

# Carbon Management with Fraunhofer UMSICHT

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CLIB Networking Day, 19.9.24  
Dr. Christoph Glasner

# Focus of research

Leading organization for application-oriented research in Europe



over **30,000**  
employees



**76**  
institutes and research  
facilities



**6200**  
customers from  
industry



**€ 3.0 billion**

financial volume  
thereof € 2.6 billion contract research



**funding mix: 70 % orders**  
from industry und public sector

**30 % base funding**  
from Germany's state and  
federal governments

Figures refer to the year 2022: Status as of May 15, 2023

# Fraunhofer UMSICHT

Pioneering the way to a sustainable world



**2 locations** (Oberhausen, Sulzbach-Rosenberg)  
**600 staff**  
**53 million € operational budget**

# Four focus topics

Sustainable restructuring of economy and society: circular, climate-neutral, economical



## Carbon Management

Sustainable use of carbon



## Circular Economy

Materials and processes for the circular use of resources: from laboratory to industrial scale



## Green Hydrogen

Materials and processes for the electrochemical production, utilization and storage of green hydrogen



## Local Energy Systems

Concepts and technologies for transforming the energy supply of districts and industry



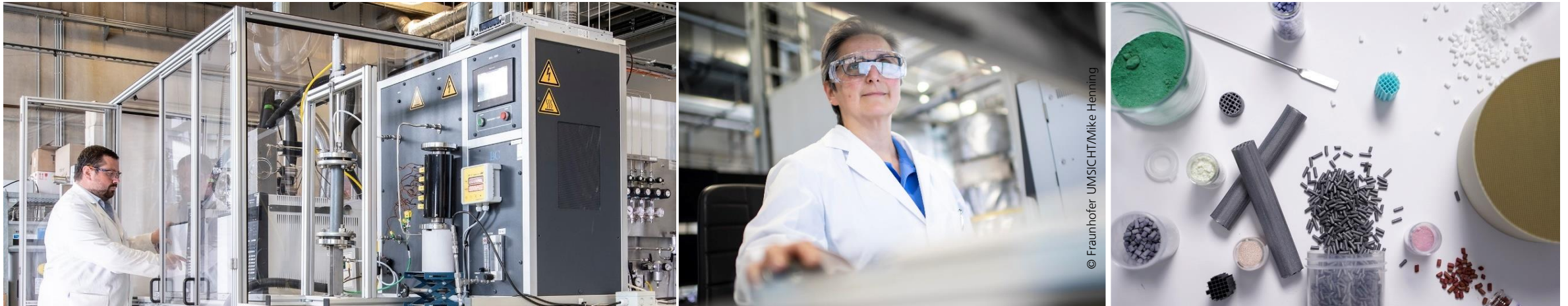
# Carbon Management

Sustainable use of carbon



# Carbon Management

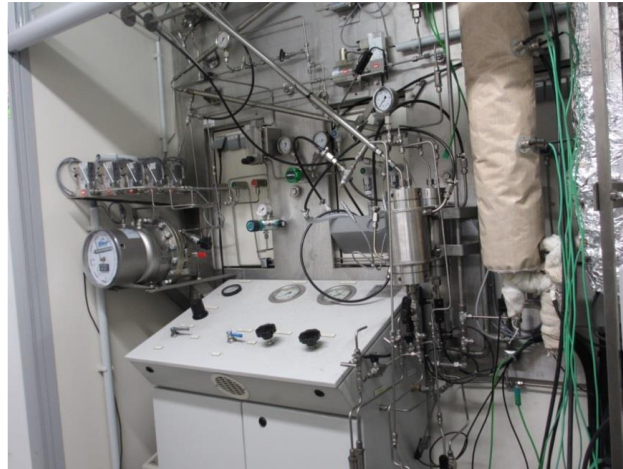
Sustainable use of carbon



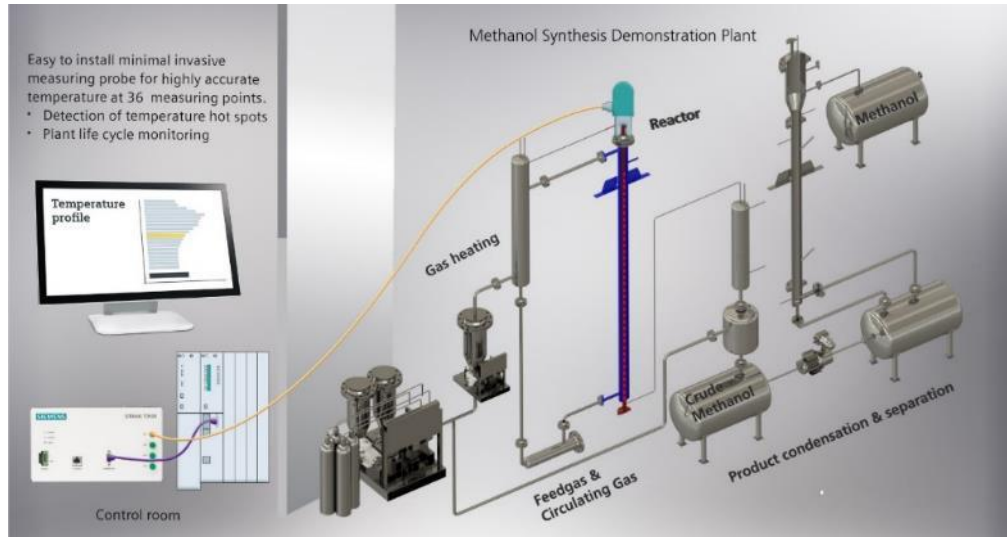
## Technology and material development along the CCU value chain

- CO<sub>2</sub> separation, CO<sub>2</sub> storage and gas purification
- Processes for the production of chemicals, fuels and materials from CO<sub>2</sub>, CO and H<sub>2</sub>
- Catalyst development, testing and upscaling
- CO<sub>2</sub> electrolysis
- Pyrolysis and carbonization of carbonaceous residues
- Modelling, simulation and optimization of Power-to-X and CCU processes

# Methanol in Carbon2Chem®



- From lab scale to demo scale
- Set up in Oberhausen, later the plant will be operated at the steel mill in Duisburg

