

Bringing advanced heat batteries in residential heat and electric systems closer to market through real life demonstration in different climates

Background and challenges

According to the International Renewable Energy Association (IRENA) the global share of renewable energy is bound to increase in order to meet future predicted CO₂ emission budgets, and could account for >70% of the total energy supply in the EU in 2050. Increasing energy system flexibility has become a priority in the transition to renewable energy. Current challenges include highly fluctuating patterns of supply and demand, with periods of high peak loads and periods when none or insufficient renewable energy is available. Decentralised renewable energy generation is becoming more common, causing imbalance with central energy supply via the grid. Moreover, the current lack of compact and affordable decentralised storage solutions are contributing to the still incomplete exploitation of renewable heat in Europe.

Objectives

HEAT-INSYDE is a collaborative Innovation Action (IA) that addresses the challenges outlined above by bringing together key industry players and research institutions with a sound track record in thermal storage technologies and in energy-related EU projects. Together they form an interdisciplinary consortium of 12 partners from 6 countries that will advance a ground-breaking closed-loop concept for heat storage using thermochemical material. They will turn it into a compact domestic heat storage prototype at a Technology Readiness Level of 7, through a user-centric approach with real-life demonstrations in 3 different European climate zones. The 'heat battery' delivered by HEAT-INSYDE aims to be an affordable (first generation system price of 8.2 k€), highly compact (< 1 m³) solution with robust, long term (> 25 years) performance. The specific objectives of HEAT-INSYDE are:

- Develop an industrial production technology for guaranteed long-term (>25 years) material performance and quality.
- Advance a closed-loop system to a prototype for real life demonstration by optimising critical components and user interfaces and increasing system compactness.
- Optimise application flexibility so that both heat and electricity grid integration are possible.
- Ease maintenance and reduce maintenance costs by creating a simple system with affordable components and a device design that guarantees easy access, thus reducing (dis)assembly times.
- Ensure safe and reliable operation of the heat storage system.
- Validate the economic viability and user acceptance in real-life demonstrations, thereby paving the way for successful market development.
- Organise and develop the supply and value chain for a heat battery, covering all steps from the materials used for its production, to the engineering of its system, to its functionality on the grid, and adoption by end-users.

Funding Programme:

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Project Duration:

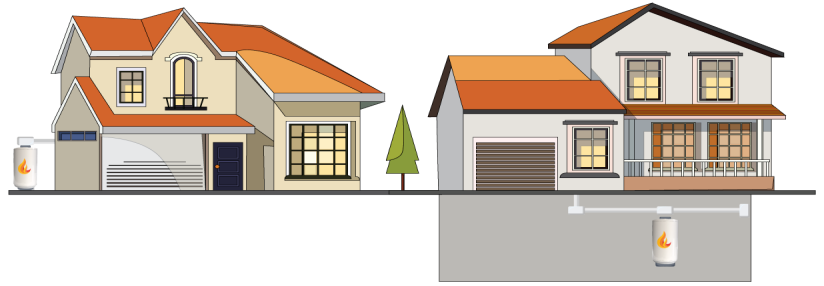
01/10/2019-31/03/2024

Project Budget:

7.7 million euro

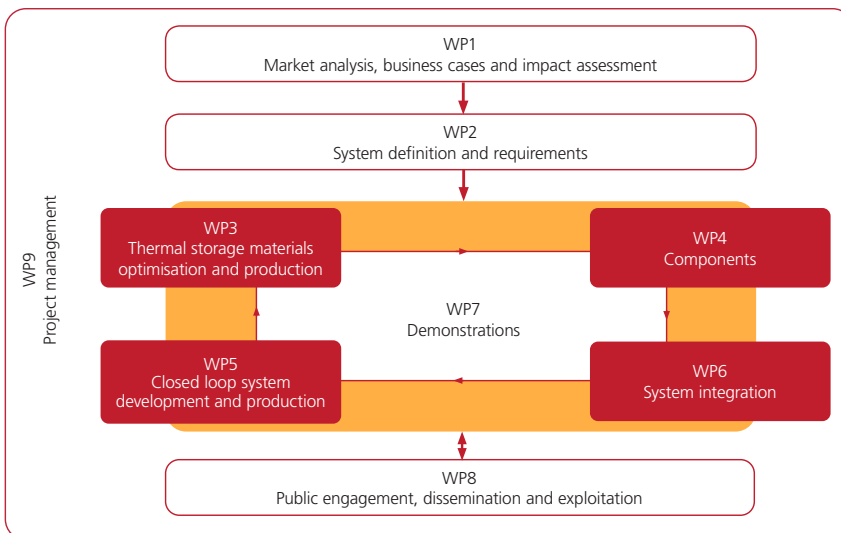
Project Website:

www.heat-insyde.eu



Activities

The activities in HEAT-INSYDE are organised in nine Work Packages (WPs), starting with a comprehensive market analysis, including business cases and impact assessment (WP1), which will guide the system definition and identification of main requirements (WP2). The three key technologies at the base of HEAT-INSYDE are developed and implemented in WP3 - 6: industrial production technology of optimised thermochemical material (WP3), a closed-loop system (WP4 and WP5) and energy management and interfacing with the energy system (WP6). Demonstration of the system in three countries with different climates (WP7) will pave the way towards the first commercialisation of the HEAT-INSYDE solution, with support in exploitation strategies, dissemination, and creation of user awareness provided by WP8.



Impact

HEAT-INSYDE provides an affordable, compact, and long-term solution for decentralised heat storage that will contribute to the transition towards increased use of renewable energy. The proposed new heat battery will result in an overall reduction in energy consumption of 43% and will empower the switch towards renewable resources in the electricity market. Of interest for the electricity market, the heat market, the decentral energy storage market, and the building construction market, the HEAT-INSYDE solution has huge business potential and will help promote the environmentally important concept of energy neutral buildings.

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Project participants:

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- Caldic Nederland B.V., NL
- Evonik Performance Materials GmbH, DE
- Ventilairsec, FR
- Commissariat a l'énergie atomique et aux énergies alternatives, FR
- Gemeente Eindhoven, NL
- Stichting Sint TRUDO, NL
- Przedsiębiorstwo Robot Elewacyjno-chfasada Sp. z o.o., PL
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