
Impulsvortrag

Technologie- und Konzeptentwicklung am Beispiel Pilot-SBG



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Projektleitung Forschungs- und Demonstrations-projekt Pilot-SBG
„Bioressourcen und Wasserstoff zu Methan als Kraftstoff“

Vom Bedarf zur Lösung: Technologie- und Konzeptentwicklung am Beispiel Pilot-SBG

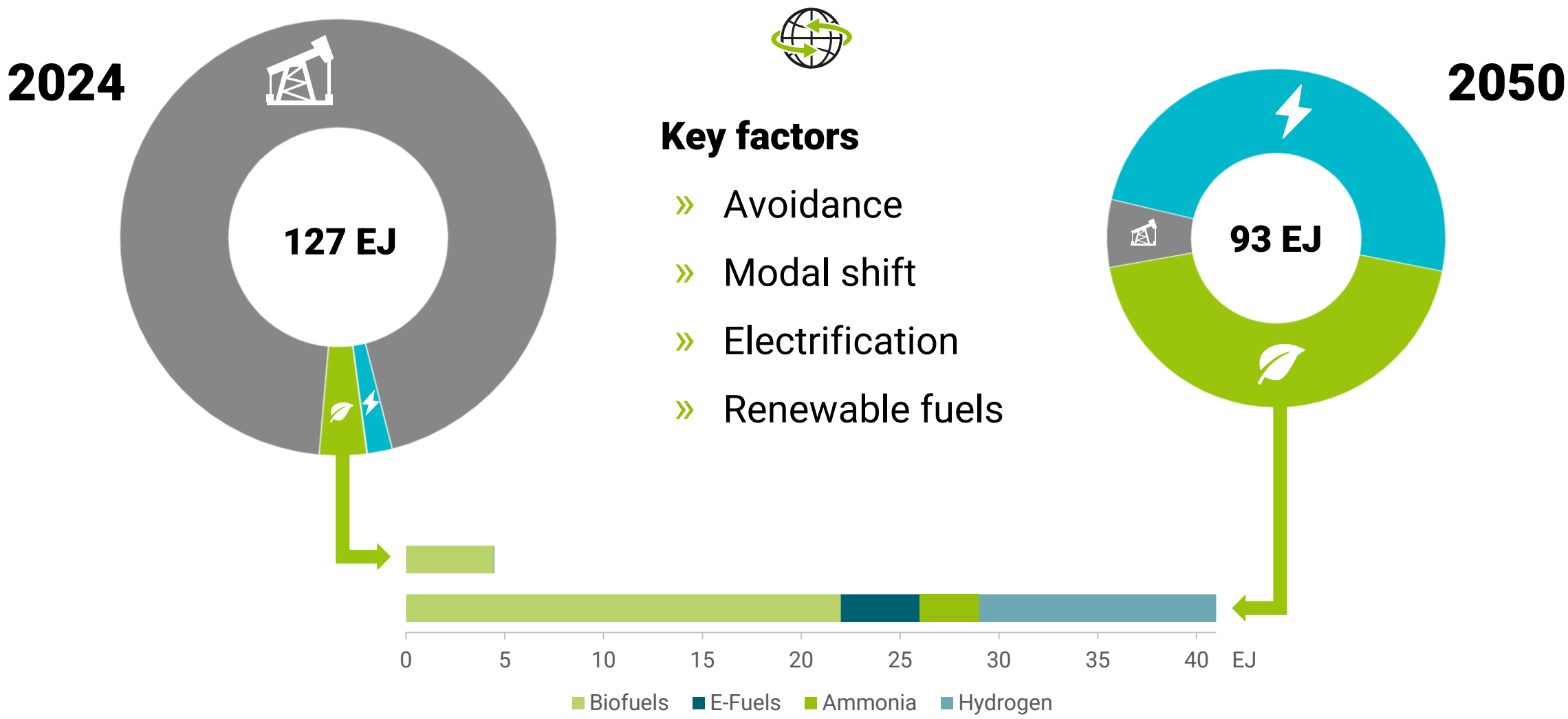
Auswirkungen der hydrothermalen Vorbehandlung auf die Leistung und die Wirtschaftlichkeit einer Bioraffinerie zur Gewinnung von erneuerbarem Methan und wertschöpfenden Nebenprodukten