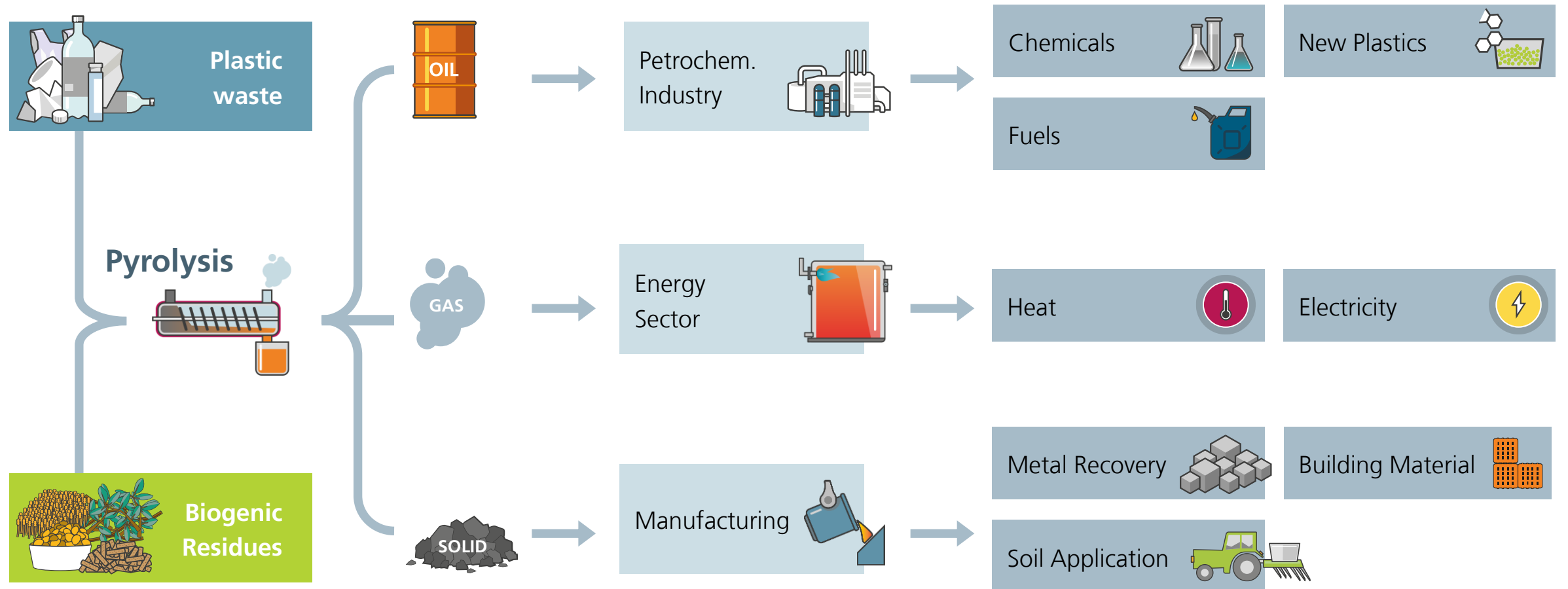


## Technical specifications:

- Isothermally operated reactor
- Capacity 2 l/h Methanol
- Reactor  $L = 6\text{m}$ ,  $d_i = 34,3\text{ mm}$
- Temperature 220 - 260 °C
- Pressure 80 bar
- Fiber optic temperature measurement (36 measuring points) inside of the catalyst bed

# Pyrolysis: tap alternative Carbon Sources and substitute fossil Carbons

High flexibility in feedstocks, wide product range



# Research on heterogeneous catalysts at Fraunhofer UMSICHT

## Technical facilities

### Catalyst development



### Scale-up

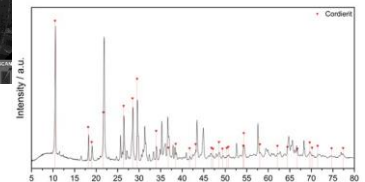
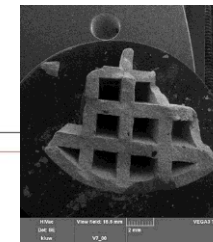
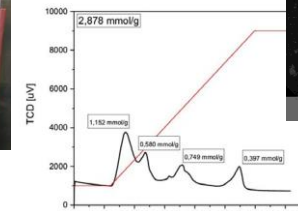


