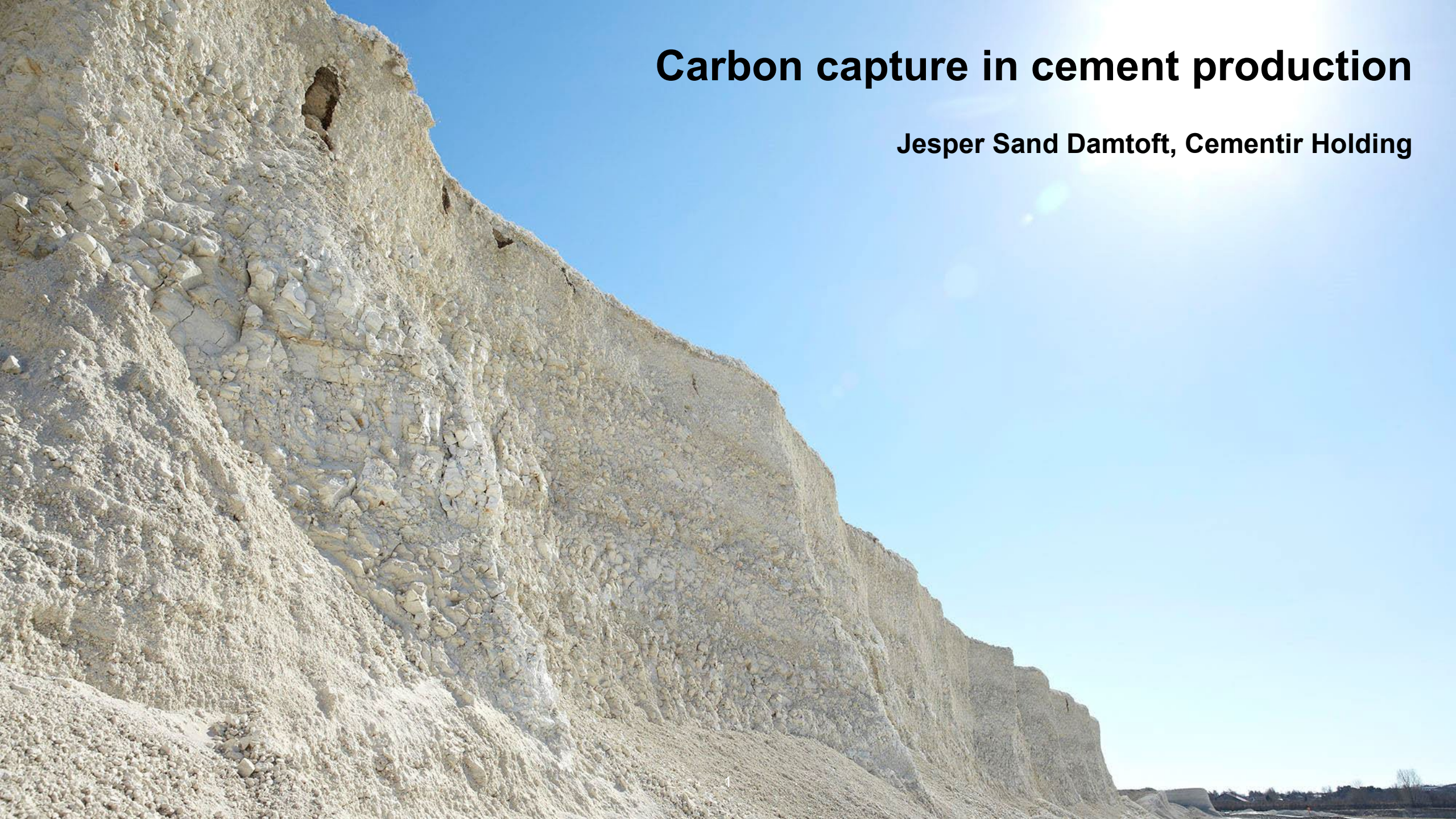
