Interdisciplinary centre for Storage, Transformation and Upgrading of Thermal Energy

Sustainable Refrigerated Road Transport

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Opportunities for reducing energy consumption and carbon emissions

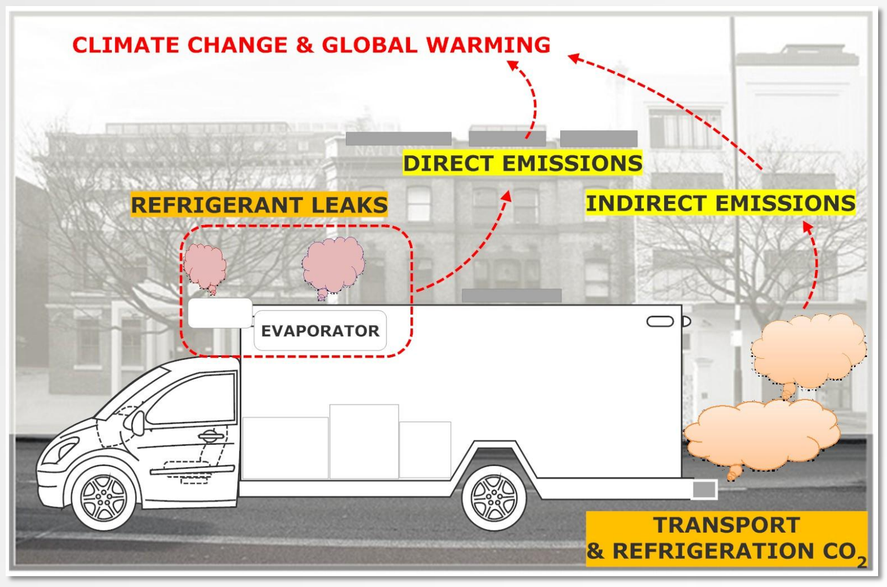

Figure 1. Carbon emissions from RRT units

Faster delivery schedules and lower temperature requirements have led to increased energy consumption and carbon emissions in the transport refrigeration sector.

Primary food distribution by refrigerated road transport (RRT) in the UK uses 40% more energy than comparable non-refrigerated vehicles, and accounts for 2 Mtonnes of indirect CO_2 emissions from the engine alone.

RRT units can also leak up to 30% of their total refrigerant charge per year, contributing directly to CO_2e emissions. With the revised F-Gas regulations RRT units will now need to be leak tight.

Leak tight solutions for RRT units

Widespread research into combatting leaks in stationary refrigeration systems has been conducted in recent years, however, there has been less focus on RRT to date.

Refrigerant leakage in RRT units remains a common issue due to the greater vibrations and shocks experienced.

This study identifies common sources of refrigerant leakage in the vapour compression RRT systems and localizes it to distinct components with the aim of determining generic solutions.

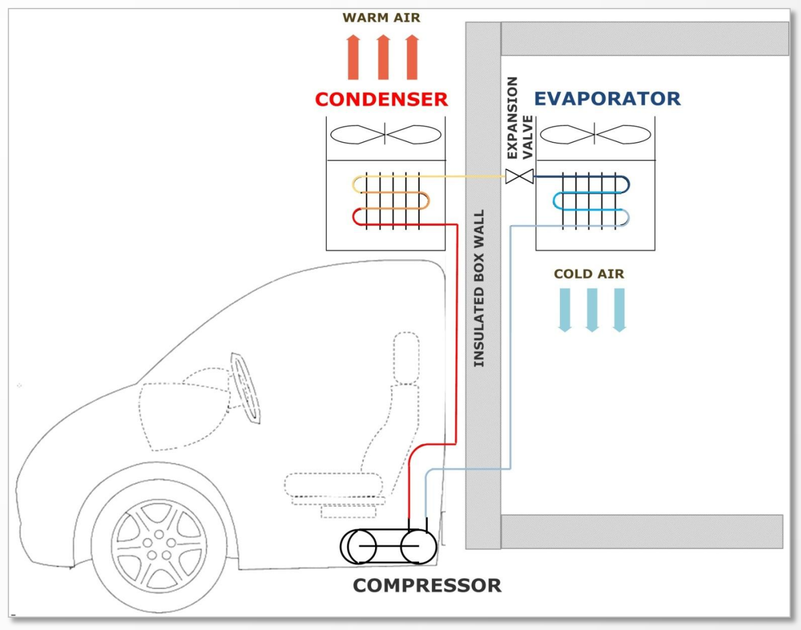

Figure 2. Schematic of RRT vapour compression system

Energy saving options for RRT units

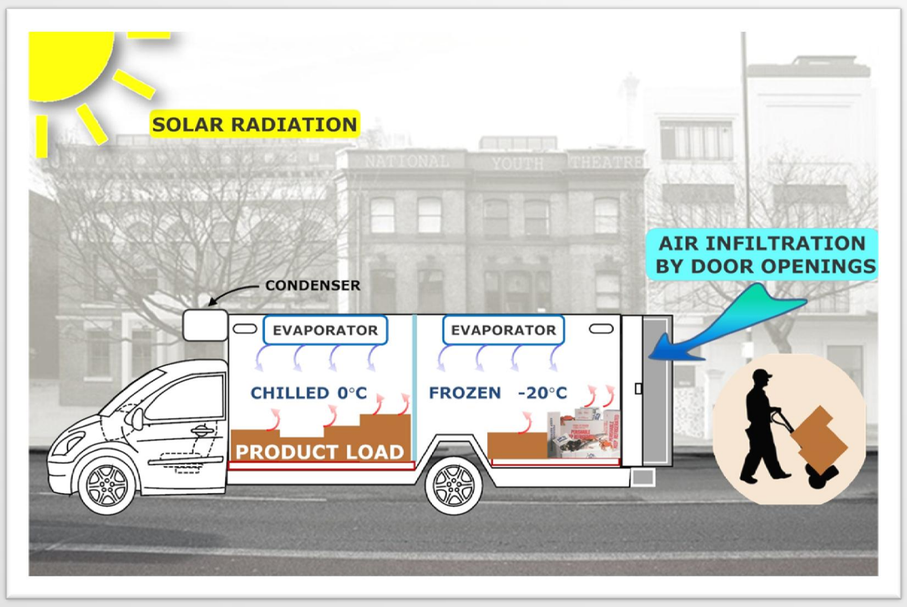

Figure 3. Multi-compartment RRT unit

It has been estimated that up to 50% energy savings can be achieved for refrigerated goods transport.

Energy saving options may include: modulating refrigeration power to meet part load requirements; coordinating delivery logistics, utilizing alternative refrigeration methods; and enhancing design features.

This research will model and evaluate the relative energy intensity, cost and carbon emissions of a combination of various RRT designs with multi-compartment temperature zones and multi-drop delivery operation.

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