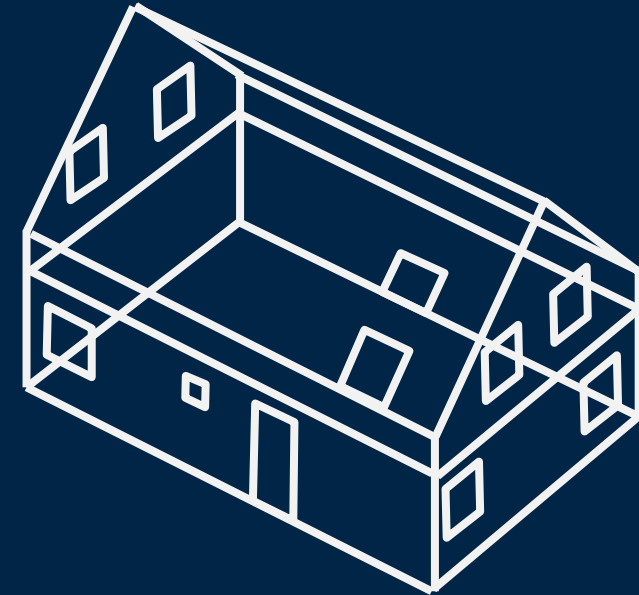
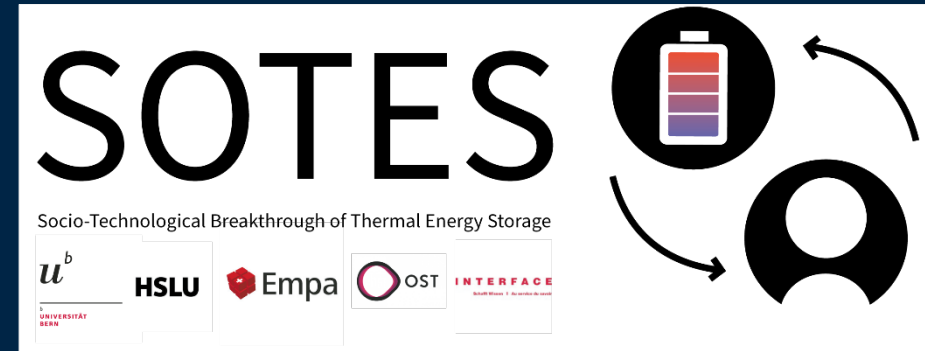


# SENSIBLE, LATENT OR THERMOCHEMICAL? THE SIGNIFICANCE OF STORAGE VOLUME VALUE



# WHAT IS THE COST OF VOLUME SAVING?

**Sensible (Water)**  
50 kWh/m<sup>3</sup>

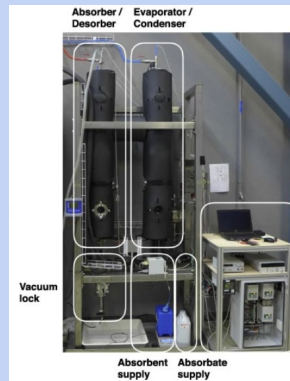
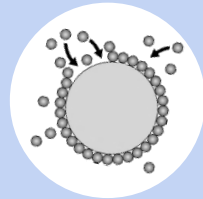


Source: Wikipedia

**Latent (PCM)**  
70-120 kWh/m<sup>3</sup>



**Thermochemical (sorption - sodium hydroxide and water)**  
300kWh/m<sup>3</sup>



Source: Heat transfer constraints and performance mapping of a closed liquid sorption heat storage process, B.Fumey et al. (10.1016/j.apenergy.2023.120755)

System design

**OPTIMIZATION**

System operation

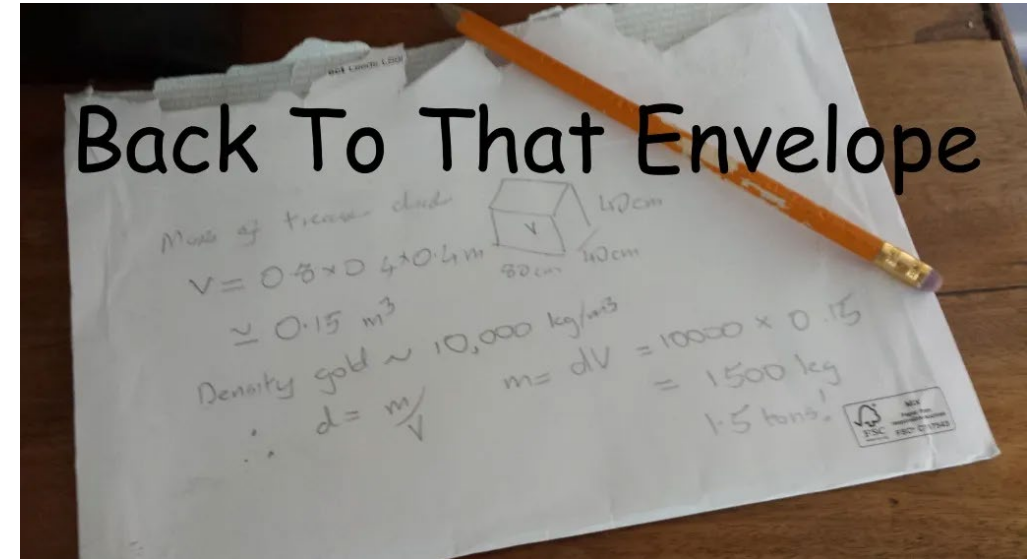
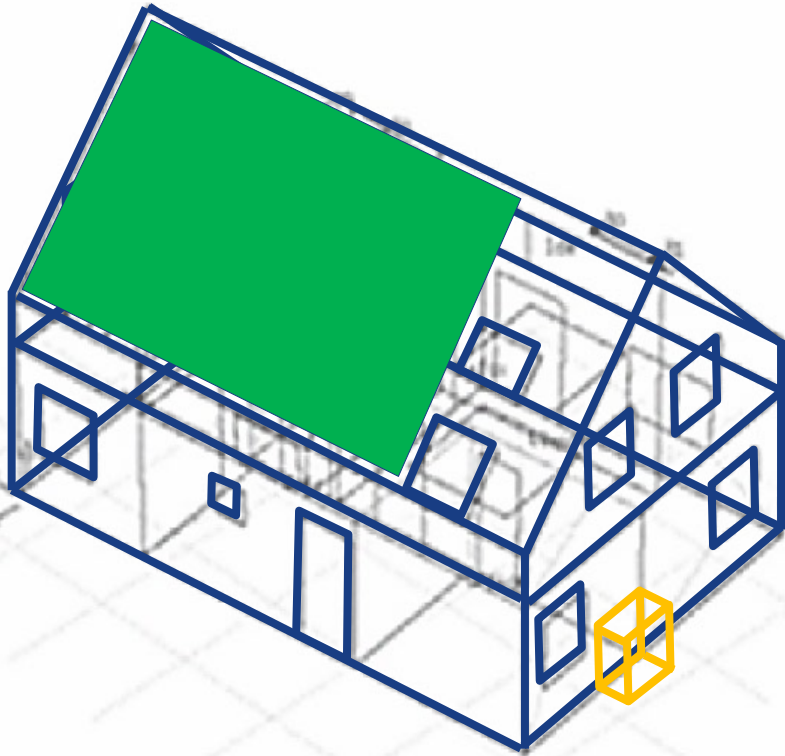


