

Direct and indirect pathways for conversion of CO₂ for the production of fuel and chemicals

Philipp Graefe

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Innovation, Mobility
and Infrastructure
Republic of Austria

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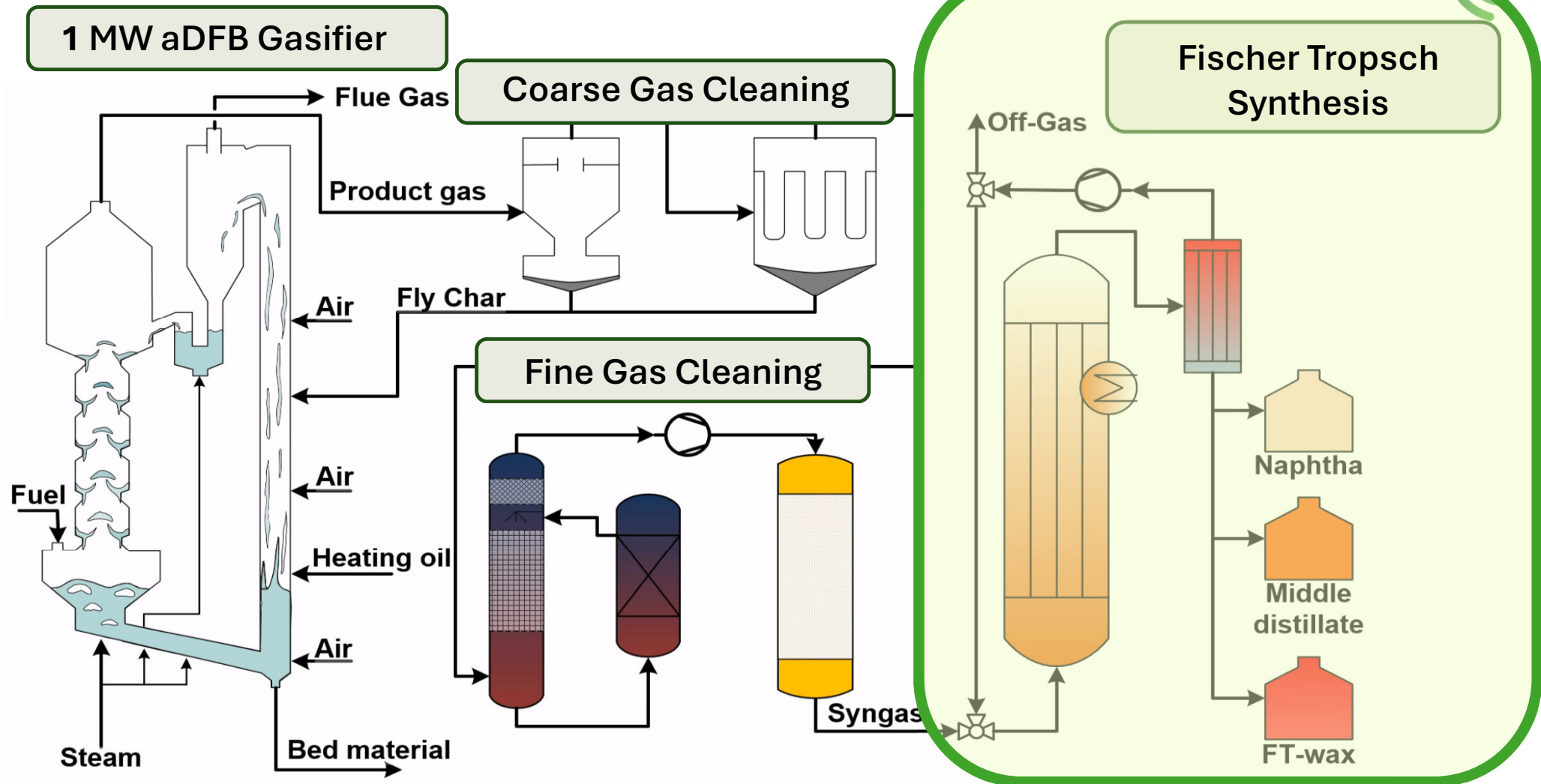
 For the
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 Das Land
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 **SFG** 
STYRIAN FUTURE GROUP

