



BioTheRoS

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



Bioenergy and
Sustainable Technologies

Syngas Platform Vienna

Syngas Platform Vienna



Gasification of residues and synthesis of fuel and chemicals

Theresa Köffler, BEST

“Webinar: Scaling up advanced biofuels production”

12th of November 2024



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

Agenda

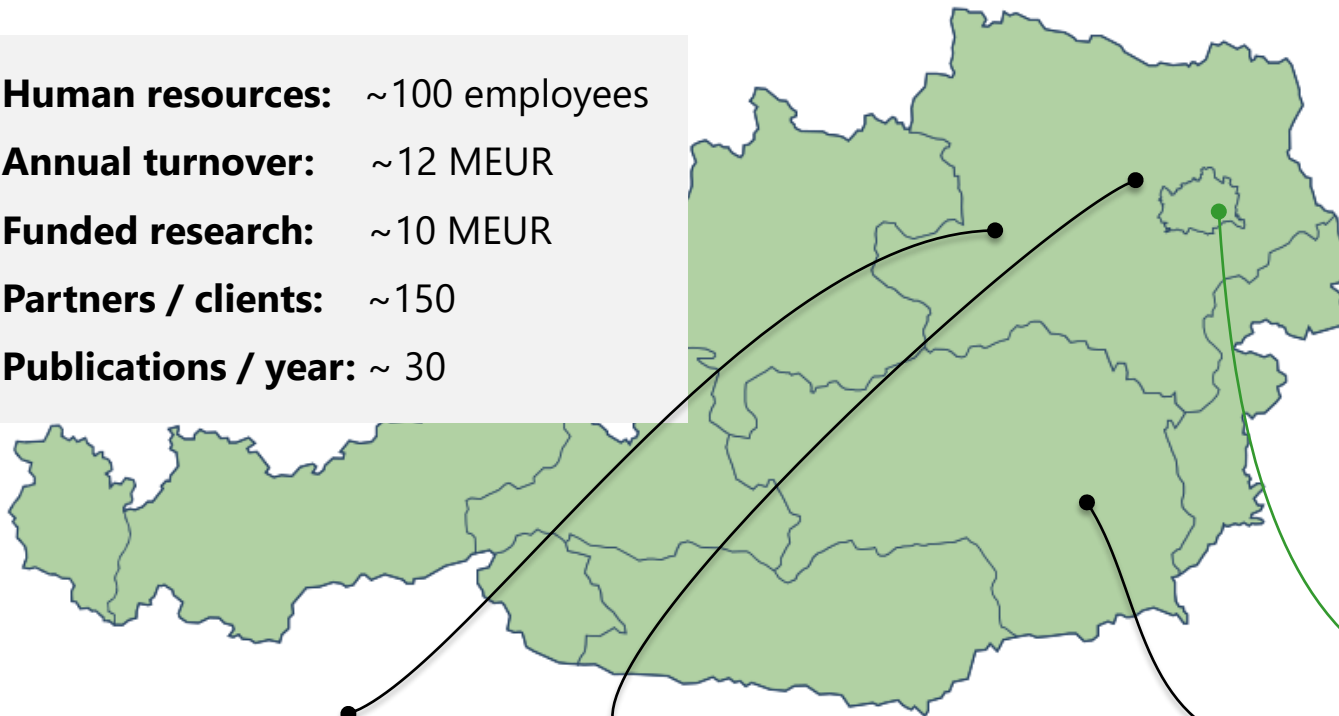
BEST

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

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: ~12 MEUR
Funded research: ~10 MEUR
Partners / clients: ~150
Publications / year: ~30