Karin Naumann und Philipp Knötig | Workshop "Zukunft Bioökonomie: Biogener Kohlenstoff für Chemie und Energie im Kreislauf"

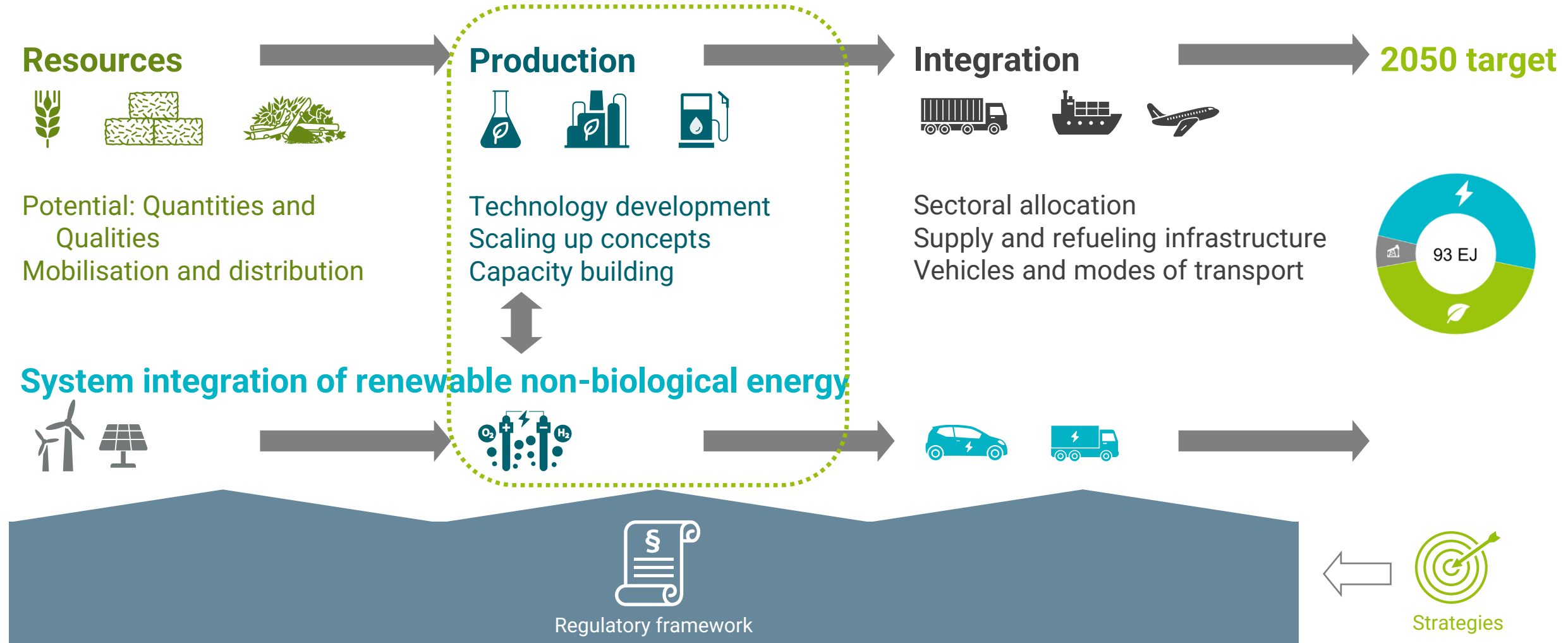
26.08.2026, 10:00-15:00 Uhr am Deutschen Biomasseforschungszentrum gemeinnützige GmbH