Reactors up to 20 L\*

### Catalyst Forming



\* 200 L coming soon

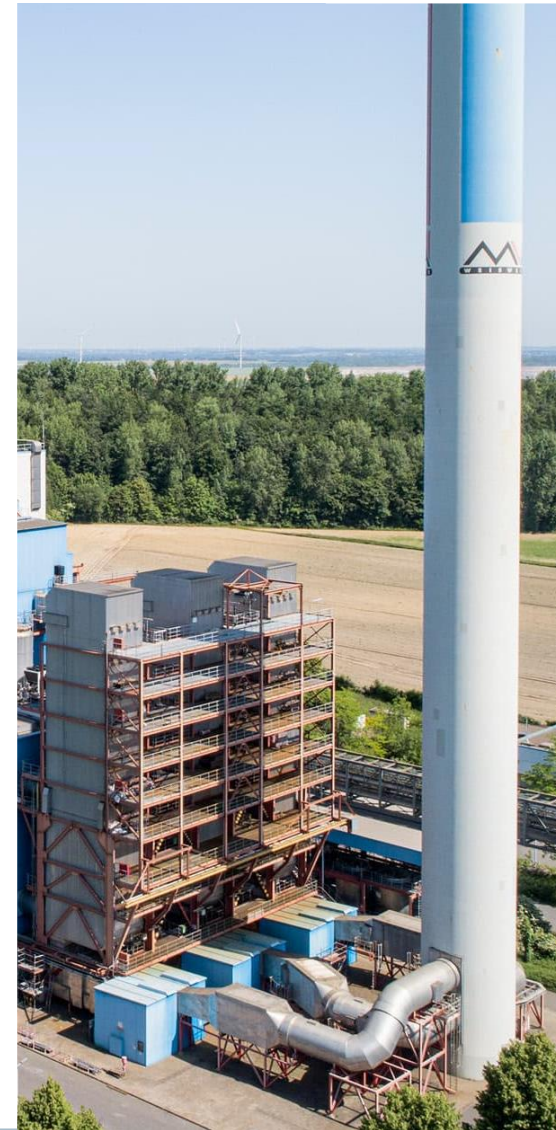
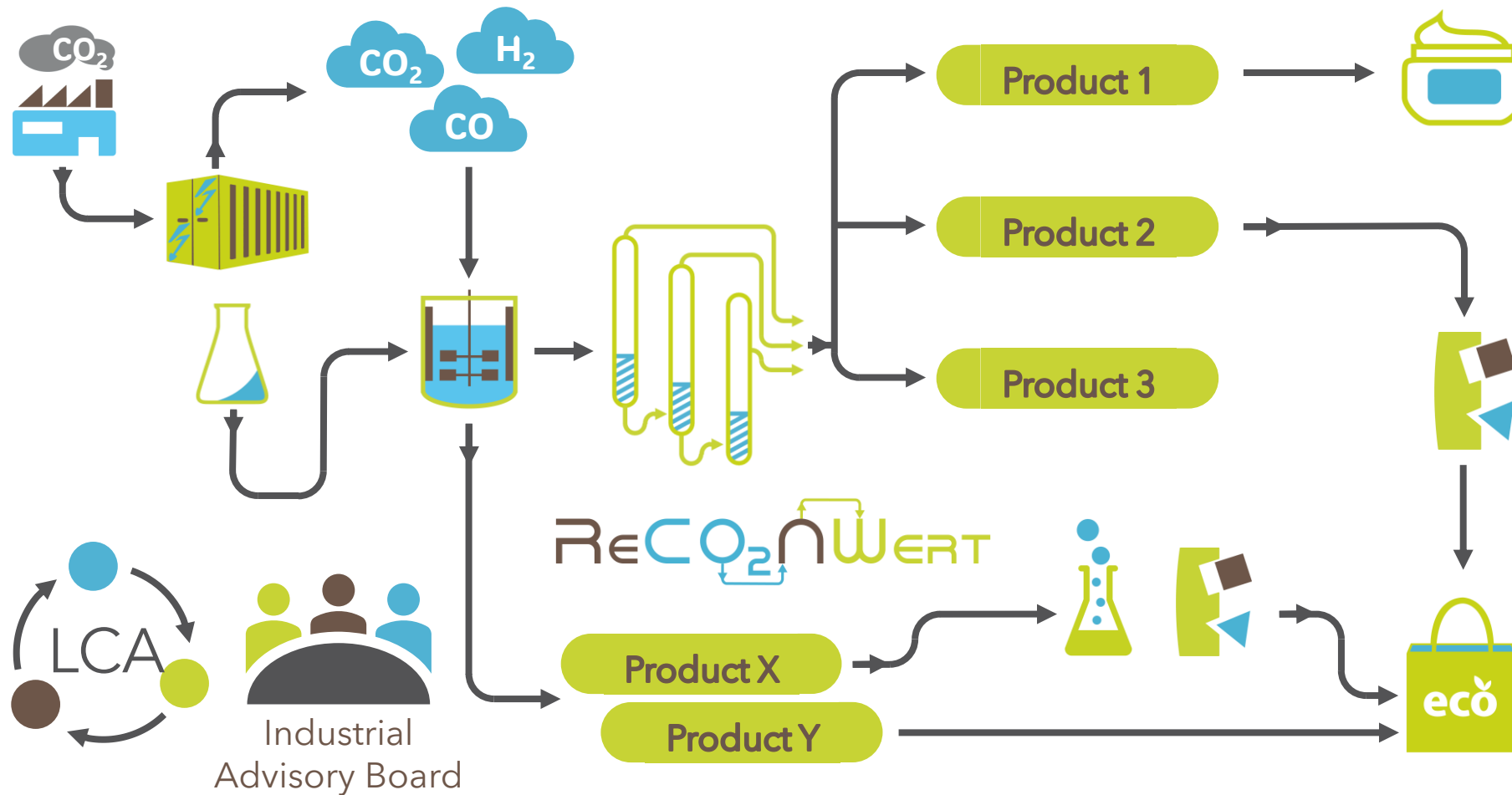


