

Project concept



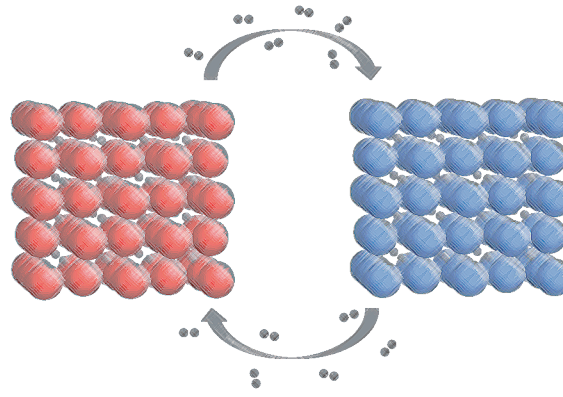
Products transportation in refrigerated vehicles is an energy-consuming activity that requires extra fuel consumption in order to feed the compressor-driven **Air Conditioning System**.

At the same time, the vehicles waste a high amount of energy as flue gas sensible heat and in the engine cooling circuit.

HP-ACS project is focused on an innovative heat pump technology based on the adsorption/desorption of hydrogen gas on hydriding metal alloys solid beds to be applied for onboard vans refrigeration.

A cooling system technology able to exploit the waste heat driving a heat pump would lead to a considerable fuel saving and to an improvement of the overall vehicle efficiency with positive consequences in reduction of greenhouse gases emissions.

The SMEs proposers COIBENT CAR, READER, AERFRIGOR and ADMATIS have identified in the expertise developed by the RTD performers ENEA and LABOR real applicative potentialities and a positive starting point for the development of a competitive refrigerated vans ACS.



Background

According to Global Industry Analysis Inc., refrigerated transportation world market will reach 5 billion € by 2015.

Increasing awareness about food safety, consumer spending on high value perishable goods and replacement of refrigerated vehicles are driving the growth in refrigerated transportation market.

Approximately 650.000 refrigerated road vehicles are currently in use within the EU. The increase of fuel price is becoming a crucial aspect for cold transport companies, since the continuous growth of oil price is leading to a drastic increase of operative costs.

Scientific and Technological Objectives

- 1 Developing, testing and characterizing of suitable materials pair for cold van refrigeration (operating temperature $\leq 4^{\circ}\text{C}$).
- 2 Designing and engineering a retrofit HP-ACS system, to be easily assembled in cold van and with the scope to minimize system weight and volume by:
 - a. reducing MH mass requirements to achieve project specifics;
 - b. optimizing auxiliaries;
 - c. selecting light materials.
- 3 Implementation and testing of HP-ACS prototype on a refrigerated van, in conformity to the CEI EN regulation, to be benchmarked with presently van ACS systems.
- 4 Demonstrating the feasibility and reliability of the MHCS technology.
- 5 Evaluating the technical, economic and environmental impact of the HP-ACS technology in the cold transportation sector

Technology

By this technology, cold transportation companies could save 800 (2 m³ refrigerated vans) – 7.200 (90 m³ Rigid Semi-Trailer) fuel liter/-years on average (1.200-10.800 €/year) for each van/truck, since the cold generation system is totally fed by the engine waste heat and the operating costs for refrigeration are completely avoided.

MH heat pump is the most promising technology to improve refrigeration efficiency and to develop a reliable and cost-competitive waste recovery ACS, leading to a revolution in the sector.

The refrigeration system to develop is a Metal Hydride Cooling System (MHCS) based on hydrogen adsorption/desorption on solid beds. Generally, each heat-driven air conditioning system can be applied to recover waste heat.

Contacts

If you want to know more, visit our website

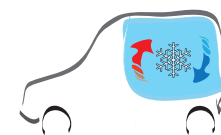


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Consortium partners



HP-ACS

vans
refrigeration
system

Metal hydride heat
pump for waste
heat recovery in
vans refrigeration
system



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