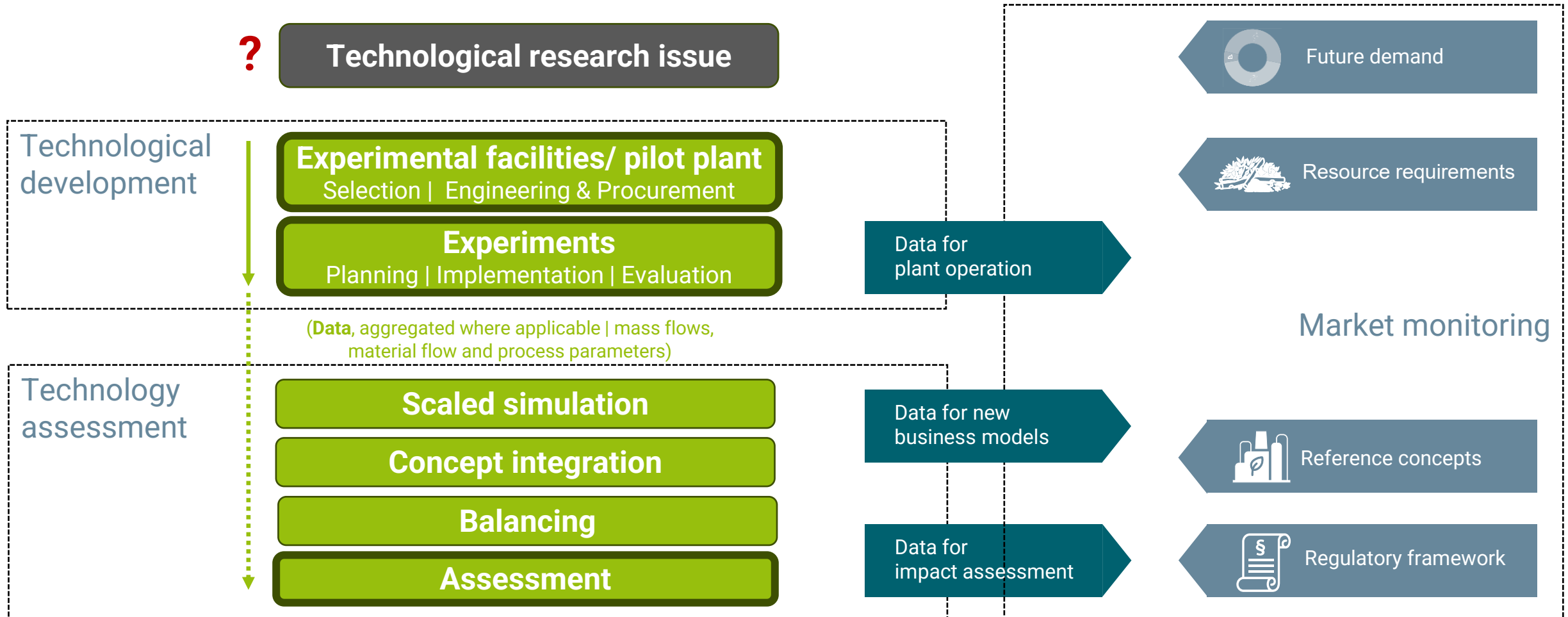
World energy demand in transport

Need of factor 10 more renewable fuels in the next 25 years



Implementation of new deployment networks





Biorefineries process scaling and integration

Hydrothermal processes



0.5-L-reactors
as a starting
point



unique
reaction
calorimeter
(0.5 L)



multi-batch
set-up with
reactors
ranging from
0.5–2 L



continuous
approaches
with flow tube
reactor



up-scaling
in a
10-L-
autoclave



100-L-
autoclave for
larger product
quantities



500-L-
autoclave with
even better
stirring



Separation technologies & process design



Process simulation (Aspen plus, Super pro Designer)

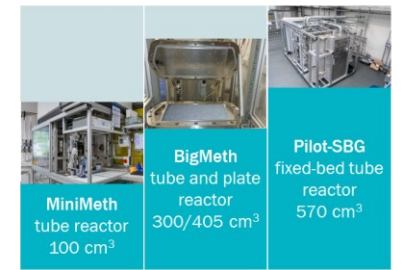


Gasification & synthesis gas processes

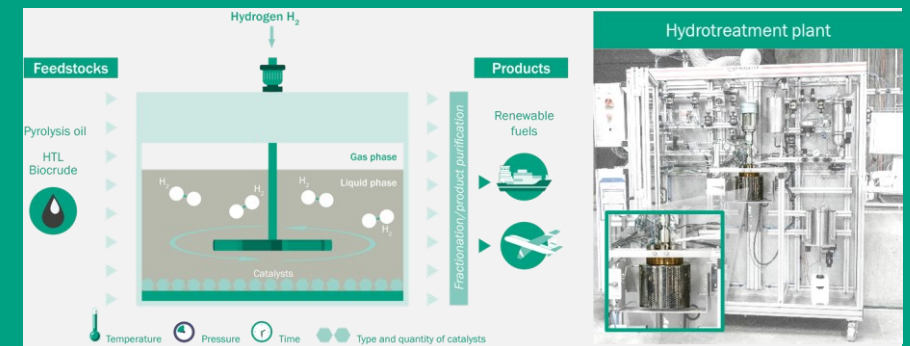
Fixed bed gasifiers
(Batch, fuel and process investigation)



