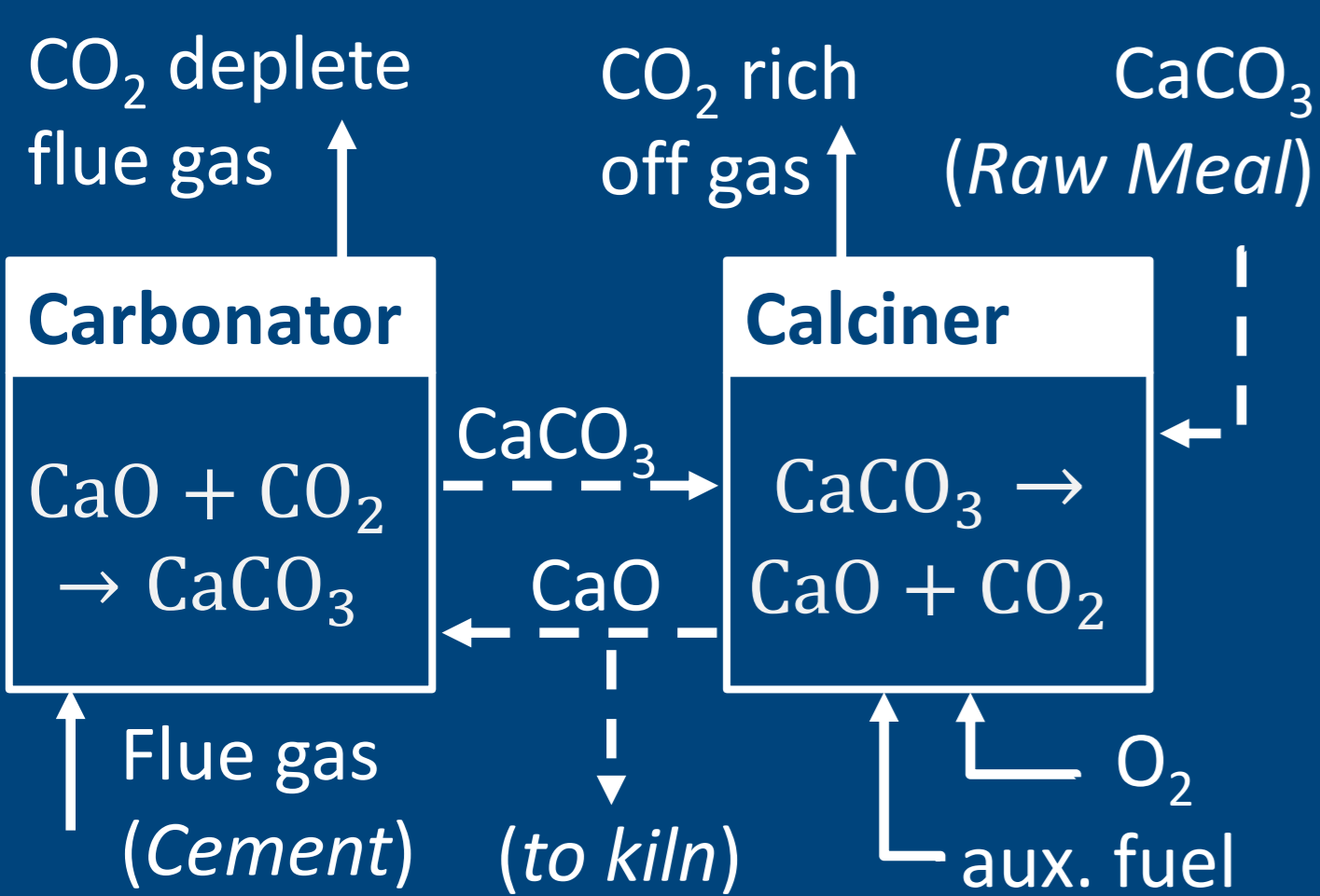


CEMCAP

CEMCAP is a Horizon 2020 project with the objective to prepare the grounds for cost- and resource-effective CCS in European cement industry.