Wieselburg, Lower Austria



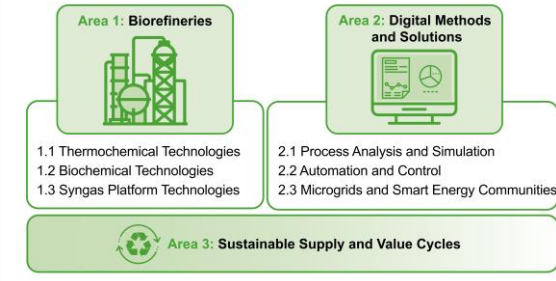
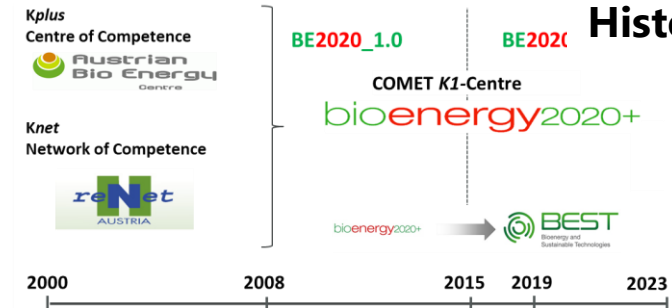
Tulln, Lower Austria



Graz, HQ, Styria



Vienna

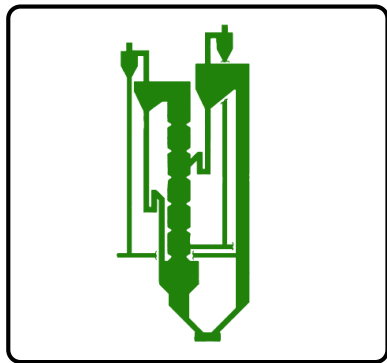




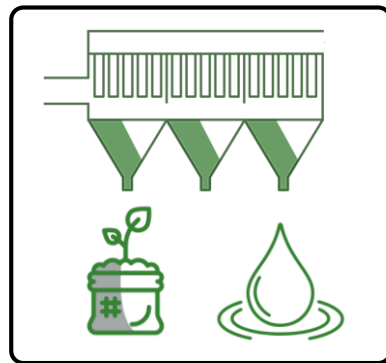
Area 1.3: Syngas Platform Technologies

TECHNOLOGY DEVELOPMENT enabling SUSTAINABLE PROCESS CHAINS in INDUSTRIES

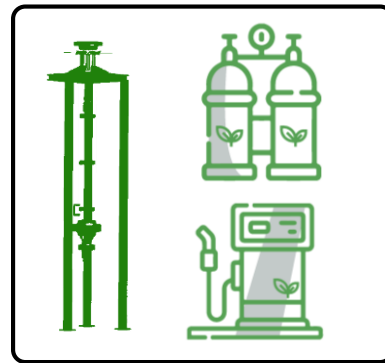
Strategic fields of action



Dual fluidized bed (DFB) processes



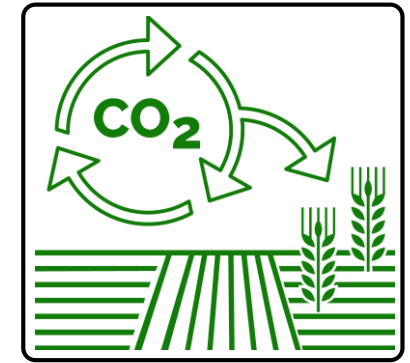
Linking process chains



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

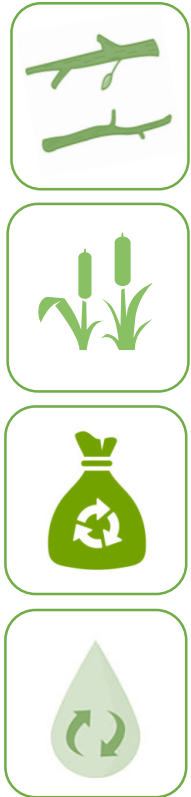
Syngas Platform Vienna





Technologies Process Overview

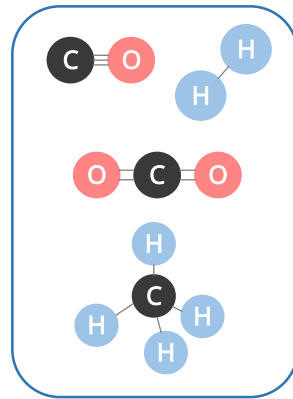
Residues
forestry,
agriculture,
industry
and WWT