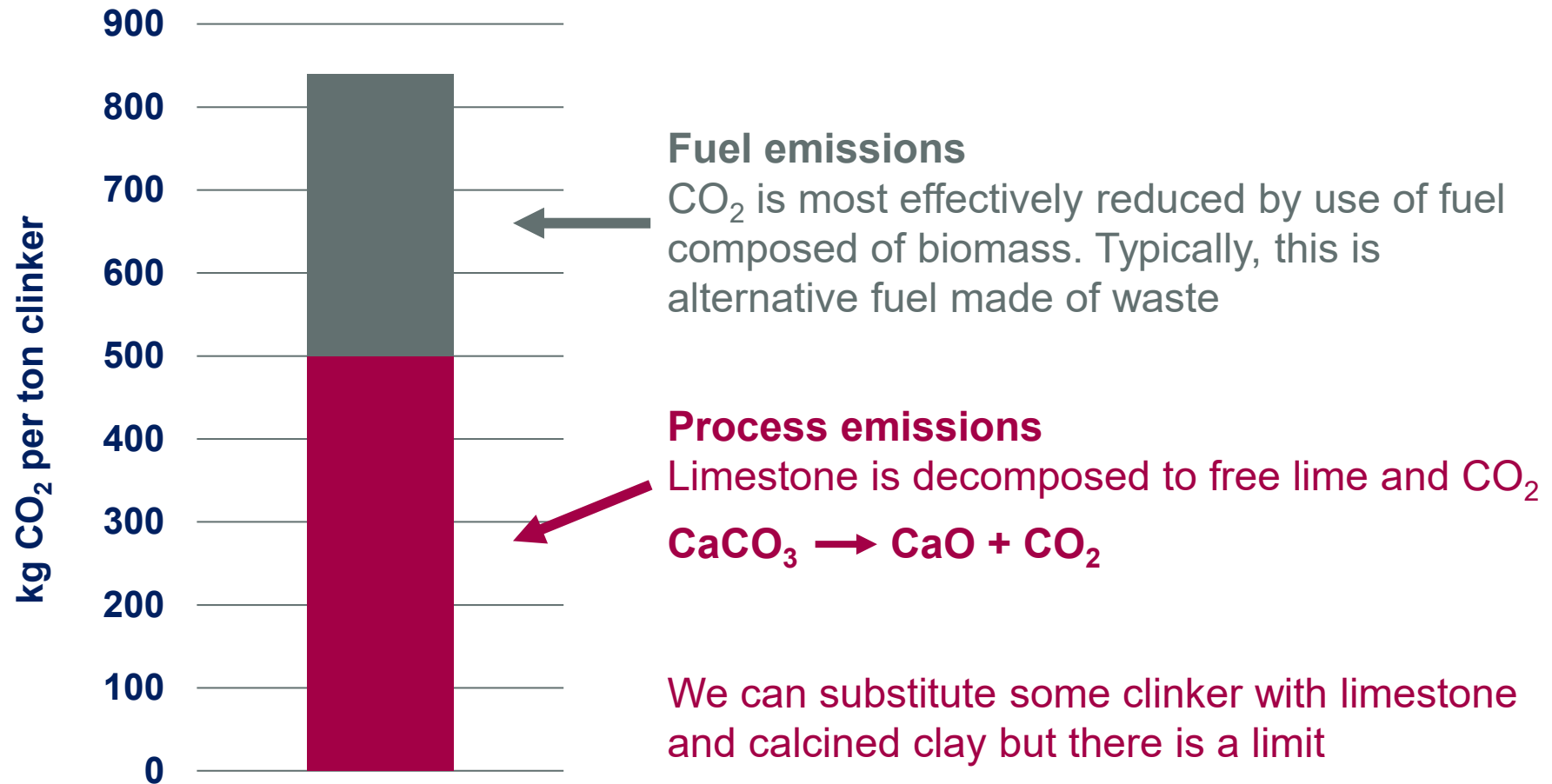