Syngas Platform Vienna

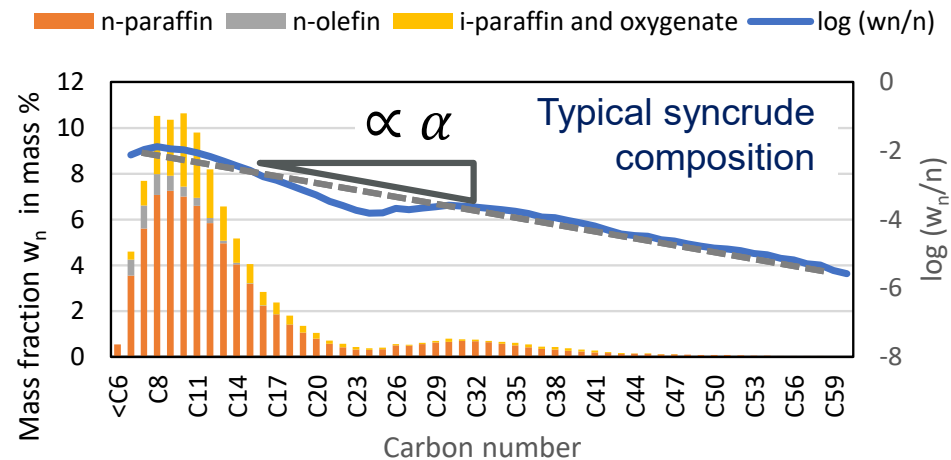
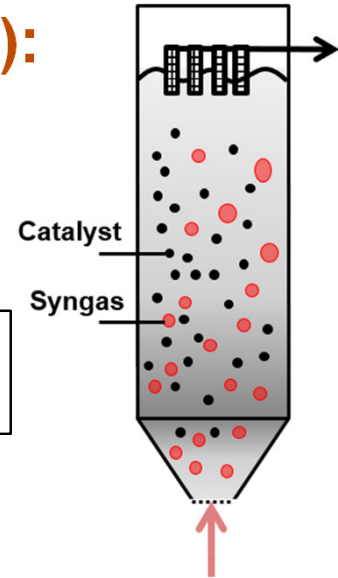
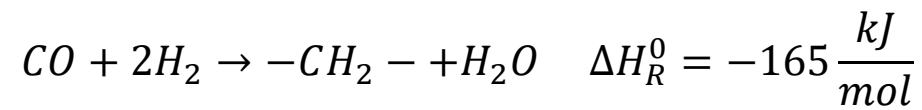


Syngas Platform Vienna: experimental equipment



Slurry-Bubble-Column-Reactor (SBCR):

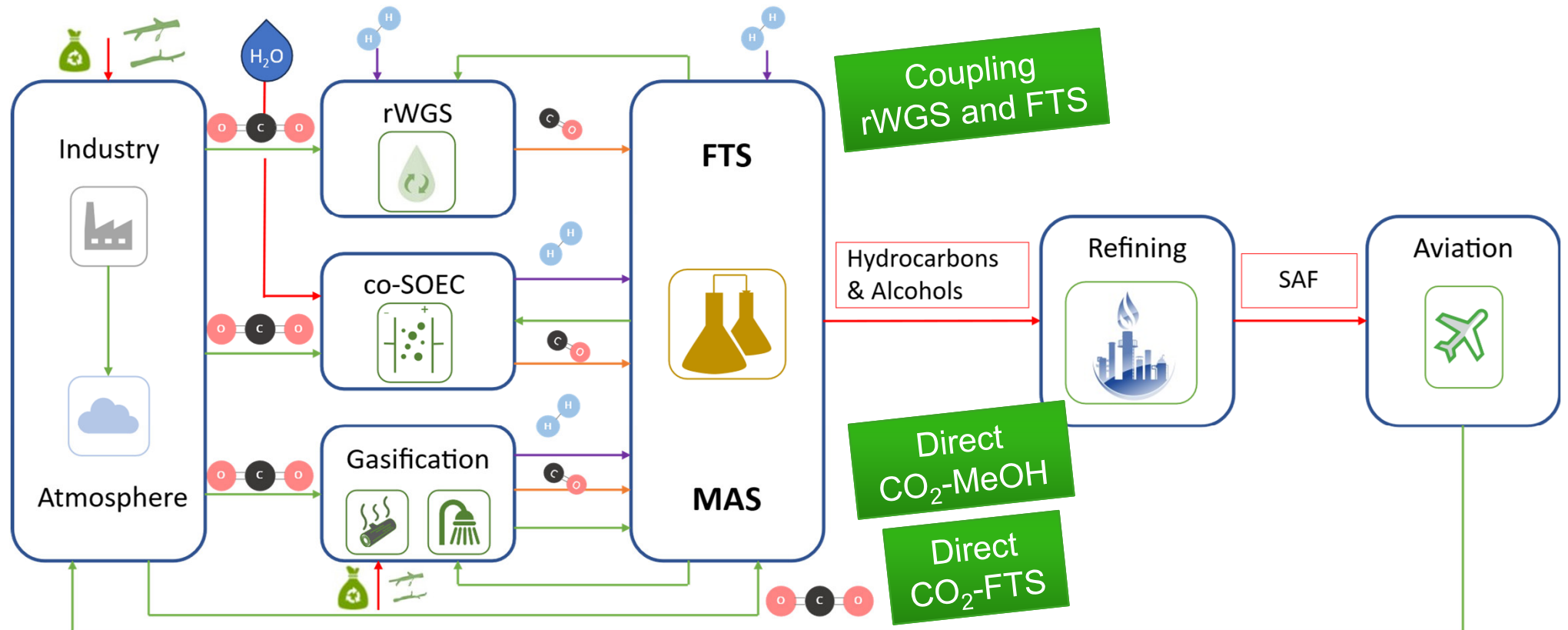
250 kW pilot-scale Fischer-Tropsch plant for long-term campaigns of multiple weeks continuous operation



