CARBON CAPTURE AND HEATING

– CAN WE COMBINE LONG-TERM ENERGY STORAGE WITH DIRECT AIR CAPTURE?

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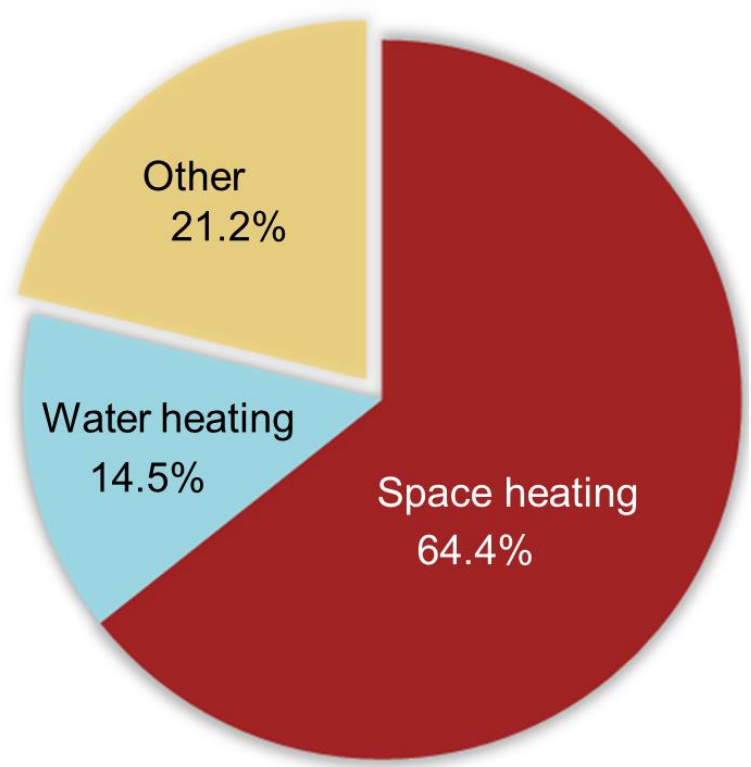
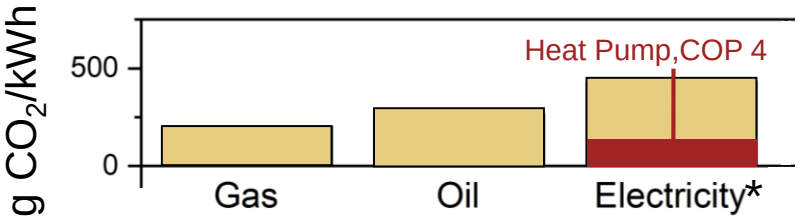
Final Energy Demand in Private Households EU, 2021



Eurostat, 2023

CO_2 emissions for heating depending on the fuel 2023

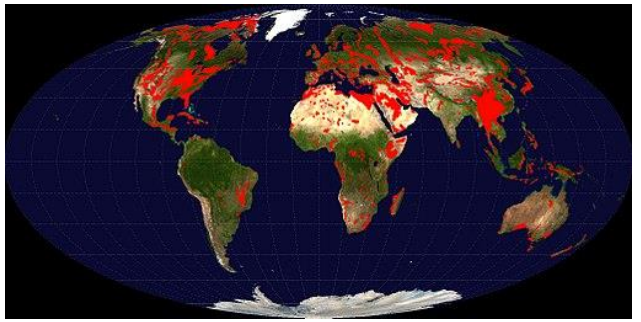


* German Electricity Mix 2022, 44% Renewable Energy

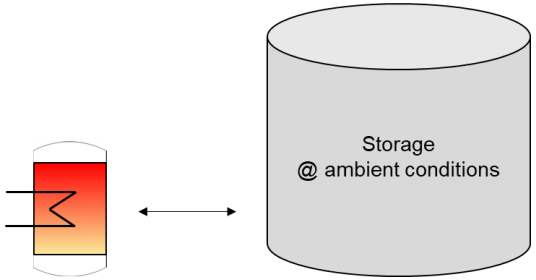
Major Challenge for any storage: no. of cycles
Our approach

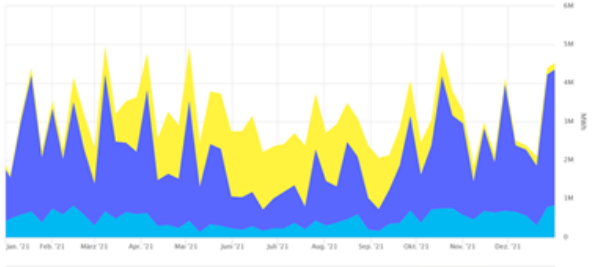
- Applied material has to be inexpensive
  - Certainly no critical materials…
    (“stones and/or salt water” would be ideal)
- Scalable capacity in cheap volumes
  - Separation of Reactor and Storage
    (comparable to “Redox-Flow”)
- Potentially re-charging
  - Connecting Heat demand with renewable Electricity

