BioTheRoS

Collaborative actions to bring novel **BIO**fuels **THE**rmochemical **RO**utes into industrial **S**cale

BEST

Bioenergy and Sustainable Technologies

Syngas Platform Vienna

Syngas Platform Vienna

Gasification of residues and synthesis of fuel and chemicals

Theresa Köffler, BEST

Workshop on Advancing Industrial-Scale Biofuels:

Innovative Pathways in Thermochemical Conversion

23rd of October 2025

The BioTheRoS Project has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement No. 101122212.

Agenda

- BEST
- Syngas Platform Vienna
- Full chain demonstration within BioTheRoS

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BEST

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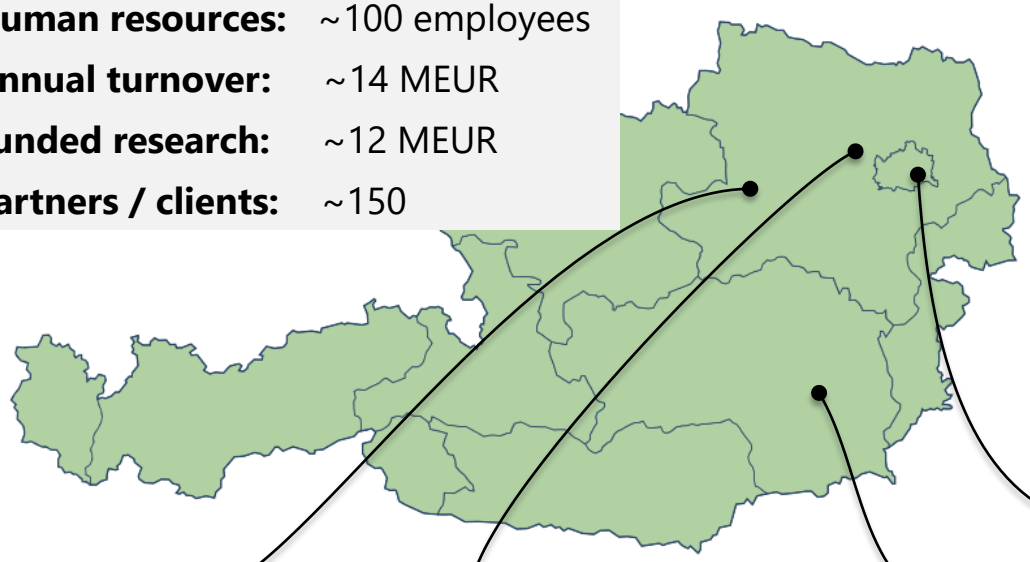
BEST in a nutshell

Bridging the gap between fundamental research and industrial deployment with RTD services to shape the transition to a sustainable and climate friendly bioeconomy

Human resources: ~100 employees
Annual turnover: ~14 MEUR
Funded research: ~12 MEUR
Partners / clients: ~150



High value products from residues and waste

Economic and efficient renewable energy systems

Wieselburg, Lower

Tulln, Lower

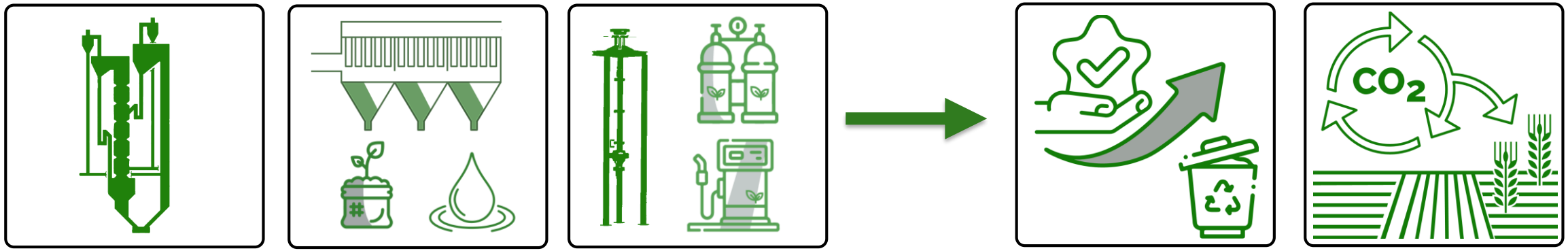
Graz, HQ, Styria

Vienna

Area 1.3: Syngas Platform Technologies

TECHNOLOGY DEVELOPMENT enabling SUSTAINABLE PROCESS CHAINS in INDUSTRIES

Strategic fields of action



Dual fluidized bed (DFB) processes

Linking process chains

Gas upgrading and synthesis

High value products from residues

Negative emissions

Lab-, pilot- and demonstration-scale infrastructure for **experimental de-risking** to enable **industrial implementation**

