

ANICA – Advanced Indirectly Heated Carbonate Looping Process

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Main Objectives

Development of novel concept for **CO₂ capture in lime and cement plants**

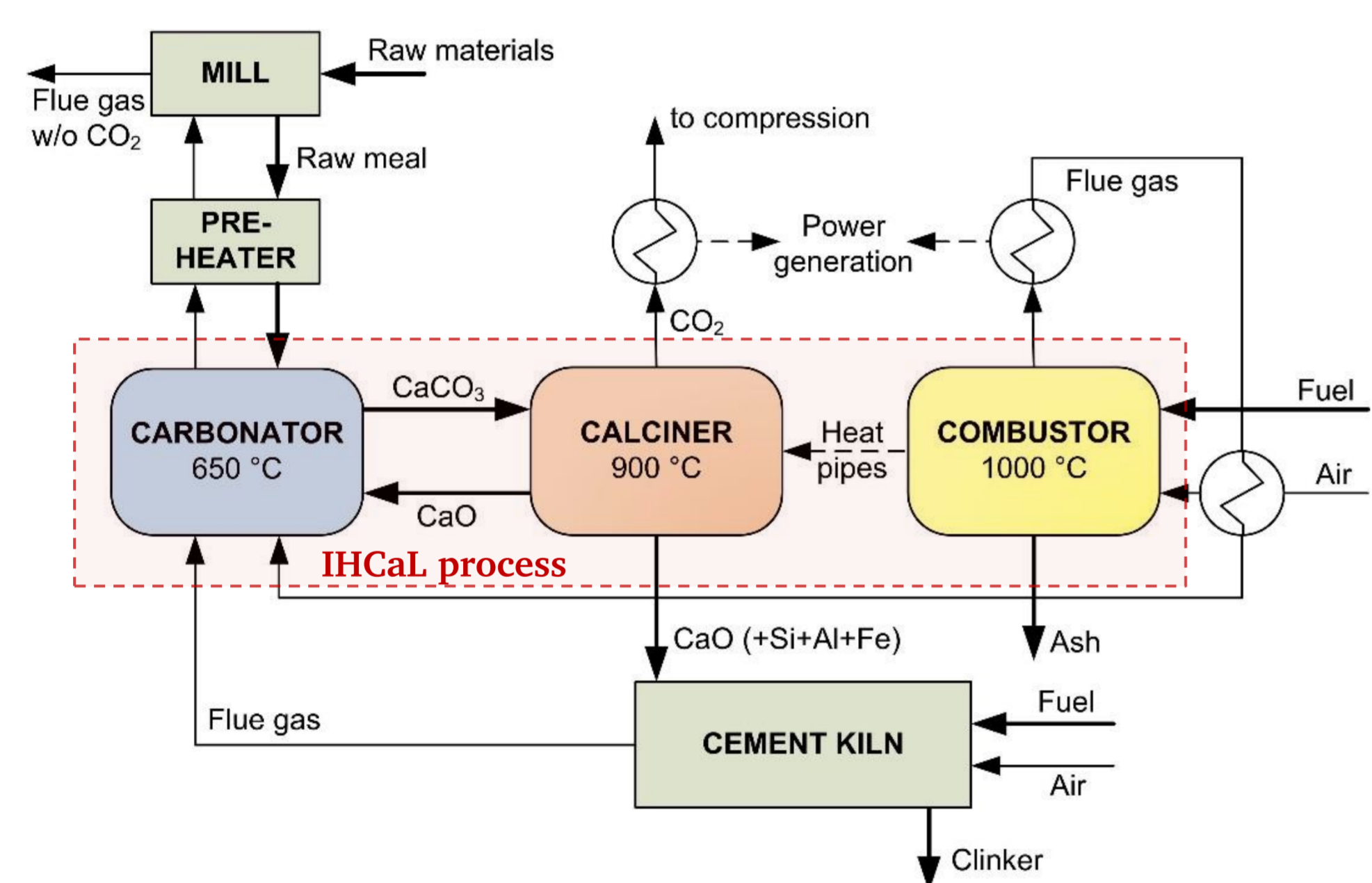
- Advanced key performance parameters (KPIs)
- Development of 1D- and 3D-models of dual fluidized bed reactors
- Demonstration of technology in industrial environment (300kW_{th})
- Evaluate risks, economic performance, and environmental impact of process
- Provide basic design and cost estimation of 20 MW_{th} demo plant

