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HORIZON 2020 RESEARCH PROJECT

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CREATE[®]

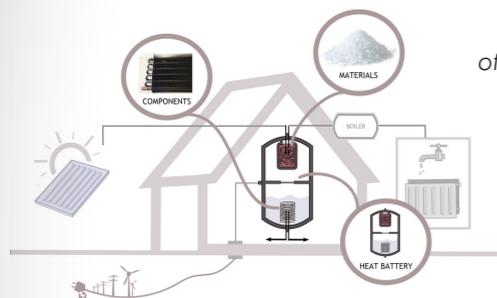


An economically affordable, compact and loss-free heat battery for existing buildings.

Compact **RE**trofit **A**dvanced
Thermal **E**nergy storage

01 INTRODUCTION

The buildings sector accounts for the largest share of energy consumption (Europe wide approx. 37%). As two third of the building stock in 2050 is made up of currently existing buildings, the solution should be realized with the current building stock. The CREATE project aims to tackle this challenge by developing a compact heat storage module.



Schematic of the CREATE concept

The heat battery allows for better use of available renewables in two ways:

Bridging the gap between supply and demand of renewable heat, by storing locally generated solar heat in summer for use in winter (heating, hot tap water).

Increasing the flexibility of the energy grid, by converting electricity peaks in renewable electricity, e.g. wind energy, in stored heat for later use.

CO₂ reduction due to better use of available renewable energy sources instead of fossil energy

02 DESCRIPTION

The main aim of CREATE is to develop and demonstrate a heat battery, i.e. an advanced thermal storage system based on Thermo-Chemical Materials (TCMs), that enables:

- **Economical affordability:** For the existing building stock CREATE will reach at least a reduction of 15% of the net energy consumption with a potential Return-On-Investment shorter than 10 years.
- **Compactness:** Novel high-density materials will be used in order to limit the use of the available space to a maximum of 2.5 m³ thermochemical material.
- **No heat losses during storage:** This is an intrinsic material property of thermochemical storage technology, thereby enabling long-term storage.

The CREATE technology is the game changer in the transformation of our existing building stock towards near-zero energy buildings.

03 DEMONSTRATION

Implementation of the CREATE concept is foreseen in typical European dwellings. To demonstrate applicability of the thermochemical storage solution and its operation in real life conditions and to receive early user feedback, MOSTOSTAL will install a full scale solar TCS system delivered by the CREATE project. The system will be installed into a single family house in Warsaw, Poland, where a land climate delivers both cold winters and warm summers.



Demo house provided by Mostostal by courtesy of the City of Warsaw.

The CREATE concept is based on advanced compact thermal storage for existing dwellings using thermochemical storage materials. The heart of the system consists of a vessel that contains a salt that is hydrated and dehydrated, which generates an energy effect. In the time between dehydration and hydration the energy is stored in the salt. We envision two applications for the heat battery:

- 01 decentral thermal energy storage bridging supply and demand of renewable thermal energy.
- 02 decentral grid-connected storage for increasing energy efficiency and introducing flexibility in the electricity grid, e.g. using a heat pump.

CREATE is focusing the following sub-objectives:

- Stable & compact materials:** Energy density of more than 1.5 GJ/m³ (420 kWh/m³).
- Efficient and high power energy discharge:** As high as 5kW for a single family home.
- Long lifetime:** TCM/stabilizer composite materials and the prevention of unwanted side-reactions.
- Safe and reliable operation:** Full validation and testing against failure modes, effects analysis and demonstration of compliance.
- Affordable technology:** Focus on low-cost and maintenance-free concepts for heat storage.
- Future value chain:** 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.