**DUAL FLUID
Gasification**



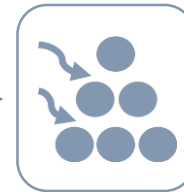
Product gas



Coarse gas
cleaning



Fine gas
cleaning to
obtain
 H_2 -rich
synthesis gas



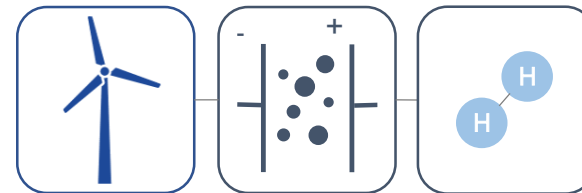
Downstream
synthesis



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



Possible sector
coupling with
external H_2

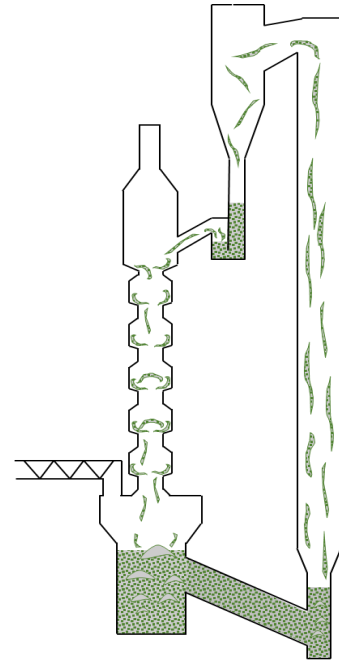


Syngas Platform Vienna: experimental equipment



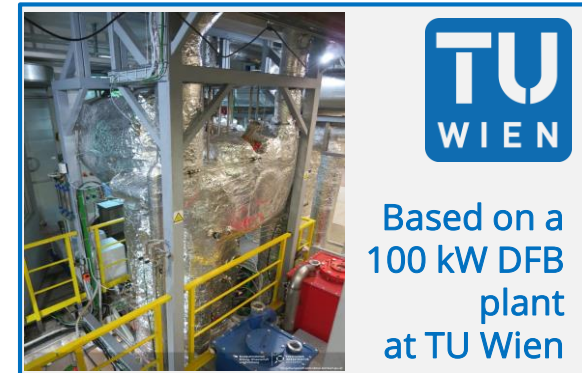
Dual fluidized bed (DFB) gasification:

- 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

H ₂	CO	CO ₂	CH ₄	C ₂ H ₄
41%	24%	23%	10%	

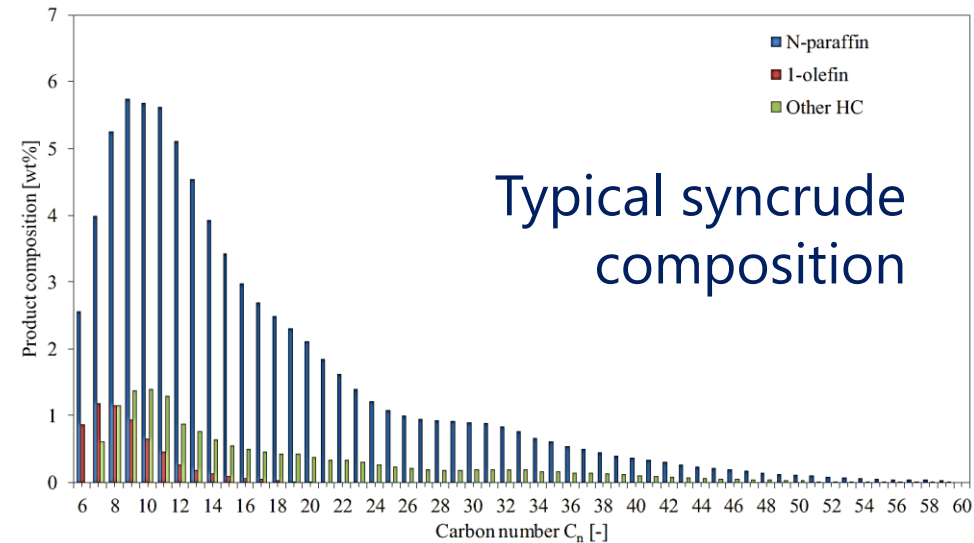
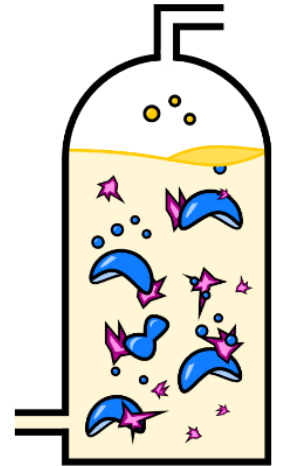


Syngas Platform Vienna: experimental equipment



