



# CORA CO2-WIN Conference BMBF

Dr.-Ing. Ulrich Zuberbühler

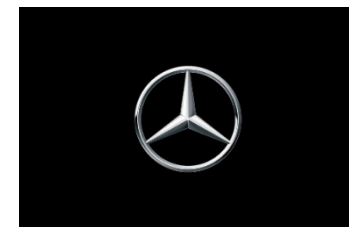
8 – 9 June 2021 virtual event



DEUTSCHE INSTITUTE FÜR  
TEXTIL+FASERFORSCHUNG



INSTITUT FÜR ENERGIE-  
UND UMWELTFORSCHUNG  
HEIDELBERG

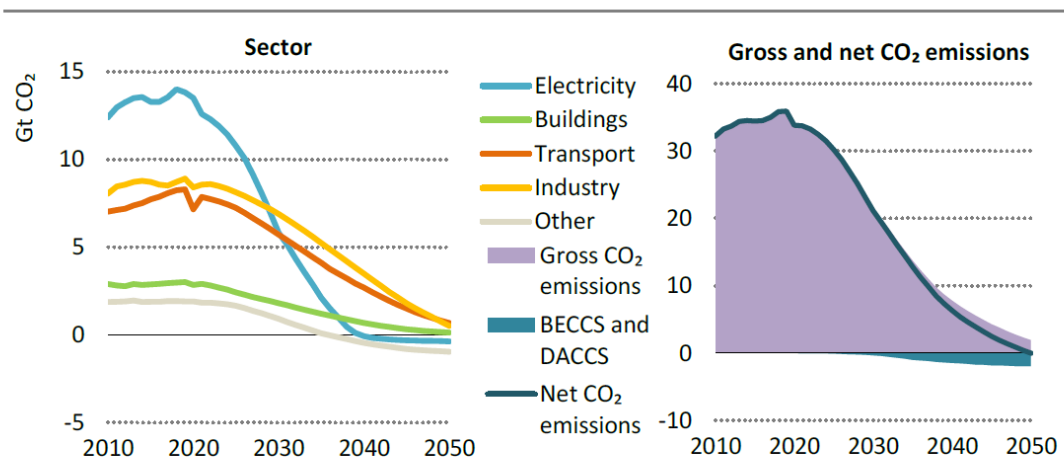


# Statement

## CORA: CO<sub>2</sub>-capture from air for power-to-X processes for sector coupling

**Direct Air Capture** of CO<sub>2</sub> can support compliance with the climate targets initially with raw materials for Power-to-X processes and in the long term with negative CO<sub>2</sub> emissions. That is why DAC has to be developed and industrialized today.

**Figure 2.3** ▶ Global net-CO<sub>2</sub> emissions by sector, and gross and net CO<sub>2</sub> emissions in the NZE



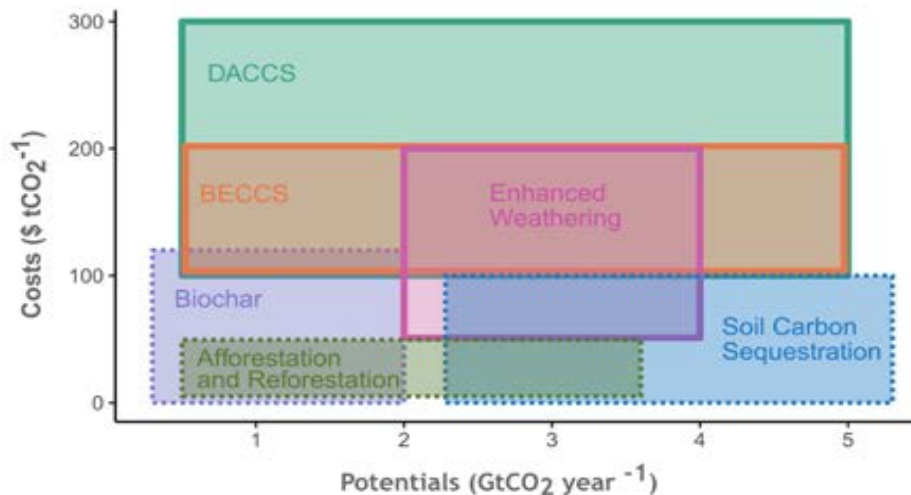
IEA. All rights reserved.

*Emissions from electricity fall fastest, with declines in industry and transport accelerating in the 2030s. Around 1.9 Gt CO<sub>2</sub> are removed in 2050 via BECCS and DACCS.*