- “Activating” the so far passive storage period



https://commons.wikimedia.org/





Energy Storage based on Quicklime and Water

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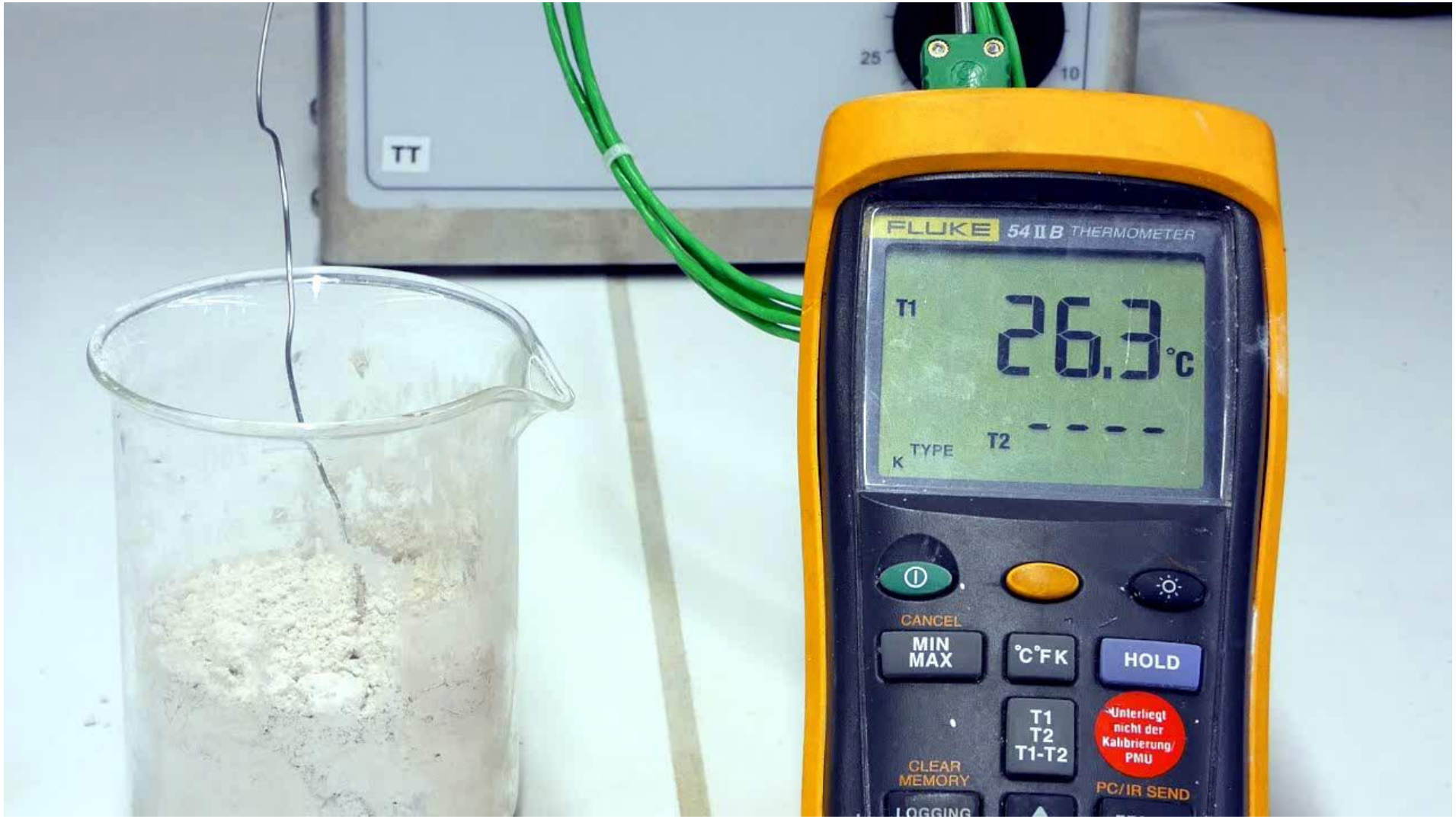
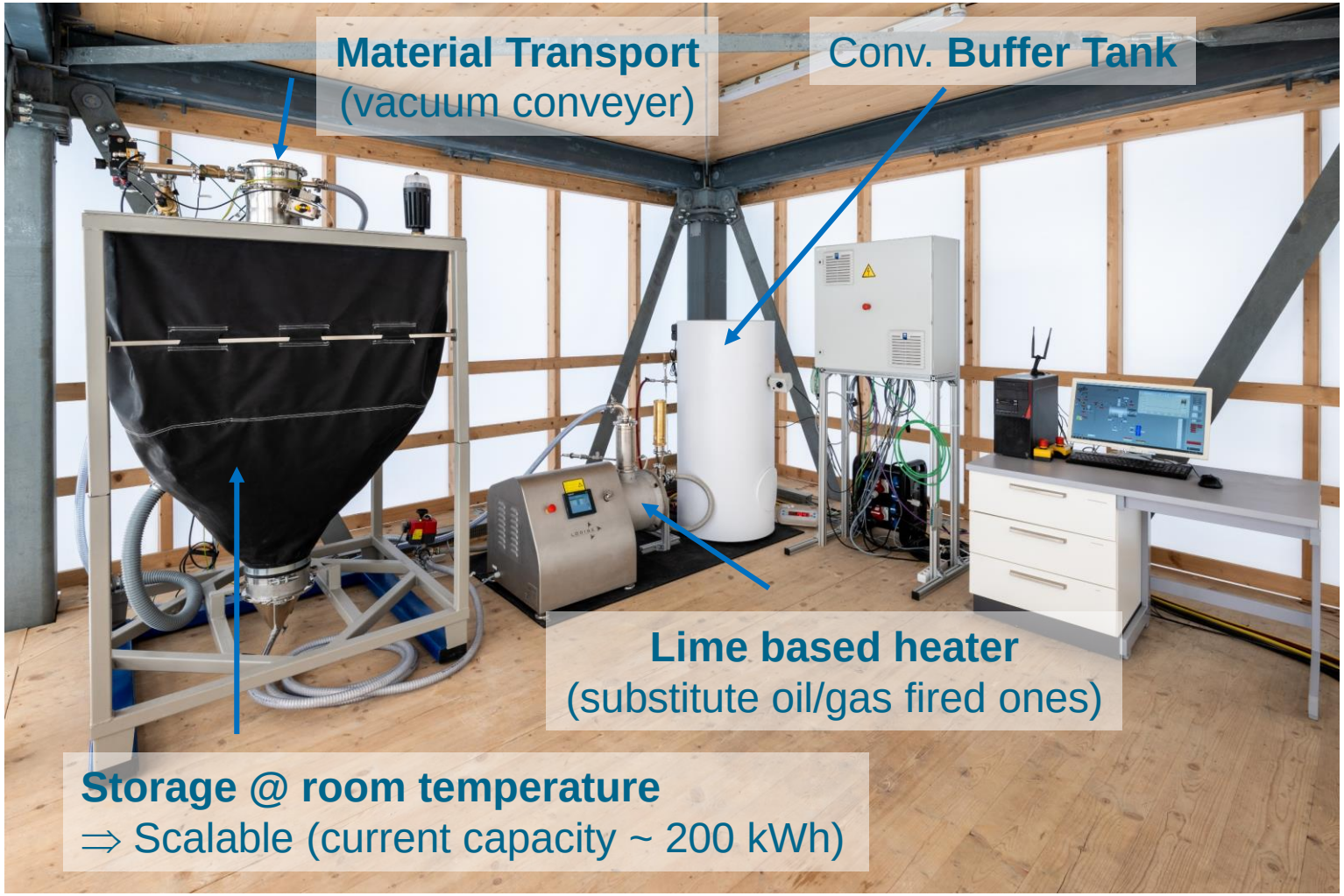


