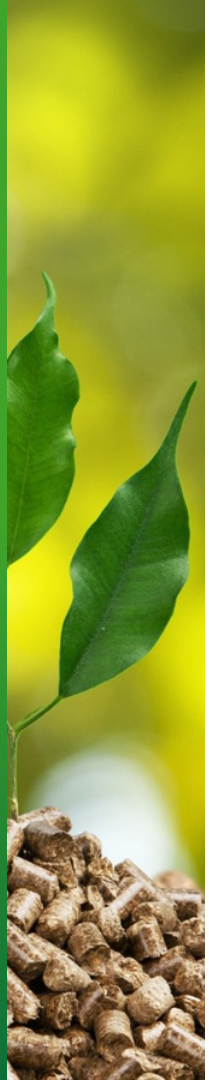


Individual heat management in the living room

BEST Day – Central European Biomass conference
22. Jänner 2020

DI Manuel Schwabl

Graz, 22.01.2020

Definition of comfort

Individual human.

Activity, clothing, personnel preferences and behaviour

picture: www.austroflamm.com

Air.

Temperature, velocity, humidity

Radiation.

Surface temperature, heat radiation, short wavelength radiation

Requirements for heat management

User specific

System adaptive

time and spatial flexible

Heat management for firewood room heaters

- **Radiation** via the front glass fastly dissipates heat released by the flames. The heat may be varied by coadings, appertures or by innovative electric shutters
- **Convection** allows spatial distribution of heat, the release occurs slightly time delayed. The heat released is depending on dimensioning of heat exchangers.
- **Heat storage** accumulates the heat and release it at a different time. Heat storage capacity, heat conductivity and mass of the storage material influence the amount and duration of stored heat.
- New **smart** prediction models and decision making support allow the user define mass of firewood and time for ignition to optimally adapt for their current needs.

Heat storage

sensible.

Heat is stored in the thermodynamical movement of molecules. The higher the temperature of the material, the higher is the stored energy.

latent.

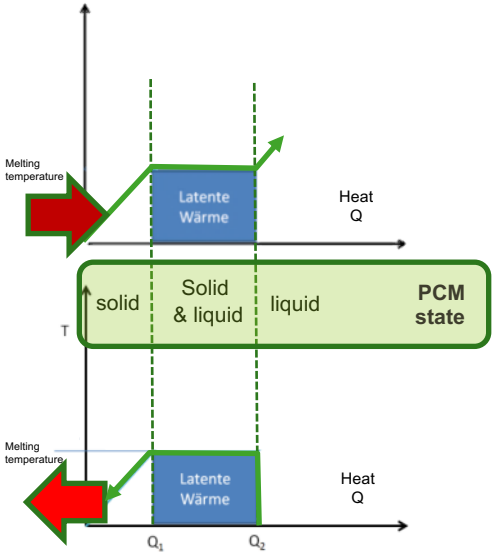
Heat is used to induce a phase change of a material. E.g. from solid to liquid or from liquid to gaseous. The heat storage occurs at a constant temperature level.

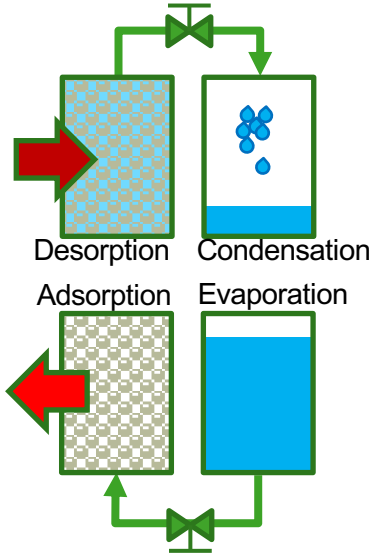
thermochemical.