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



Agenda

▶ BEST

▶ Syngas Platform Vienna

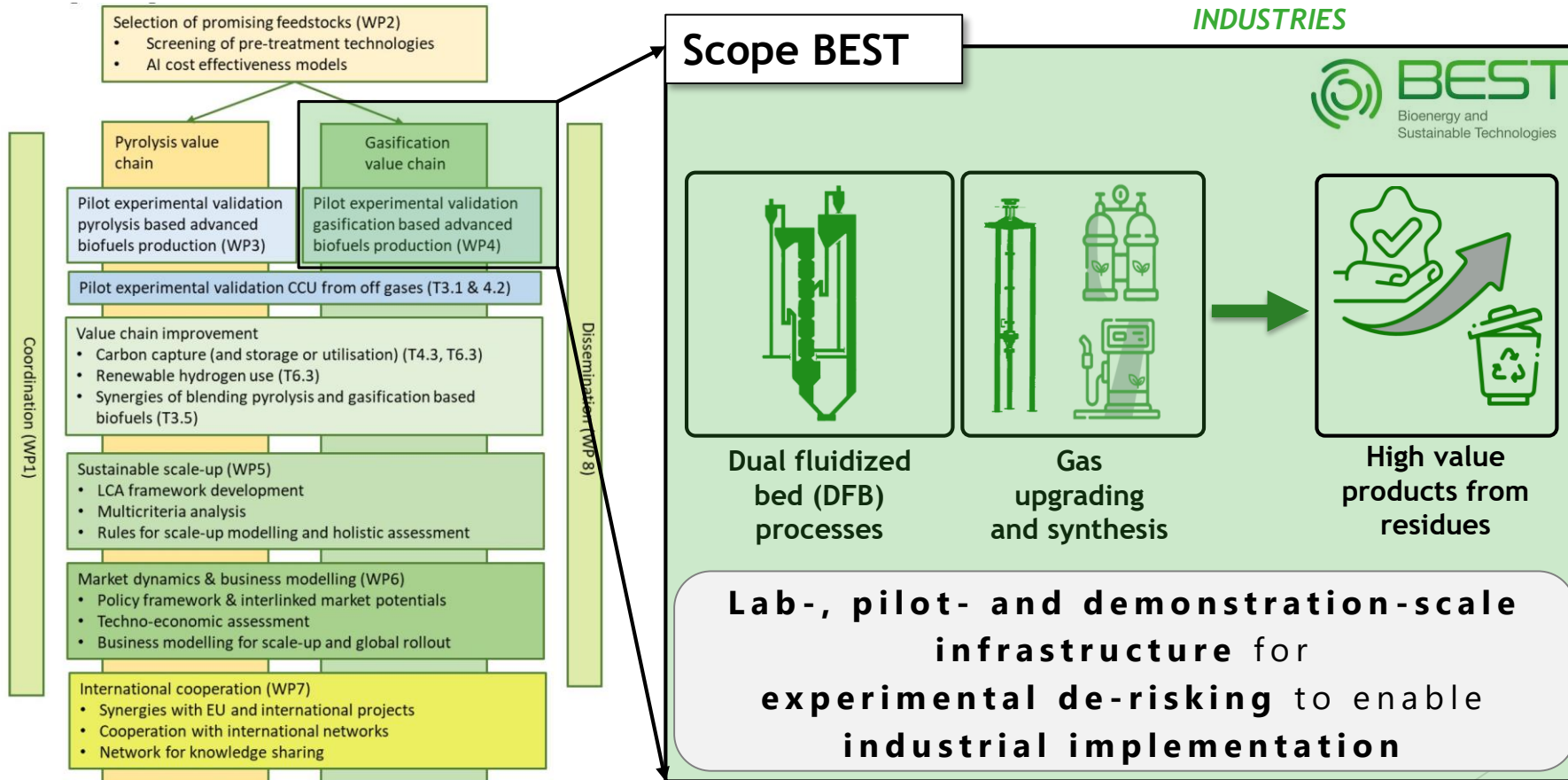
Full chain demonstration within BioTheRoS