Image source: [medium.com/precarious-physicist/back-to-that-envelope-8d45de2e26a2](https://medium.com/precarious-physicist/back-to-that-envelope-8d45de2e26a2)

# SINGLE FAMILY HOUSE CASE-STUDY

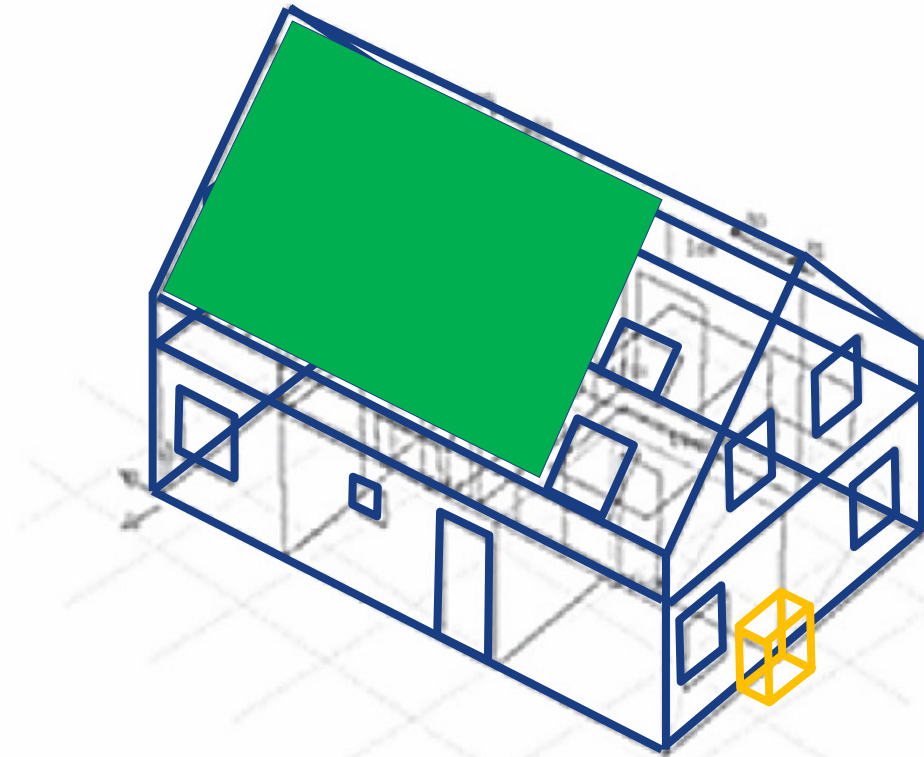


- 140 m<sup>2</sup>, on 2 floors
- 6340 kWh<sub>th</sub>/year for space heat (45 kWh/(m<sup>2</sup>·year))
- 2960 kWh<sub>el</sub>/year for appliances
- We don't consider hot water demand
- The house has underfloor heating, 35°C / 28°C

