



NEW STORAGE LATENT AND SENSIBLE  
CONCEPT FOR HIGH EFFICIENT CSP PLANTS



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

H2020 Grant Agreement N°:  
720985

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**Project acronym: NEWSOL**

**Project full title: NEW StOrage Latent and sensible concept for high efficient CSP plants**

## **Deliverable D3.6 - Thermal behavior of new encapsulated PCMs**

### **ABSTRACT**

The aim of this the deliverable D3.6 is to summarise the status of thermal behavior of new encapsulated phase change materials (PCMs) in terms of previous work. In addition, results of modelling and experiments on material aspects, storage component aspects and system level are given.

Space is limited and is always subject to a cost. Having a higher density of energy is thus a valuable feature of any energy system and is one of the main advantages of using latent heat and thermochemical storage systems, which are described in this report considering a target temperature range between 150°C and 550°C.

Phase change materials for this operation range were investigated and have been screened in WP2 in order to be used on a thermocline tank that will have a ternary molten salt mixture of Na-K-Ca  $\text{NO}_3$  as sensible heat storage media. The PCMs will be encapsulated in steel cylinders, at laboratory scale the size considered was 3 cm diameter and 10cm height for heat transfer experimental work, considering three PCMs tested inside one oven: sodium nitrate, potassium nitrate and lithium nitrate. Cooling rates have been determined for each material, after and before phase transition.

Furthermore, by means of simulating charging and discharging process of a dual media thermocline tank, a parametric study (temperature profiles, outlet fluid temperature and efficiencies) was performed to evaluate the interest of having PCM materials inside of the tank in three possible locations: bottom (LT), medium (MT) and top area (HT). Each of these PCM has a different melting temperature. The global efficiency for the cases simulated is discussed and recommendations for the design of the tank including PCMs are issued.