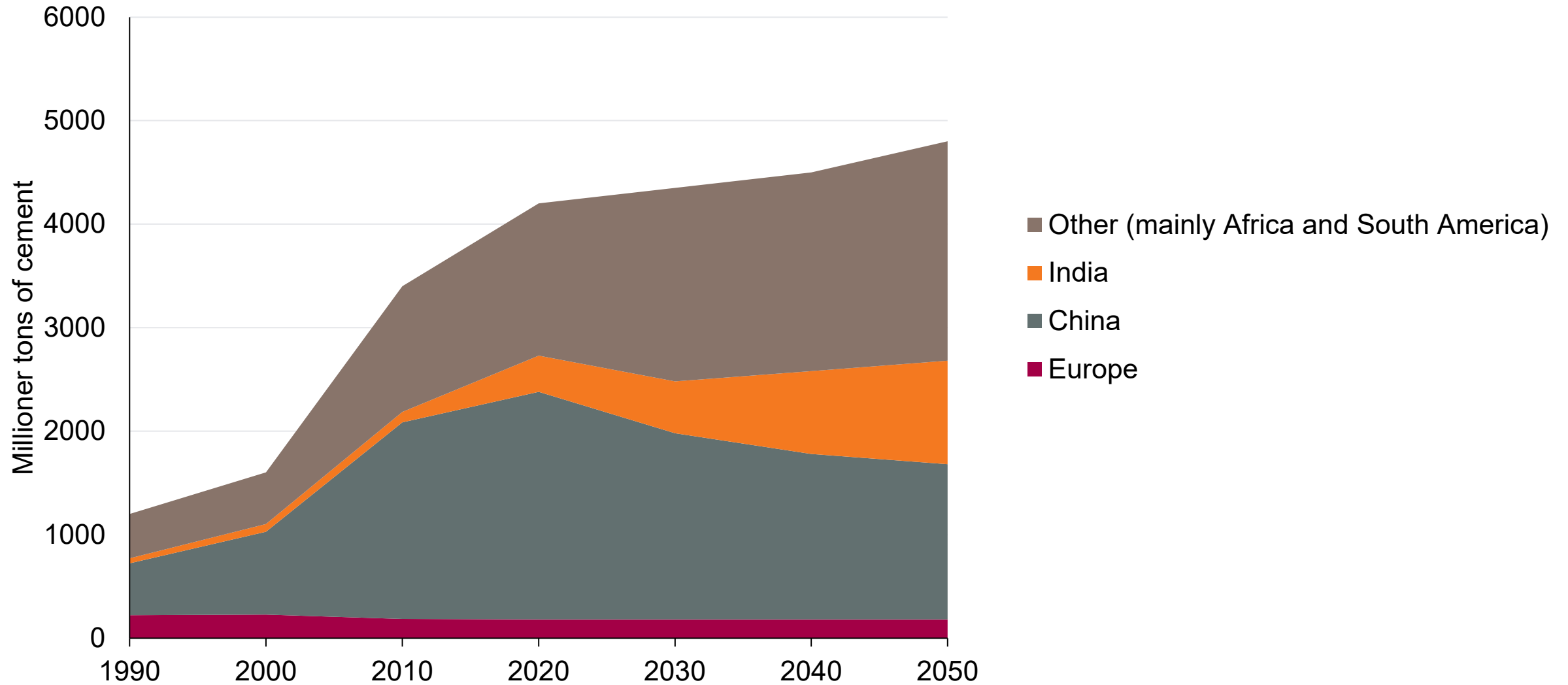
Carbon capture in cement production

Jesper Sand Damtoft, Cementir Holding





Global consumption of cement is increasing - leading to higher CO₂ emissions