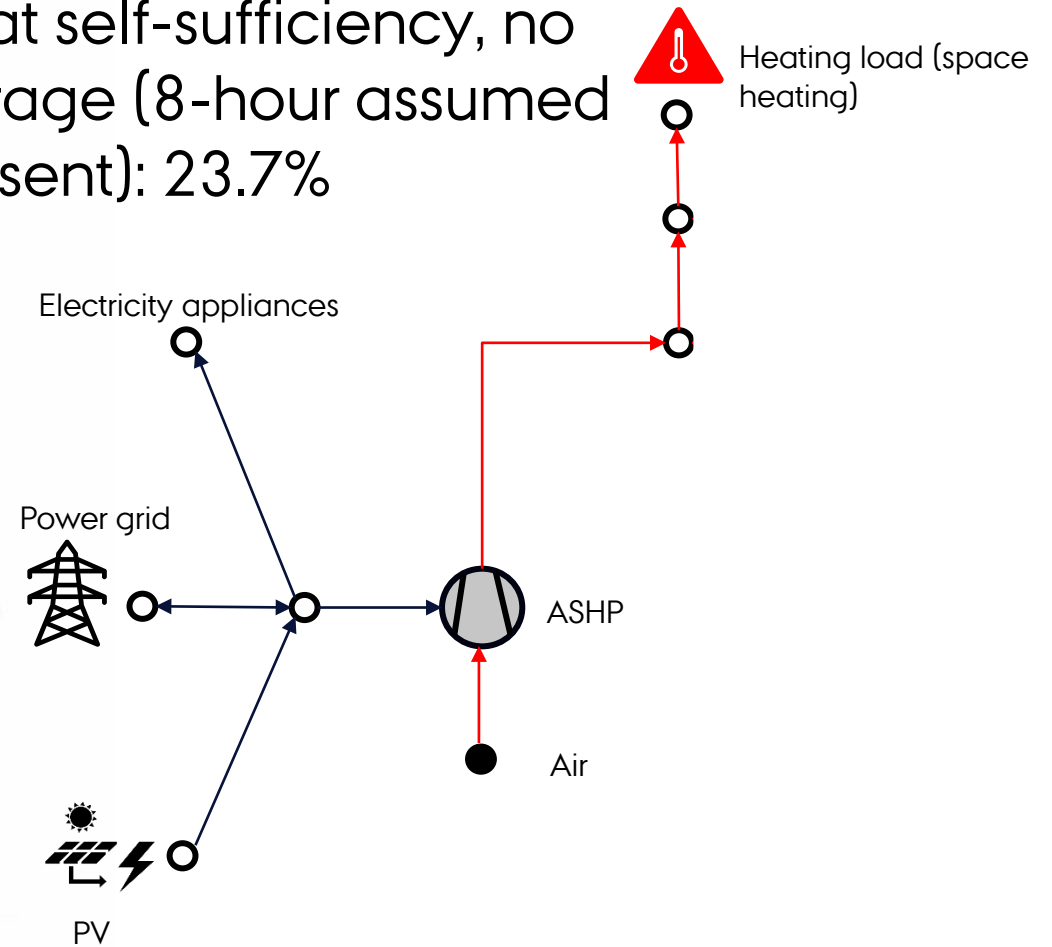
We assume

- we have 45 m<sup>2</sup> of PV installed, producing 9120 kWh<sub>el</sub>/year
- a heat pump generates the heat
- Any storage would be inside the house

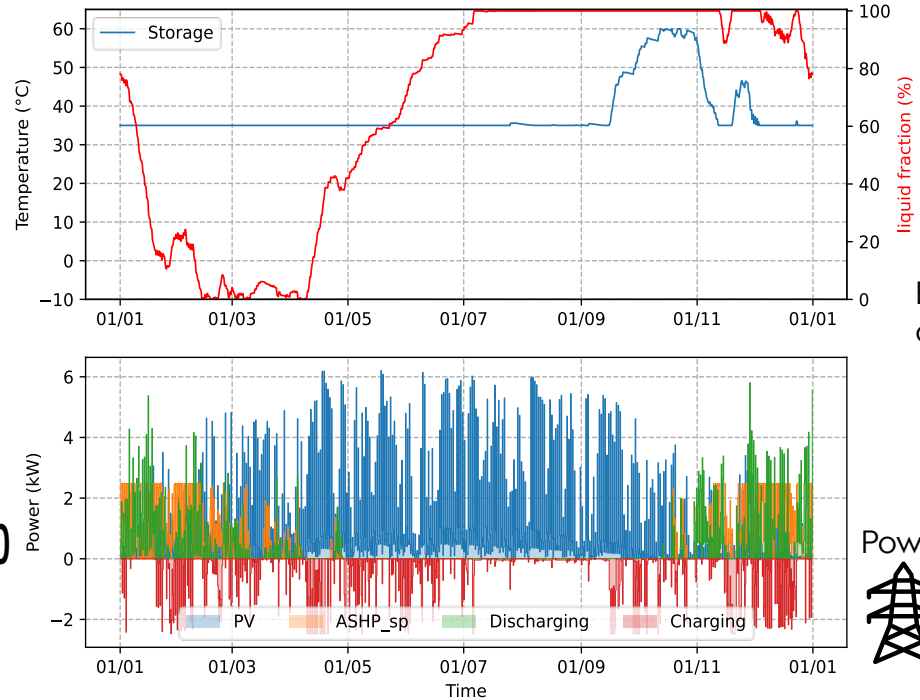
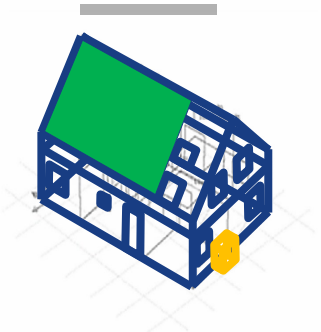
# BASE SYSTEM



Heat self-sufficiency, no storage (8-hour assumed present): 23.7%

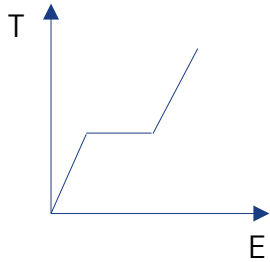
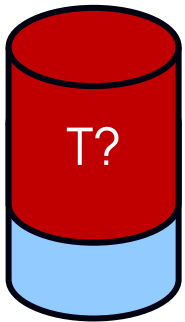


