PARTNERS

WWW.AEE-INTEC.AT

WWW.EDFENERGY.COM

WWW.TUE.NL

WWW.MOSTOSTAL.WAW.PL

WWW.TNO.NL

WWW.DOW.COM

WWW.RINACUNSULTIONG.ORG

WWW.CALDIC.COM

WWW.VAILLANT-GROUP.COM

WWW.POLARKAELTETECHNIK.DE

WWW.FENIXTNT.CZ

HORIZON 2020 RESEARCH PROJECT
This project is supported by the European Commission under the Energy Theme of the Horizon 2020 for research and Technological development.

H2020-EeB-2014-2015/H2020-EeB-2015
Grant Agreement number: 680450

CONTACT

w.vanhelden@aee.at

WWW.CREATEPROJECT.EU

This brochure presents the project status of March 2018.

Produced and designed by FENIX TNT s.r.o.

CREATE©

An economically affordable, compact and loss-free heat battery for existing buildings.

Compact REtrofit Advanced
Thermal Energy storage

01 ABOUT THE PROJECT

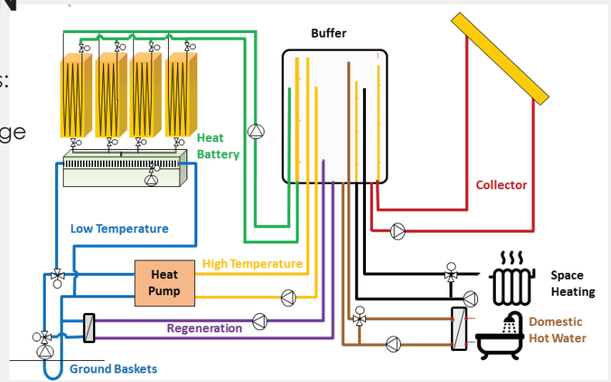
In Europe, the building sector accounts for the largest share of energy consumption. Harvesting, converting and storage of seasonal solar energy in the building sector is therefore essential to achieve the European goal of an energy-neutral built environment in 2050. The CREATE project aims to tackle this challenge by developing a compact thermal energy storage system which is able to provide renewable heat over the entire year.

The CREATE system is an advanced thermal storage system based on Thermo-Chemical Materials (TCMs), that enables economically affordable, compact and loss-free storage of heat in existing buildings. The system consists of several storage modules containing salt, which is hydrated (charged) in summer and dehydrated (discharged) in winter.

02 STORAGE SYSTEM DESIGN

The create storage system design consist of the following components:

- Heat battery for seasonal storage
  - Absorber modules with thermochemical material
  - Central evaporator/condenser with water reservoir
- Buffer for diurnal storage
- Heat pump
- Solar thermal collector
- Ground source



04 MATERIALS DEVELOPMENT

A database of approximately 600 hydrate reactions of salt hydrates was made based on material´s characteristics like the energy density and the (un)loading temperatures. From this list, **K_2CO_3** was selected for further materials development. Consequently, more than twenty different TCM composites of K_2CO_3 were manufactured on lab-scale by DOW and CALDIC and extensively characterized at the Eindhoven University of Technology. The composite with the highest energy density in particle beds was selected for further upscaling. CALDIC performed a successful production run of 100 kg scale batches, proving that industrial production is within range.

Lab scale investigations were performed at the Eindhoven University of Technology to determine the **optimal packing** of a granule bed in order to increase the energy density as much as possible. Further, long--term accurate outgassing tests started at TNO in order to determine **how the material** will act with the vacuum of the heat battery. Finally, researchers of DOW are investigating **coating options** for the K_2CO_3 composite to improve the cyclic stability.

Figure 1: The intermediate form of the composite salt

Figure 2: The final shape used in the 1 kg reactor which will be used in the functional scale module

05 OBJECTIVES

- Stable & compact materials: Energy density of more than 420 kWh/m3 (1.5 GJ/m3) .
- Long lifetime.
- Affordable technology.
- Efficient and high-power energy discharge: As high as 5kW for a single-family home.
- Safe and reliable operation
- To mobilize all the required key players in the supply and value chain from the material level up to the system level and the energy grid.

06 DEMOSITE

To demonstrate applicability of the thermochemical storage solution and its operation in real life conditions, a full scale solar TCS system delivered by the CREATE project will be installed into a single family house in Warsaw, Poland, where a land climate delivers both cold winters and warm summers.