



April 2009

International Institute of Refrigeration  
Institut International du Froid

## Editorial

The IIR is introducing changes. It has to change in order to meet the needs of its member countries, corporate and private members and clients.

Its services must constantly evolve in line with new information technology as it becomes available.

This is easier said than done. The IIR has launched three simultaneous actions:

- a survey of Delegates of IIR member countries. The IIR's Management Committee has confirmed, following a strategic-planning process in 2008, that the IIR must remain above all an intergovernmental organization: the challenges ahead of us in the fields of food safety and health, along with climate change, are challenges that governments must place in the very core of their policies. This is why the IIR services provided to its member countries must meet their current needs. It is also important to maintain member-country contributions and services that encourage countries to pay on a regular basis and at a level reflecting their economic importance.
- a survey of our Web site users, conducted with a view to identifying users' needs in terms of information services and medium for knowledge providing; please feel free to fill in the on-line questionnaire: [www.iifir.org](http://www.iifir.org).
- complete renewal of the IIR's information system. The aims of this computer project are to make available on-line the greatest possible number of documents abstracted in the IIR's Fridoc database (85 000 references today, making it by far the largest specialized database in our sector, with articles from all over the world), to open up access to all our Web site users instead of confining access to members, and to facilitate on-line payment.

Of course, this opening up to all users will be offset by free downloads for IIR members; beyond Fridoc, a wider range of tailored services and products according to IIR members' needs will be available thanks to an on-line portal. The benefits for corporate and private members will be even better.

I hope that these changes, the scope of which will be defined during statutory meetings in June 2009 before being implemented in 2009-2010, will enable everyone to receive modern, high-quality services.

**Didier Coulomb**  
Director of the IIR



*L'IIF bouge. L'IIF doit évoluer en fonction des besoins de ses pays membres, membres collectifs et individuels et clients.*

## IIR focus

### New decisions on environmental issues

■ Environmental issues will certainly continue to be the main driver of evolution in the refrigeration sector in the coming decades. Newsletter No. 37 mentioned new orientations decided during the latest United Nations conferences on the ozone layer and climate change. New decisions have been taken in the European Union (EU) and in the USA which will reinforce these orientations:

- The EU confirmed its decisions regarding HCFCs: prohibition of the use of new HCFCs in all equipment after the end of 2009, ban on the refilling of equipment (including with recycled fluids) with HCFCs after the end of 2014.

It confirmed its target of a 20% reduction in its greenhouse gas emissions by 2020 compared to 1990 levels and its target of a 30% reduction provided that other countries make efforts (comparable cuts from other developed countries, significant efforts from emerging countries).

It also announced that part of the Copenhagen agreement (to be discussed during the next UN Conference on Climate Change, which will be held in Copenhagen, Denmark, in December 2009) should include "an international emission reduction arrangement for HFC emissions".

*Ses services doivent s'adapter toujours davantage aux possibilités offertes par les nouvelles technologies de l'information.*

*C'est simple à proclamer. C'est plus délicat à mettre en oeuvre. L'IIF a engagé trois démarches en parallèle :*

- Une enquête auprès des Délégués des pays membres. Le Comité de Direction a en effet confirmé, à la suite notamment d'un séminaire sur la stratégie de l'IIF, tenu en 2008, que l'IIF devait rester en premier lieu un organisme intergouvernemental : les défis qui nous attendent en matière de sécurité alimentaire et de santé, en matière de climat, sont des enjeux que les gouvernements doivent placer au coeur de leurs politiques. Il importe donc que les services offerts par l'IIF à ses pays membres répondent bien à leurs besoins actuels. Il faut aussi maintenir un système de contributions et de services qui incite les pays à payer leur contribution régulièrement et au niveau correspondant à leur importance économique

- une enquête auprès des visiteurs du site Web afin de nous permettre d'identifier leurs besoins en termes de services d'information et de support de diffusion ; nous vous invitons à remplir le questionnaire disponible en ligne : [www.iifir.org](http://www.iifir.org).