Methanation modules
(Catalytic, pilot scale)



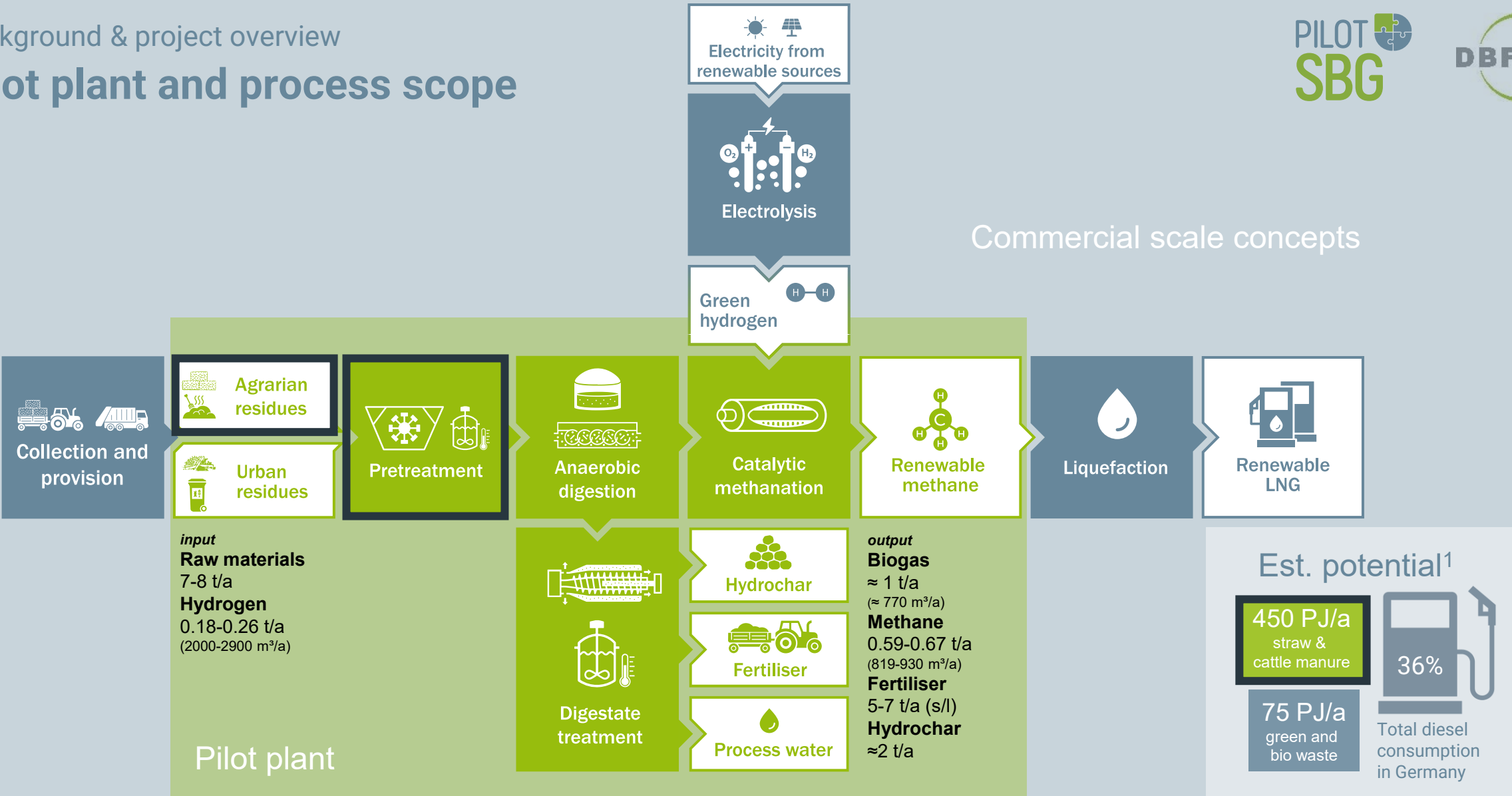
Renewable fuels for transport



Complemented by analytics laboratory for feedstocks, intermediates and products

Background & project overview

Pilot plant and process scope



m³ - standard cubic metre; Rough approximation of the mass balance. Biogas, fertiliser and hydrochar amount and composition depend on the raw material origin and quality

