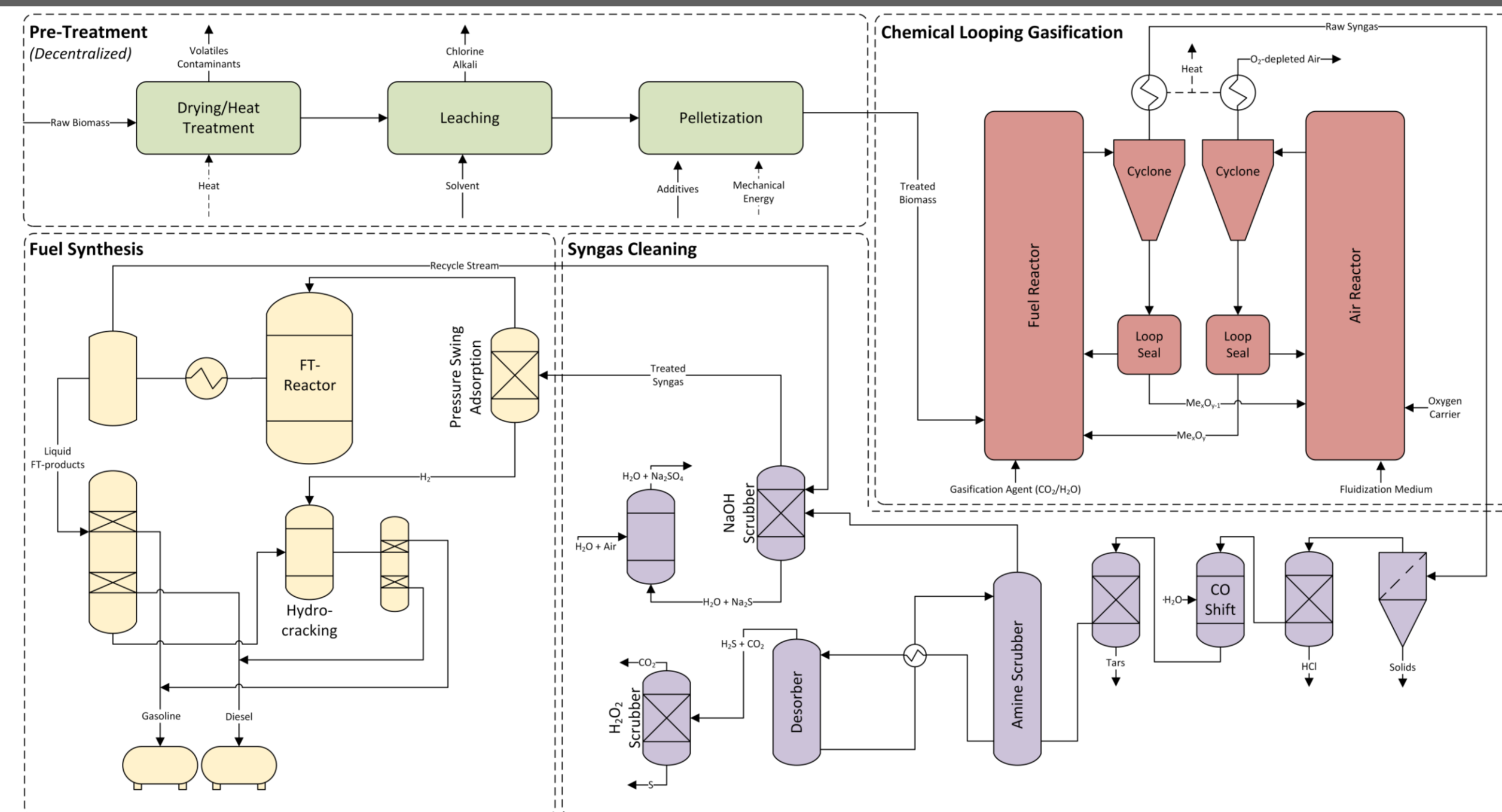
Introduction & Motivation

- Cost-efficient production of second generation biofuels from agricultural waste
- Synthesis of liquid bio-based diesel and gasoline-like fuels via:
 - Biomass pre-treatment
 - Chemical looping gasification (CLG)
 - Novel syngas purification concept
 - Fuel synthesis & upgrading (FT & hydrocracking)
- Feedstock flexibility – a variety of feedstock of different quality can be processed
- High CO₂ capture potential – low energy penalty due to high CO₂ concentrations & absence of N₂
- Competitive fuel costs – excellent energetic efficiency & high carbon utilization



Technological Approach

- Selection of feedstock
- Specification of the range of operating conditions
- Testing of selected technologies (i.e. CLG, biomass treatment, and syngas cleaning)
- Demonstration of the full process chain of biofuel production (see right) in pilot scale
- Establish effective pre-treatment concept for straw
- Bring CLG technology to next level of maturity
- Develop novel syngas cleaning concept