Several European countries have more stringent targets: Austria (for numerous refrigeration applications) and Denmark have already banned HFCs. Germany is considering subsidizing of new commercial refrigeration installations running on natural refrigerants (CO<sub>2</sub>, NH<sub>3</sub>, hydrocarbons) and subsidizing at a higher level (25% of the net investment cost) existing installations using natural refrigerants than those using fluorinated refrigerants (15%).

- In the USA, the US Environmental Protection Agency (EPA) proposed in January 2009 two rules restricting the availability and use of HCFCs: the first rule proposes to set HCFC production and import limits for the period 2010-2014 in order to meet the 2010 phase-down caps under the Montreal Protocol (see Newsletter No. 33); the second rule would ban by January 1, 2010 the sale or distribution of pre-charged refrigeration products and components manufactured after January 1, 2010, containing HCFC-22, HCFC-142b or blends containing them. By January 1, 2020, production and import of all HCFCs will be banned, as required by the Montreal Protocol.

The American Clean Energy and Security Act of 2009 discussion draft\* considers a gradual phase-down of HFC – including HFC-134a – and HFO (hydrofluoroolefin) consumption – including HFO-1234yf –

*- une rénovation complète du système documentaire de l'IIF. Le projet informatique a pour objectif en particulier de rendre accessible en ligne le plus possible de documents contenus dans la base de données Fridoc (85 000 références aujourd'hui, ce qui en fait de loin la première base de données spécialisée dans ce secteur, avec des articles du monde entier) ; d'ouvrir l'accès de la base à tous les visiteurs du site Web et non plus seulement aux membres de l'IIF et de faciliter le paiement en ligne. Bien entendu, cette ouverture à tous sera compensée par des téléchargements gratuits pour les membres de l'IIF ; au-delà de Fridoc, un portail d'information en ligne offrira un éventail plus large de services et produits personnalisés selon les besoins des membres de l'IIF. Les avantages aujourd'hui offerts aux membres collectifs et individuels seront encore meilleurs.*

*J'espère que ces changements, dont les orientations seront précisées lors des réunions statutaires de juin 2009 et dont la mise en oeuvre sera faite en 2009-2010, permettront d'offrir à tous des services modernes et de qualité.*

**Didier Coulomb**  
Directeur de l'IIF

between 2012 (96% of baseline consumption) and 2038 (15%).

Of course, these new proposals need to be adopted by the government. There could be several approaches: measures on containment of fluids, such as the F-gas Regulation in Europe; progressive bans for certain applications where leakage is high (e.g. mobile air conditioning...) and for refrigerants with high GWPs, general bans...

- Other developed countries such as Australia intend to accelerate the phase-out of HCFCs earlier than stipulated by the Montreal Protocol and to reduce the use of HFCs (through higher prices) in the near future: see Newsletter No. 37.

2009 will be a key year for the future of refrigerants and for energy efficiency. We must bear in mind that 80% of the environmental

impact of refrigeration and air conditioning is due to energy consumption. New rules on energy labelling are being prepared, for example in the European Union (see below). The economic crisis will not reduce the addressing of environmental issues in our sector.

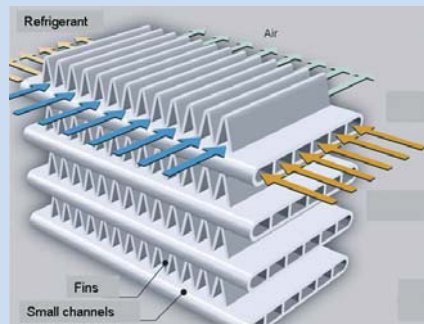
\*[http://energycommerce.house.gov/Press\\_111/20090311/acesa\\_discussiondraft.pdf](http://energycommerce.house.gov/Press_111/20090311/acesa_discussiondraft.pdf)

## IIR events

### International events



■ The 1<sup>st</sup> IIR Workshop on Refrigerant Charge Reduction in Refrigerating Systems was held in Antony, France, on April 6-7, 2009. Besides charge reduction, key topics covered included enhancement of heat and mass transfer; pressure and oil issues and frosting and plugging. With 54 participants, 2 keynote presentations, 18 papers and 6 industrial presentations, this first edition was highly appreciated, and the second event in the series is already being planned: it will be held in Valencia, Spain, in 2011. Keep updated: [www.iifir.org/en/conferences.php?rub=1](http://www.iifir.org/en/conferences.php?rub=1)