Agenda

- BEST
- **Syngas Platform Vienna**
- Full chain demonstration within BioTheRoS

SYNGAS PLATFORM VIENNA

A **research hub** featuring a Waste2Value process chain: 1 MW **DFB gasification +** 250 kW **Fischer-Tropsch** synthesis demo

A connected **laboratory** supplied **with real syngas** for gas cleaning and upgrading

Syngas Platform Vienna

DFB Gasification demo

Industrial site of

WIEN ENERGIE

Fischer-Tropsch

Fischer-Tropsch pilot

Aqueous phase reforming

Temperature swing adsorption

Feedstock containers

Analytics lab

Technologies
Process Overview

Residues forestry, agriculture, industry and WWT

DUAL FLUID Gasification

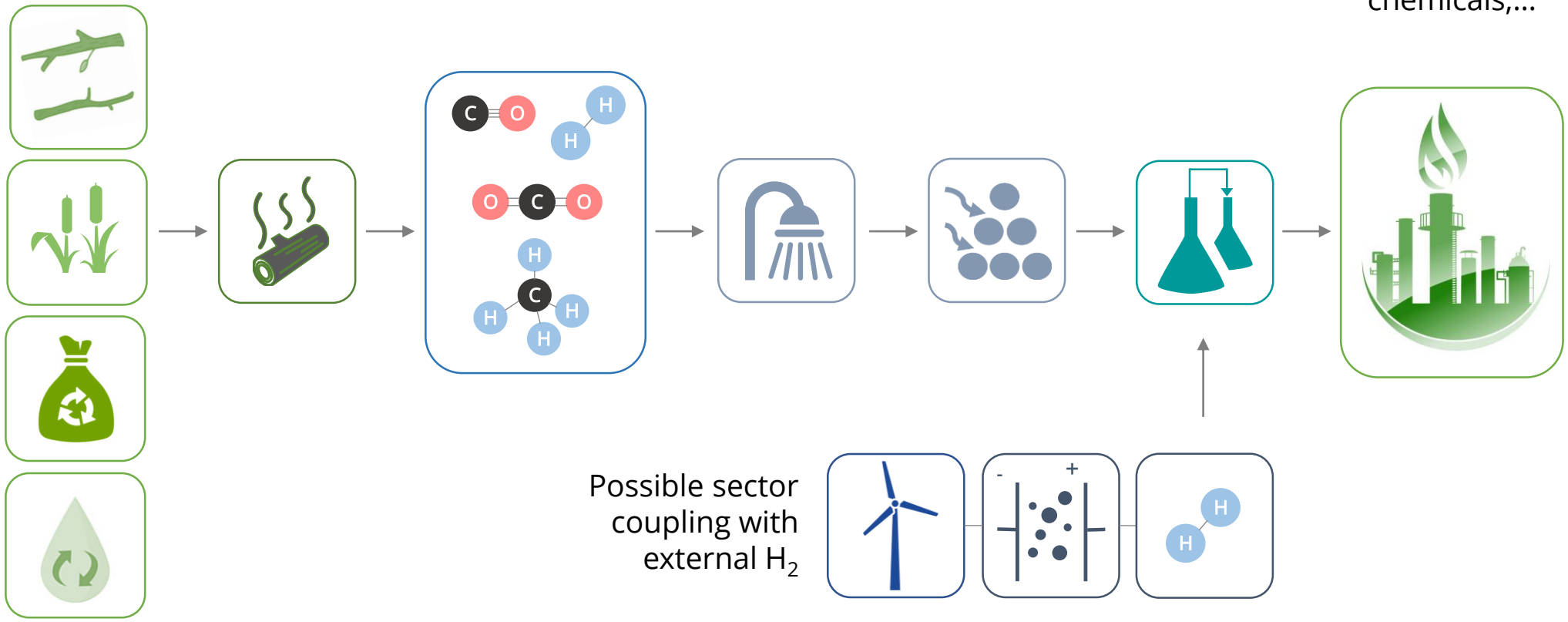
Product gas

Coarse gas cleaning

Fine gas cleaning to obtain H_2-rich synthesis gas

Downstream synthesis

Sustainable (bio)refinery products - SNG, H_2 transportation fuels, chemicals,...