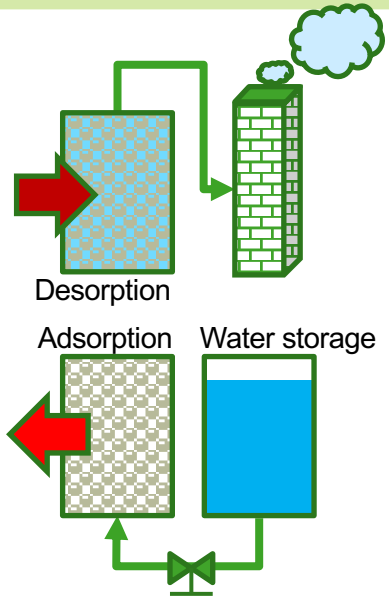
Heat is stored in a reversible chemical reaction. As for example is the combination of zeolith and water. Water is absorbed on the surface and heat is released. When the zeolith is heated up, the water is desorbed again and the storage is ready for a new cycle.

Heat storage release at the push of a button

Phase change material.	Closed sorption storage.	Open sorption storage.





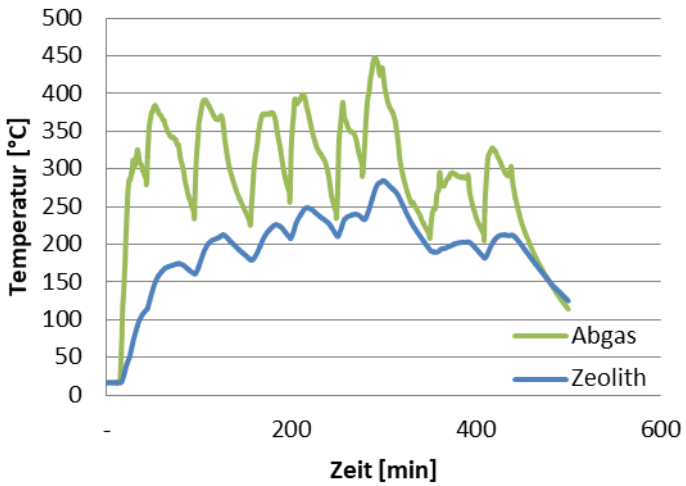


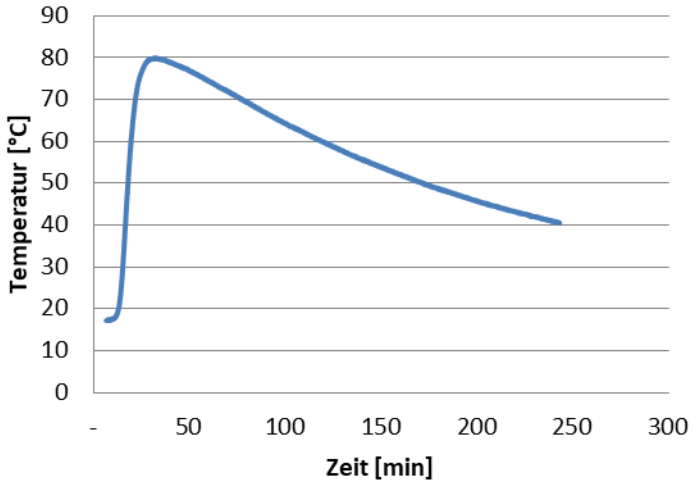
Heat storage release at the push of a button

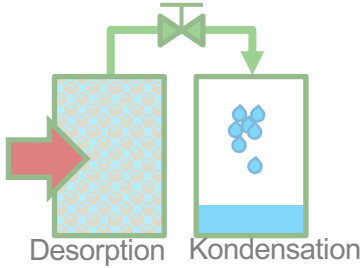
Phase change material.	Closed sorption storage.	Open sorption storage.
Energy density		
Up to 120 Wh/dm³	Up to 200-500 Wh/dm³	Up to 75 Wh/dm³
Working temperature (storage– release)		
Max. 120 °C / 50-70°C	Up to 300 °C / Up to 100°C	
Heat release process		
Uppon push of a button	adjustable	
Heat storage process		
No stop until all PCM is molten	Variable and accumulative	