HTP within Pilot-SBG

Hydrothermal pre-treatment

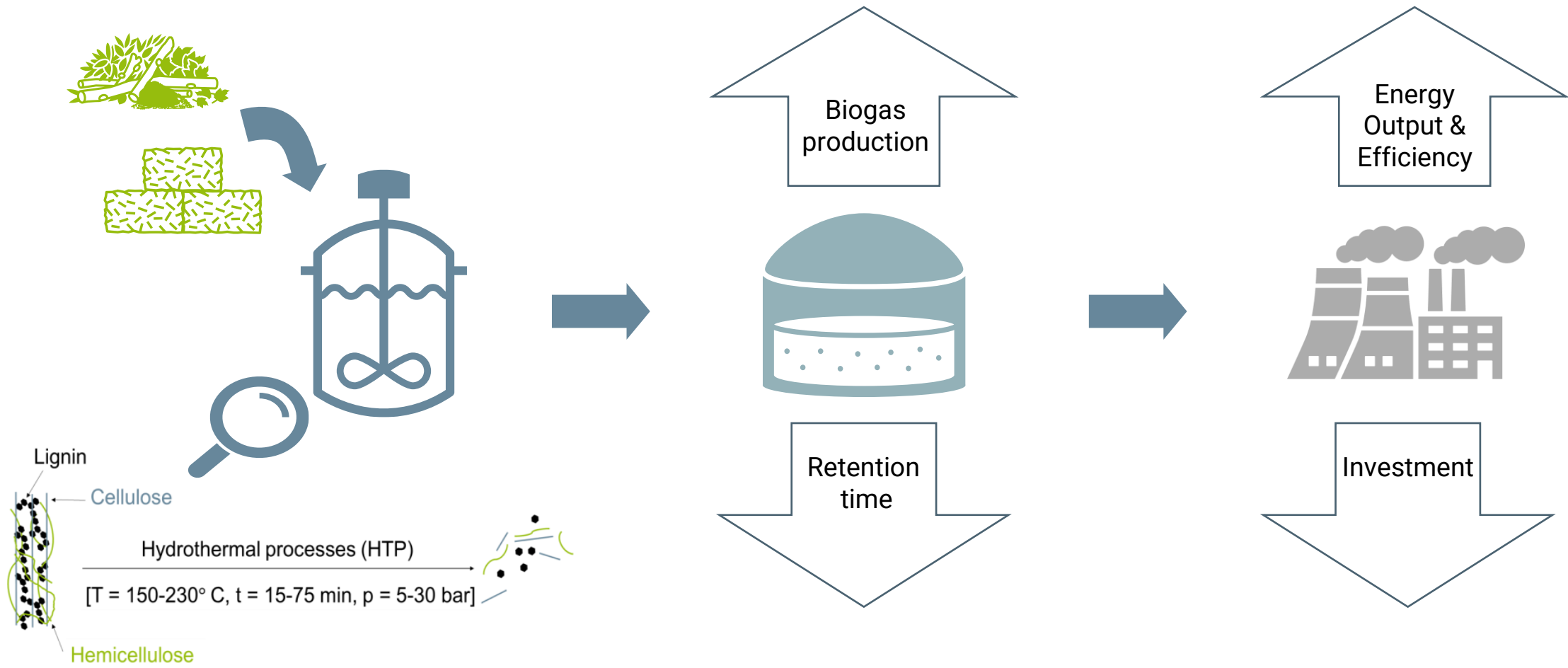


Fig. 1



From Lab to Pilot Scale

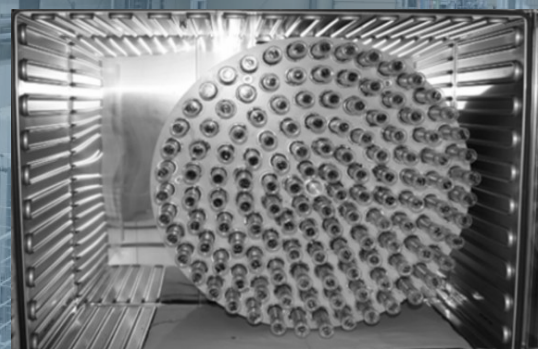


Input materials

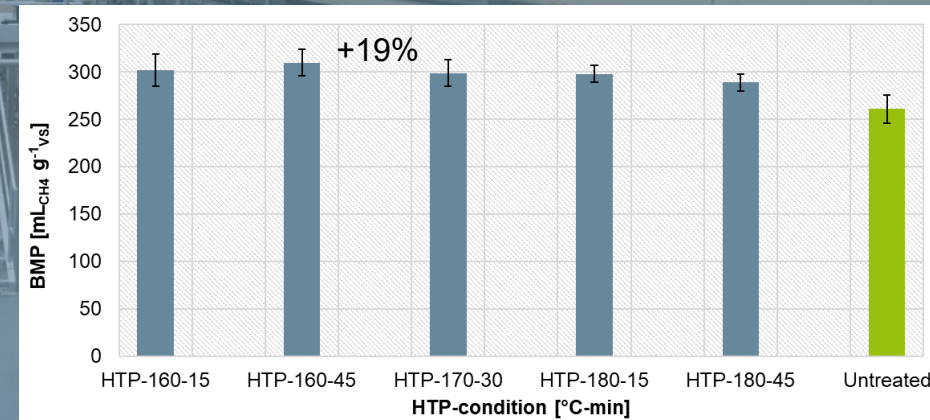