Commercial $Co/\gamma-Al_2O_3$ catalyst
20 - 22 bar, 200 - 230 °C

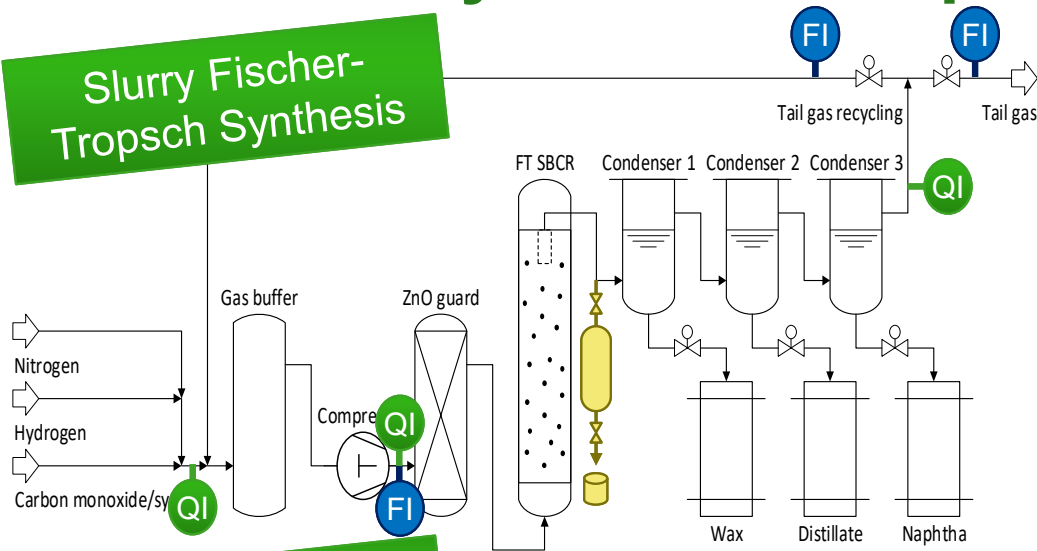


The network behind CO₂ valorization



Lab-scale synthesis setups in Vienna

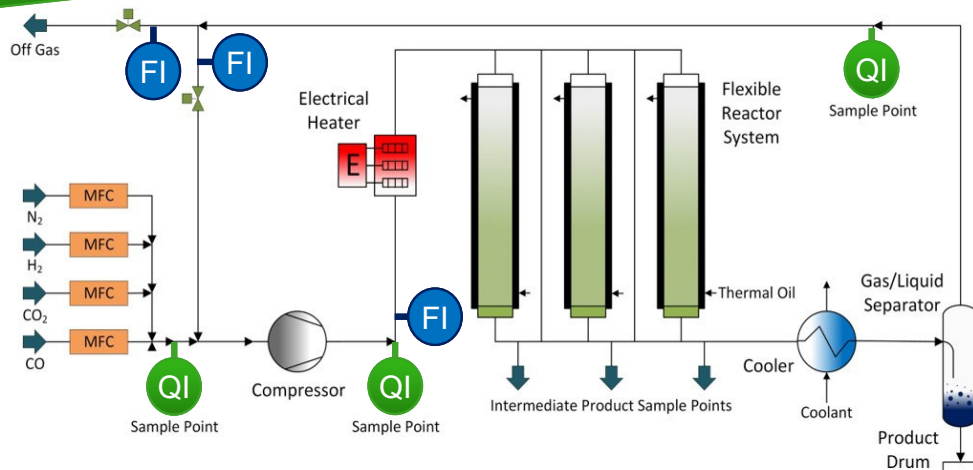
Slurry Fischer-Tropsch Synthesis



Operating conditions

- ✓ **250 °C** in the slurry
- ✓ **24 bar** after compressor
- ✓ **25 L** reactor volume
- ✓ **7 Nm³/h** total gas flow
- ✓ **10 kg/d** syncrude production

