Hybrid Services from Advanced Thermal Energy Storage Systems: the HYSTORE project

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The roadmap for urban sustainability involves the transition to reliable and decarbonised energy networks. In this regard, flexibility concepts based on sector coupling through the use of hybrid energy storage systems can play a key role. The HYSTORE project is placed in this context, with the aim of evaluating the flexibility potential of novel Thermal Energy Storage (TES) in order to provide thermal energy and load shifting services. Among the investigated technologies, a promising solution is the use of thermochemical energy storage in which the charging process involves direct heating of the storage material by means of electromagnetic fields. On this line, the technical feasibility in the use of radio-frequency for the desorption of zeolites under the typical operating conditions was evaluated. The main goal of the activity was to characterize the temporal evolution of the temperature of the material and quantify the efficiency of the process, in order to compare it with indirect charging methods. In addition, the flexibility potential of such advanced technologies was assessed to provide load shifting services to the electricity grid and improve the renewables penetration. Lessons learned from the project can constitute insights for scientists and technology providers, boosting research and diffusion of thermal energy storage technologies as an alternative to electricity storage batteries and hydrogen systems for unlocking the flexibility potential of electric grids.