■ The First International Scientific Conference on Industrial Gases was held at Bauman Moscow State Technical University (MMSTU) in Moscow on March 11, 2009, under the auspices of the IIR. It marked the 100<sup>th</sup> anniversary of the First Congress of Russian Refrigeration Engineers. Over 70 Russian and foreign scientists, industrial experts, researchers and students attended the event. Prof. A. Arkharov and Dr V. Chrz headed the organizing committee. Nineteen papers covering a broad range of industrial gas topics were presented. The second event in the series will be held in March 2011. [www.cryogen-expo.com](http://www.cryogen-expo.com)



■ The 12<sup>th</sup> European Cold Chain Logistics Education Program took place in Amsterdam on January 26-27, 2009 and attracted over 160 participants from 24 countries. Thirty-one presentations covered a wide range of logistics issues including ways of adapting to the current economic situation, solar technology, automated loading and unloading systems, ammonia safety and human factors in the cold-storage sphere. [www.wflo.org/hq/europeaneducation](http://www.wflo.org/hq/europeaneducation)



■ was held at Kintex in Koyang City, near Seoul, South Korea, on March 18-21, 2009. 20 000 visitors discovered a broad range of products on 176 stands. Thanks to KRAIA (Korea Refrigeration and Air conditioning Association), the IIR ran a stand throughout the show. The Korean National Committee for the IIR staged the Third Korean Congress of Refrigeration in conjunction with HARFKO: 32 papers were presented. [www.harfko.com](http://www.harfko.com) [www.kraia.or.kr](http://www.kraia.or.kr)



The opening ceremony

■ The IIR took part in yet another successful RAC Exhibition (6000 visitors and 186 exhibitors) in Birmingham in February 2009 thanks to the UK Institute of Refrigeration (IOR). Compliance with the F-gas Regulation was a key focus of the exhibition and the IOR provides constantly updated information on approved training centres and has launched Real Zero – Refrigerants emissions and leakage zero: [www.realzero.org.uk](http://www.realzero.org.uk) [www.ior.org.uk](http://www.ior.org.uk) The UK Department for Environment, Food and Rural Affairs was also on hand at the RAC show to assist visitors seeking advice on F-gas strategy: [www.defra.gov.uk/environment/air-atmos/fgas/index.htm](http://www.defra.gov.uk/environment/air-atmos/fgas/index.htm)

### Conference update

A record number of IIR events will be held in 2009 and there's something for everyone!



■ The next conference in a series of leading-edge IIR events on ammonia is to be held in Ohrid, Macedonia, on May 7-9, 2009: **Ammonia Refrigeration Technology**. [ristoci@ukim.edu.mk](mailto:ristoci@ukim.edu.mk) [www.mf.ukim.edu.mk/web\\_ohrid2009/ohrid-2009.html](http://www.mf.ukim.edu.mk/web_ohrid2009/ohrid-2009.html)



■ The 3<sup>rd</sup> International Conference on Magnetic Refrigeration at Room Temperature will take place in Des Moines, USA, on May 12-15, 2009. Register for this cutting-edge event: [vtkp@ameslab.gov](mailto:vtkp@ameslab.gov) [www.ucs.iastate.edu/mnet/thermaghome.html](http://www.ucs.iastate.edu/mnet/thermaghome.html)



■ The 8<sup>th</sup> Conference on Phase-Change Materials and Slurries is to be staged by the IIR working party in this field in Karlsruhe, Germany, on June 3-5, 2009.