Key Performance Indicators (KPIs)

KPI	Target
CO ₂ capture efficiency	> 90 %
CO ₂ purity	> 95 %
Net efficiency for power co-generation	> 45 %
Sorbent utilization	> 90 %
CO ₂ avoidance costs	< 25 €/t
Net CO ₂ emissions	< 0

Indirectly Heated Carbonate Looping (IHCaL) Process

Integration of IHCaL process into cement plant



- No oxygen for calciner
- **high efficiency**
- No fuel in calciner
- **few impurities and low deactivation**
- Almost **pure CO₂ stream** at calciner exit

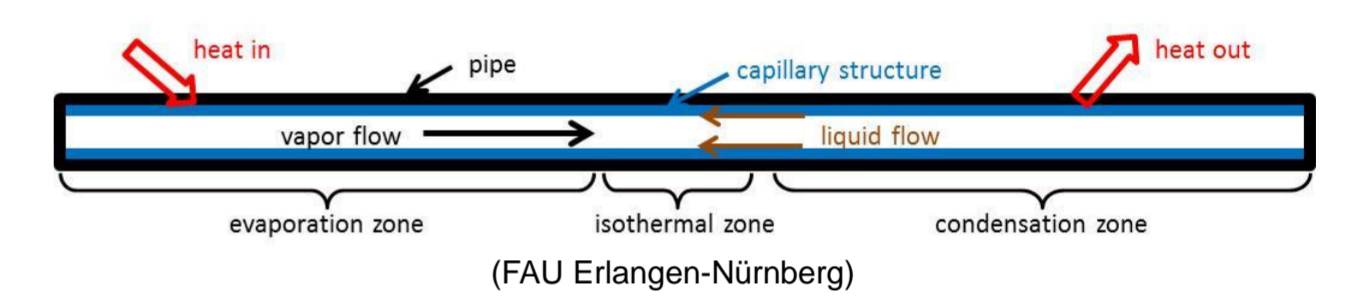


Source: VDZ

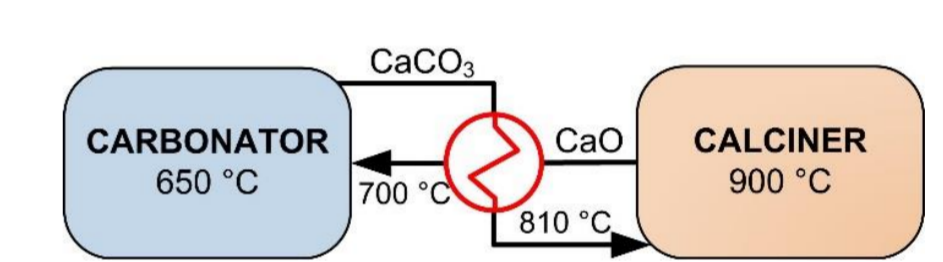
Coupled Reactor Development

Reduce high heat duty of the calciner

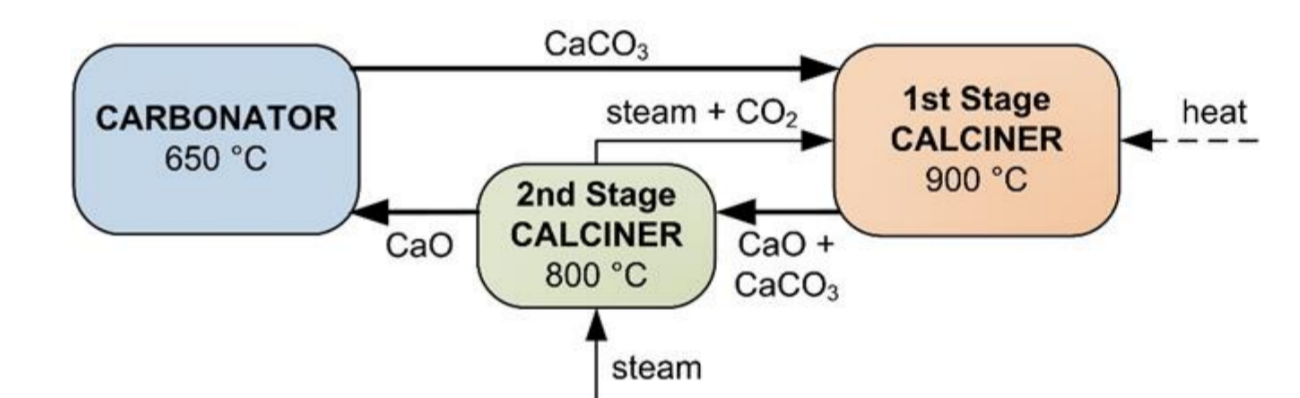
Improved heat pipe performance



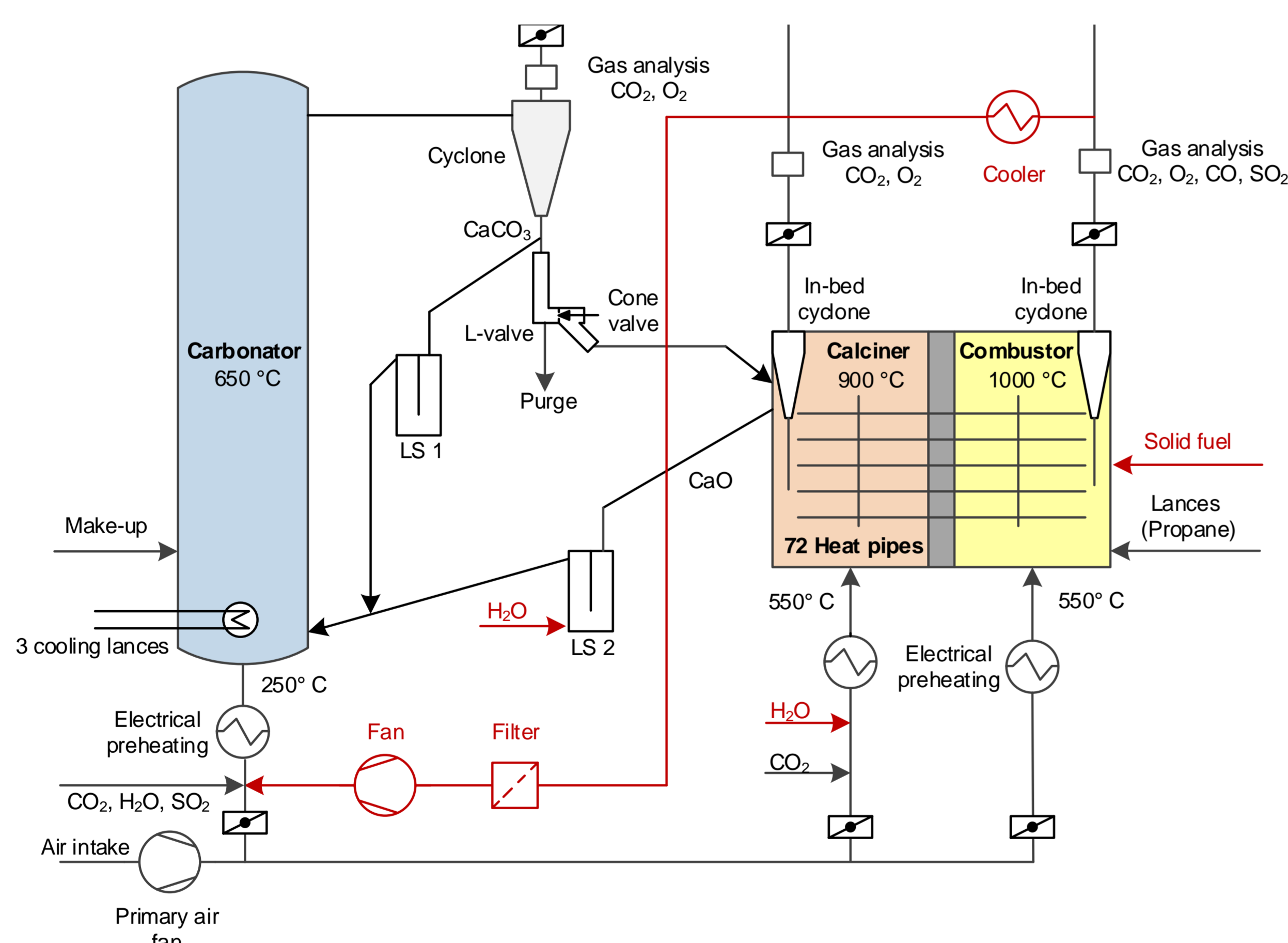