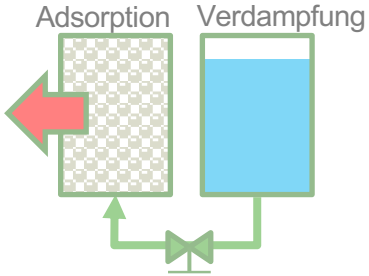
Closed sorption storage

test appliance for release and storage process



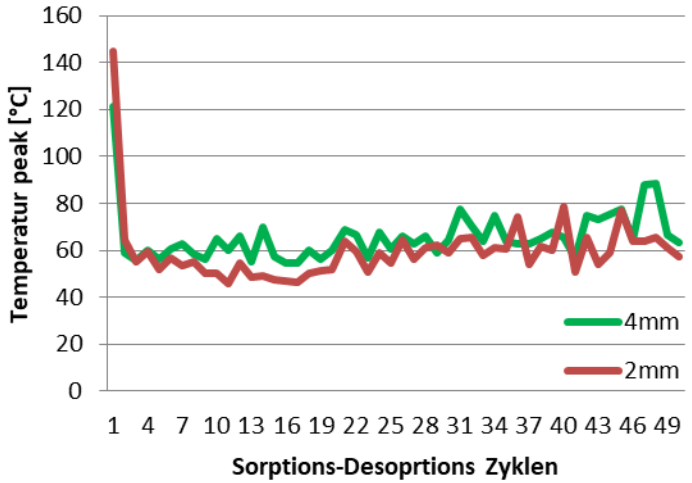


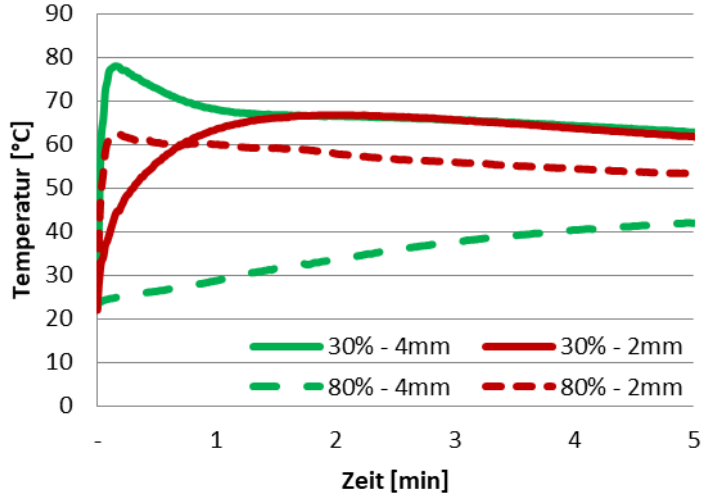


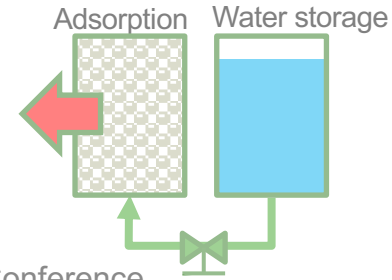


Open sorption storage

Laboratory-Tests with 2 differen Zeolith-sizes







Conclusions

- Innovative technologies for heat storage allow **time independent and fast responding** heat release

- Efficient heating needs an **effective heat management**
- Heat management describes the **adaptive heat release** on the individual heat demands

Thanks for your attention.

Manuel Schwabl
manuel.schwabl@best-research.eu

AUSTRO FLAMM

FFG
COMET Competence Centers for Excellent Technologies
Bundesministerium Digitalisierung und Wirtschaftsstandort
Bundesministerium Verkehr, Innovation und Technologie
wirtschaftsagentur wien Ein Fonds der Stadt Wien
Das Land Steiermark
SFG NEUES DENKEN. NEUES FÖRDERN.