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■ The 3<sup>rd</sup> Conference on Thermophysical Properties and Transfer Properties of Refrigerants is to take place in Boulder (CO) USA on June 23-26, 2009. Submit a paper and register: [piotr.domanski@nist.gov](mailto:piotr.domanski@nist.gov) or [mark.mclinden@nist.gov](mailto:mark.mclinden@nist.gov) [www.iirboulder2009.org](http://www.iirboulder2009.org)



■ For an update on the state of the art in the compressors field, register for the 7<sup>th</sup> International Conference on Compressors and Coolants – Compressors 2009 to be held in Casta Papiernicka, Slovak Republic, on September 30-October 2, 2009. Present a paper and register: [zvazchkt@isternet.sk](mailto:zvazchkt@isternet.sk) [www.isternet.sk/szchkt](http://www.isternet.sk/szchkt)



■ The IIR-co-sponsored 47<sup>th</sup> AICARR International Conference will be held in Rome on October 8-9, 2009. REHVA and ASHRAE are also-co-sponsoring this event. For full details: [convegnoroma@aicarr.it](mailto:convegnoroma@aicarr.it) [renato@gest.unipd.it](mailto:renato@gest.unipd.it) [www.aicarr.it](http://www.aicarr.it)

■ The 1<sup>st</sup> IIR Cold Chain Conference that was scheduled to take place in Singapore on April 27-29, 2009 is postponed. It will be held at another venue: for updates, check out [www.airah.org.au/iir-coldchain09.asp](http://www.airah.org.au/iir-coldchain09.asp)



■ The 9<sup>th</sup> IIR Gustav Lorentzen Conference Natural Working Fluids will be held in Sydney, Australia, on April 12-14, 2010. The call for papers and first announcement are now available: [www.airah.org.au/iir-gl2010.asp](http://www.airah.org.au/iir-gl2010.asp). The conference will focus on the latest research results and advances related to the use of natural refrigerants in refrigeration, air conditioning, heat pump systems, case studies; reduction of emissions. The main themes will include: natural primary refrigerants; secondary coolants and ice slurries; low emission and low charge (HFC) systems; sorption systems; non-conventional systems; heat transfer and fluid flow; energy use and energy efficiency. Papers are being sought on the following key topics: hydrocarbons, ammonia, CO<sub>2</sub>, water, air, indirect cooling, commercial and industrial refrigeration, emissions and energy savings, district cooling and heating, sorption systems, lubricants, sustainable heating and cooling with CO<sub>2</sub>, CO<sub>2</sub> in hot climates, CO<sub>2</sub> heat pump systems, heat transfer and heat exchangers.

## Valuable publications

■ **Refrigeration Fundamentals:** this IIR course deals with refrigeration fundamentals, components of refrigeration plants, the refrigerants and lubricants used, and control systems. It is an attractive and valuable teaching tool that technicians and engineers will find highly useful. Available in CD-ROM and paper versions: [www.iifir.org/en/details.php?id=1055](http://www.iifir.org/en/details.php?id=1055)

■ A new edition of **Refrigeration and Air Conditioning**, fully revised and updated by Guy Hundy, was published in July 2008. This 392-page book is an introductory text and is ideal for new entrants to the industry, particularly suited to students and those coming from other disciplines. Contents include theory basics, refrigerant properties, refrigeration cycles, pressure enthalpy charts and psychometrics. The book enables the reader to gain an insight into the requirements for designing, installing and maintaining efficient and cost-effective equipment. [www.elsevierdirect.com/product.jsp?isbn=9780750685191](http://www.elsevierdirect.com/product.jsp?isbn=9780750685191)

## New IIR members

■ The IIR welcomes the following new members:

### Corporate members

Liebherr-Hausgerate Ochsenhausen GmbH, Ochsenhausen, Germany  
Shrieve Products International Ltd, West Malling, Kent, United Kingdom  
Refrigeration Solutions (Pty) Ltd, Cape Town, South Africa  
Institute of Mechanics & Engineering of Szent Istvan University, Godollo, Hungary  
Mayekawa Europe Nv, Zaventem, Belgium  
Diversified Laboratory Repair Inc, Gaithersburg MD, United States  
Tecumseh do Brazil Ltda, Sao Carlos SP, Brazil

### Private members

Mr Charlie M. Noseworthy, China  
Mr Peter Rindler, Italy  
Mr Erik Melis, Belgium  
Mr Olivier Gorieu, Norway  
Mr Yu Hou, China  
Mr Christian Garnier, Italy