# SYSTEM WITH STORAGE

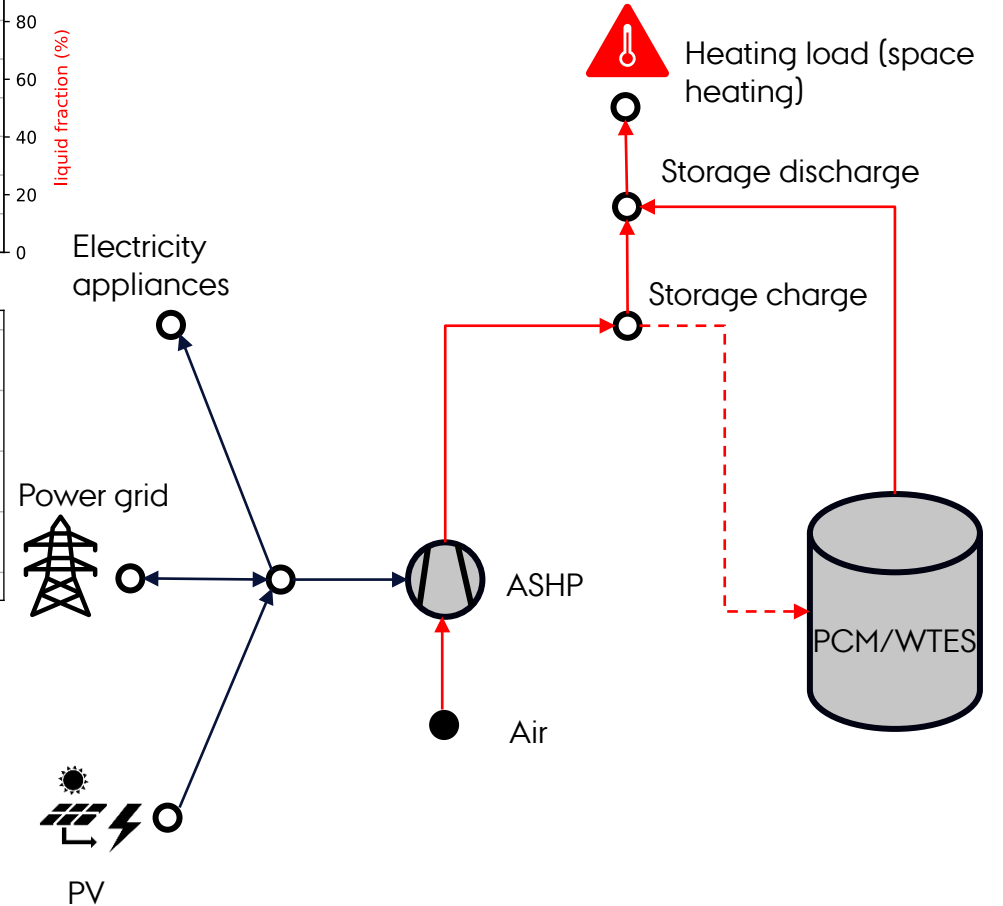


Sensible (Water)

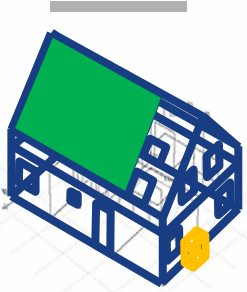
Latent (PCM)



