

Abstract STEEP



A large amount of energy is rejected by the industry at low temperature level (between 0 and 150 ° C). Indeed, considering all the French industrial processes, the amount of energy lost in this temperature range is estimated at 75 TWh / year. In order to improve the overall energy efficiency of these processes, it is possible to re-use this waste heat.

However, in a large number of industrial processes, there is time delay between the process step at which the energy is lost and the process step at which this energy could be recovered. A thermal storage system should then be integrated in the process to match the energy demand and the production. This would lead to a reduction in the consumption of primary energy.

The thermal energy storage technology included Phase Change Material (PCM) appears particularly attractive in this particular application. It combines large volume and mass storage capacity and constant charge and discharge temperature. These two parameters are particularly suitable for heat recovery in batch processes.

However, the implementation of these storage systems is determined by scientific and technological bottleneck. These are at different levels: thermal storage material, system and its command control, integration in industrial processes....

Within a framework of industrial research, the objective of the project Thermal Storage for Eco-Efficient Process (STEEP) is to develop a storage system based on solid-liquid PCM technology in a temperature range between 70 and 150 ° C. The consortium to develop this system is composed of two laboratories and three companies. The project coordinator is the Laboratory of Thermal Energy and Processes (LaTEP) specialized in energy storage systems by latent heat. Other partners are the Eco Efficiency and Industrial Processes Department of EDF, the Institute of Materials, Microelectronics and Nanosciences de Provence (IM2NP), the R&D department of CRISTOPIA Company, and the R&I center of the Industrial Thermal Applications Company (CIAT).



STEPP project aims to demonstrate the technical and economic feasibility of a storage system adapted to the energy recovery in industrial process and using a solid-liquid PCM technology. It revolves different tasks ranging from materials development to their implementation in a pilot plant. The numerical evaluation of the performance of an industrial process incorporating a storage module for PCM will also be done. These performances will be expressed in terms of energy, economic and life cycle analysis (LCA).