

Non-CO₂ Greenhouse Gases: High-GWP Gases

Source/Sectors: Substitution of ODS/Household Refrigeration

Technology: Use of hydrocarbons (C.1.1.1.2)

Description of the Technology:

Hydrocarbons have the same good thermal properties as HFCs and therefore, can replace HFC refrigerant in new manufactured household refrigerators and freezers (IEA, 2003; USEPA, 2001). Currently used refrigerants include HC-600a, HC-290, and HC-1270 (USEPA, 2006b). HC-600a system, the growing hydrocarbon refrigerant, has about 40% smaller charge size of a typical household refrigeration unit (USEPA, 2006b).

Effectiveness: Good

Implementability: The conversion of hydrocarbon in hermetic systems has been proved to be easy; in large part, it can be converted at the manufacturing site. In Europe, hydrocarbon is rapidly becoming popular for new household refrigeration (IEA, 2003).

Reliability: Although there have been some cases reported of fire during the manufacture processes in some countries, there is no health risk for a domestic size refrigeration system (IEA, 2003).

Maturity: Hydrocarbon refrigerant, especially isobutene (HC-600a) is continuing to grow in European market share, and also gaining market share in Japan (USEPA, 2006b).

Environmental Benefits: HFCs emission reduction

Cost Effectiveness:

Technology	Lifetime (yrs)	MP (%)	RE (%)	TA (%)	Capital cost	Annual cost	Benefits
Use of hydrocarbons ¹	15	-	100	2-7	\$38.49	\$0.00	\$0.00

Note: MP: market penetration; RE: reduction efficiency; TA: technical applicability; costs are in year 2000 US\$/MT_{CO₂-eq.}
1: IEA (2003)

Industry Acceptance Level: It has been used in large part of Europe; however, it has not occurred in North America yet, because of its perceived risks and low acceptance of HC as a refrigerant. To date, 120 million HC refrigerators have been estimated to be manufactured, and sold in Germany, Spain, Sweden, England, France, Turkey, Argentina, Australia, Brazil, China, Cuba, India, Indonesia, and Japan (IEA, 2003).

Limitations: This flammable alternative cause safety concern and therefore requires redesigns in the manufacturing process that would increase costs. It also requires additional engineering and testing, development of standards and service procedures, and training of technicians before commercialization (USEPA, 2006b).

Sources of Information:

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