Solid/solid heat exchanger



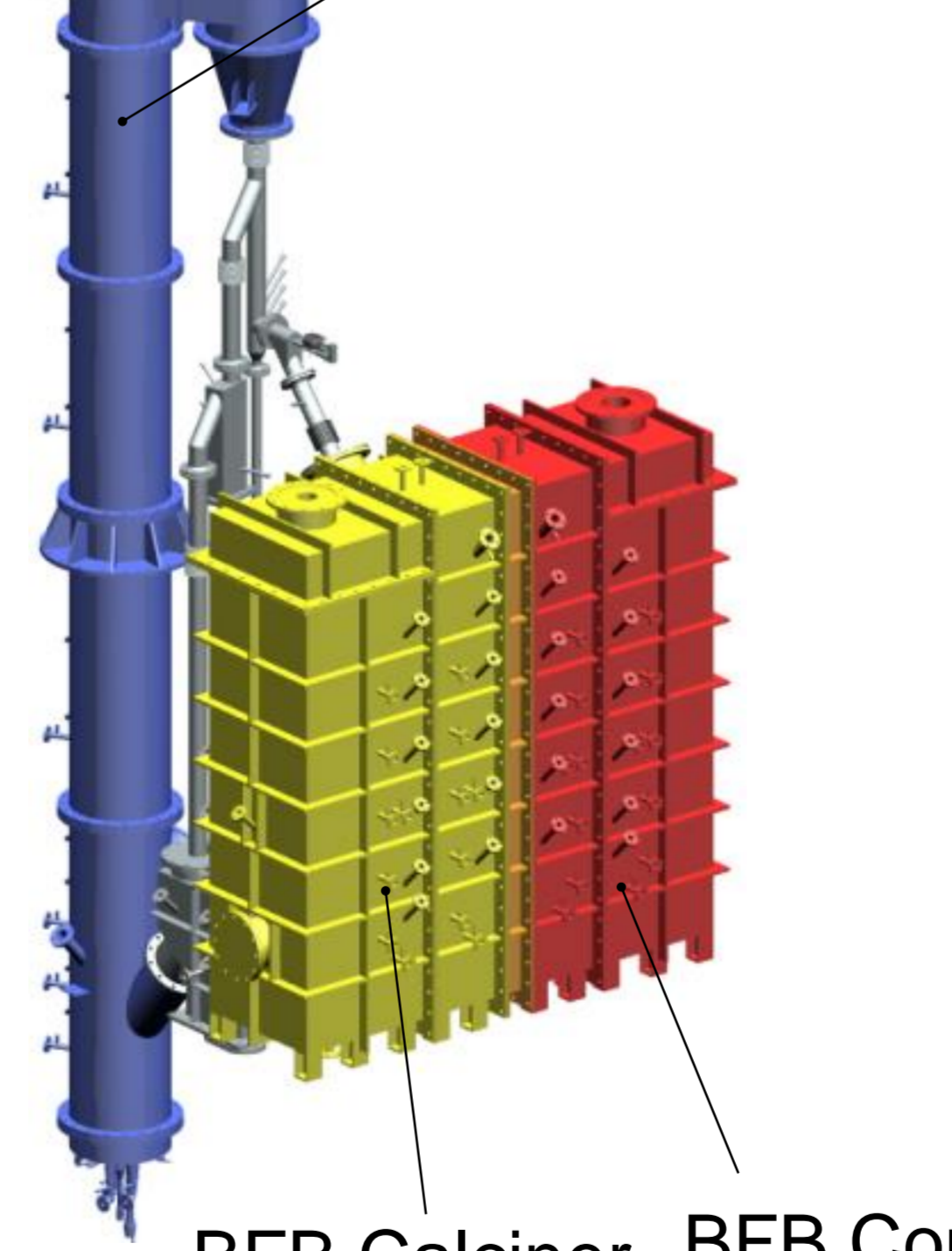
Two-stage calciner



300 kW_{th} Demo Plant at TU Darmstadt



CFB Carbonator



BFB Calciner

BFB Combustor



Consortium



Highlights

- De-carbonisation of cement & lime production industry
- Decrease costs for CO₂ capture
- Facilitation of net negative CO₂ emissions

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