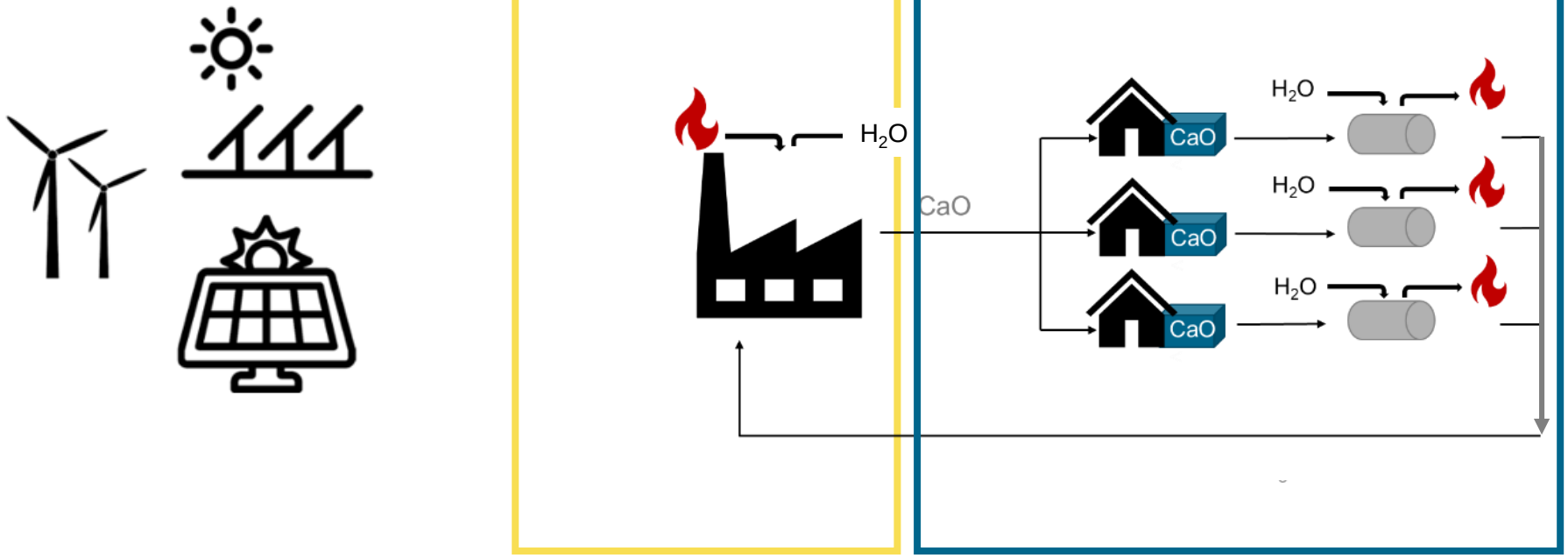
Energy Storage based on Quicklime and Water

Current Status



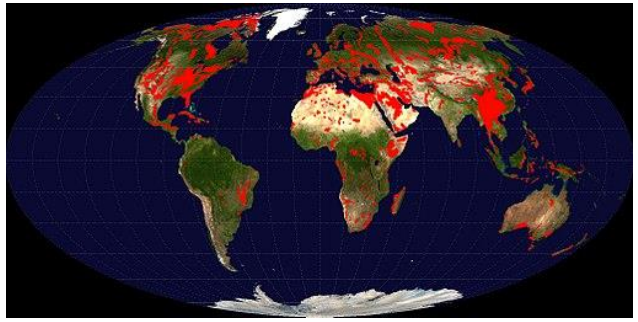
Energy Storage based on Quicklime and Water

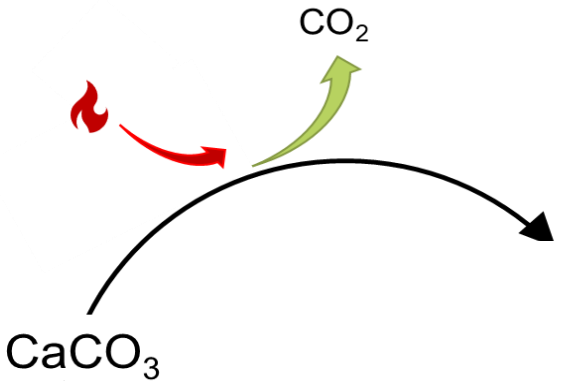
One potential concept



Carbon Capture?

How could that work?
Technical Lime Cycle





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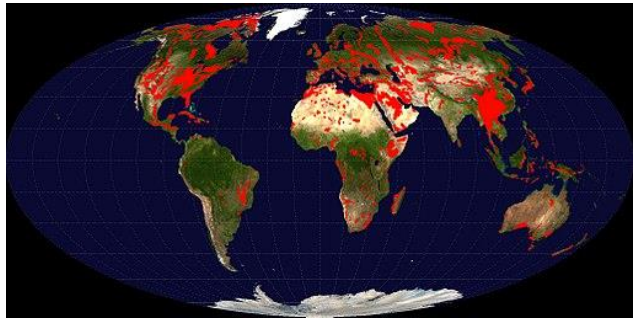