### Junior members

Mr Yunusa Iyanda Ogunbi, Nigeria  
Mr Ambadas Bhaguji, India  
Ms Cristina Mariaka Orozco, France  
Mr Chuan Cheng Wang, Taiwan

## News from IIR members



■ **Tecumseh do Brasil** has reached a landmark of 170 million compressors manufactured since the company was set up 35 years ago. The company manufactures hermetic compressors and condensing units for domestic and commercial refrigeration and air conditioners, above all for the American, European, African and Asian markets. With a capacity for 17 million units/year, Tecumseh exports 60% of its production to more than 60 countries, generating around 5100 direct jobs and hundreds of indirect jobs. On March 26, 2009 a special celebration was held to mark the company's 35<sup>th</sup> birthday. In 2009, Tecumseh Brazil sales on the domestic and Latin American markets will be higher than last year. [www.tecumseh.com.br/english/noticias/noticias.asp?id=116](http://www.tecumseh.com.br/english/noticias/noticias.asp?id=116)

■ **Danfoss** won the **2009 AHR Exposition Refrigeration Innovation Award**. The honoured product is a newly developed energy-saving variable frequency drive for compressors, pumps, and fans. In refrigeration applications, the AKD 102 constantly matches compressor output to demand, resulting in a higher COP. Pumps and fans become major opportunities for energy savings with the AKD 102 drive because they consume power according to the Affinity Law. This principle of physics states that when power is used to drive a rotating shaft, energy

use is proportional to the cube of shaft speed. By load matching, fans designed for peak load can successfully perform at reduced speed about 85% of the time, resulting in huge energy savings. Danfoss is the first company to receive two Innovation Awards in one year. The second award was for development of the Apexx VSH variable speed R-410A scroll compressor for commercial air conditioning. [www.danfoss.com](http://www.danfoss.com)  
[www.ahrexpo.com](http://www.ahrexpo.com)

■ **Air Liquide** and **VitalAire** are launching a new, personalized support programme for sleep apnoea patients. This disorder affects 1.5 million people in France, and 5% of the world's adult population. Eight out of 10 persons suffering from this condition are unaware of it. Untreated sleep apnoea multiplies by six the risk of road accidents and coronary accidents and it can lead to numerous other disorders (diabetes, metabolic syndrome, depression, behavioral problems, etc.). The standard treatment for is Continuous Positive Airway Pressure (CPAP), and is provided in the patient's home. [www.airliquide.com](http://www.airliquide.com)

■ **Linde Gases** recently signed an agreement with Stena Aluminium in Sweden for the installation of its low-temperature Oxyfuel technology. Stena is a major aluminium producer and will boost productivity thanks to the Oxyfuel solution: the technology will more efficiently supply the energy needed for dissolution of added alloys and superheat the melt. Emissions of greenhouse gases, CO<sub>2</sub> and NO<sub>x</sub> will also be reduced. The technology typically boosts capacity by up to 30-50%, delivering uniform furnace temperatures to avoid hot spots, and reducing fuel consumption and emissions by up to 50%. [www.linde.com](http://www.linde.com)

■ Mr Roger Genet has been appointed new General Director of **Cemagref**, a leading French research organization in the sustainable land and water management field, benefactor member of the IIR. He replaces Mr Pascal Viné. [www.cemagref.fr](http://www.cemagref.fr)

## In the news

### Markets

#### ■ LNG market

According to Andy Flower, an energy consultant, the global LNG market would maintain an average 12% annual growth until 2012 but should see a shortfall of about 120 million tonnes by 2020. Global LNG trade fell last year for the first time since 1981. Nearly half of the additional production expected between 2009 and 2012 (95 million tonnes) will be in Qatar. Russia will add about 9.6 million tonnes and Algeria about 9.2 million tonnes. Flower said forecasts beyond 2012 were difficult but estimated that the global market might grow by 5% between 2013 and 2020. About 270 million tonnes per year new capacity is planned, 70% of which will be in Australia, Nigeria, Iran and Russia, but these

countries need to address environmental and other issues before launching new facilities. With an extra supply of about 25 million tonnes this year, prices could drop if there is insufficient growth in the market. [www.gulf-times.com](http://www.gulf-times.com)

#### ■ Refrigerated road transport: facts and figures

According to a recent TechNavio Insights study on the UK refrigerated road transport market study, the estimated total number of refrigerated road transport vehicles in the UK, in 2008, was around 140 000. Of these, 43% (60 000) were vans and 35% (45 000) were trailers, and the remaining 25% (35 000) were trucks. Use of semi-trailers as compared to trailers has increased over the last five years, because they are low-cost, more portable and less cumbersome. The number of vehicles in the UK is expected to grow at an average rate of 2% per annum until 2012. Around 72% of the fleet is rented and 28% is owned, generally by large retail companies.