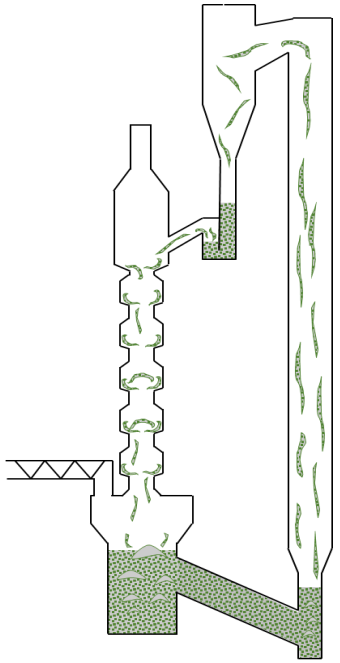


Possible sector coupling with external H_2

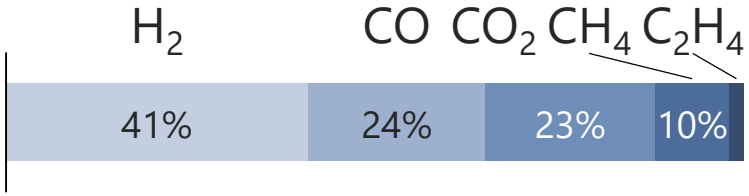
Syngas Platform Vienna: experimental equipment

Dual fluidized bed (DFB) gasification:

- 1 MW demonstration-scale plant for long-term campaigns of multiple weeks continuous operation
- Advanced DFB gasification (aDFB) reactor design upscaled from 100 kW



Typical syngas composition

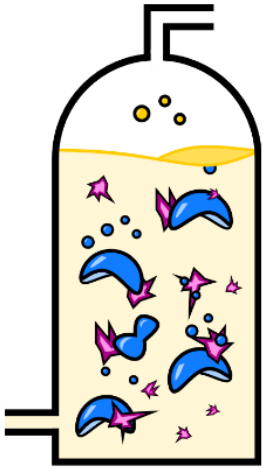


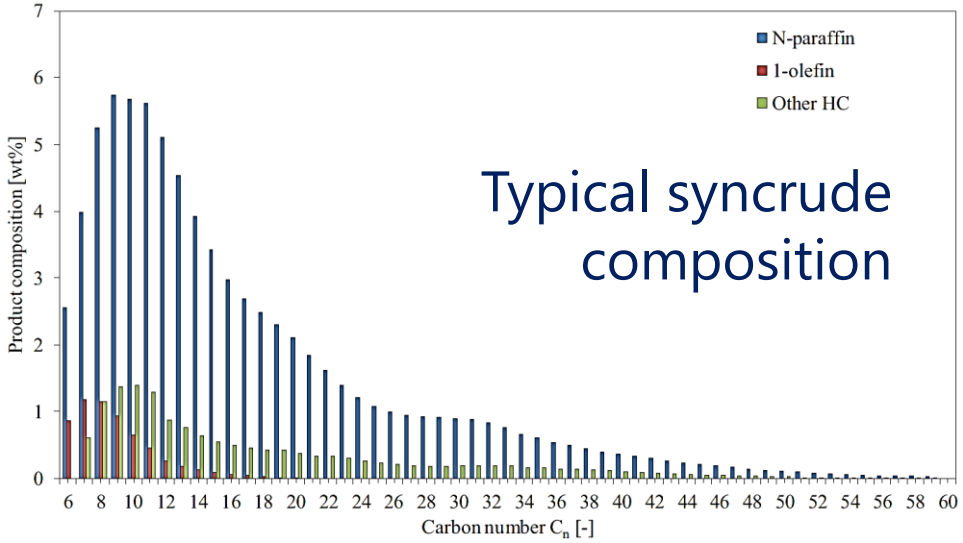
Based on a 100 kW DFB plant at TU Wien

Syngas Platform Vienna: experimental equipment

Slurry-Bubble-Column-Reactor (SBCR):

- 250 kW pilot-scale Fischer-Tropsch plant for long-term campaigns of multiple weeks continuous operation
- Gas cleaning includes hot filtration, a quench, solvent scrubbers, activated carbon filters and ZnO filters





Typical syncrude composition

Karlsruher Institut für Technologie

In cooperation with KIT Karlsruhe

Agenda

- BEST
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- **Full chain demonstration within BioTheRoS**

BioTheRoS - At a glance

Collaborative actions to bring novel **BIO**fuels **THE**rmochemical **RO**utes into industrial **S**cale

TECHNOLOGY DEVELOPMENT enabling SUSTAINABLE PROCESS CHAINS in INDUSTRIES

Selection of promising feedstocks (WP2)
- Screening of pre-treatment technologies
- AI cost effectiveness models

Pyrolysis value chain

Gasification value chain

Pilot experimental validation pyrolysis based advanced biofuels production (WP3)