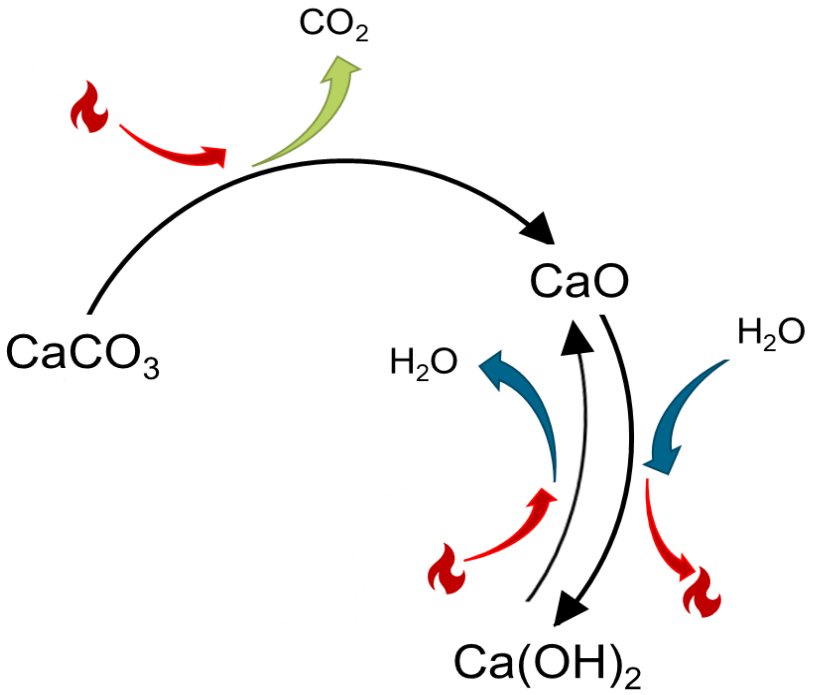

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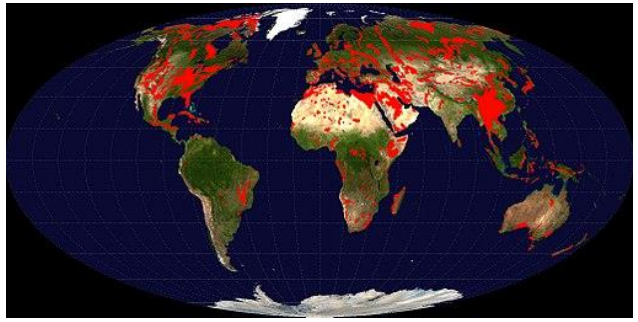
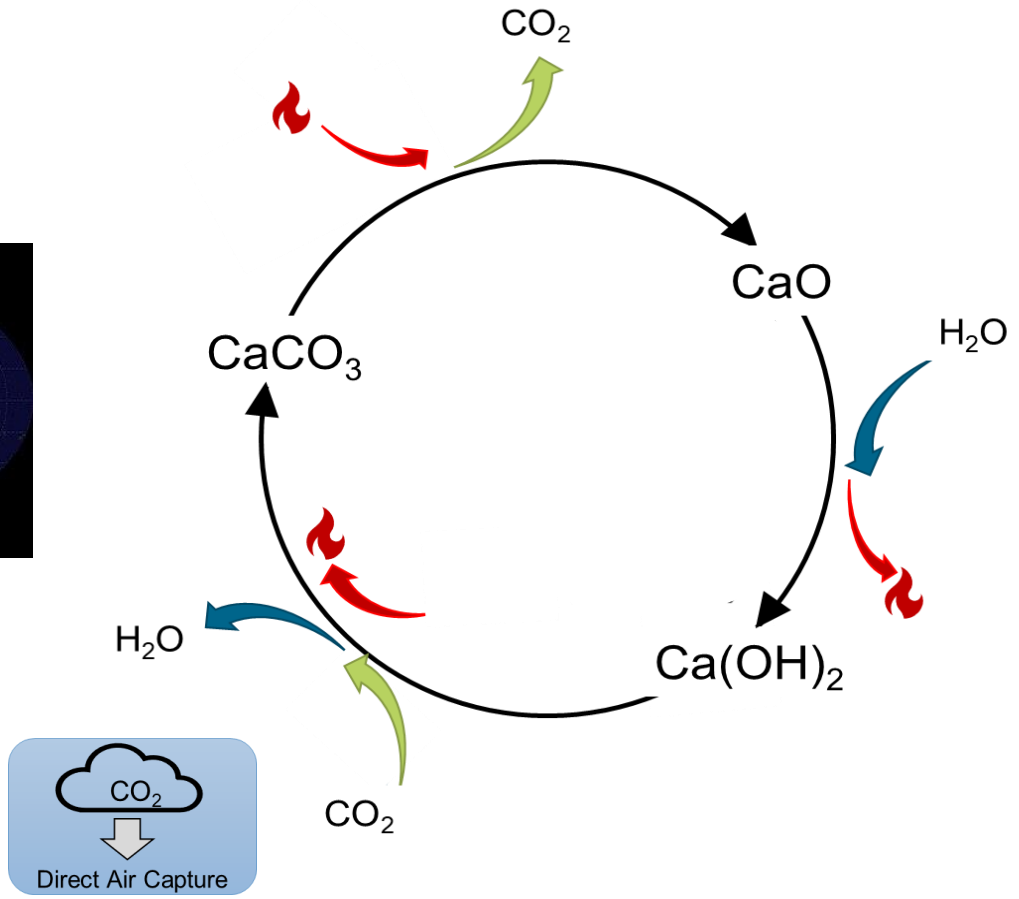
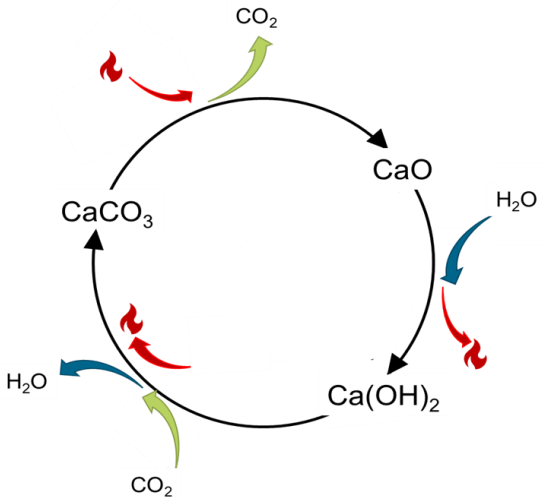
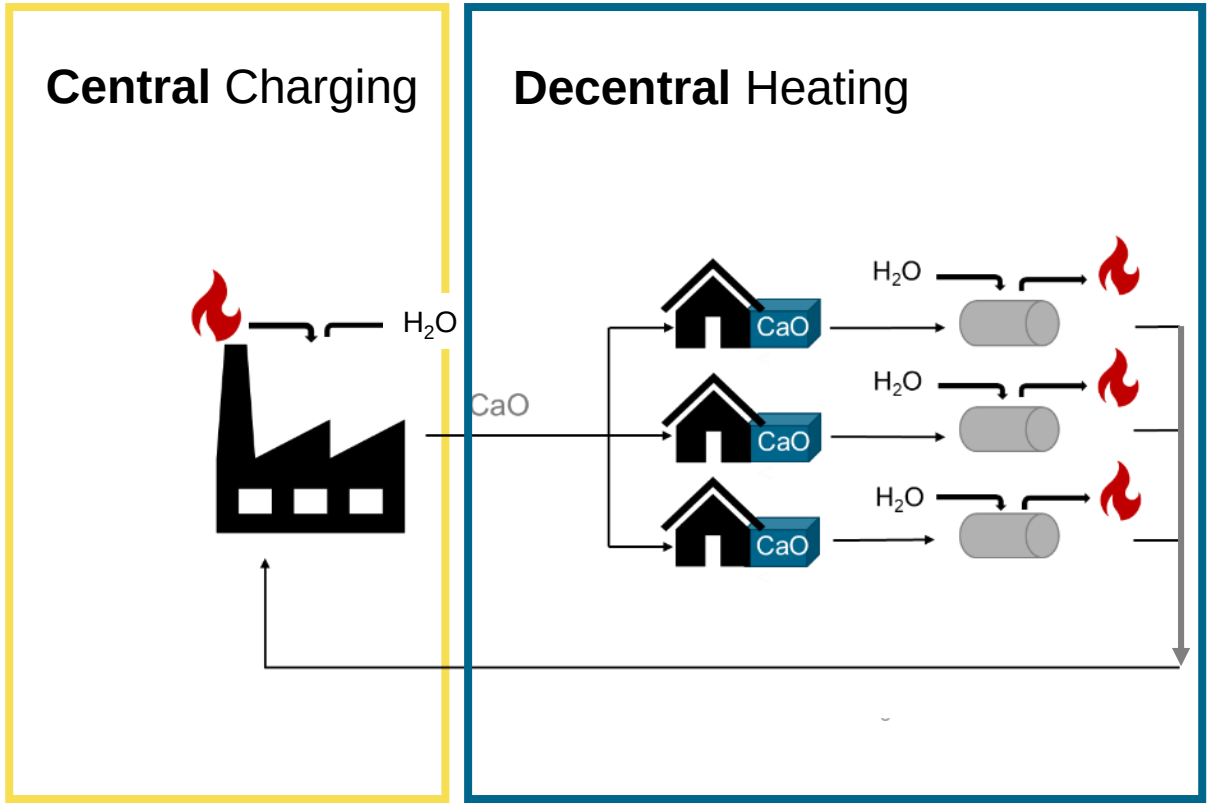