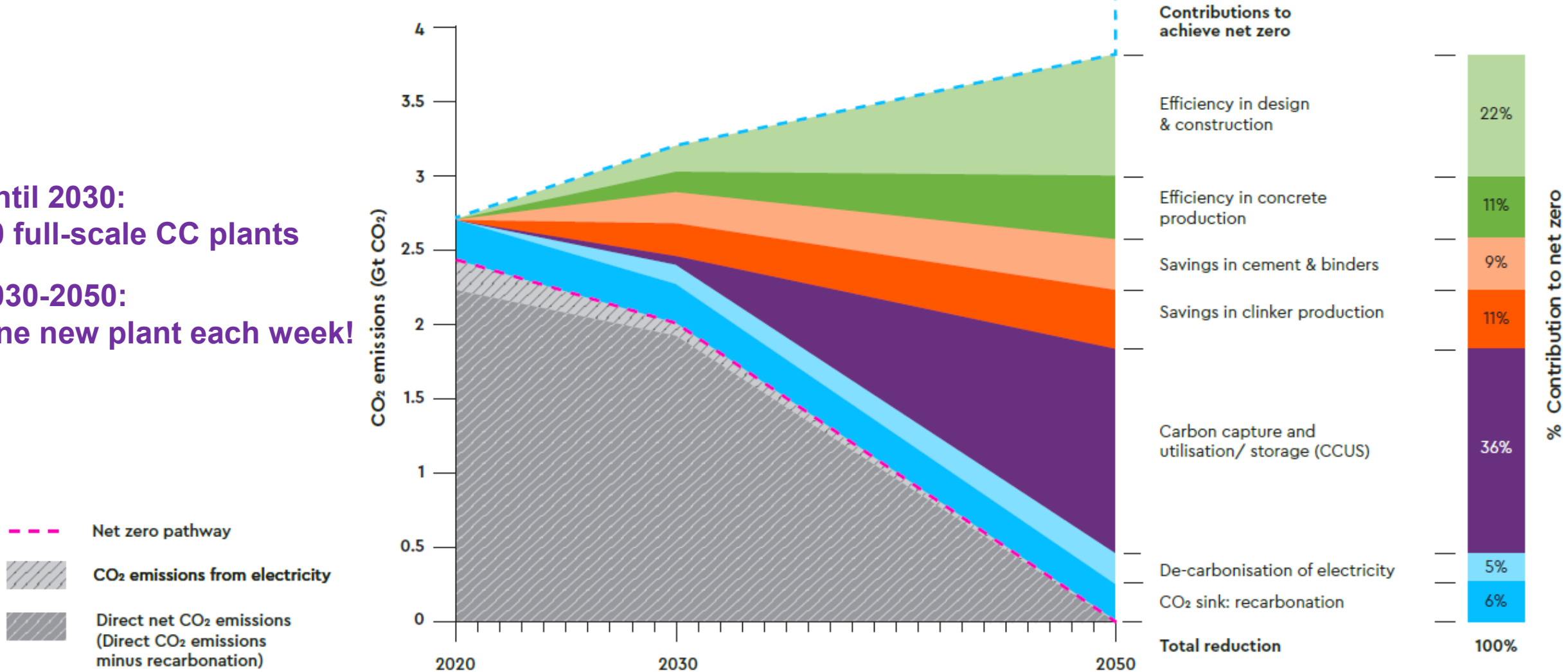


Global Cement and Concrete Association Roadmap to net-zero CO₂ in 2050

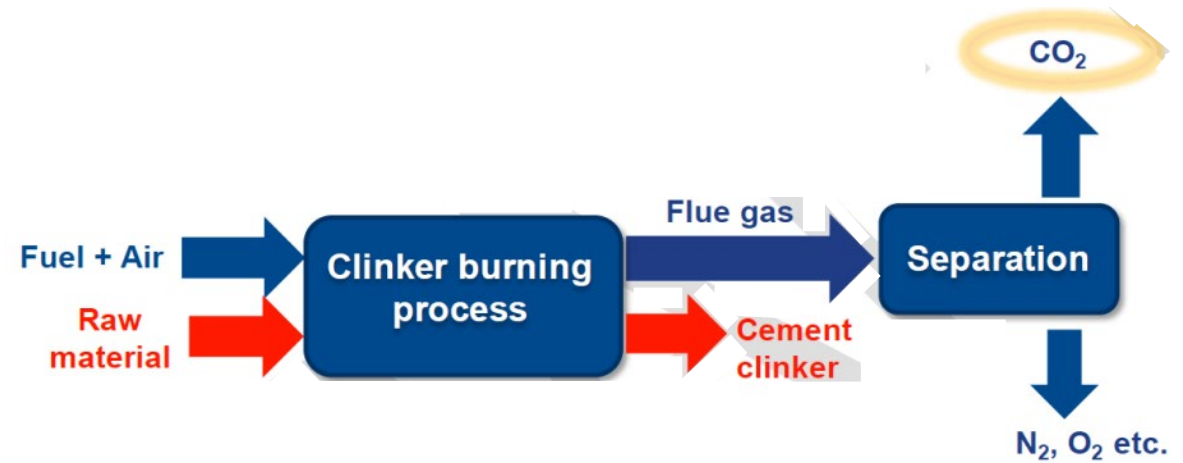
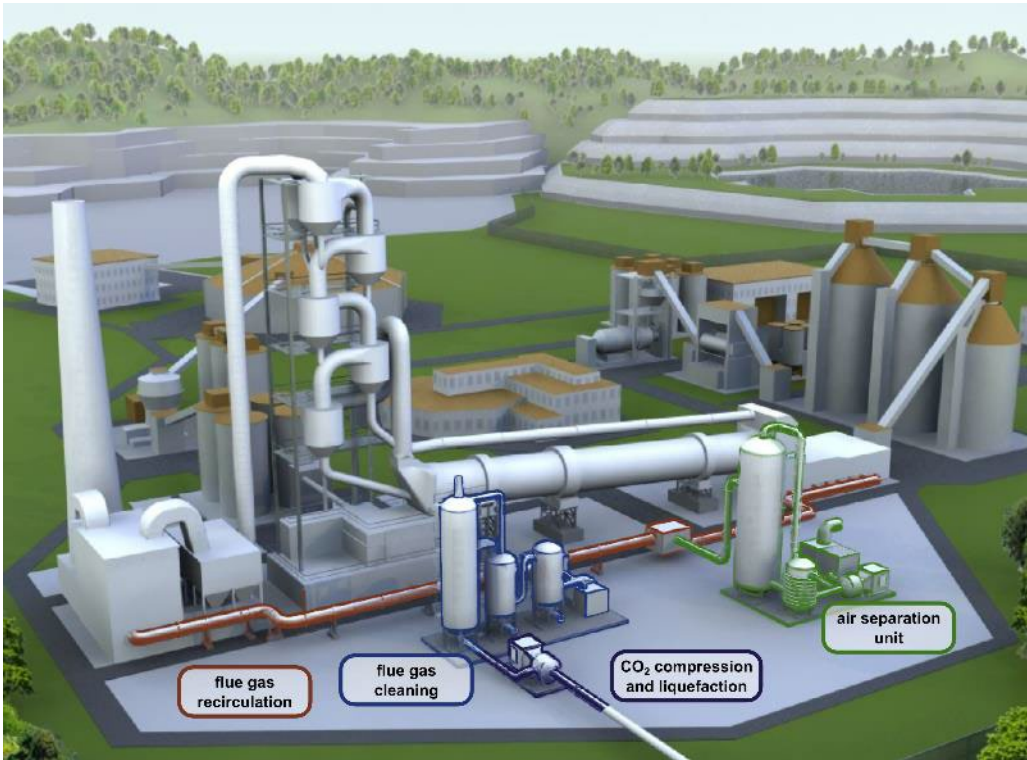
Until 2030:
10 full-scale CC plants

2030-2050:
One new plant each week!

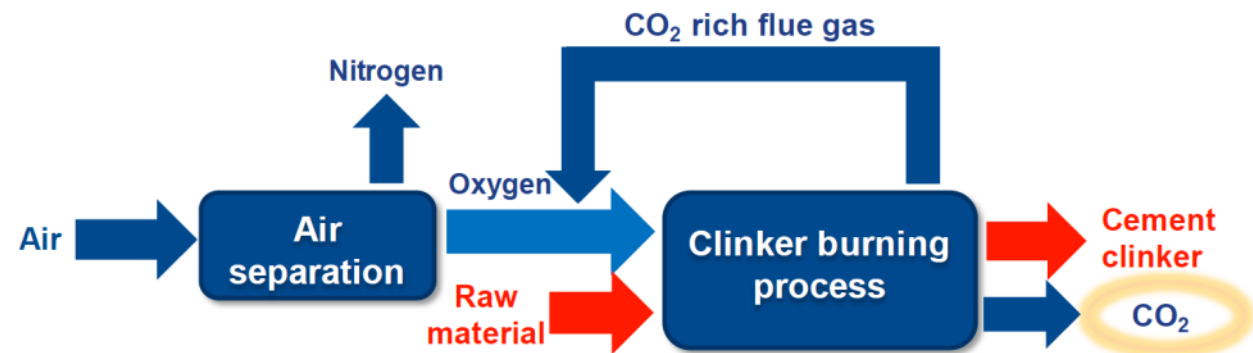
Societies need for concrete
(in the absence of any
action) is forecast to result
in 3.8Gt CO₂ in 2050.