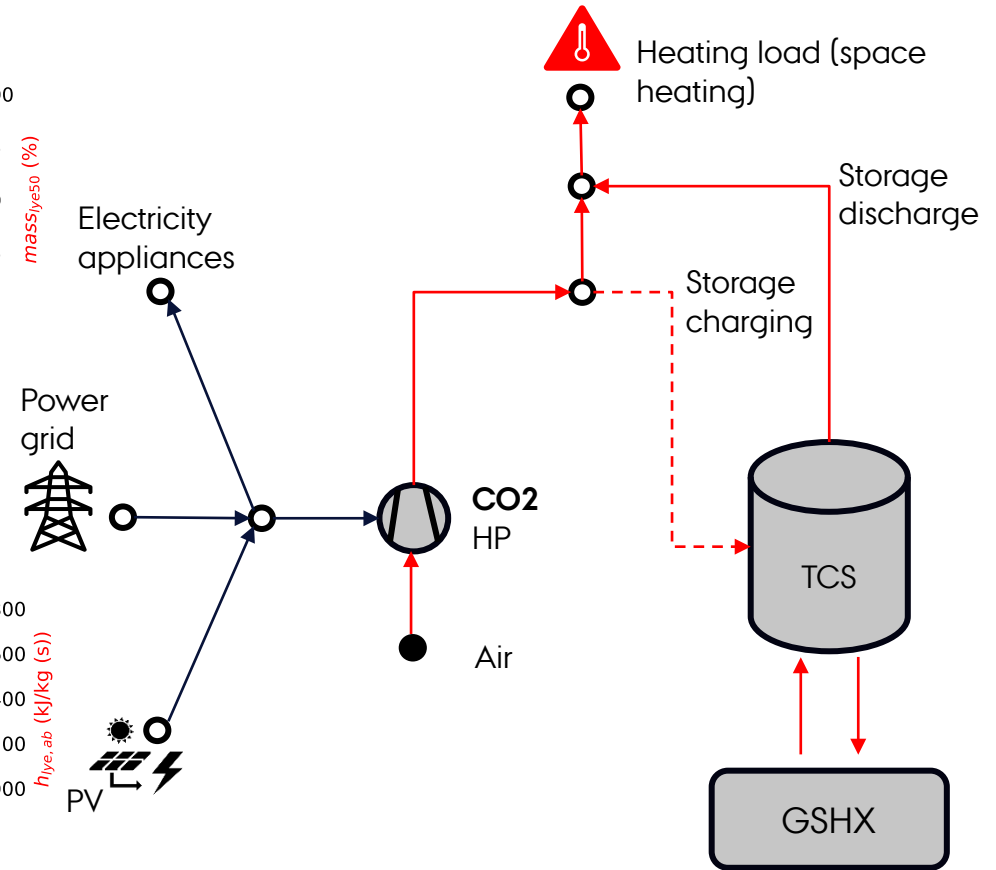
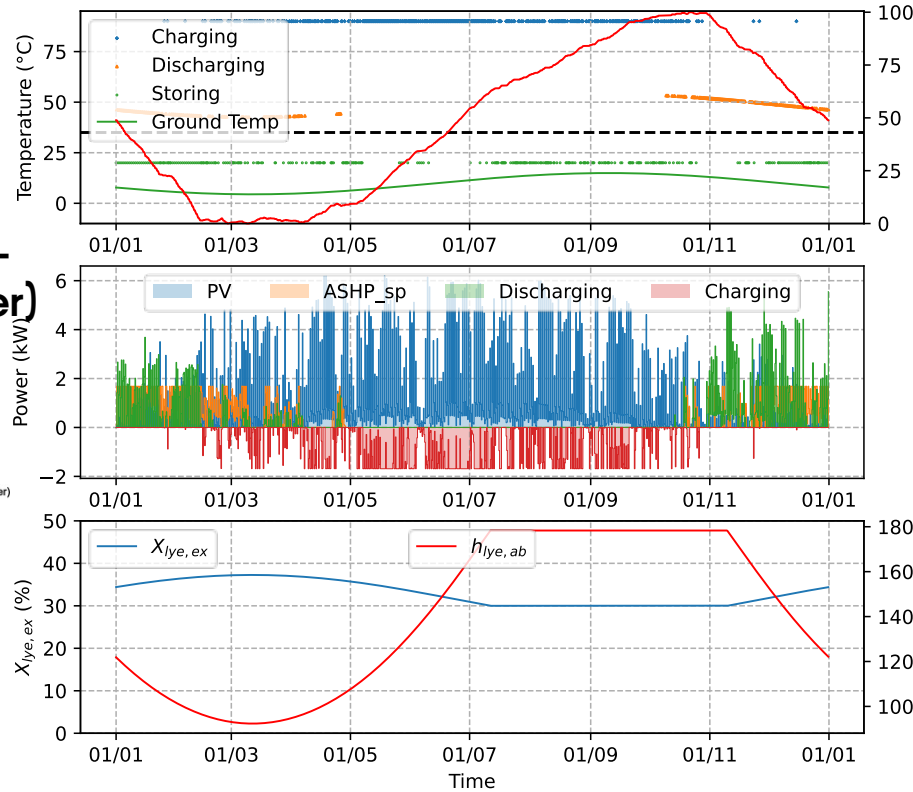
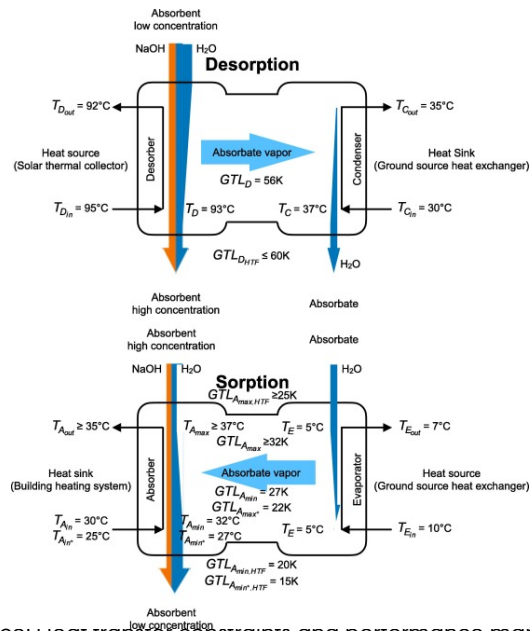