0.5-L HT-Reactor



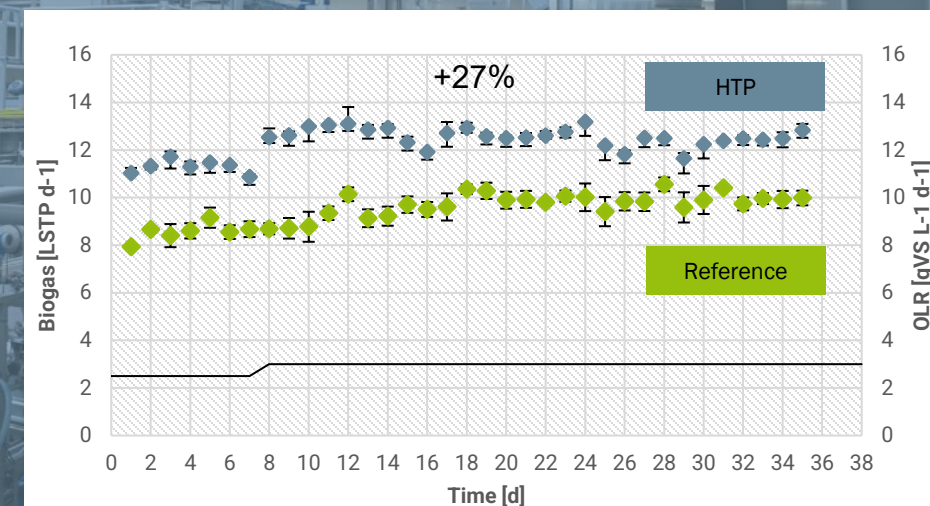
BMP-Batch



10/100-L HT-Reactor



10-L-Continuous

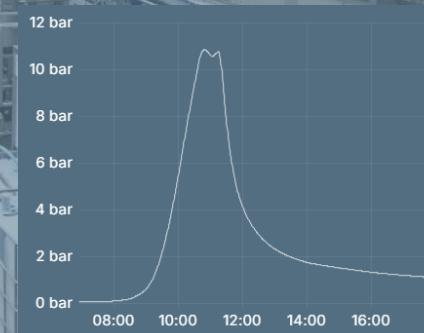
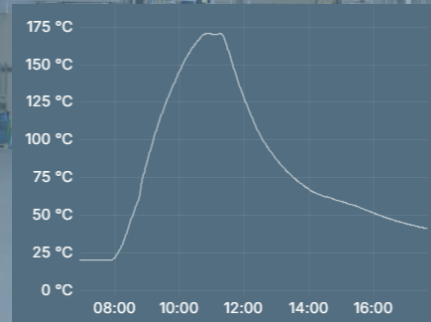