CO₂ capture in cement production



Post-combustion



Oxyfuel

Illustrations from ECRA, European Cement Research Academy

Two full-scale installations under construction - but heavily subsidised



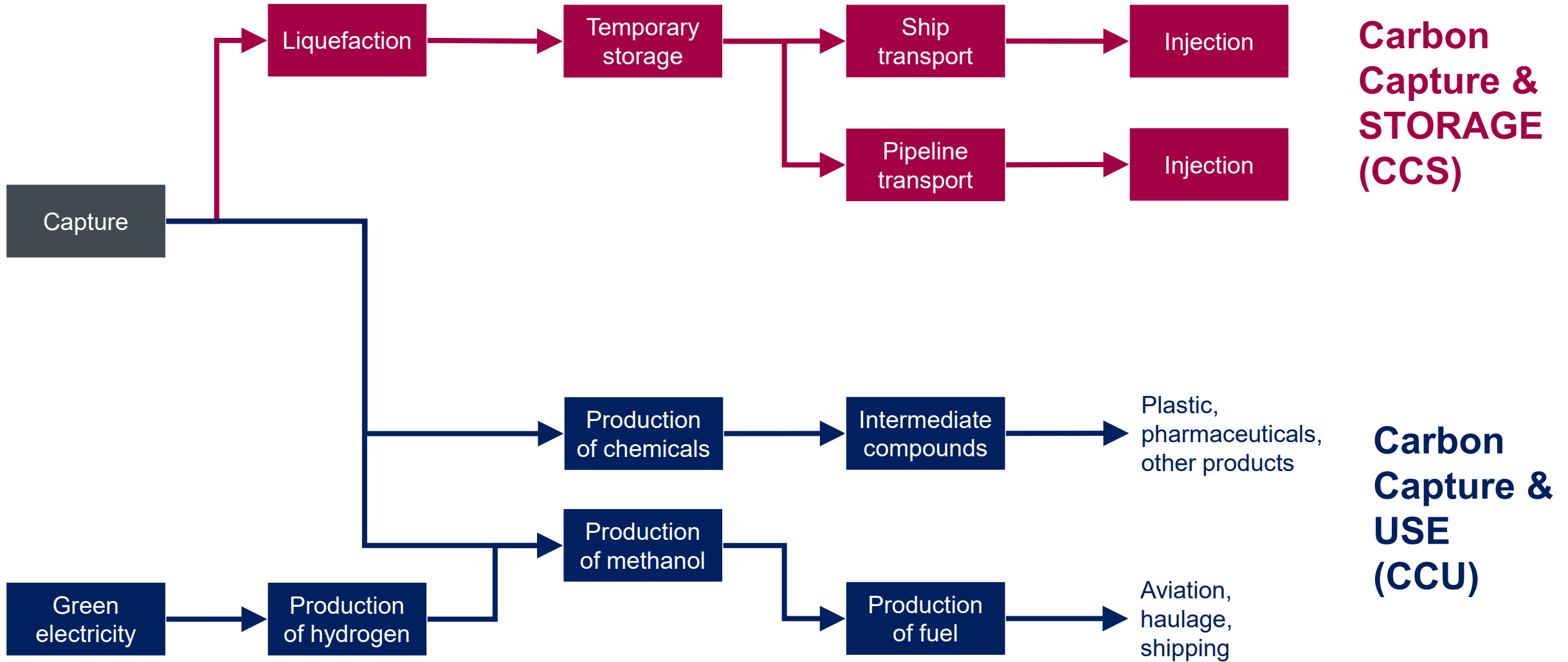
Brevik, Norway

- 400,000 tons CO₂ per year captured
- Start of operation: 2024
- Investment at the cement plant: DKK 3.2-3.4 billion
 - Government support >80% incl. 10 years of operation
- Total cost of Longship, including Northern Lights carbon storage: DKK 19.7 billion
 - Investment + 10 years of operation
 - Government support: DKK 13.2 billion