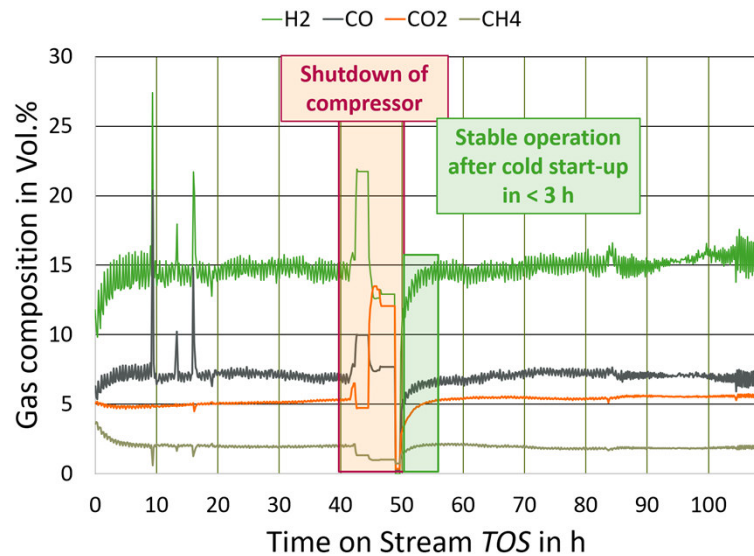
Alcohol Synthesis



Operating conditions

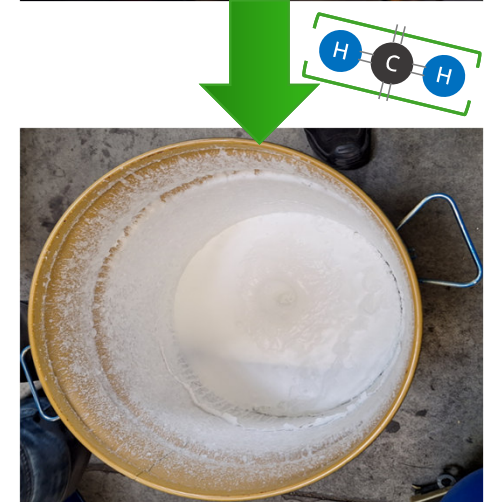
- ✓ **350 °C** in fixed bed
- ✓ **200 bar** after compressor
- ✓ **2 L** reactor volume
- ✓ **7 Nm³/h** total gas flow
- ✓ **20 kg/d** alcohol production

Coupling of RWGS-CL and slurry FT



Hard facts:

- ✓ 1st time syncrude from renewable CO_2 , H_2 via RWGS-CL and FTS
- ✓ >900 h Total Time on Stream of RWGS-CL and FTS
- ✓ >200 h Demonstration of integrated process
- ✓ >50 kg CO_2 converted via RWGS-CL
- ✓ >75 kg Syncrude produced via FTS SCBR
- ✓ < 3 h for 100% load change