Calcium Looping CO₂ Capture



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Results & Publications

<https://www.sintef.no/projectweb/cemcap/results/>



This project is funded by the European Union's Horizon 2020 Framework Programme for research and innovation

Calcium Looping CO₂ Capture

Tail-end Fluidized Bed CaL

Principle of Calcium Looping (CaL) CO₂ Capture

- CO₂ 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

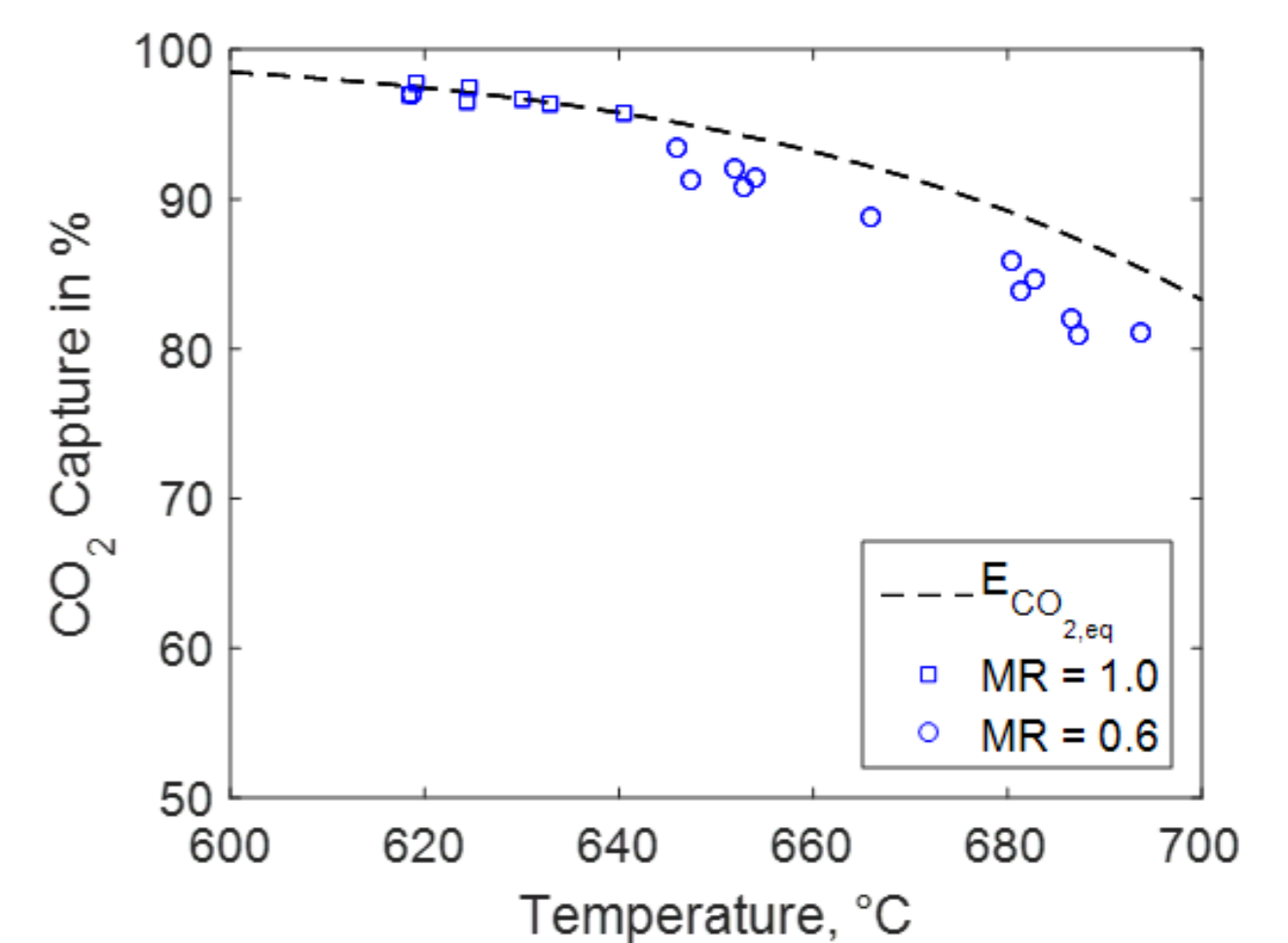
Main Conclusions

- CO₂ capture of 98 % demonstrated
- High fuel consumptions but net clean electricity export possible with heat recovery steam cycle
- Technology ready to implement
- Energy demand for CO₂ avoidance: 2.7 – 3.7 MJ_{LHV}/kg_{CO₂}

Research Statements

Tail-end FB CaL:

- High CO₂ capture efficiencies demonstrated at semi industrial scale (up to 98 % CO₂ capture)
- Well-known CaL design criteria are applicable for cement flue gases
- Minor uncertainties regarding usability for CO₂ capture in cement plant
- Additional milling step may be required for FB systems to ensure clinker quality