Lumbres, France

- 810,000 tons CO₂ per year avoided
 - Captured or saved by plant upgrade
- Start of operation: 2028
- Grant by the EU Innovation Fund: DKK 1.1 billion

| CO₂ capture and storage/use value chains



Learning CCUS

Understand Technology

Develop value chains

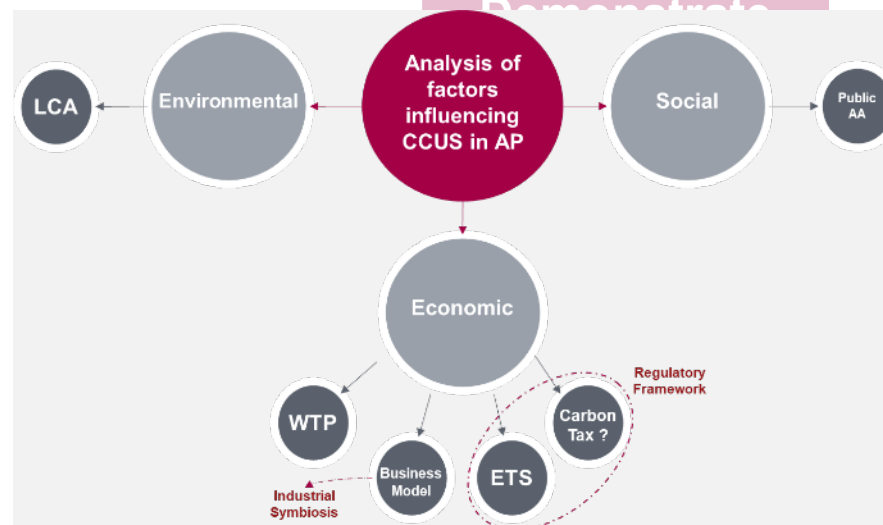
Assess sustainability

Develop business model

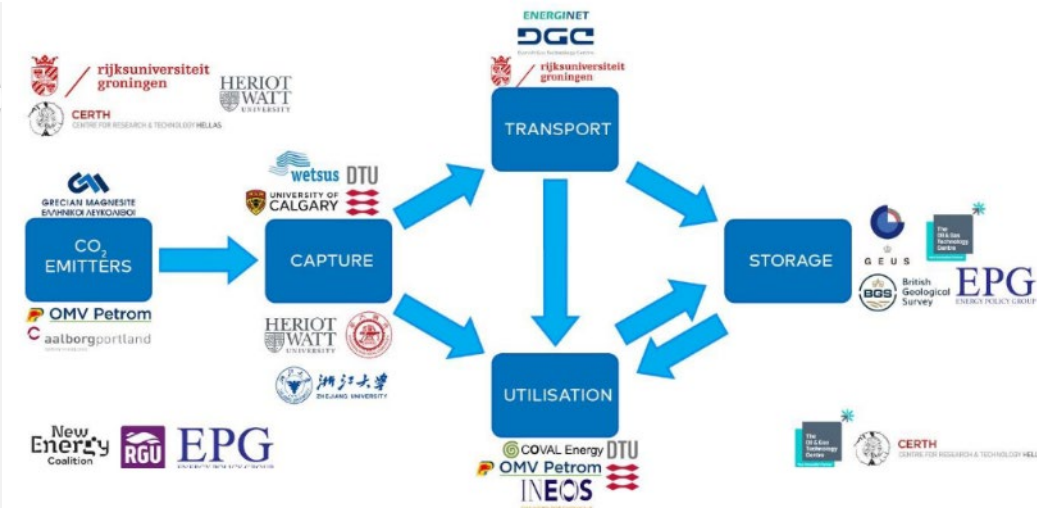
GreenCem



MADE FAST



ConsenCUS



GreenCem results

- **Capture technology**
Jeppe Grue, COWI
- **CO₂ utilization to produce e-fuel**
Søren Knudsen Kær, European Energy
Mads Pagh, Aalborg University
- **Life-cycle analysis**
Juanita Gallego, Aalborg University/Cementir Holding
- **CCUS infrastructure and system integration**
Jesper Raakjær, Port of Aalborg

Budget

- DKK 11.2 million
 - Funding from EUDP: DKK 6.8 million



Partners

- Aalborg Portland, Port of Aalborg, Aalborg Energi Holding, European Energy, Aalborg University, Cemtec Fonden (Hydrogen Valley), DFDS, Reno-Nord

CemChain



Technical University
of Denmark



PENTAIR

Capturing and
liquefying CO₂
from Aalborg
Portland

**BLUE
WATER
SHIPPING**

ISO containers
Transport to
Greensand

Deve
c

s
bility

Demonstrate



Greensand CO₂ storage project

Application to EUDP

Decision in June



The pathway to a full-scale carbon capture plant

Understand
Technology



Develop
Business model

Implement