Carbon Capture and Heating





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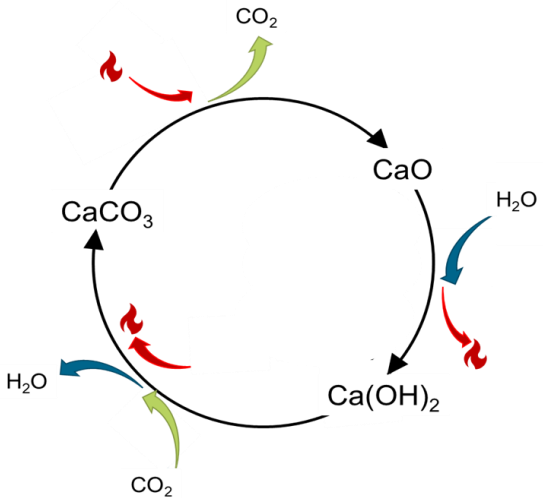

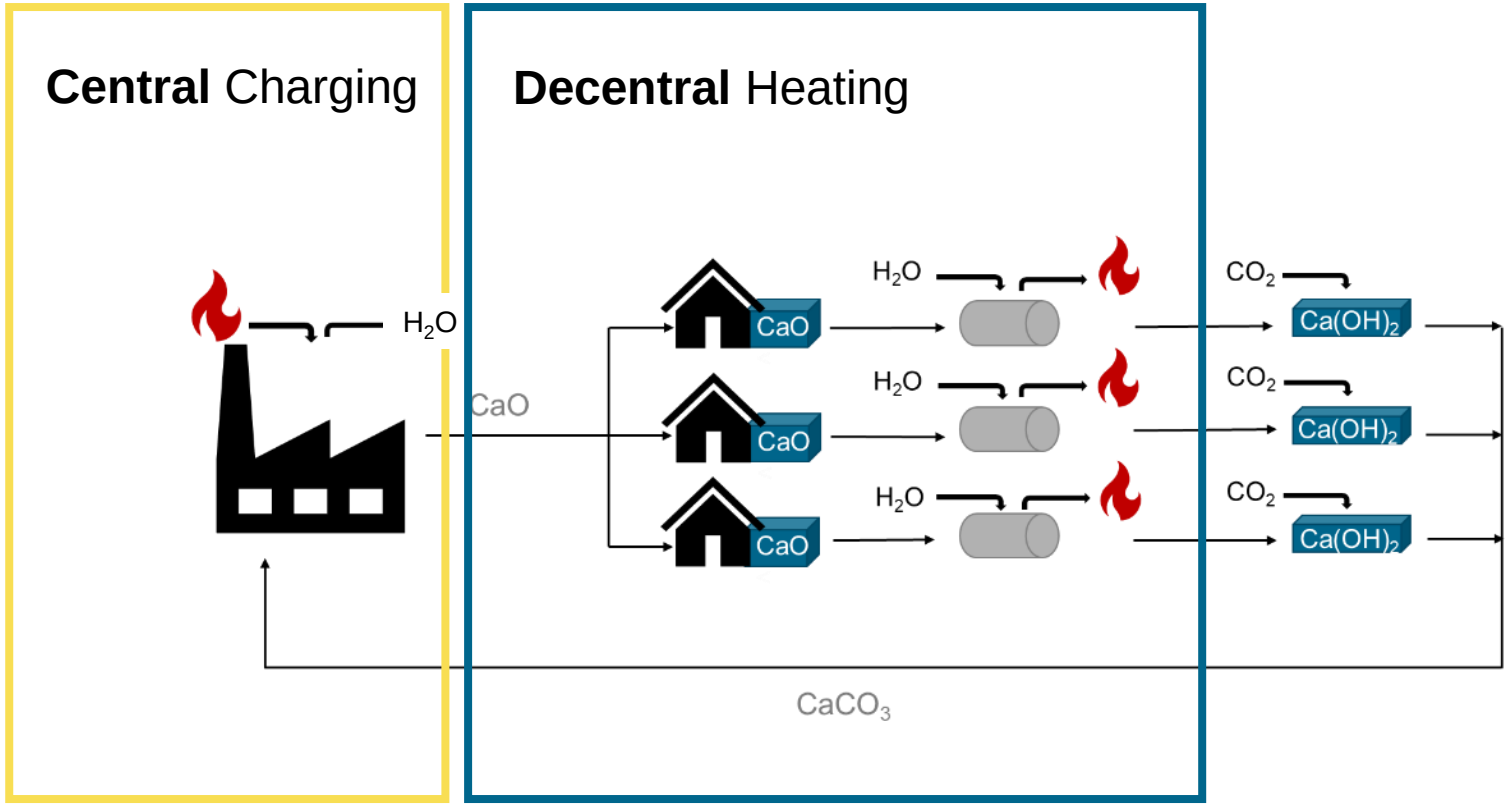