Pilot experimental validation gasification based advanced biofuels production (WP4)

Pilot experimental validation CCU from off gases (T3.1 & 4.2)

Value chain improvement
- Carbon capture (and storage or utilisation) (T4.3, T6.3)
- Renewable hydrogen use (T6.3)
- Synergies of blending pyrolysis and gasification based biofuels (T3.5)

Sustainable scale-up (WP5)
- LCA framework development
- Multicriteria analysis
- Rules for scale-up modelling and holistic assessment

Market dynamics & business modelling (WP6)
- Policy framework & interlinked market potentials
- Techno-economic assessment
- Business modelling for scale-up and global rollout

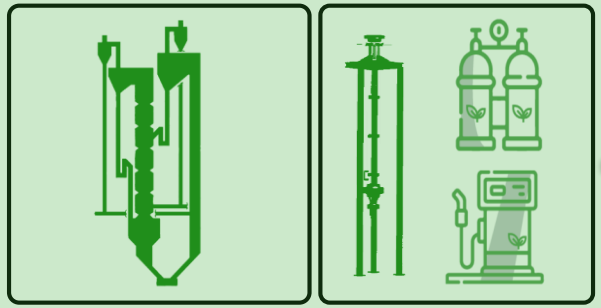
International cooperation (WP7)
- Synergies with EU and international projects
- Cooperation with international networks
- Network for knowledge sharing

Coordination (WP1)

Dissemination (WP 8)

Scope BEST

BEST Bioenergy and Sustainable Technologies



Dual fluidized bed (DFB) processes

Gas upgrading and synthesis

High value products from residues

Lab-, pilot- and demonstration-scale infrastructure for **experimental de-risking** to enable **industrial implementation**

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Coordinator
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BioTheRoS - Gasification value chain

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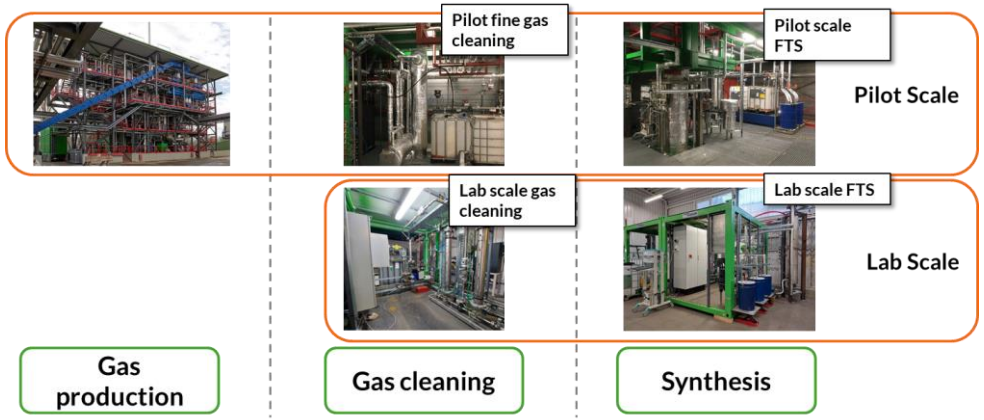

Main activities

- **Gasification of biogenic waste feedstock**
- **Screening on gas impurities and gas cleaning strategies**
- **Operation of full process chain and production of FT raw product**

FT raw product

Syngas Platform Vienna

Information

Main activities

- **Hydrocracking of FT raw product**
- **Integration of carbon capture technology into thermochemical processes**
- **Simulation and modelling for scale-up of gasification process**

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BioTheRoS - Gasification value chain

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Wood chips

Forestry residue

Gasifier

Fine gas cleaning

FT-synthesis

Full Gasification value chain operation

Gas production

Gas cleaning

Synthesis

FT raw product

Full chain demonstration successfully accomplished!

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BioTheRoS - Achievements

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Aim:

Investigation of biogenic waste feedstocks for gasification value chain for the production of advanced biofuels

Achievements:

- Operation of full process chain overall several days
- Assessment of gas impurities and gas cleaning performance
- Production of FT-syncrude for further processing by CERTH
- Production of advanced biofuels (SAF) is on-going

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BioTheRoS - Key lessons and next steps

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Take aways:

- Biogenic waste materials can effectively serve as feedstock for gasification with minor effect on syngas quality
- Higher amounts of impurities sufficiently reduced to necessary levels for synthesis
- Approved usage of waste feedstock to improve economics

Next steps:

- Finalizing data assessment and publications
- Investigations on scale-up, TEA and LCA by project partners

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Thank you!

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Syngas Platform Vienna

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https://www.biotheros.eu/de/startseite/

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