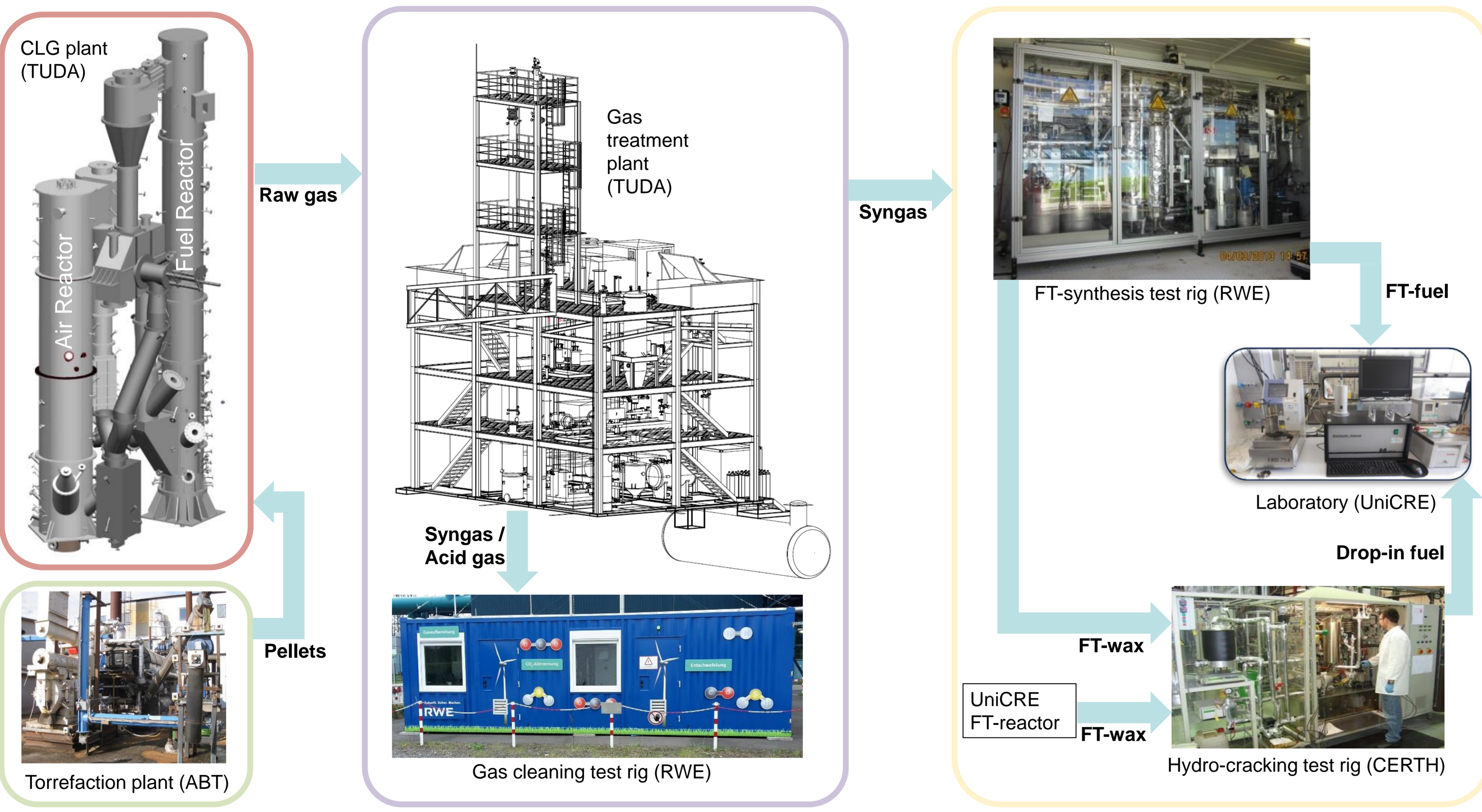


Partners



Pilot Plant

- One of the biggest fluidized bed test sites in the world
- Erected in 2009
- Height: 20 m
- Two connected circulating fluidized bed (CFB) reactors for CLG:
 - Air reactor: CFB600 (d_i = 600 mm)
 - Fuel reactor: CFB400 (d_i = 400 mm)



Summary & Outlook

- Investigation of biomass to biofuel process chain in pilot scale
- Development, testing and optimization of innovative concepts for:
 - Biomass pre-treatment
 - Chemical looping gasification (CLG)
 - Syngas cleaning
- Elevation of investigated technologies to TLR 5-6
- Exploitation of research results in cooperation with industry partners
- Industrial-scale implementation of the process chain
- Large-scale production of cost-competitive biofuels

Highlights

- Demonstration of full process chain in pilot scale
- De-carbonization of fuel & chemical industry
- Facilitation of net-negative CO₂ emissions (BECCS/U)

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