

### Principle of Calcium Looping (CaL) CO<sub>2</sub> Capture

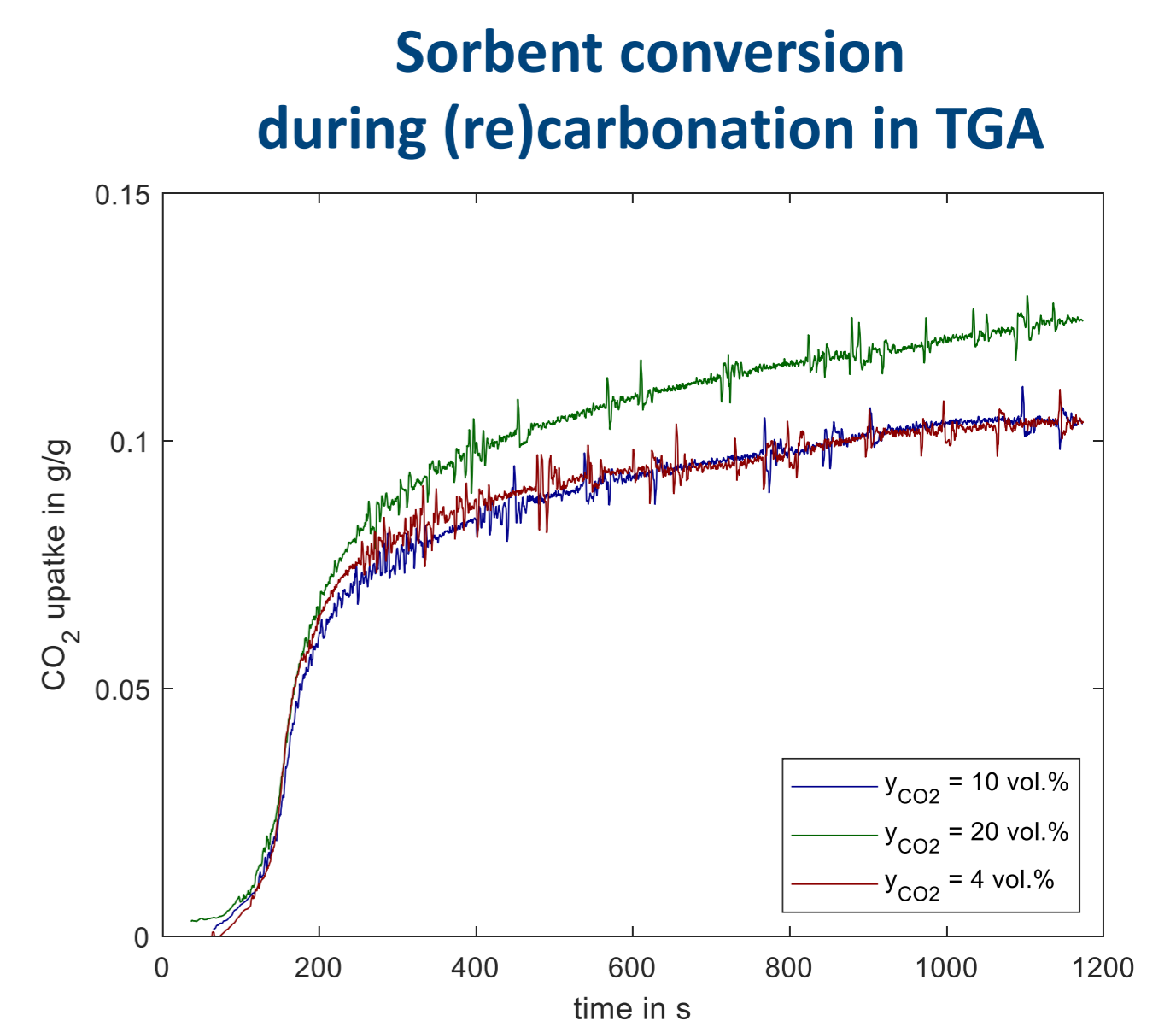
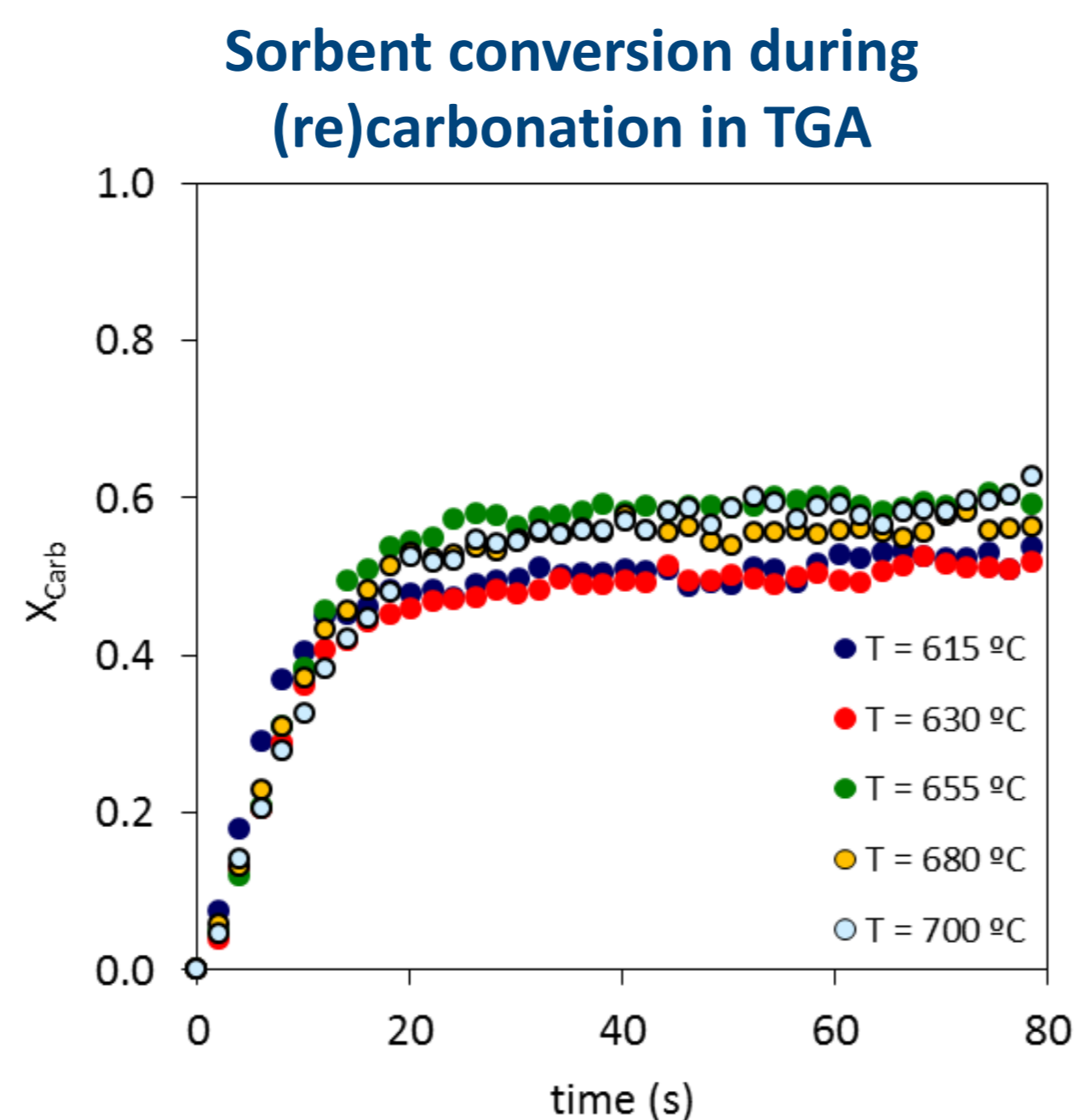
- CO<sub>2</sub> capture by cyclic calcination and (re)carbonation of CaO containing sorbent
- High energy efficiency due to high temperature level, beneficial heat integration
- Synergies arise from common feedstock of clinker manufacturing and CaL