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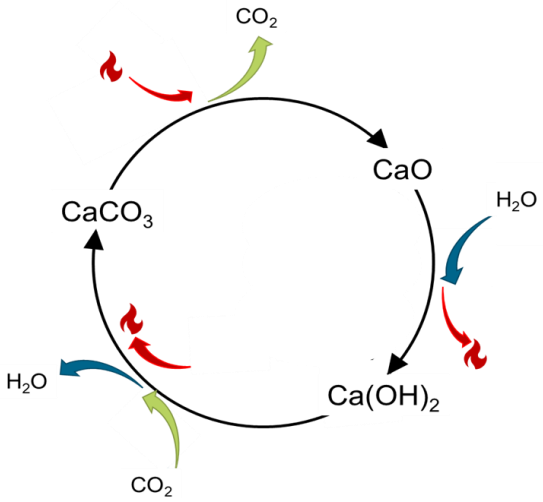
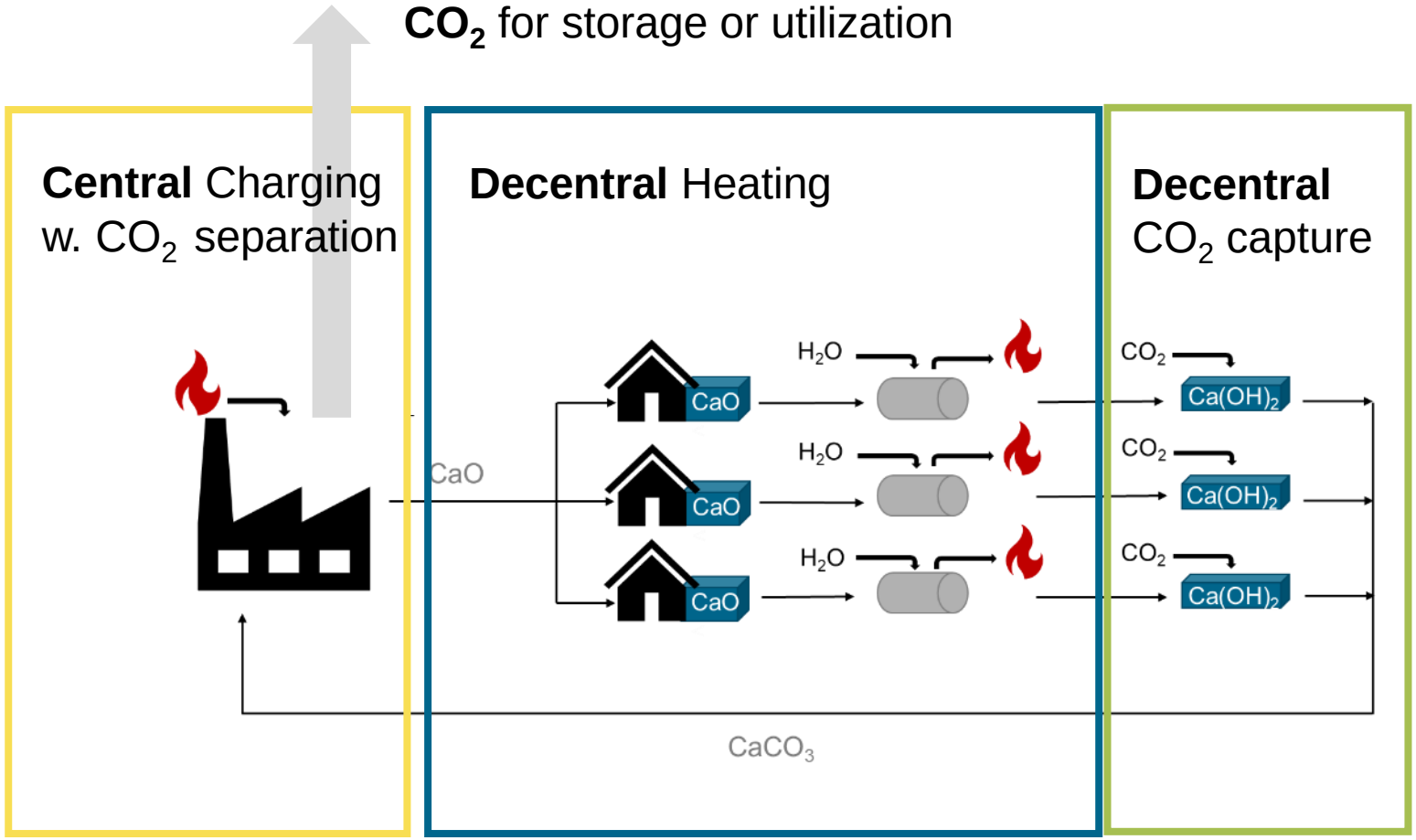
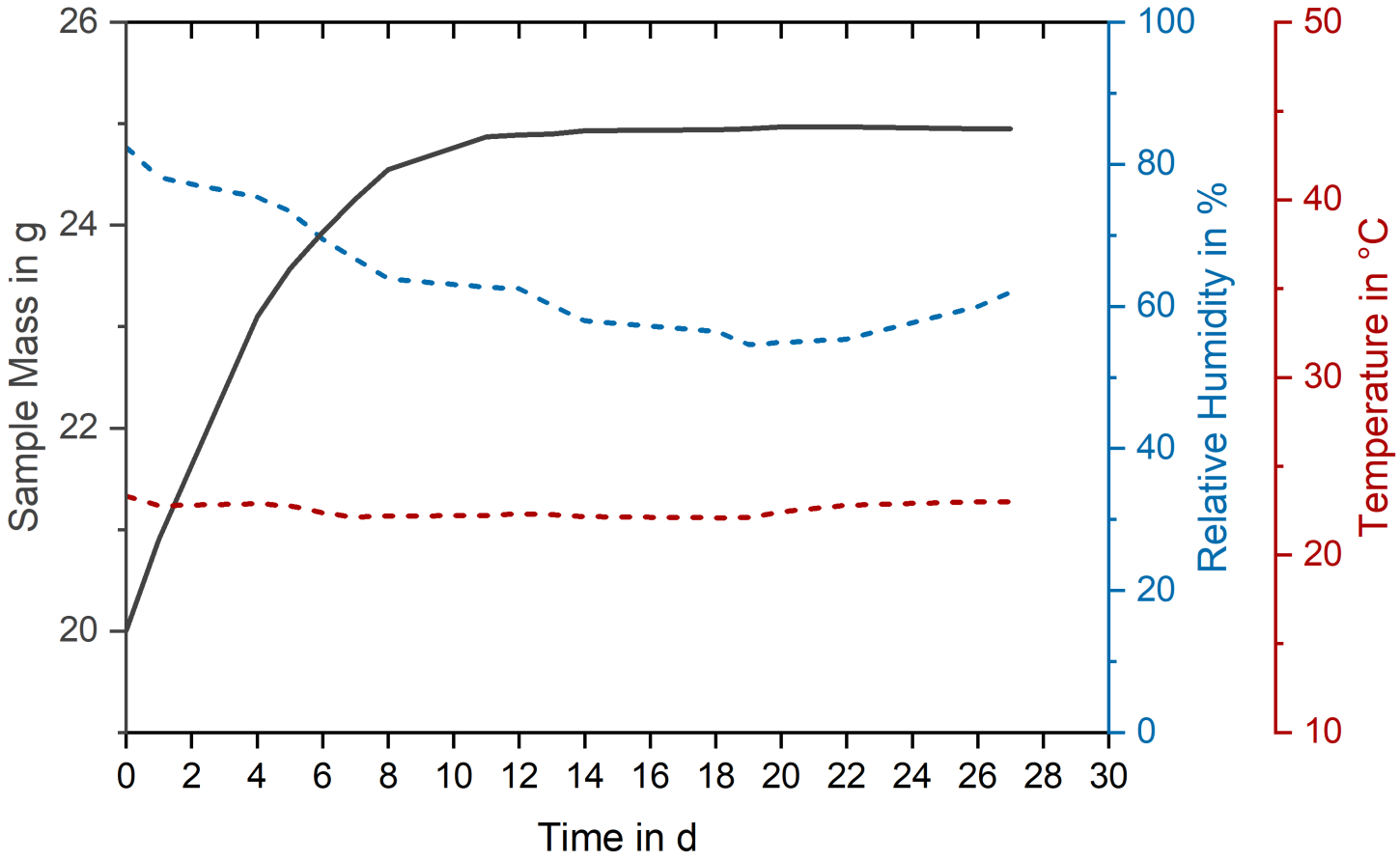


