

Moving Towards Sustainable Refrigeration Industrial Applications



Setting the Trend

Nestlé have undertaken further significant efforts to accelerate the phase out of HCFCs, well ahead of the Montreal Protocol and EU requirements. In 2000 we have set another major milestone in our leadership role to revive CO₂ as an industrial refrigerant by completely converting our Hayes freeze drying factory in the UK from R22 to an innovative CO₂/NH₃ cascade system. This achievement was recognised by several prestigious awards, including the top award of the Institution of Chemical Engineers in London, which is given to the best project paying stringent attention to safety and environment. Our groundbreaking Hayes project caused a snowball effect and today there are more than 50 CO₂/NH₃ cascade systems operational in the world.



Below: Representatives from Nestlé, winner of the Cremer & Warner Medal (pictured left) posing with Michael Fish (left) and Dame Julia Higgins, who presented the award



Early HCFC Phase Out

As reported in the environment section of Nestlé Internet site www.environment.nestle.com we have reduced the emission of ozone depleting substances per tonne of product manufactured by 99% since the start of our systematic phase-out program in 1986. With further major investments currently undertaken in six other sites we will eliminate another 80 tonnes of R22 from our installations.

Promoting CO₂ as Natural Refrigerant in Large Scale Refrigeration Plants

In addition to some of our R22 phase out programs mentioned above, Nestlé also successfully commissioned one of the first and the world's largest CO₂ refrigeration plants in the USA.



Largest CO₂ plant in the world at Jonesboro – USA

Industrial Applications

Promoting CO₂ as Natural Refrigerant in Large Scale Refrigeration Plants (cont)

This project, which was completed in January 2003 at our frozen food factory in Jonesboro, is now setting the new standard for industrial refrigeration in the USA. Building on our success in Jonesboro and Hayes, Nestlé commissioned in August 2003 Switzerland's largest CO₂ refrigeration plant in our Orbe factory



CO₂ condensers - NH₃ evaporators in the plant room

Promoting CO₂ as Natural Refrigerant in Cold Stores.

In a further effort to promote CO₂, Nestlé has developed together with suppliers, an environmentally friendly alternative, using CO₂ as a secondary coolant ("brine"): This system is now installed at several of our cold store distribution centres where the use of ammonia is restricted



Refrigerant charge of NH₃ < 1.5 tonne / CO₂ ~6 tonne

Promoting Ammonia Equipment

Nestlé successfully convinced manufacturers to develop water chillers with small ammonia charge (few kg) that can be used in non industrial applications. Two such ammonia chillers were recently installed in our Coffee R&D centre, each with an ammonia charge of less than 4 kg.

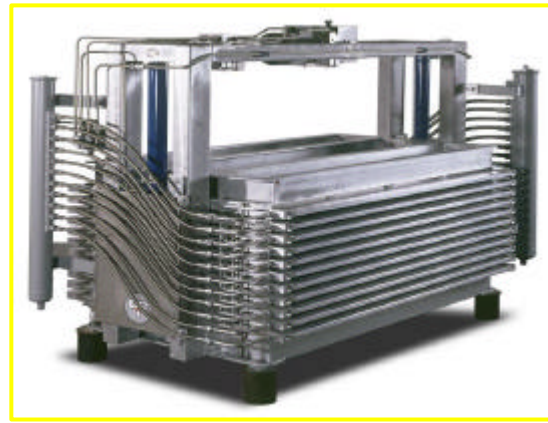


Water chiller with an ammonia charge of less than 4 kg

Promoting Ammonia Refrigeration

Industrial Applications

Finding alternative refrigerants in most applications require the development of alternative process equipment. Nestlé has taken the lead to work with several suppliers to develop such equipment, which will not only allow the use of natural refrigerants, but also operate at improved efficiencies and lower energy consumption.



CO₂ plate freezer

Hydrocarbon water chillers.

Nestlé has installed in industrial application water chillers operating with hydro carbon refrigeration systems.

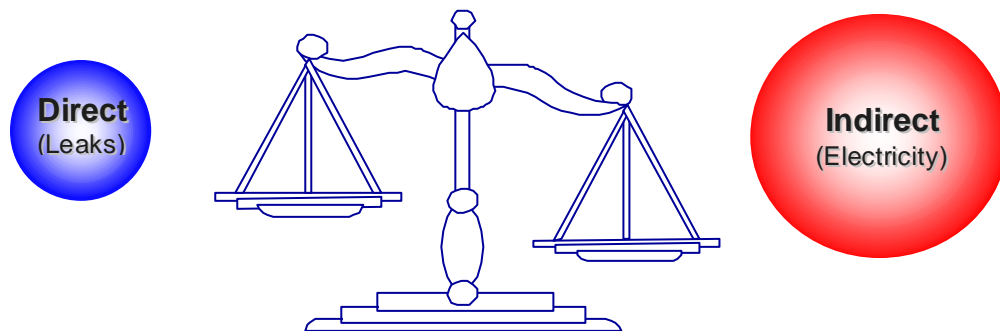


Hydrocarbon water chillers

Saving Energy and Reducing CO₂ Emissions

Refrigeration plants often consume significant amounts of electricity and therefore contribute indirectly to global warming through CO₂ emissions of power stations. In all R22 phase-out projects, Nestlé has successfully reduced electricity consumption by more than 25% by using more efficient refrigeration systems.

Due to systematic energy conservation measures undertaken over recent years, such as installation of co-generation plants, our overall energy efficiency in manufacturing processes has improved by over 37% between 1997 and 2003. Combined with a replacement of fuel- and coal-fired boilers by natural gas our CO₂ emissions per tonne of products have decreased by over 40% in the same period.



CO₂ emissions Nestlé work on both