

# Natural Refrigerants and TES for last mile delivery

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## **Abstract**

Transport refrigeration is a key link in the cold chain, however it accounts for nearly 25% of the total cold chain emissions. In the last years, especially in the post-covid era, e-commerce and last mile delivery of perishable goods have significantly increased. Insulated boxes equipped with eutectic plates, acting as a thermal energy storage (TES), charged before the products distribution activity with a stationary refrigeration unit are widely used for short distance. They combine ease of use, flexibility, simplicity, lightness and do not act as noise or emission sources in city centers. Within the EU project ENOUGH, whose goal is to provide tools, methods and technologies for the decarbonisation of the food chain in support to the Farm to Fork strategy, a newly developed stationary refrigeration system is under development and demonstration, employing the natural refrigerants propane (R290) as operating fluid in the vapour compression cycle and two-phase CO<sub>2</sub> (R744) as heat transfer medium to freeze the eutectic plates. The goal is to improve both the energy performance and the environmental sustainability of the application compared to currently employed solutions