### Research objectives (Comparative raw meal characterization for CaL)

- Determination of entrained flow calcination and carbonation kinetics and conversion rates for various cement raw meals to transfer demonstration results at Vernasca plant to other cement plants
- Development of a guideline on raw meal characterization in respect to suitability for CaL applications

### Research Statements

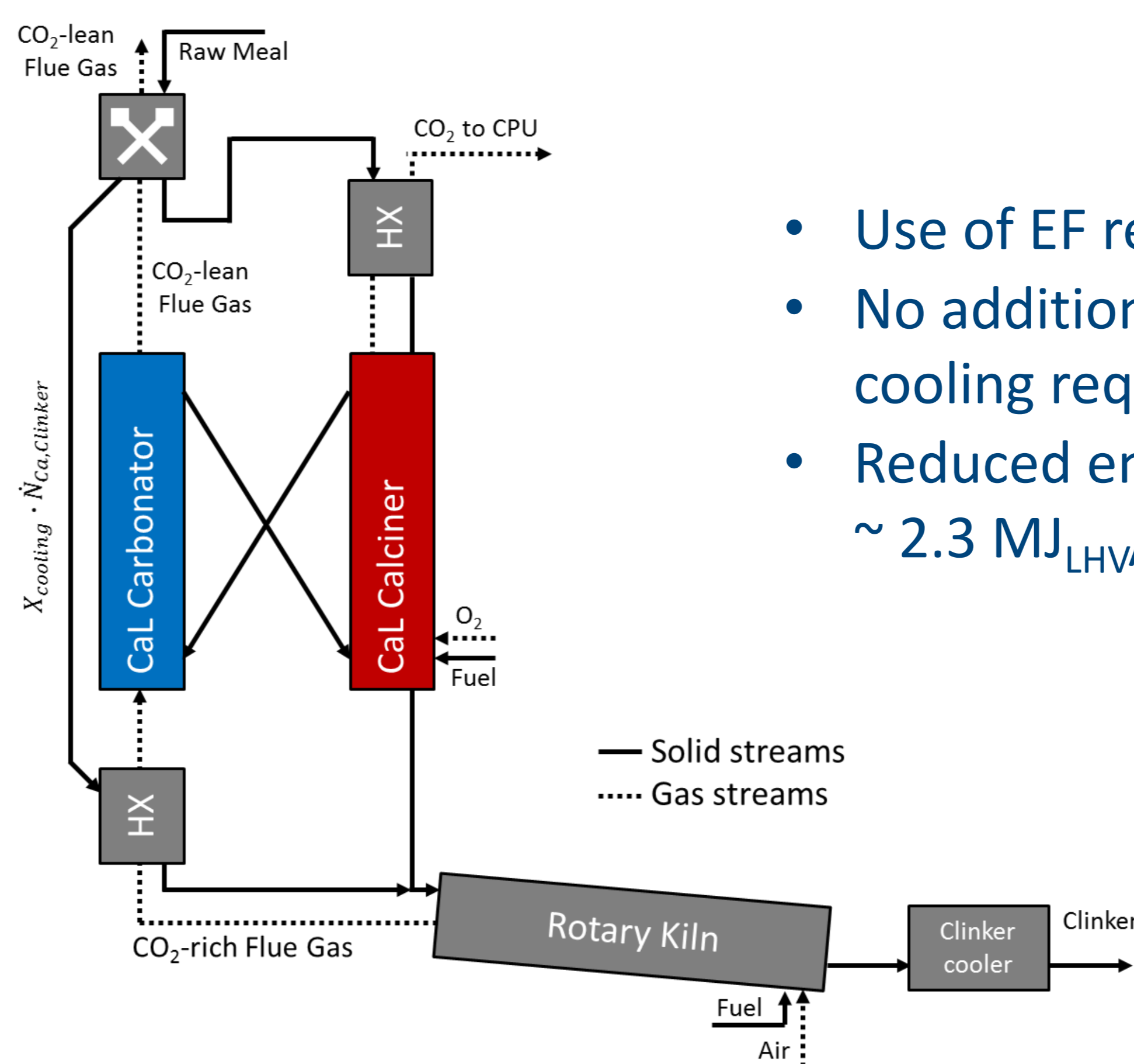
- Simulations of EF carbonator show that high CO<sub>2</sub> capture is achievable with proper solid/gas ratio
- Sorbent CO<sub>2</sub> carrying capacity depended on Belite side reaction
- Sorbent CO<sub>2</sub> uptake increases in moist conditions and with increasing  $X_{avg}$  and CO<sub>2</sub> partial pressures
- EF CaL concept proofed in lab scale conditions (CEMCAP)



### Ongoing Research Activities

- Assessment of different raw meal qualities regarding CaL suitability by lab and mini-pilot scale experiments
- Determination of relevant kinetic data for demonstrator design and proceeding simulation activities

