Press release

eurammon lecture event at the Chillventa

Natural refrigerants increasingly significant worldwide

Frankfurt (Main), 12/03/2014. **In Europe, the F-Gas Regulation is driving the advance of natural refrigerants "by law". But what are the framework conditions like in other countries? The lecture event entitled "Natural Refrigerants Throughout the World – Country Situation, Applications and Experiences" held by eurammon on 15/10/2014 at the Chillventa illuminated the current situation in various international markets. Experts from the individual countries showed how the use of natural refrigerants is developing in Kazakhstan, the Middle East, Turkey and the USA.**

Kazakhstan: initial movement in the political sector

Kazakhstan still has a long way to go to achieve environmentally friendly standards in refrigeration. Even so, its endorsement of the Kyoto Protocol in 2009 constituted a first important milestone for the Central Asian state when it comes to sustainable technologies. The country now has to implement a national plan to regulate the emissions of climate-damaging greenhouse gases. But a lot still has to be done for natural refrigerants, confirms Yuri Dubodelov from SAKADA Engineering, Almaty. The whole region is suffering from an extreme lack of skilled workers, with scarcely any engineering and development expertise, and there is very little demand for high-performance refrigeration systems that also face strict safety requirements.

The Middle East: cost awareness beats environmental awareness

The situation in the Middle East is much better. Hans Raaymakers, General Manager at ADEAREST, underlines in particular the role played by ammonia in the United Arab Emirates. There has been widespread use of the natural refrigerant throughout the whole region since the 1990s, thanks to the influence of western companies. Many systems are currently being modernized or replaced by new ones, so we expect a continued increase in the spread of ammonia; however, until legislation is in place to urge the use of ammonia, then the cheaper initial costs of adopting conventional refrigeration systems will be seen as an advantage.

Turkey: progressive phase-out

For decades now, applications with natural refrigerants have been accepted as part of the industrial standard in Turkey. Around 90% of the systems use ammonia; only 10% of the systems are operated with fluorinated refrigerants and this is only for cooling areas smaller than 2,000 m² in size. By contrast, there is still relatively little use of CO_2 as a refrigerant. Here increasing impetus is coming from multinational companies that are refurbishing systems with high global warming potential (GWP) and high ozone depletion potential (ODP). A statutory, highly progressive F-gas phase-out based on the EU regulations will continue to boost the significance of natural refrigerants in the next few years, explains Hüseyin M. Yüksel from the Turkish *Air Conditioning & Refrigeration Manufacturers´ Association (ISKID)* with regard to the current situation.

USA: throwing the economic switch

Barack Obama has created the legal framework for phasing out F-gases with high ODP and GWP, reports Dave Rule, President of the *International Institute of Ammonia Refrigeration (IIAR)* from the USA. In the medium term, the industry expects to see a corresponding shortage which will make environmentally harmful refrigerants more expensive, and is therefore currently searching for efficient alternatives that are also viable in terms of costs. Altogether the USA reveals a comprehensive, cross-application trend toward natural refrigerants, starting from large refrigerated warehouses via smaller commercial applications through to air-conditioning systems. To forge ahead with this transformation with the greatest possible efficiency, at the moment new partnerships are emerging where representatives from the industrial and political sectors are collaborating closely with end users.

Conclusion: large and small steps in the right direction

Natural refrigerants are currently becoming increasingly significant on a worldwide scale. Various legal, economic, ecological, infrastructural and political factors influence the spread of environmentally friendly refrigerants such as ammonia or CO_2. The EU and major industrial countries such as the USA or Turkey are driving these developments and acting as a source of inspiration, setting standards that are increasingly being taken as guidelines by countries in other regions.

Annex

Ammonia (NH_3)

Ammonia has been successfully used as a refrigerant in industrial refrigeration plants for over 100 years. It is a colourless gas, liquefies under pressure, and has a pungent odour. In coolant technology, ammonia is known as R 717 (R = Refrigerant) and is synthetically produced for use in refrigeration. Ammonia has no ozone depletion potential (ODP = 0) and no direct global warming potential (GWP = 0). Thanks to its high energy efficiency, its contribution to the indirect global warming potential is also low. Ammonia is flammable. However, its ignition energy is 50 times higher than that of natural gas and ammonia will not burn without a supporting flame. Due to the high affinity of ammonia for atmospheric humidity it is rated as “hardly flammable”. Ammonia is toxic, but has a characteristic, sharp smell which gives a warning below concentrations of 3 mg/m³ ammonia in air possible. This means that ammonia is evident at levels far below those which endanger health (>1,750 mg/m³). Furthermore ammonia is lighter than air and therefore rises quickly.

Carbon dioxide (CO_2)

Carbon dioxide is known in refrigeration technology as R 744 and has a long history extending back to the mid 19th century. It is a colourless gas that liquefies under pressure, with a slightly acidic odour and taste. Carbon dioxide has no ozone depletion potential (ODP = 0) and negligible direct global warming potential (GWP = 1) when used as a refrigerant in closed cycles. It is non-flammable, chemically inert and heavier than air. Carbon dioxide has a narcotic and asphyxiating effect only in high concentrations. Carbon dioxide occurs naturally in abundance.

Ozone Depletion and Global Warming Potential of Refrigerants

	Ozone Depletion Potential (ODP)	Global Warming Potential (GWP)
Ammonia (NH_3)	0	0
Carbon dioxide (CO_2)	0	1
Hydrocarbons (propane C_3H_8, propene C_3H_6, isobutane C_4H_{10})	0	<3
Water (H_2O)	0	0
Chlorofluoro-hydrocarbons (CFCs)	1	4680–10720
Partially halogenated chlorofluoro-hydrocarbons (HCFCs)	0.02–0.06	76–12100
Per-fluorocarbons (PFCs)	0	5820–12010
Partially halogenated fluorinated hydrocarbons (HFCs)	0	122–14310

Ozone Depletion Potential (ODP)

The ozone layer is damaged by the catalytic action of chlorine, fluorine and bromine in compounds, which reduce ozone to oxygen and thus destroy the ozone layer. The Ozone Depletion Potential (ODP) of a compound is shown as chlorine equivalent (ODP of a chlorine molecule = 1).

Global Warming Potential (GWP)

The greenhouse effect arises from the capacity of materials in the atmosphere to reflect the heat emitted by the Earth back onto the Earth. The direct Global Warming Potential (GWP) of a compound is shown as a CO_2 equivalent (GWP of a CO_2 molecule = 1).

About eurammon

eurammon is a joint European initiative of companies, institutions and individuals who advocate an increased use of natural refrigerants. As a knowledge pool for the use of natural refrigerants in refrigeration engineering, the initiative sees as its mandate the creation of a platform for information sharing and the promotion of public awareness and acceptance of natural refrigerants. The objective is to promote the use of natural refrigerants in the interest of a healthy environment, and thereby encourage a sustainable approach in refrigeration engineering. eurammon provides comprehensive information about all aspects of natural refrigerants to experts, politicians and the public at large. It serves as a qualified contact for anyone interested in the subject. Users and designers of refrigeration projects can turn to eurammon for specific project experience and extensive information, as well as for advice on all matters of planning, licensing and operating refrigeration plants. The initiative was set up in 1996 and is open to European companies and institutions with a vested interest in natural refrigerants, as well as to individuals e.g. scientists and researchers.
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