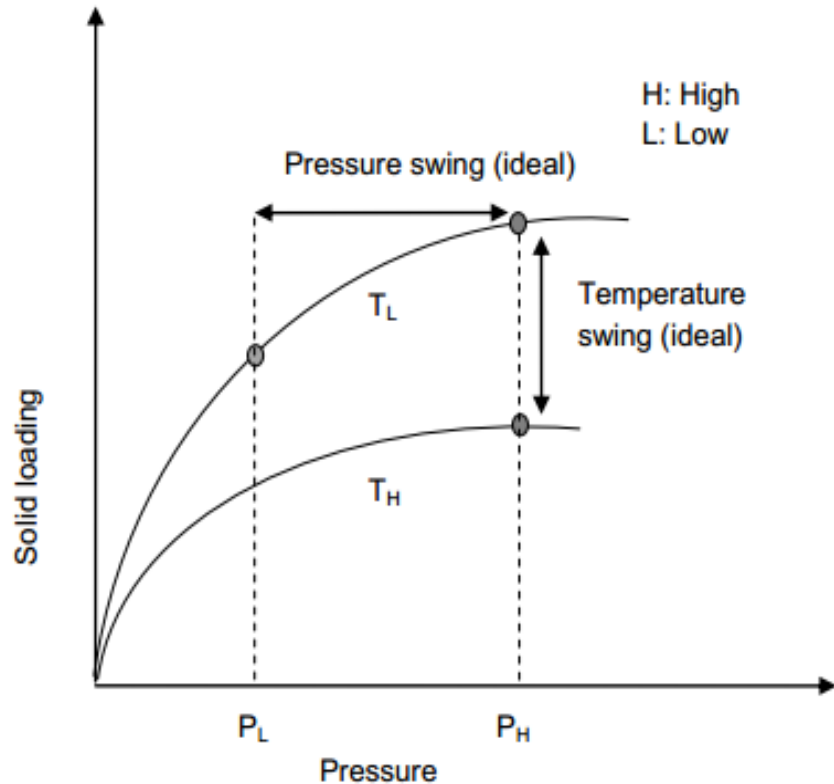
# Motivation

- CORA: New cost efficient DAC process (CO<sub>2</sub> & H<sub>2</sub>O)
- CO<sub>2</sub>-Sorbent: Cellulose with fixed Amine
- Process: less power consumption < 0.5 kWh/kg CO<sub>2</sub>
- Using waste heat
  
- Substitution of fossil carbon in products or fuels
- Other Options eg. Sequestration (for negative CO<sub>2</sub> Emissions)