Tank cost + ~900 CHF/m<sup>3</sup>



# SYSTEM WITH STORAGE

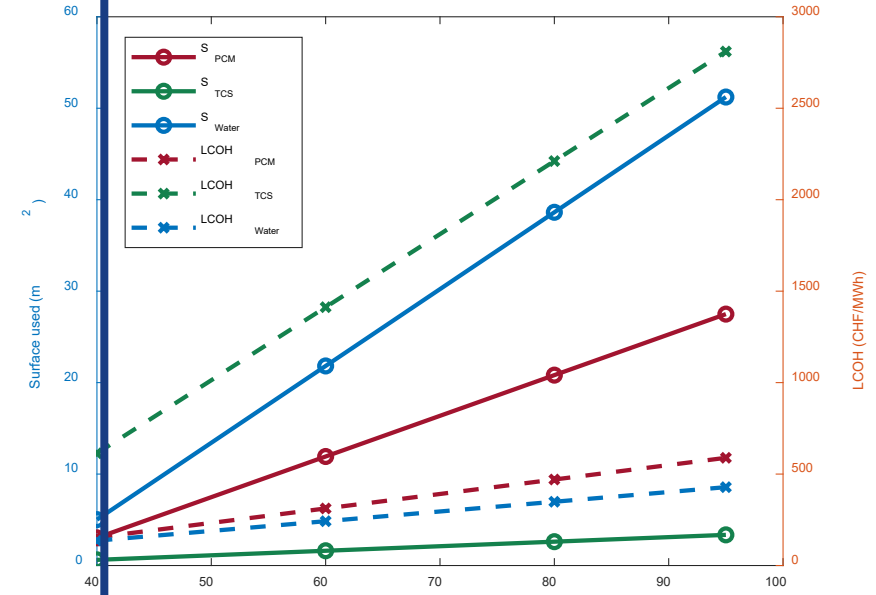
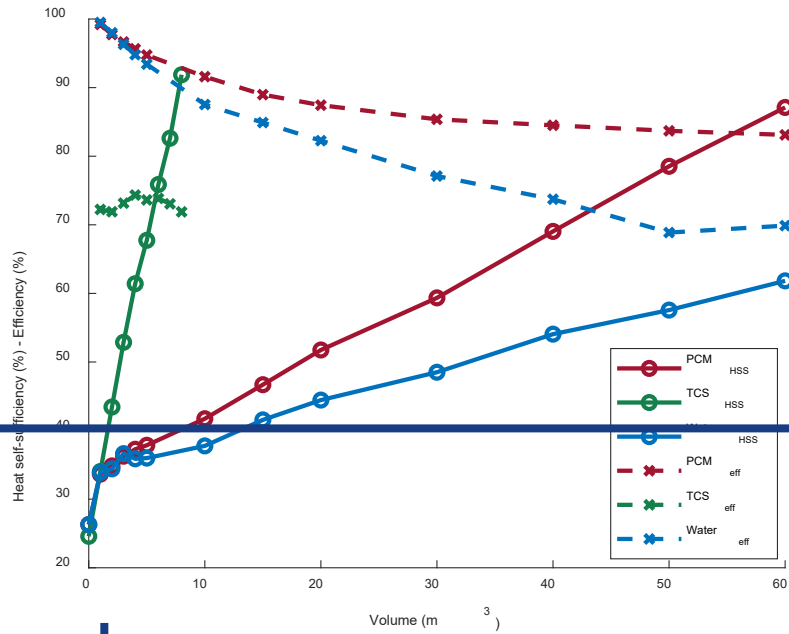