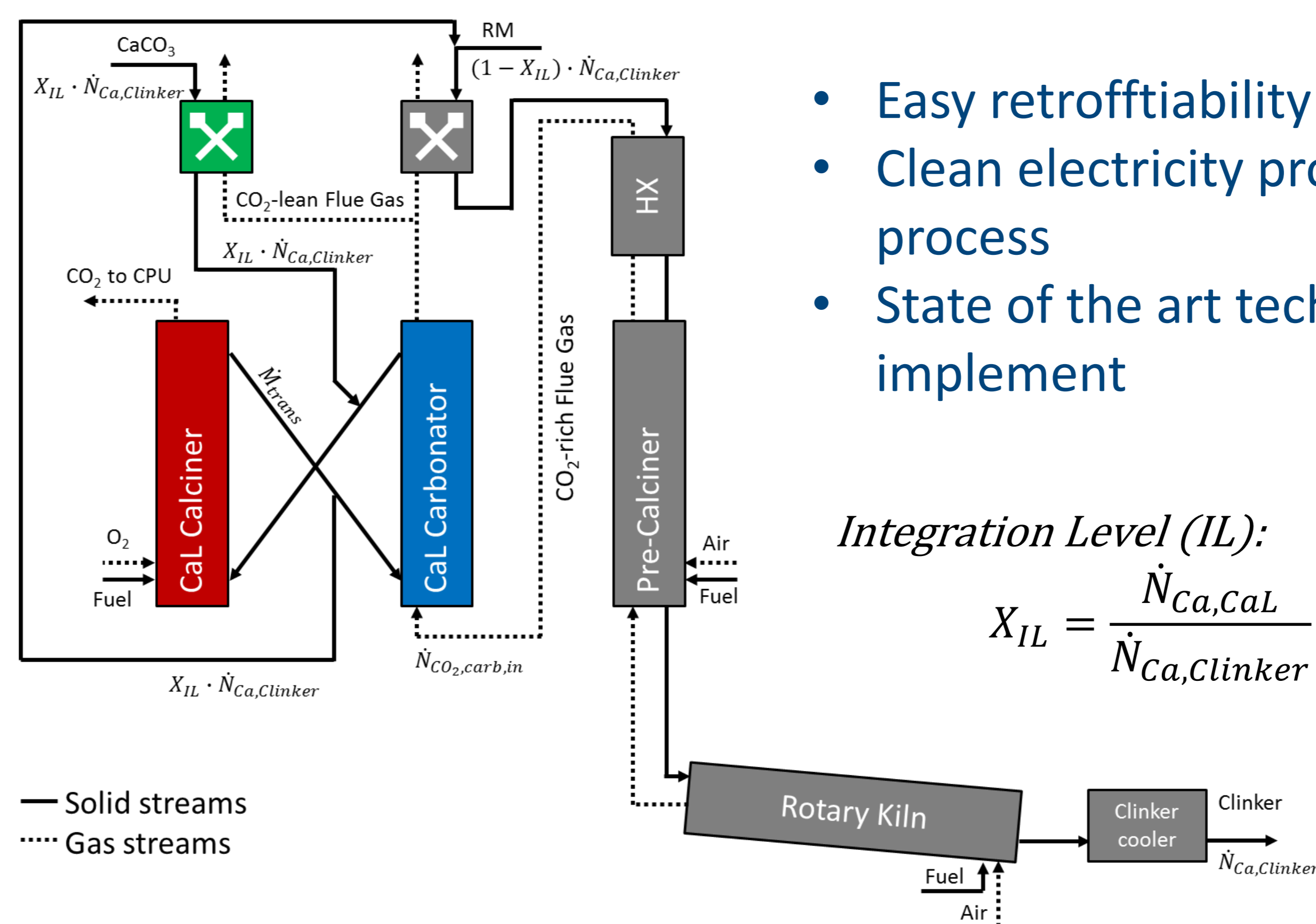
Silicate formation:

- Partial deactivation of CaO sorbent by fast formation of Belite
- Deactivation is influenced by (i) Ca/Si distribution in solid, (ii) temperature, (iii) residence time, (iv) partial pressures of CO₂ and H₂O_(g)

Entrained flow (EF) Calcium Looping:

- Proof of concept within the CEMCAP project. Further investigation at demonstration scale within the CLEANKER project

Tail-end FB CaL – cement plant integration



- Easy retrofitability
- Clean electricity production by CaL process
- State of the art technology ready to implement

Integration Level (IL):

$$X_{IL} = \frac{\dot{N}_{Ca, CaL}}{\dot{N}_{Ca, Clinker}}$$