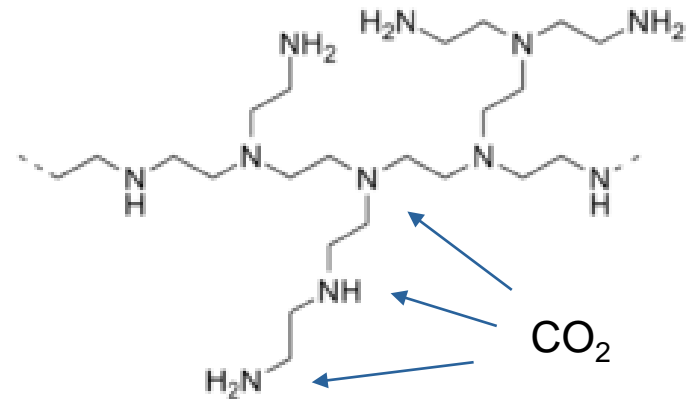
Estimated costs and 2050 potentials



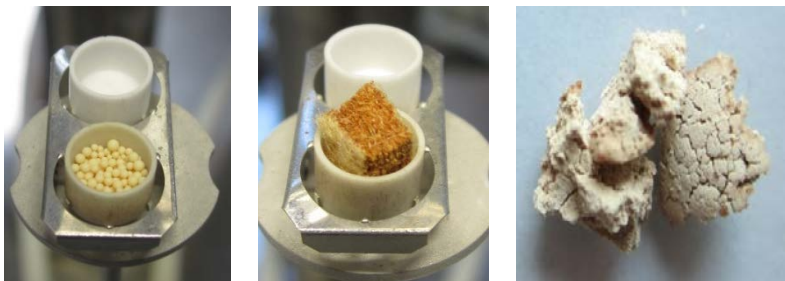
# CO2 Desorption Principle



PEI Polyethylenimin, branched  
Adsorption capacity 15 mmol CO<sub>2</sub>/g PEI

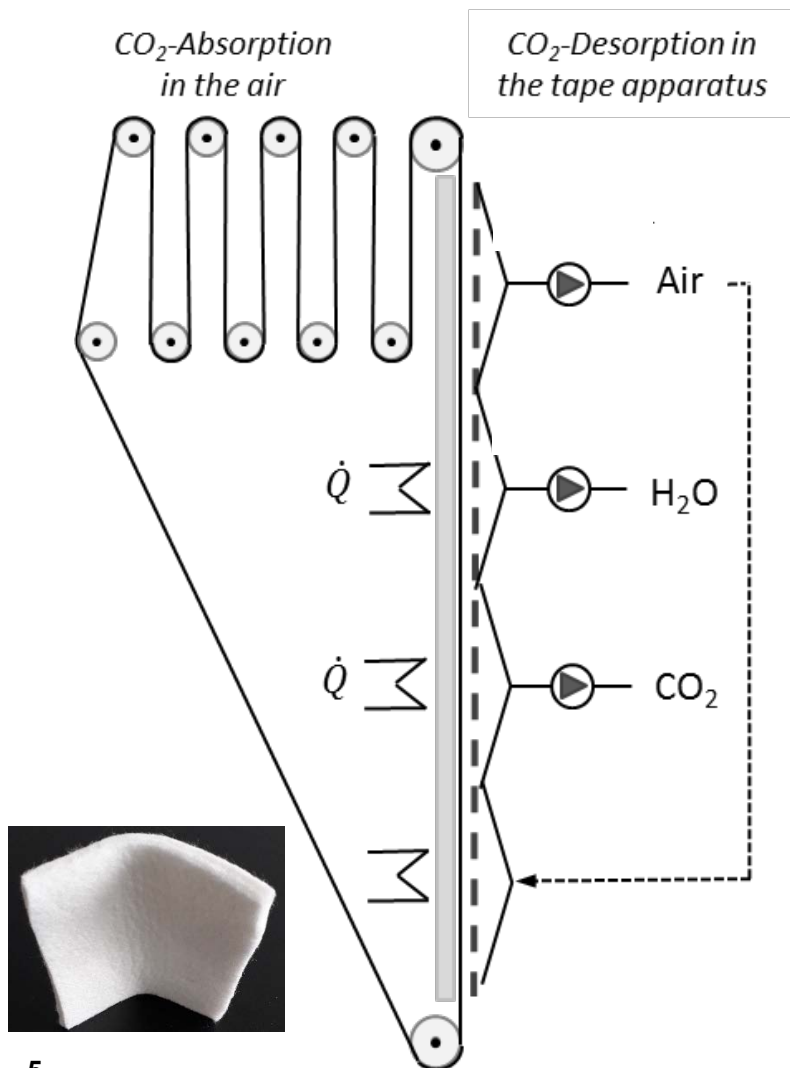


Probe/Datum [mg/mgSorbent]	CO <sub>2</sub> feucht	CO <sub>2</sub> trocken	H <sub>2</sub> O
Lewatit 09/2017	0.029	0.0150	0.088
PEI 10 08/2018	0.056	0.0075	0.236
CPEI 41 06/2019	0.026	0.0069	0.247

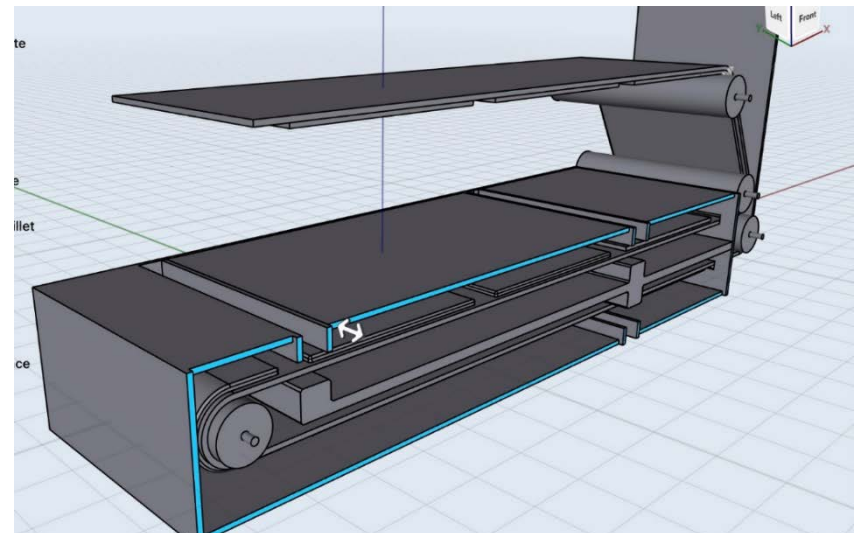


Graph source: Rackley, S.A. (2010) 'Carbon Capture and Storage', Elsevier, Oxford

# CO<sub>2</sub> Desorption tape apparatus



- Different desorption steps in series
- Air removal
- Temperatur increase, Pressure decrease
- H<sub>2</sub>O desorption and further air displacement
- CO<sub>2</sub> desorption
- adjustment to ambient air



# Partners and their tasks

Partner	Tasks
<b>ZSW Stuttgart</b>	Process development and integration in PtX Construction of an demonstrator Assessment of long-term CO2 retention
<b>Deutsche Institute für Textil- und Faserforschung (DITF) Denkendorf</b>	Sorbent development and production (tape) Cellulose-based fibers as carrier for the CO2- binding amines Material Up-scaling
<b>Institut für Energie- und Umweltforschung (ifeu) Heidelberg</b>	Life cycle assessment (LCA) Accompanying ecological research
<b>Mercedes-Benz AG Sindelfingen (Associated partner)</b>	Assessment of scalability and industrialization Coupling with existing air and energy flows on production sites

**FKZ 033RC032A**

Project duration

4 Years, Start 04/2021

Funding 1.8 Mio.€

Contact

[ulrich.zuberbuehler@zsw](mailto:ulrich.zuberbuehler@zsw)

-bw.de

**Further industrial**

**Partners are welcome**

# THANK YOU FOR YOUR ATTENTION

Ulrich Zuberbühler

E-Mail: [ulrich.zuberbuehler@zsw-bw.de](mailto:ulrich.zuberbuehler@zsw-bw.de)