BioTheRoS - At a glance

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

TECHNOLOGY DEVELOPMENT enabling SUSTAINABLE PROCESS CHAINS in INDUSTRIES



Coordinator

CERTH
CENTRE FOR RESEARCH & TECHNOLOGY HELLAS

circe

btg
biomass technology group

BEST
Bioenergy and Sustainable Technologies

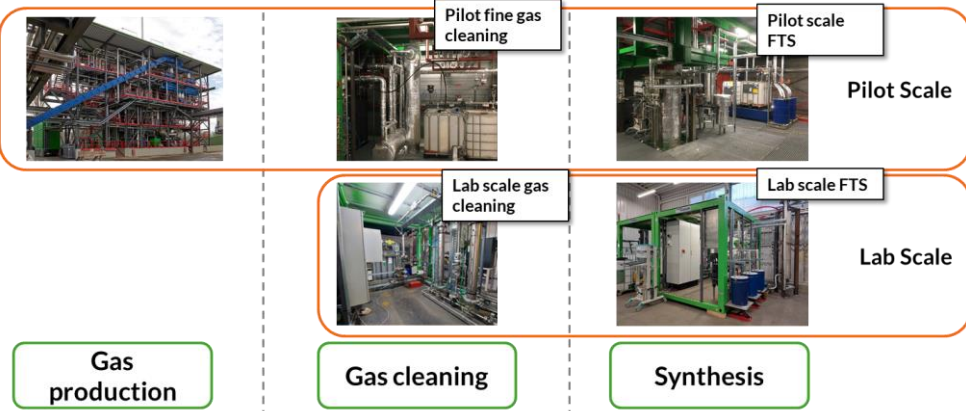
WIP RENEWABLE ENERGIES

MOTOR OIL



BioTheRoS - Gasification value chain

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



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



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

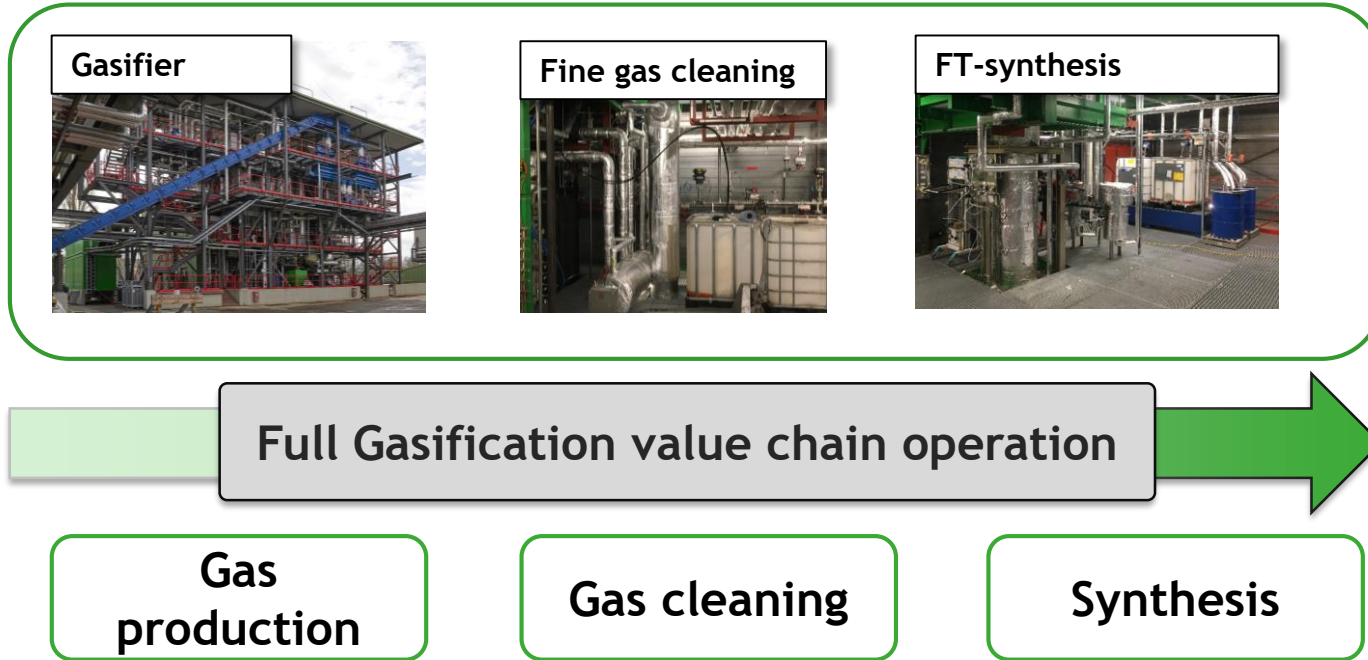
Coordinator





BioTheRoS - Gasification value chain

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



Full chain demonstration successfully accomplished!

Coordinator



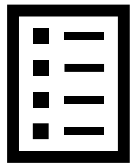
BioTheRoS - Summary

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



Aim:

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



Work:

- ▶ **Full process chain demonstration using biogenic waste feedstock at the Syngas Platform Vienna**
 1. Investigation on gas cleaning strategies and characterization of gas impurities
 2. Production of FT raw products
 3. Production of SAF from FT raw products





BioTheRoS - Summary

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



Outcome:

- ▶ Approved usage of waste feedstock to improve economics
- ▶ Operational knowledge on the usage of biogenic waste feedstocks (e.g. feedstock supply,..)
- ▶ Knowledge on increased impurities amount on gas cleaning
- ▶ Investigations on the further scale-up
- ▶ Valuable input for TEA and LCA





BioTheRoS - Scale Up Challenges

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



Challenges:

▶ Gasification unit

- ▶ Usage of residues of low quality
- ▶ Product gas composition
- ▶ Counter-current column
 - Complexity in engineering
 - + Higher tar conversion

▶ Gas cleaning unit

- ▶ Liquid scrubber systems
- ▶ Set up

▶ Synthesis unit

- ▶ Scale up of slurry reactor
- ▶ Tailgas recycling
- ▶ Load change behaviour of slurry reactor

Coordinator





BioTheRoS - Outlook

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

*BioTheRoS will develop best practices and concepts along the entire value chain for accelerating **the scaleup of sustainable biofuels worldwide.***

ANNOUNCEMENT:

Expert workshop at Syngas Platform Vienna

March 2025

Date to be defined



Thank you!



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



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