

The Role of Thermal Energy Storage in our Future Energy System

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Thermal Energy Storage - Technologies

Thermal Energy Storage Technologies

- Storage of Sensible Heat



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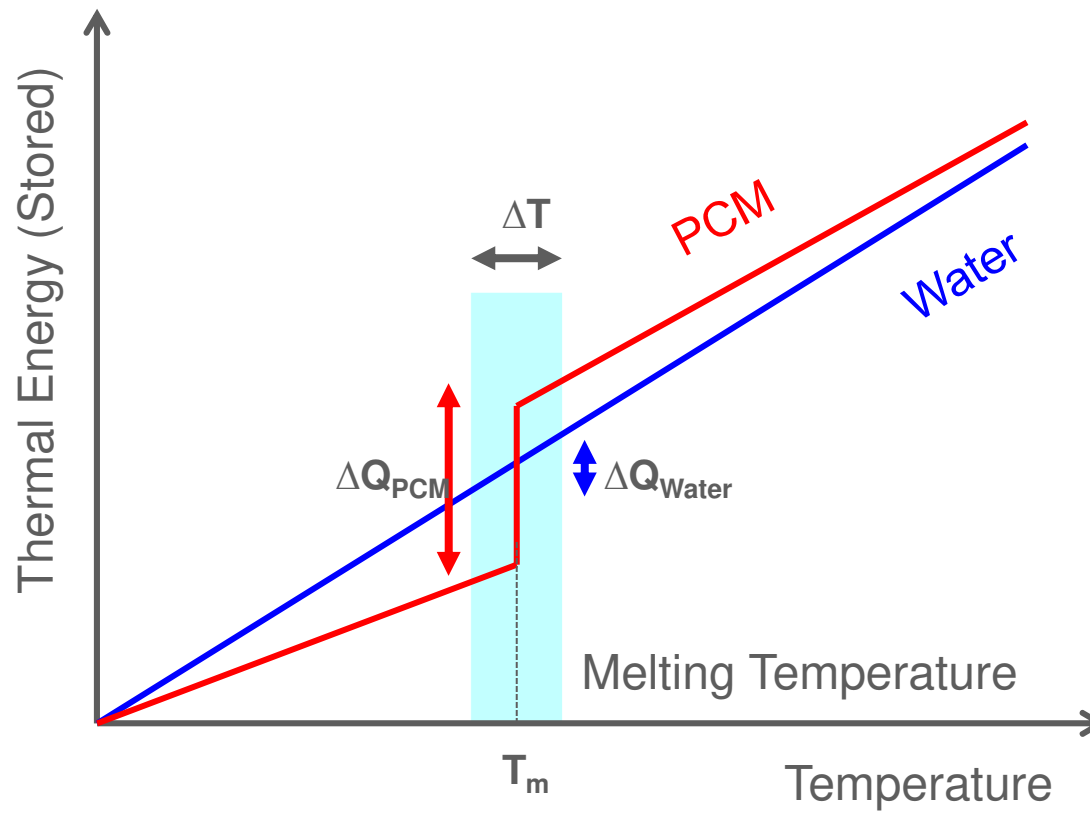
- Storage of Latent Heat



- Thermochemical Heat Storage



Sensible / Latent Heat Storage



Thermochemical Storage

Chemical Reactions:



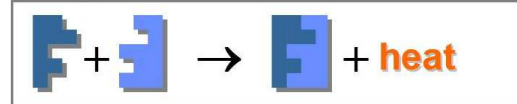
CHARGE



STORE



DISCHARGE



© ECN

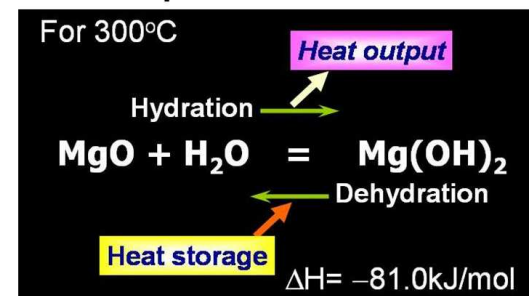
Charging: Heat Engine

$$\eta_c = 1 - T_{\text{amb}}/T_{\text{char}}$$

Discharging: Heat Pump

$$\eta_d = 1/(1 - T_{\text{amb}}/T_{\text{dischar}})$$

Example:



Thermal Energy Storage - Applications

The Crucial Parameter – The Temperature

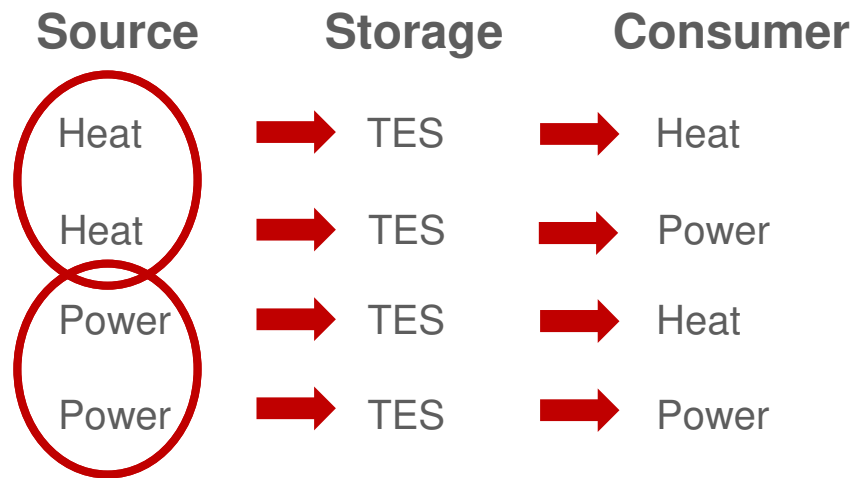


- **Cold Storage**
-40 °C – 6 °C
- **Storage for Heating / DHW**
30 °C – 90 °C
- **Storage for Process Heat**
> 100 °C
- **High Temperature Storage**
> 350 °C



Energy Storage Configuration: Source - Storage - Consumer

- In general energy storage is bridging the time mismatch between supply and demand
- (High-temperature) thermal storage systems (TES) are able to charge and discharge heat as well as electricity



Heat = Solarthermal

Power = PV/Wind



Thank you very much for your attention!