

The EU building stock has large potential to increase its energy efficiency with solutions that can be integrated to existing dwellings and through different measures. One of them is optimizing the use and management of thermal energy by allowing it to be stored, levelling demand peaks and increasing use of renewables affected by intermittency such as solar-based heating. The MiniStor project aims at designing and producing a novel compact integrated thermal storage system for achieving sustainable heating, cooling and electricity storage that can be adapted to existing systems in residential buildings.

It is based on a high-performing $\text{CaCl}_2/\text{NH}_3$ (calcium chloride/ammonia) thermochemical material reaction combined with parallel hot and cold phase-change materials for flexibility and usage year-round. It also stores electrical energy in a Li-ion battery that responds to grid signals and can sell to the electrical grid. The system is managed by a smart Building Energy Management System that connects to the Internet of Things.

The system can have as input energy obtained from a variety of renewable energy sources such as hybrid photovoltaic thermal panels. This arrangement is demonstrated and validated in four demonstration sites (Ireland, France, Greece and Hungary), testing its effectiveness at different local climatic conditions and facilitating market replication.

The system provides stability, performance and use of at least 20 years, an estimated compact storage material volume of 0.72 m³, reduced net energy consumption in a building by at least 44% and a return-on-investment period of 6.7 years, using high energy density storage materials that reach storage densities up to 10.6 times higher than water.

The consortium delivering this project is made of 18 partners from eight different countries in Europe and the UK, and is led by IERC. They include industry, academic and non-profit institutions as well as local government. This project has received funding from the European Union through the Horizon 2020 research and innovation programme.

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