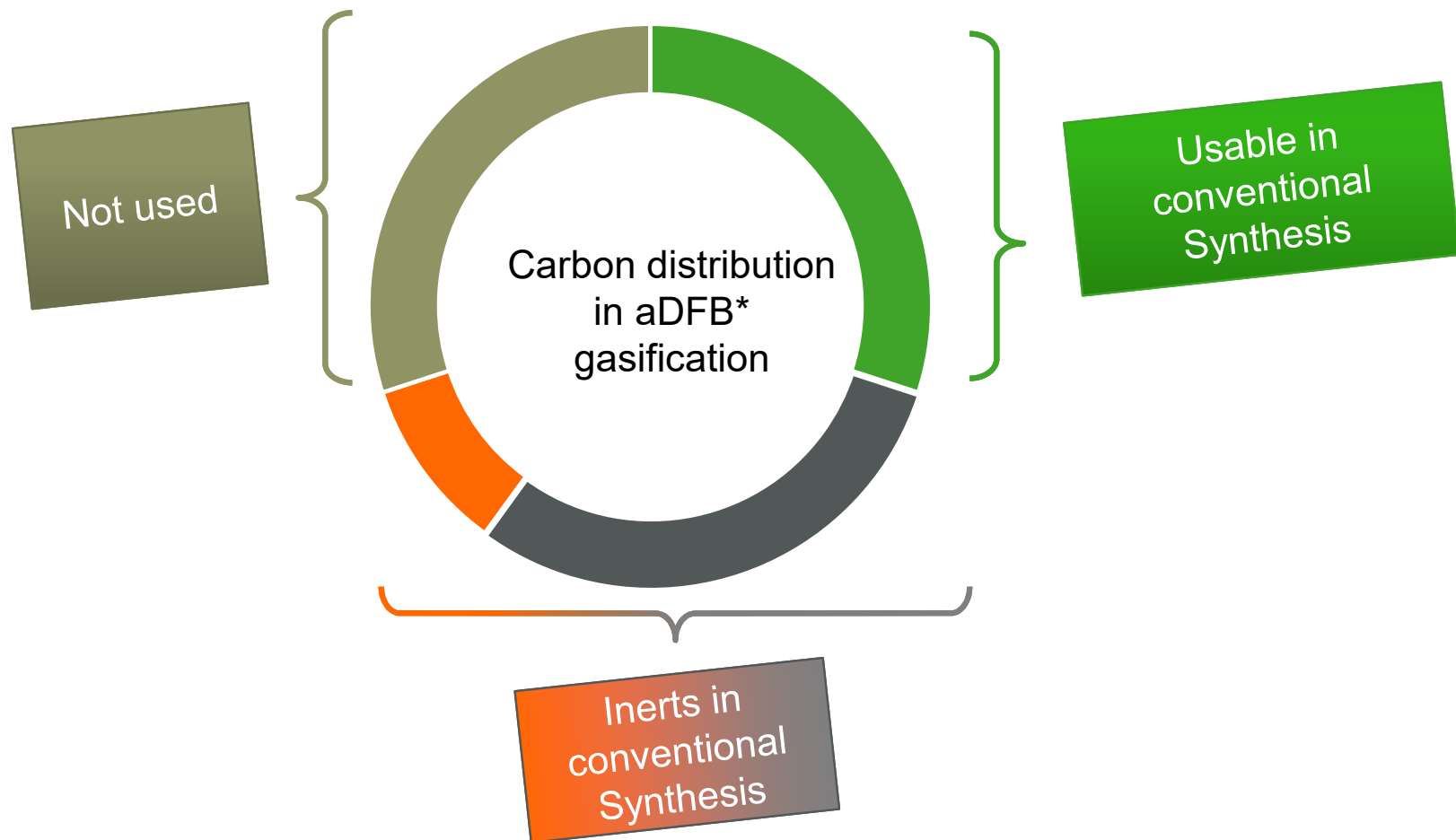


The Future ? ?