## Thermochemical (sorption - sodium hydroxide and water)

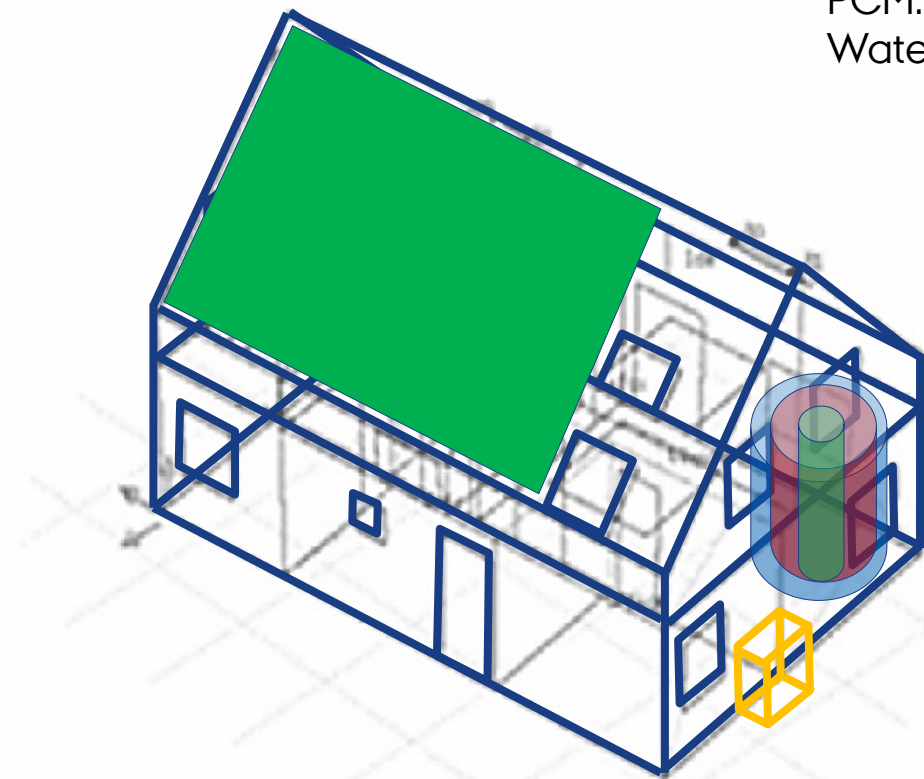


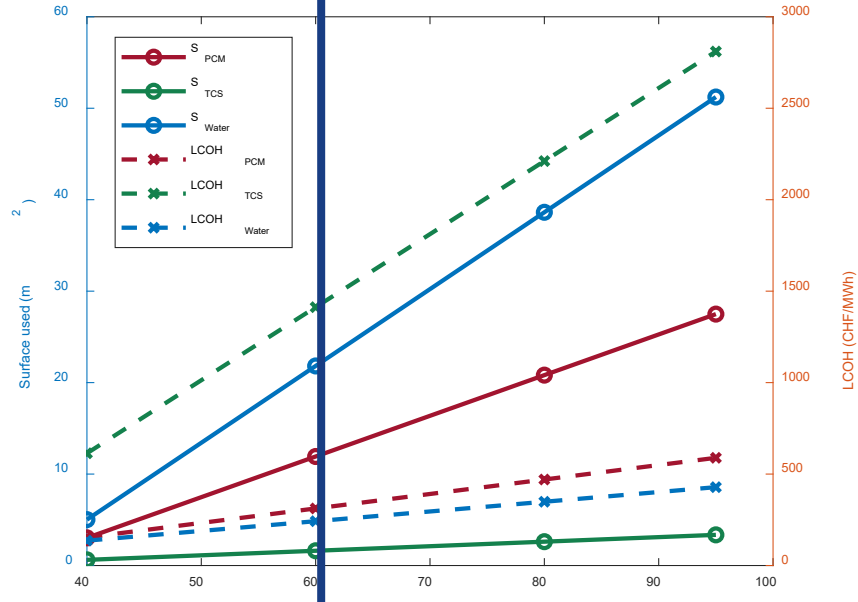
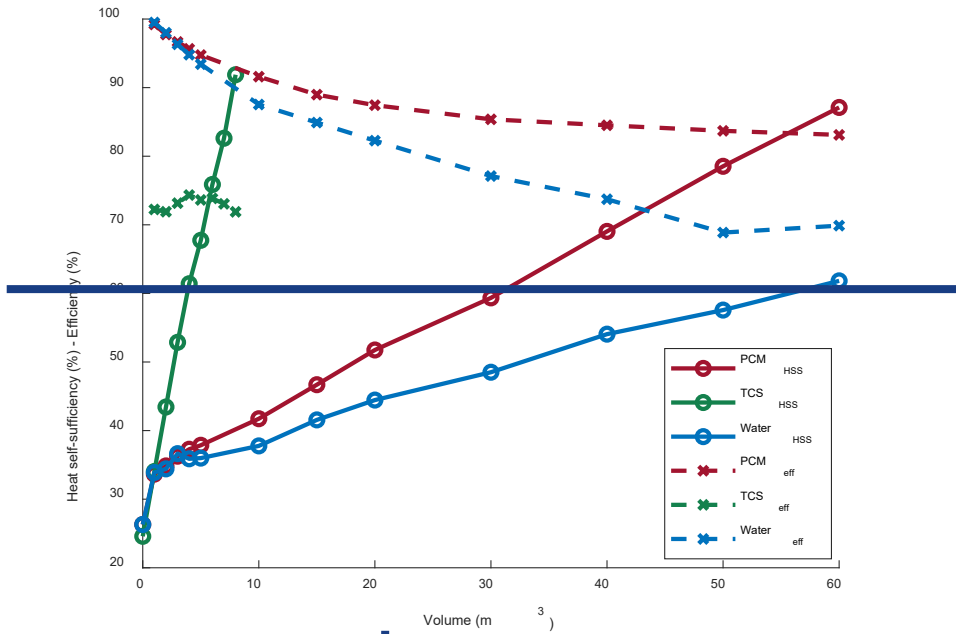
Source: heat transfer constraints and performance mapping of a closed liquid sorption heat storage process, B.Fumey et al. (10.1016/j.apenergy.2023.120755)