500-L-HT Reactor (Pilot-SBG)



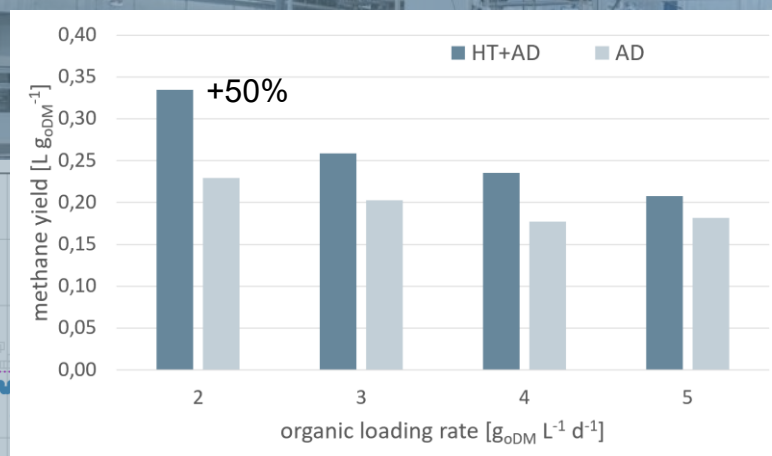
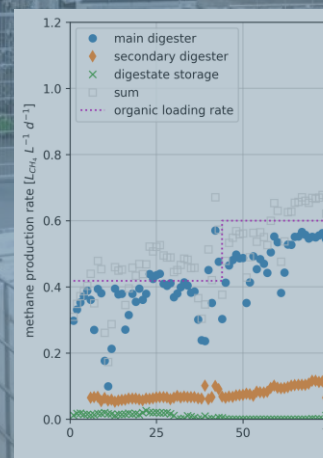
untreated



Pre-treated material



Anaerobic fermentation (AD)



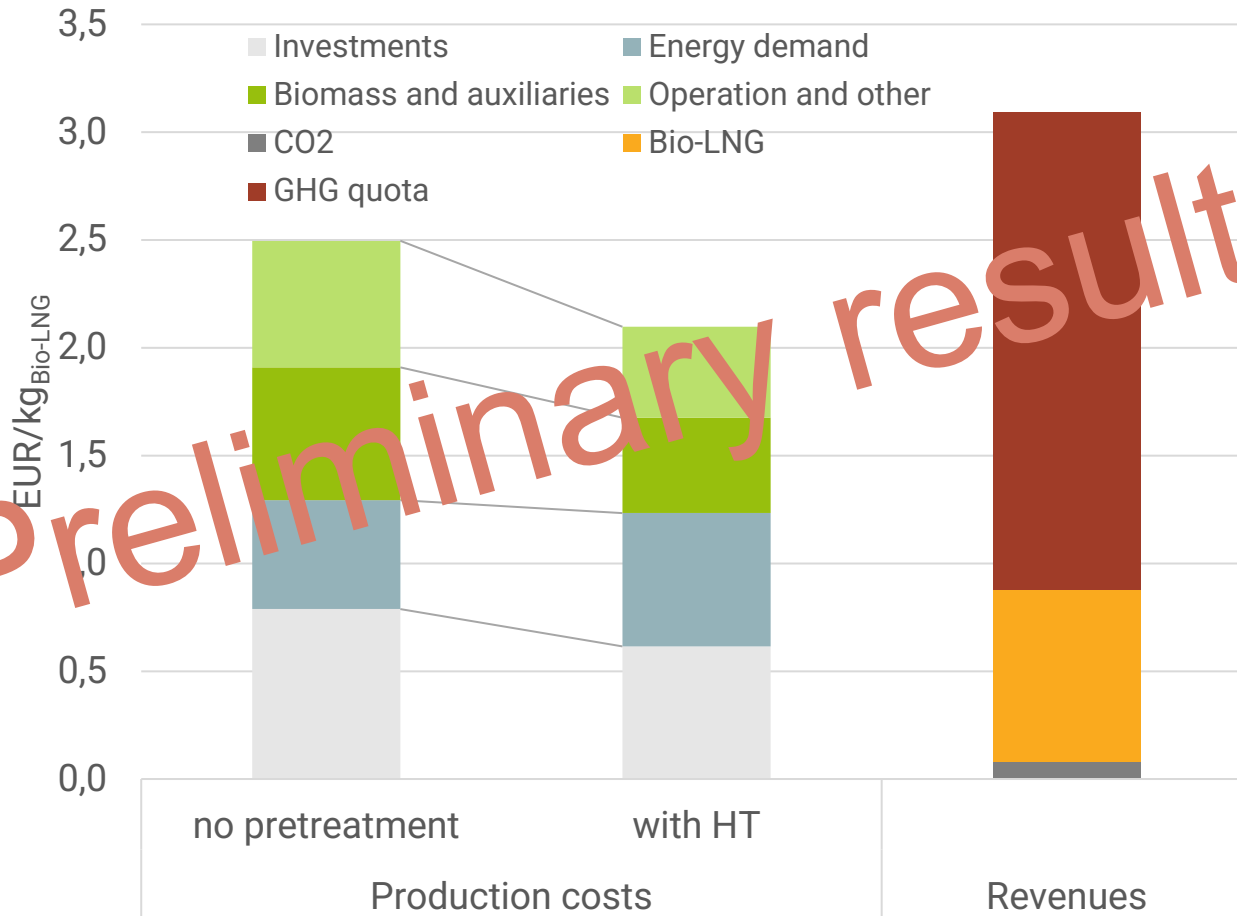
Pros:

- Promising ORL 2 – methane yield significantly increased (roughly 50%)
- Reduced power consumption of feeding pumps by 5-29% (biggest reduction when fed with fresh substrate)
- Decrease of noise level of the pumps → less mechanical stress → longevity of equipment
- No emergency maintenance necessary due to clogging during campaign 2 → Handling of wheat straw less difficult

Cons:

- Investment of high pressure reactor technology
- More technology, more maintenance & operation costs
- Process with high heat demand

Effects of hydrothermal pre-treatment on Market | Costs and revenues



- **Economic and environmental assessment is currently in progress**
- HT pretreatment leads to approx. 16% decrease in production costs
- GHG quota revenues have a high positive impact on the business case
- Assumed GHG Quota 400 EUR/t_{CO₂eq} (results from 05/2026)

Technology and fields of research

Fully automated plant

Intensive process monitoring

Plug and play

Waste/Biomass To X (W/BtX)

Flexibility

Biogenic CO₂

RFNBO / PTX / E-fuels

Advanced feedstock (wastes and residues)

Modularity

Catalytic Methanation

Substrate preparation

Gas storage

Digestate processing and recovery of valuable by-products

Anaerobic fermentation
(continuous stirring tank and plug flow reactor)

HTP (pre-)treatment of
substrates and digestates

Technical overview

Visit our website



Do you want to add your technology and test it in relevant environment?

Do you need to scale up your lab scale fermentations?



5x 1m³ **CSTR**
1x 0.5m³ **PFR**



E-fuels from captured CO₂, biogas,
syngas; catalyst testing and more ...



500-L-Reactor (240 °C / 40 bar);
with Steam generator
and high pressure injection

Adsorption unit
Fixed bed methanation
reactor
Product gas cleaning



Technical scale
research biogas plant

Fully automated,
2x 180 m³ CSTR, 50 m³ PFR,
postdigester + digestate storage,
mechanical pretreatment ...

Screw press
Chamber filter press
Ultra-/Nanofiltration
Reverse osmosis



You need down streaming for your fermentation broth?



Are you looking for reliable partner in your research activities?

Contact us

#renewablemethane #biofuels #biogas #energysecurity
#greenhydrogen #GHGquota #biomass #greenbiorefinery
#sustainability #bioeconomy #pilotplant #innovation



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Interested?
Contact us!

More research on upscaling,
economics, educt potentials, etc.



www.dbfz.de/pilot-sbg