State of the Game - Gasification



■ CO - Gasifier ■ CO₂ - Gasifier ■ CH₄ - Gasifier ■ CO₂ - Combustor

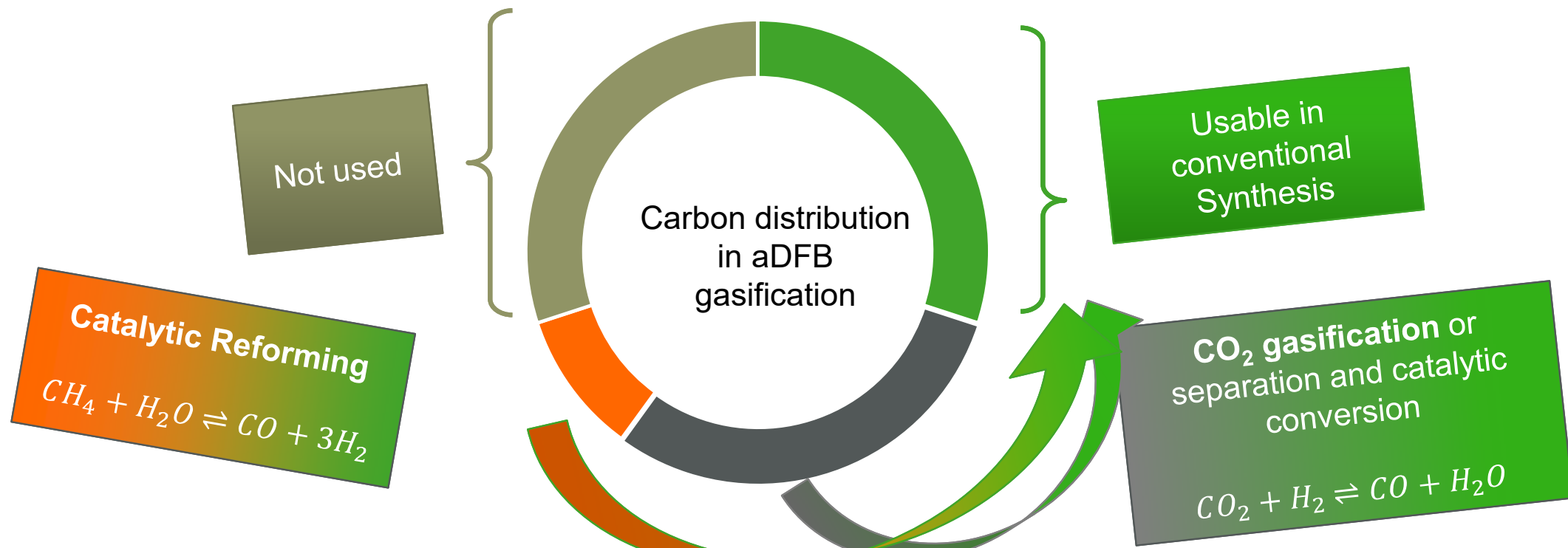


*aDFB: Advanced Dual Fluidized Bed

Changing the Carbon Game – in gasification



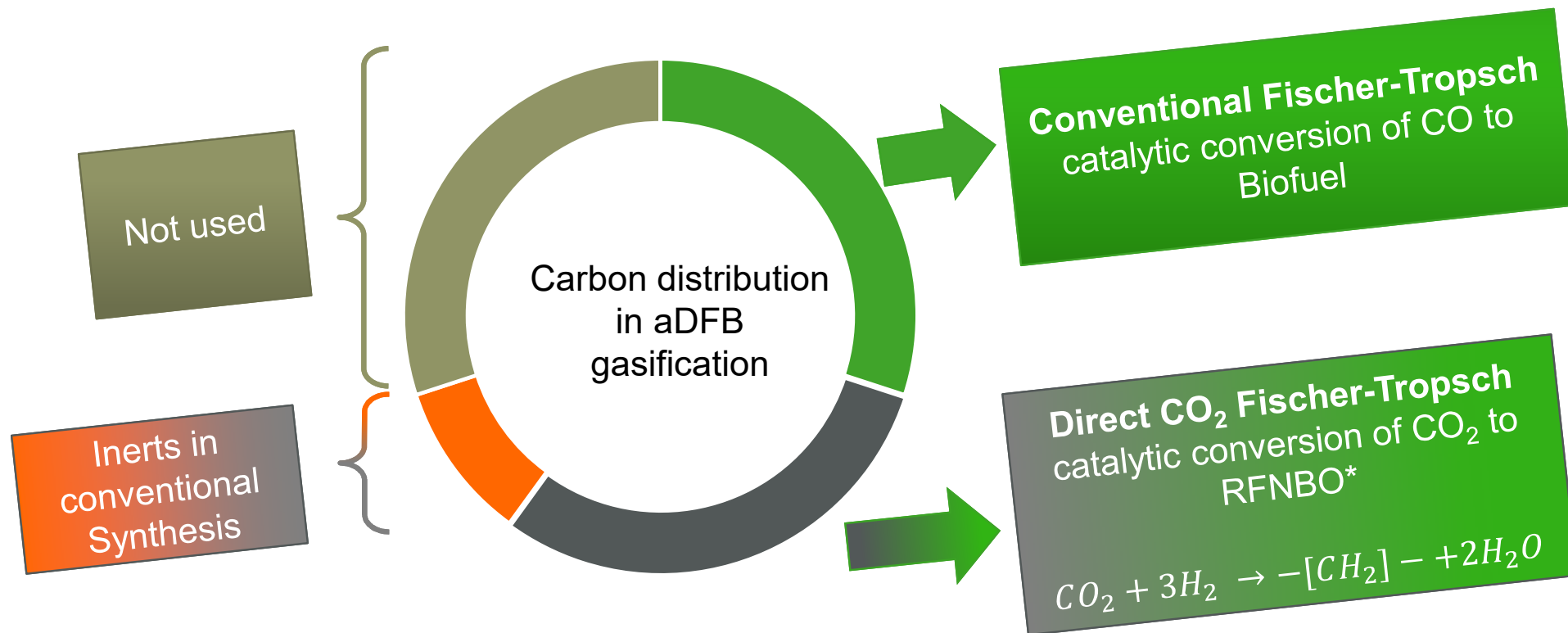
■ CO - Gasifier ■ CO₂ - Gasifier ■ CH₄ - Gasifier ■ CO₂ - Combustor