### Comprehensive equipment for catalyst testing and characterization



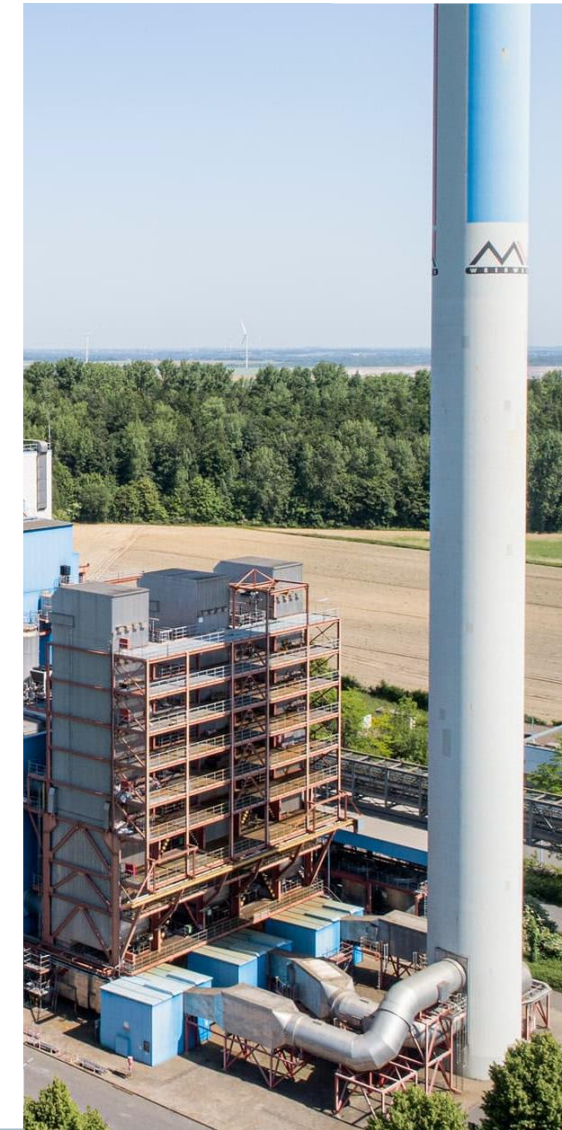
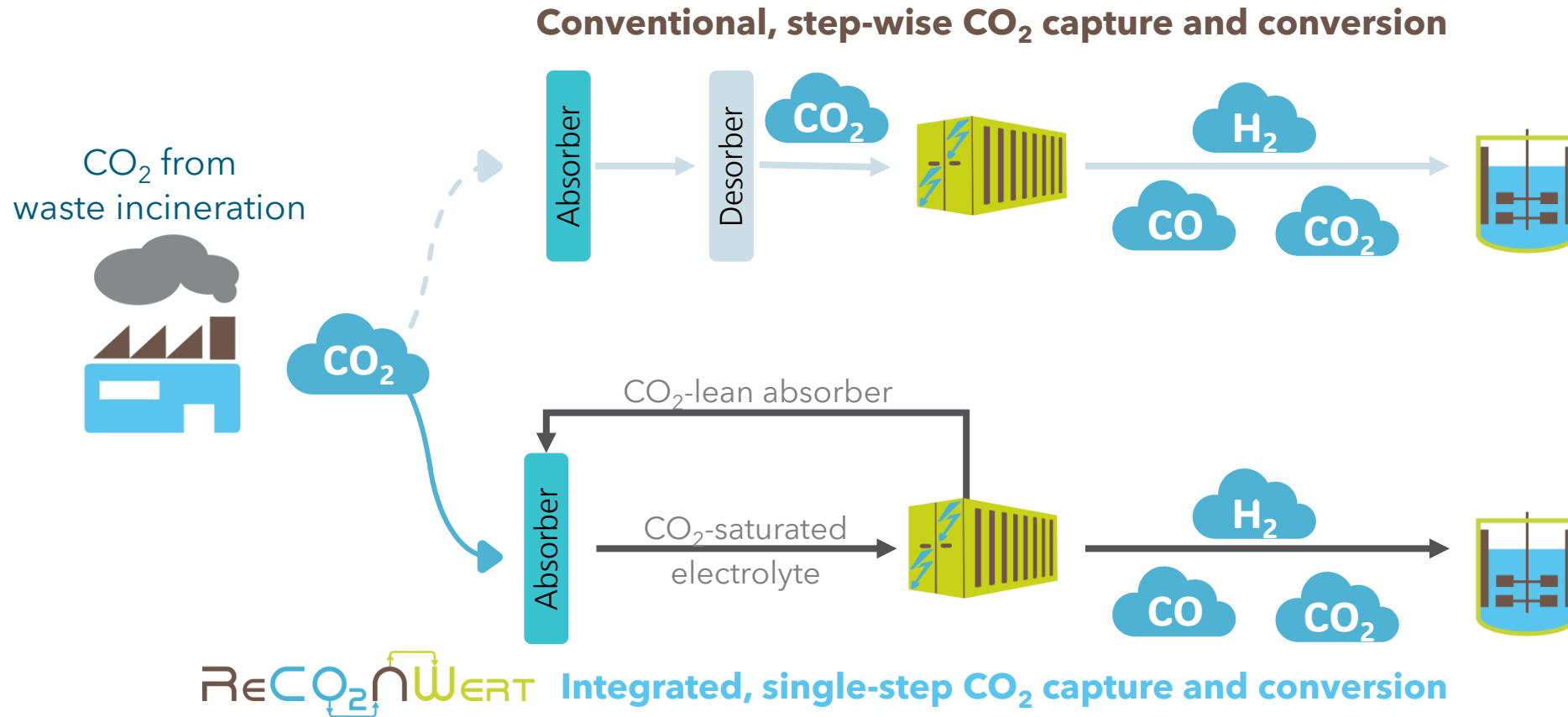
# Integrated CO<sub>2</sub> capture and electrolytic conversion

