Press release

Far ahead in the field of life cycle costs

Systems with natural refrigerant – a clean calculation

Frankfurt (Main), 15-03-2017. From the CFC ban and the Kyoto protocol to the EU regulation on fluorinated greenhouse gases – more and more national and international laws are limiting the use of refrigerants that are harmful to the climate. Against this background, operators are confronted with the increasingly urgent question of the ecological and economical characteristics of refrigeration methods. With an ODP of 0 and a GWP between 0 and 3, natural refrigerants are particularly environment-friendly, and also a safe option for the users – no use restrictions are to be expected for the foreseeable future.

At first glance, the initial investment costs for systems using natural refrigerants often look off-puttingly high – but they should always be considered in context: A detailed analysis of the life cycle costs shows that natural refrigerants are also often the best choice in terms of economy. eurammon member Rob Lamb, marketing director at Star Refrigeration Ltd., explains in detail what the important factors are for an economic calculation.

1. **To compare the economic efficiency of different systems, you need to look at the overall costs. What are the relevant factors for the calculation of the so-called life cycle costs?**

   Rob Lamb: When comparing different cooling solutions it is important to look at. Cooling systems operate at design conditions for only a few hours per year. Understand the cooling load profile and ambient temperature profile for a project enable calculations to be carried out to show differences in performance between two or more systems. Modern ammonia systems typically incorporate energy enhancing features such as variable speed compressor motors and fans. They also have heat exchangers with close temperature approaches and control systems that enable the evaporating and condensing temperatures to vary with load and ambient conditions. The combination of these energy enhancements typically show energy benefits over alternative solutions using synthetic refrigerants.

   Plant life expectancy should also be built into life cycle calculations. Ammonia systems are designed for an operating life of 20+ years due to the quality of materials and

components used, and the methods of construction. Solutions using synthetic refrigerants are typically build to a price and with a shorter operating life. It is common to find that synthetic solutions need replacing after 10 years and this should be built into any life cycle comparison. There is also the uncertainty of HFC refrigerants to consider and it may mean that refrigerant replacement needs to be considered some time in the future.

2. **The relatively high initial investment costs for systems using natural refrigerants are counterbalanced by lower operating costs and a longer life cycle. What does that mean for the amortization time?**

   Rob Lamb: Investment in natural refrigerant systems should be seen as a long term, 20+ years, investment, particularly when using ammonia. It is typical to find a return on the additional investment requirement of 3 to 5 years. After this point, the natural refrigerant systems will continue to deliver reduced operating costs over the life time of the plant.

3. **Natural refrigerants are very cost-efficient. How do contents and leaking affect the operating costs?**

   Rob Lamb: The toxicity and/or flammability of natural refrigerant systems (with the exception of carbon dioxide, which is neither toxic nor flammable) mean that mitigating the risk of leakage at the design and manufacturing stages is of key importance. Historically, leakage rates from ammonia systems have been negligible and topping up of refrigerant has typically been the result of service work where it has been necessary to remove some of the refrigerant before carrying out work. The cost of any replacement natural refrigerant is typically less than 10% of HFC gases and this gap is set to widen with the introduction of more expensive HFO and HFC/HFO blends.

4. **In spite of their higher initial investment costs, ammonia-based systems for large-scale industrial refrigeration have been established for quite some time. By now, natural refrigerants are finding their way into more and more sectors of the air-conditioning industry, for example smaller applications with up to 200 kW. What do you think are the reasons for this development – and where is this trend leading the industry?**

Rob Lamb: Uncertainty over the future of synthetic refrigerants is a key driver behind the growing interest in natural refrigerants for smaller applications. End users don't want to invest in equipment that may need replacing or retrofitting in the next five to ten years. Natural refrigerant solutions provide certainty in terms of not being subject to any future phase down or restriction on uses.

Developments in natural refrigerant technology have also helped to grow interest as it has meant that natural refrigerant components and equipment have become more affordable. Particularly carbon dioxide systems are price attractive and have therefore resulted in growing numbers, for example in retail and commercial applications. Natural refrigerants are a viable alternative to synthetic solutions also for small capacity systems.

5. **In your opinion, which topics require the most information on the market to convince the decision-makers of the long-term profitability of natural refrigerants?**

Rob Lamb: Demonstrating a reasonable return on investment with natural refrigerant systems and also the uncertainty over synthetic refrigerants are to two key drivers in convincing customers to move to natural refrigerants. Whilst initial cost may be higher, when all aspects of the life cycle cost are considered including efficiency, longevity and long term availability, natural refrigerants make sense.

Picture:

Picture 1:

Dr. Robert Lamb, Group Sales & Marketing Director, Star Refrigeration Ltd.

About eurammon

eurammon is a joint 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 companies and institutions with a vested interest in natural refrigerants, as well as to individuals e.g. scientists and researchers.

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