Maximizing Carbon Utilization from gasification in
COMET project C3PO

Changing the Carbon Game – AFTER gasification

■ CO - Gasifier ■ CO₂ - Gasifier ■ CH₄ - Gasifier ■ CO₂ - Combustor

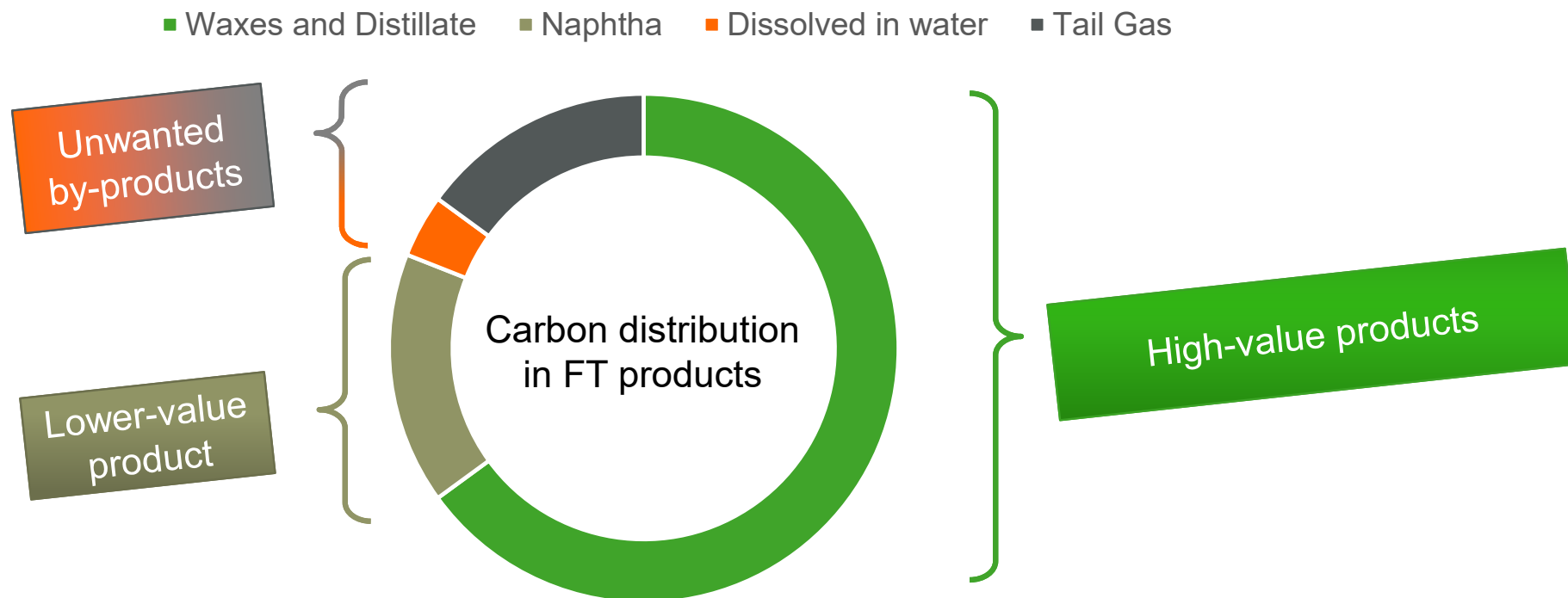


**Maximizing Carbon Utilization from Syngas in
HORIZON project INTERRENEWABLE**



*RFNBO: Renewable Fuel of Non-biological Origin

State of the Game – In Synthesis

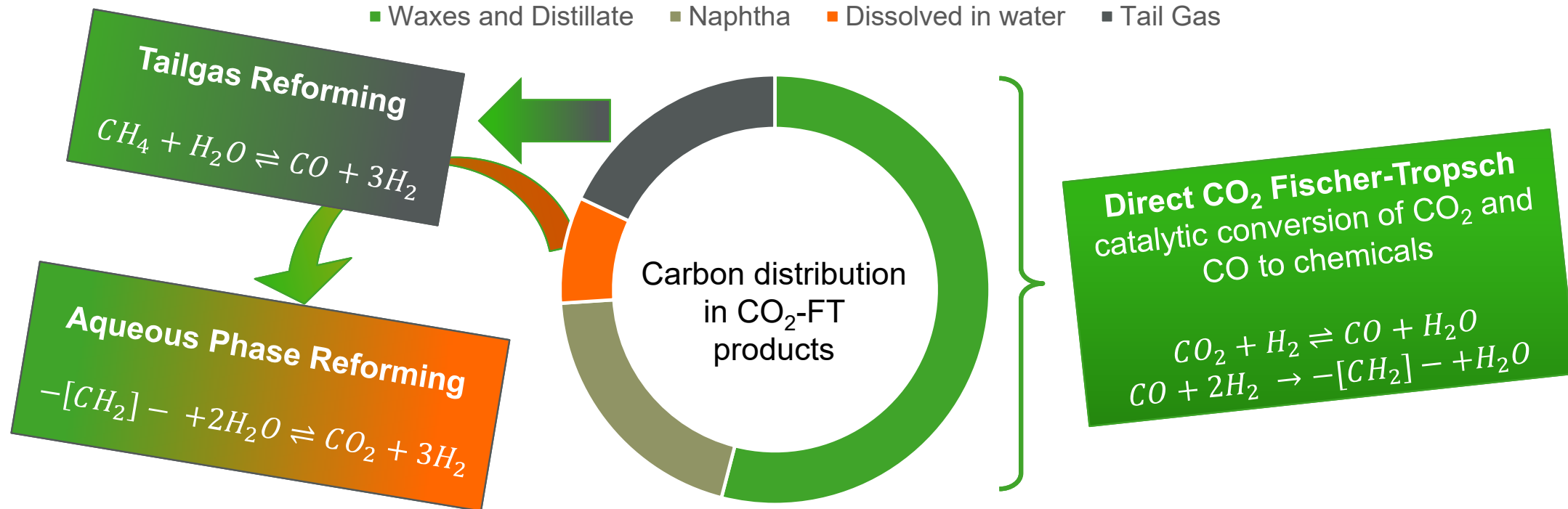


Maximum 66% Carbon in High-value Products after Synthesis

Changing the Carbon Game – In Synthesis

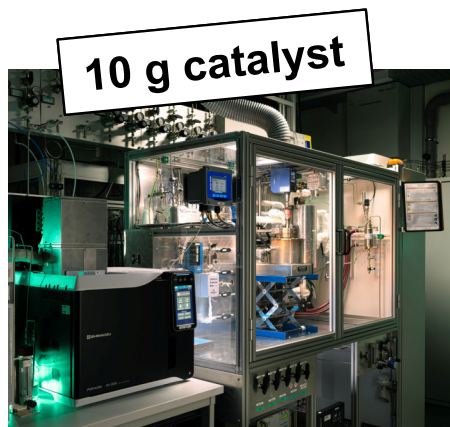


■ Waxes and Distillate ■ Naphtha ■ Dissolved in water ■ Tail Gas



**Maximizing Carbon Utilization in Chemical Production
in HORIZON project CHEMSTONE**

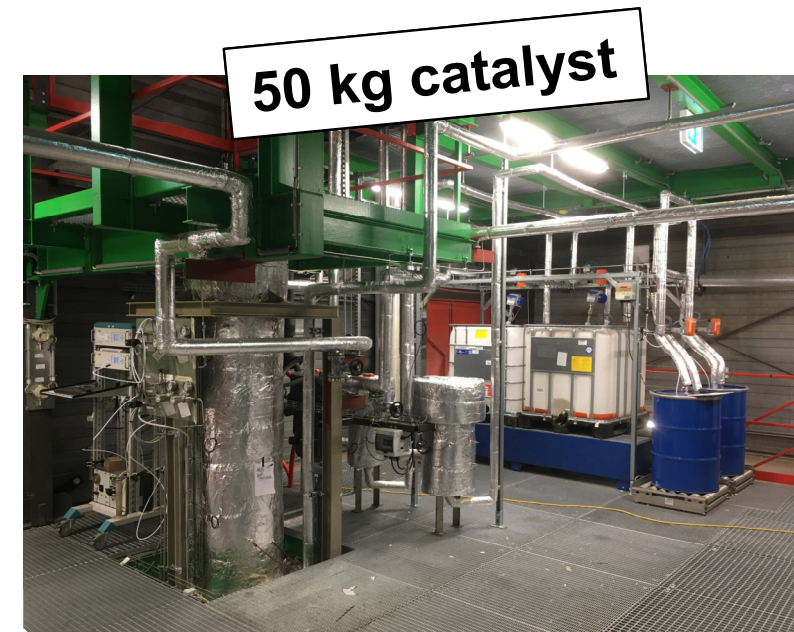
Scaling direct CO₂ Fischer-Tropsch Synthesis



Past



Present



Future

Scaling CO₂ Fischer-Tropsch Synthesis in projects
CHEMSTONE and C3PO

**A team with hands-on
experience**



Contact



Prof. Matthias Kuba

Area Manager| Syngas Platform Technologies

matthias.kuba@best-research.eu

T +43 664 5139549



Gerald Weber

Area Manager| Syngas Platform Technologies

gerald.weber@best-research.eu

T +43 664 4532782



Theresa Köffler

Junior Researcher| Syngas Platform Technologies
Slurry Fischer-Tropsch Synthesis

Theresa.koeffler@best-research.eu

T +43 5 02378-9368



Immanuel Wustinger

Researcher| Syngas Platform Technologies
CO₂ based synthesis of liquids

Immanuel.wustinger@best-research.eu

T +43 5 02378-9375



Philipp Graefe

Senior Researcher| Syngas Platform Technologies
Synthesis

philipp.graefe@best-research.eu

T +43 5 02378-9352