### Integrated EF CaL – cement plant integration



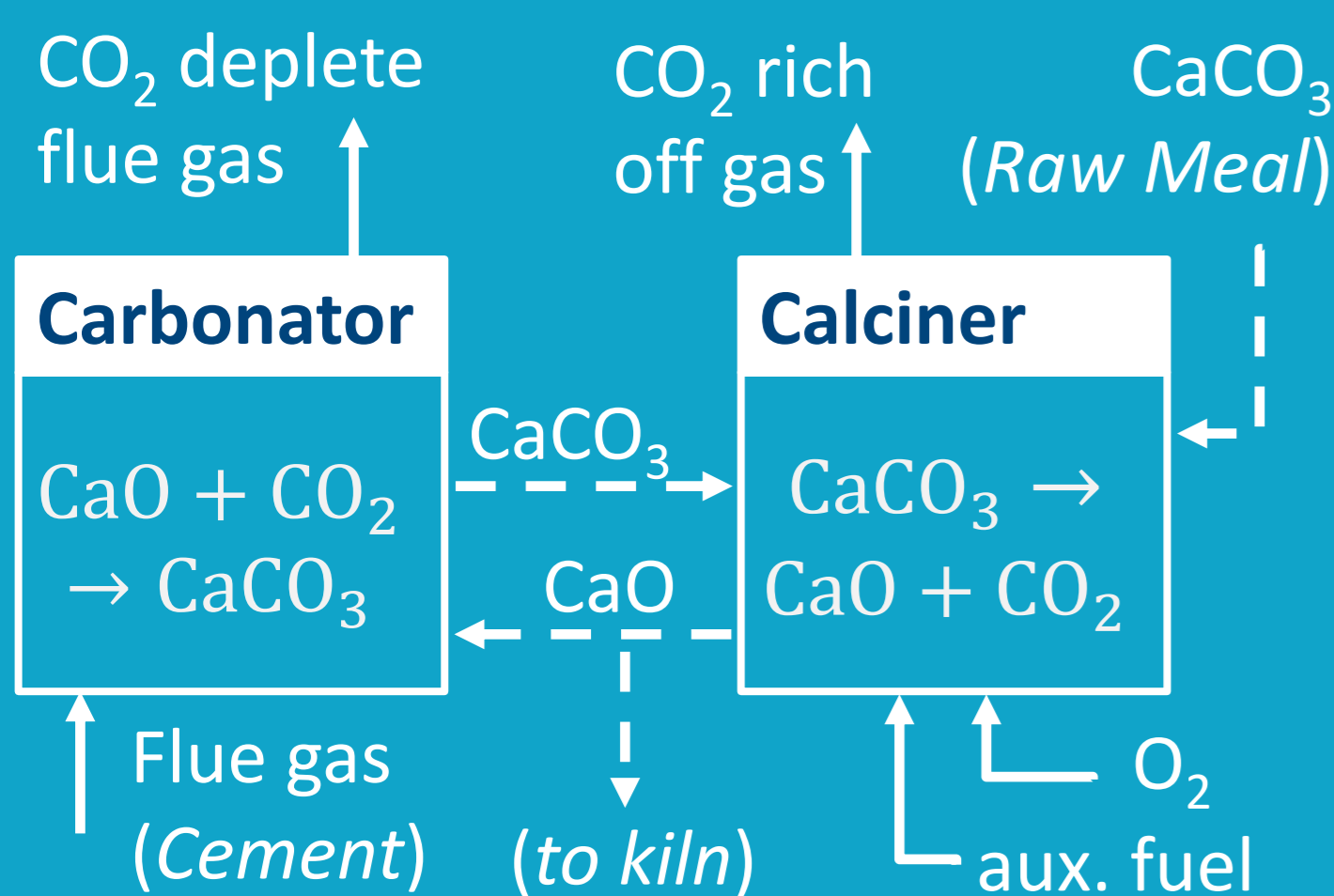
- Use of EF reactors beneficial
- No additional milling step/ sorbent cooling required
- Reduced energy consumption  $\sim 2.3 \text{ MJ}_{LHV}/\text{kg}_{CO_2}$

CLEAN clinker by calcium looping for low-CO<sub>2</sub> cement

# CLEAN KLER

*CLEANKER is a Horizon 2020 project with the ultimate objective of demonstrating the applicability of the calcium looping (CaL) process to the cement production.*

### Calcium Looping CO<sub>2</sub> Capture



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