~14167 CHF/kW (system TRL8/9) + 5000 CHF/kW (GHX)

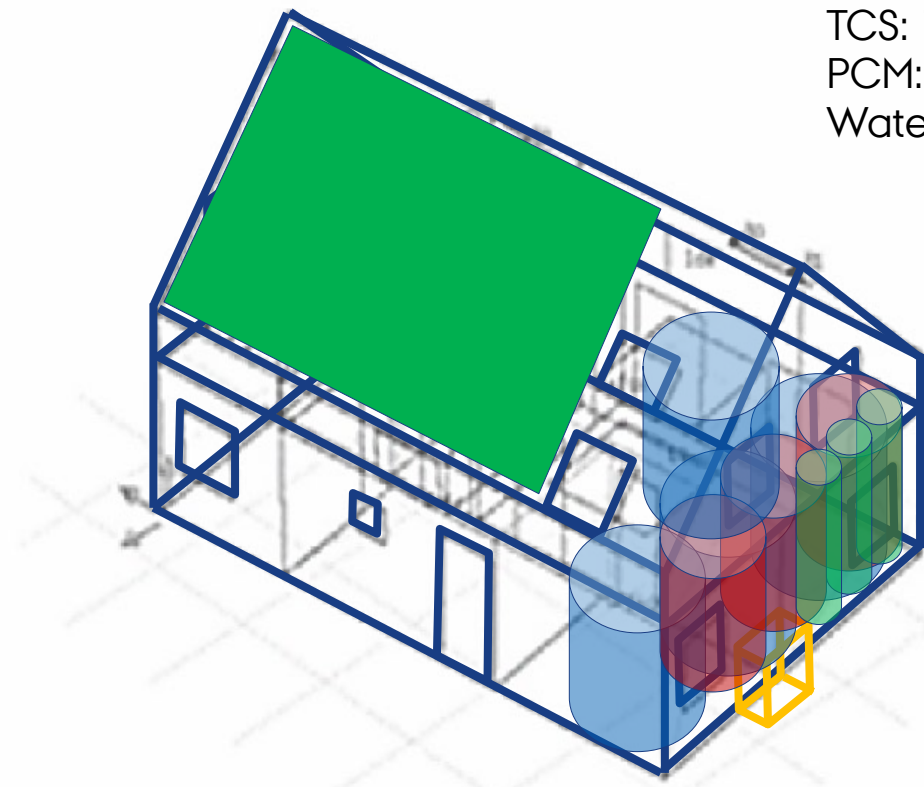


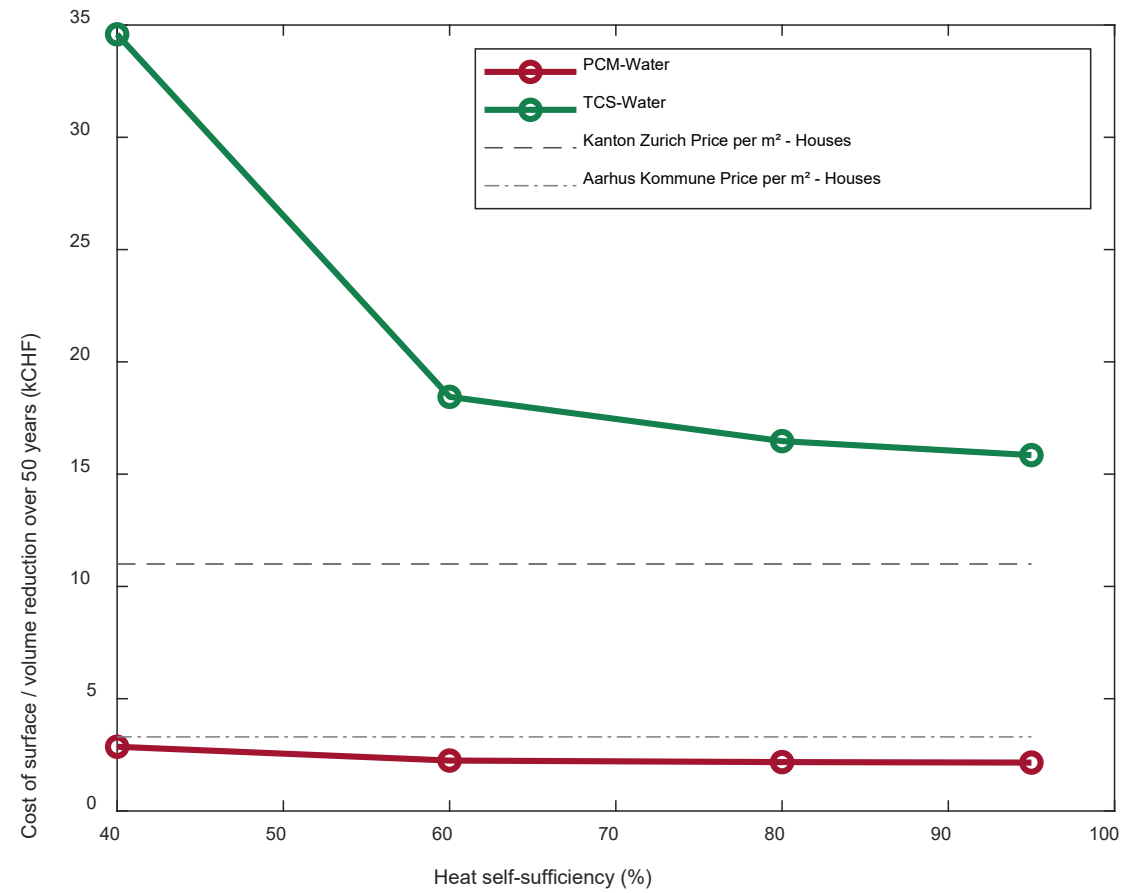
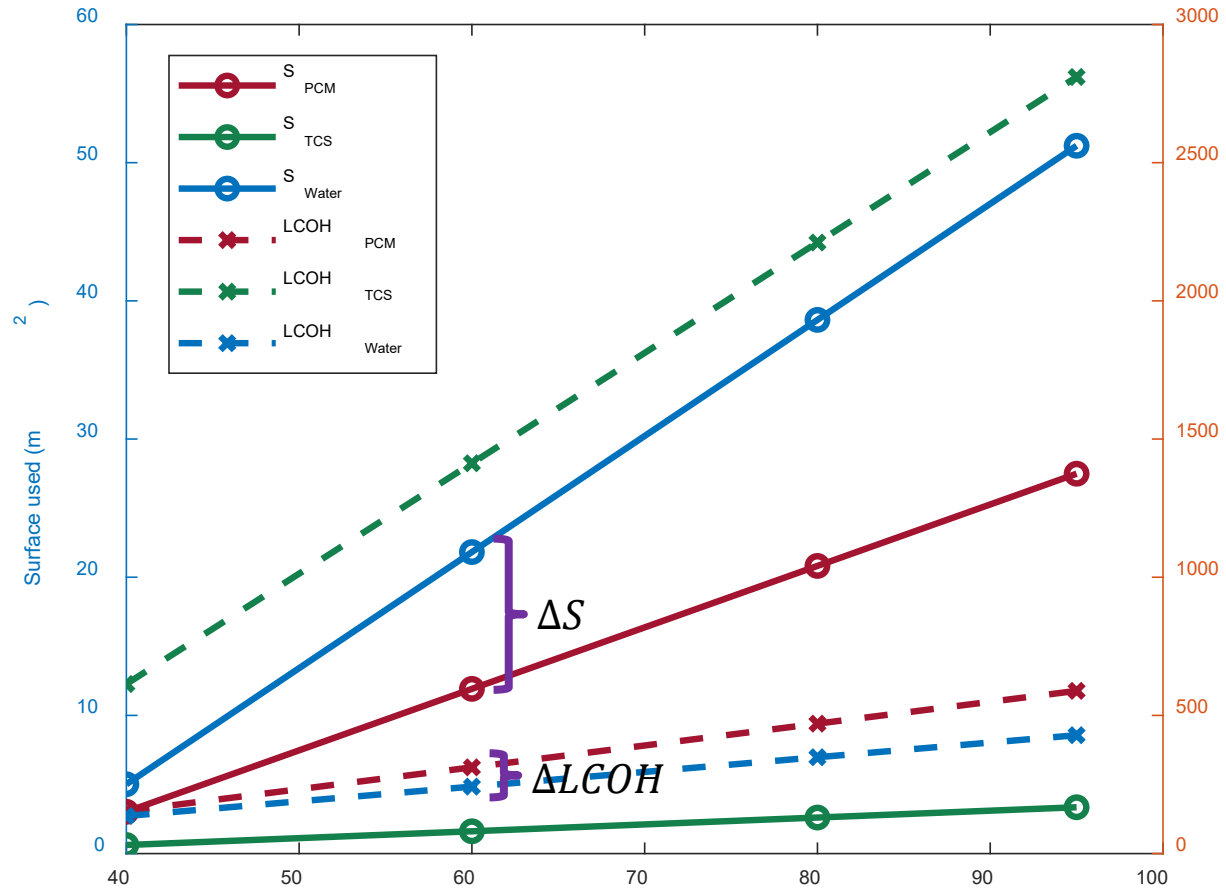
40% self-sufficiency  
 TCS: 0.62 m<sup>2</sup>  
 PCM: 3.02 m<sup>2</sup>  
 Water: 5.02 m<sup>2</sup>





60% self-sufficiency  
 TCS: 1.61 m<sup>2</sup>  
 PCM: 11.92 m<sup>2</sup>  
 Water: 21.82 m<sup>2</sup>







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