»ReCO<sub>2</sub>NWert« - From waste to products



# Integrated CO<sub>2</sub> capture and electrolytic conversion

»ReCO<sub>2</sub>NWert« - CO<sub>2</sub> electrolyzers coupled with point sources



# Models of cooperation

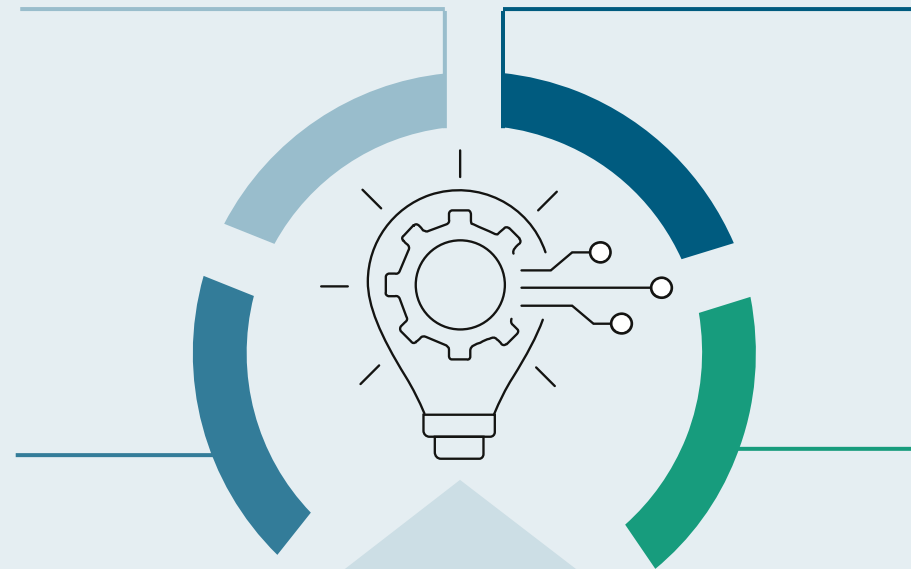
Innovative solutions for business and society

## Scientific consulting

- Idea/strategy workshops
- Literature studies
- Life cycle assessment
- Circular economy assessment

## Project support

- Supporting a publicly funded project as an associated partner



## Individual order

- R&D project based on customer requirements: Solving the problem and introducing the innovation to the company and market
- Licensing of patents

## Cooperation projects

- Project participation as a funded project partner

## Core competencies

Process engineering  
Material development  
Energy technologies

# Contact

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Thank you for your attention

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