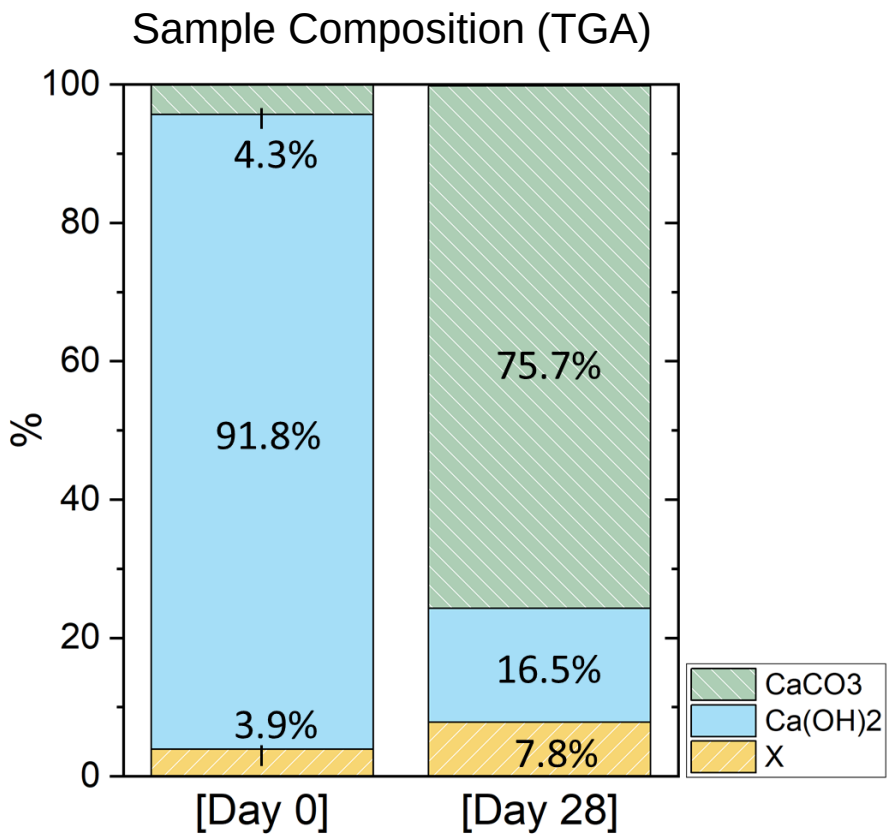


Preliminary Results

Carbonation Reaction in high humidity

Relative Humidity: 55-85%





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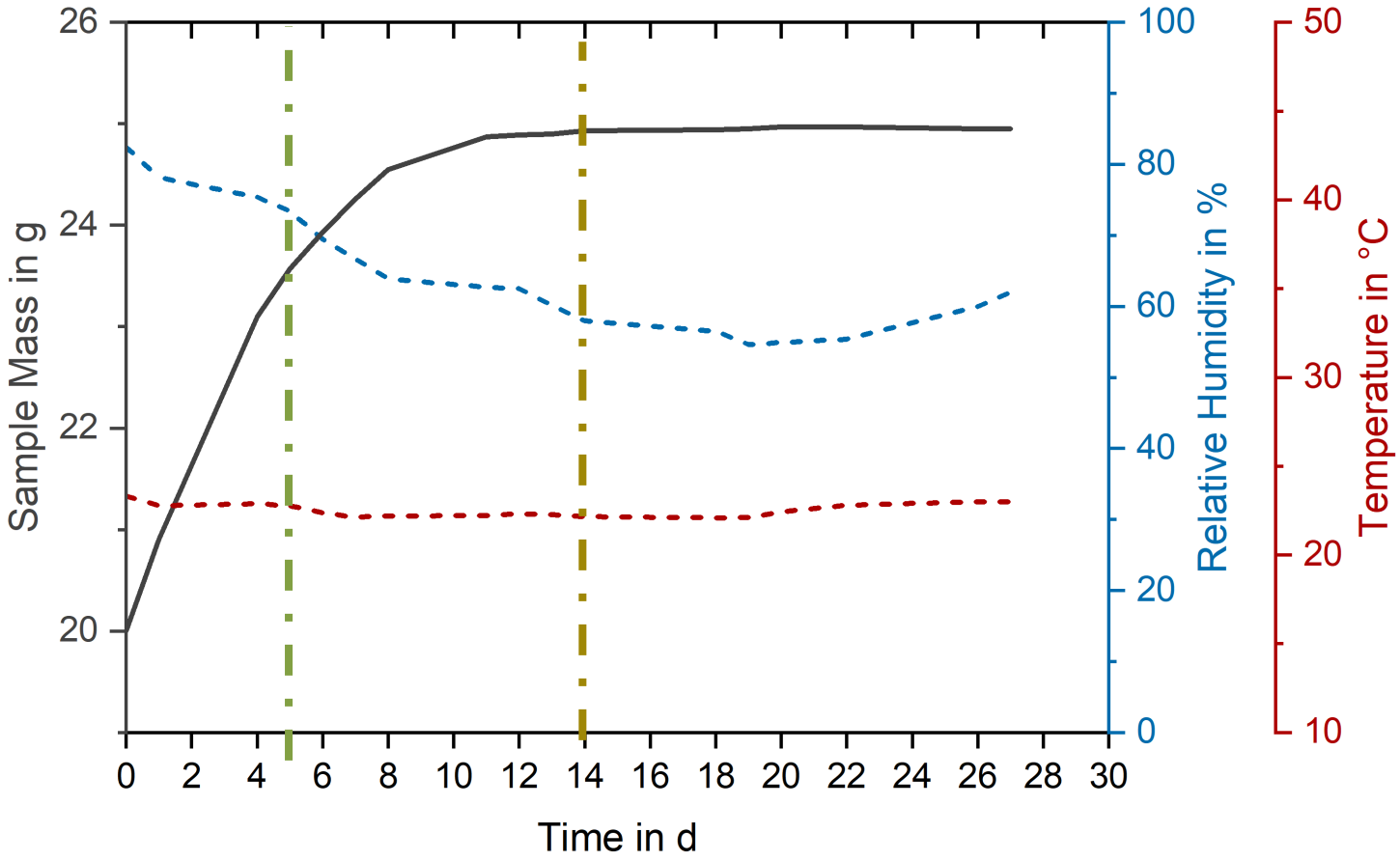
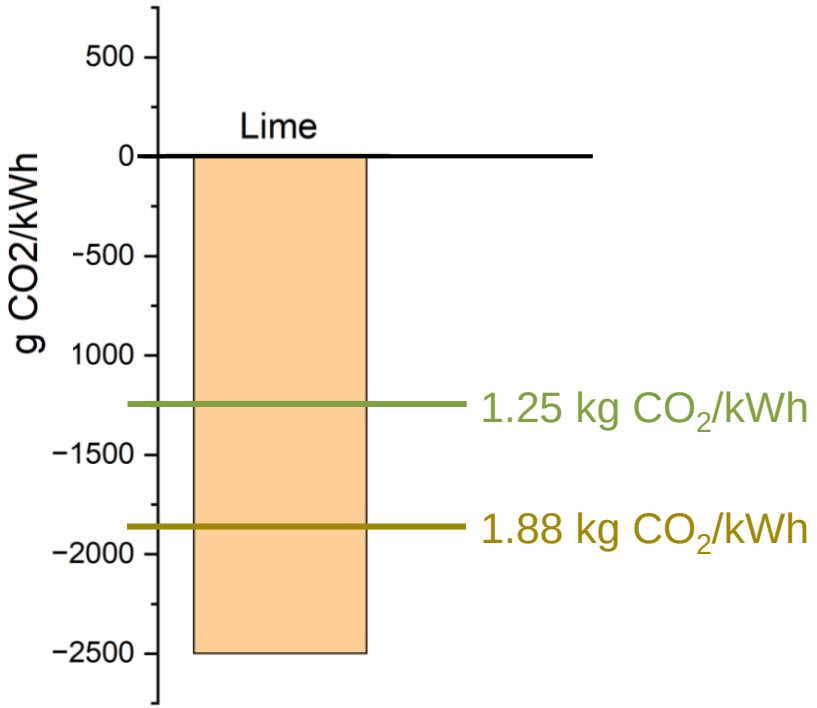
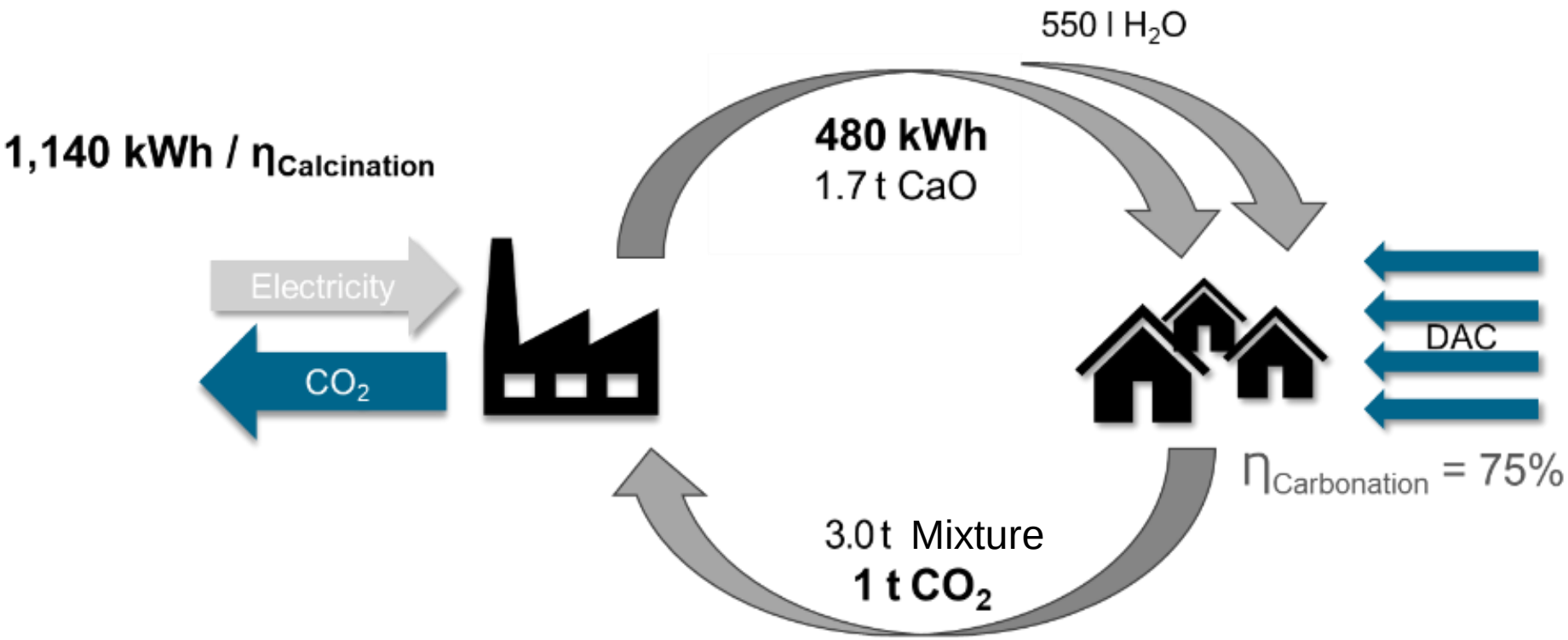


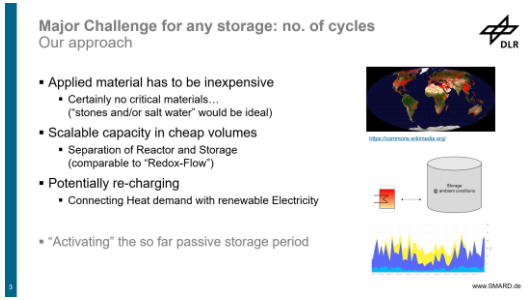


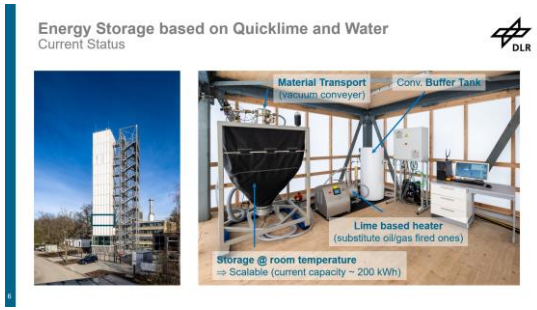
Conclusion (graphical)

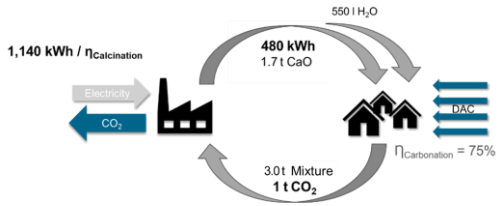


Summary

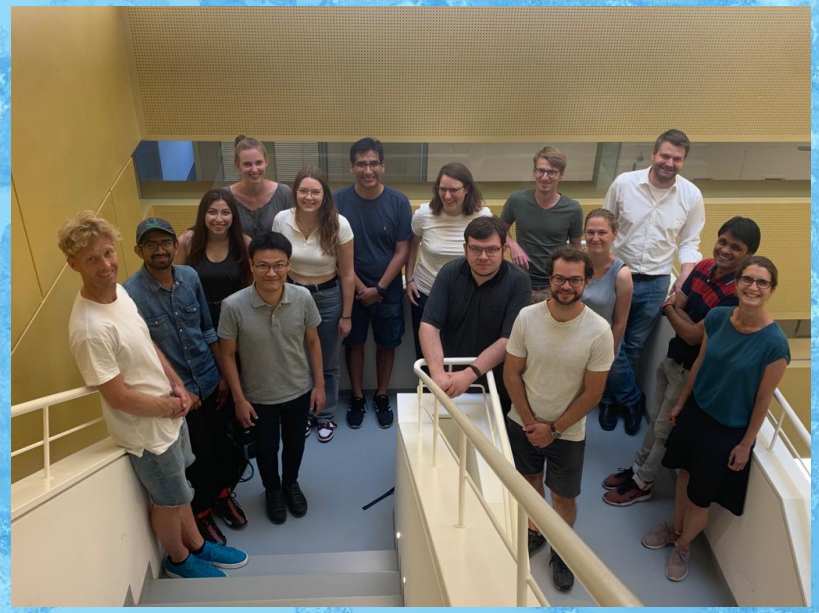
- Our approach for long-term storage
  - „stones and water“
  - separation of reactor and storage
  - „re-charging“
- Recent experimental set-up
- Double Storage Functionality (Energy and CO_2)







THANK YOU!



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