Most refrigerated transport road vehicles in the UK now use R-404A. The global road freight transport is expected to grow 2.5% per year until 2030. Europe handles 20% of total global freight, 3% of which is refrigerated. Currently there are around 12 million refrigerated vehicles, including vans, trucks (both of which use compressors running on the engine of the vehicle), semi-trailers or trailers (with self-contained refrigeration units). North America has the largest share of refrigerated vehicles (around 60%), followed by Europe, with 20%. [www.reportlinker.com/p0109161/](http://www.reportlinker.com/p0109161/)

### Impacts of the economic crisis

■ It is difficult to assess the exact effects of the recession on the refrigeration sector. However, some predictions or figures are of interest.  
- In a report dated February 2009, SummitSkills looks at the potential impacts of the recession in the UK on the building

services engineering (BSE) sector, including refrigeration and air conditioning, in 2009. Fifty-six BSE consultancy companies took part in the research. Most of them (61%) expect the recession to last for two years, until the end of 2010. SummitSkills estimates that out of 27 821 operatives in refrigeration and air conditioning in 2008, there could be between 18% job losses in the best case and 42% in the worst case in 2009. These figures are in line with job losses predicted for the whole BSE sector.

- Regarding air conditioning, according to JARN, Europe is probably the most severely affected area. Industry insiders predict that the European market will be reduced by more than 30% in 2009, with the exception of a few countries such as Turkey. The US market is also predicted to decrease markedly in 2009: by 25% for unitary equipment and 30% for window-type equipment. The Chinese and Japanese air-conditioning markets could be less affected: about -5% in 2009.

- Moreover, during the 12<sup>th</sup> Cold Chain Logistics Education Program in Amsterdam (see above), despite the economic recession, European cold store and refrigerated warehouse operators were moderately optimistic about the future. They considered that until now, the current crisis has not yet had a negative effect on the industry and a majority of the warehouse operators present at the event indicated that they expected to increase revenue this year. This optimism is based on the growing demand for frozen food, lower energy prices, decreased energy consumption, and increasing demand for services of third-party logistics (3PL) specialists.

[www.summitskills.org.uk/cgi-bin/go.pl/news/article.html?uid=435](http://www.summitskills.org.uk/cgi-bin/go.pl/news/article.html?uid=435)

JARN, January 25, 2009 <http://scanref.com>

### ■ Reduced cooling and heating might improve health

Results of a study performed by Berkeley Lab. – a US Department of Energy national laboratory – suggest that operating buildings in ways designed to save energy – with indoor temperatures slightly cooler in winter and warmer in summer – does more than just save energy. It improves the health of the occupants and makes them more comfortable. The study collected standard measurements on factors such as temperature and humidity during one week in either summer or winter in a representative set of 95 air-conditioned office buildings across the US. In winter, the researchers found that the buildings were kept mostly within the recommended temperature range, but in summer, building temperatures were on average below the comfort range. Surprisingly, buildings were on average kept even cooler in summer than in winter, by almost 0.5°C. In summer, symptoms such as headache, fatigue and difficulty concentrating were increased by over 50% for the occupants of the buildings kept below 23°C (almost half the buildings measured in summer). In winter, buildings with indoor temperatures above 23°C were associated with 30 to 80% increases in building-related nose, eye and skin symptoms and headache.

“As we look for ways to save energy, these results suggest a potential win-win situation,”

said Mendell, co-author of this study. “Our findings suggest that energy efficiency and keeping buildings healthy and comfortable for the occupants are not necessarily in conflict. Less summer cooling in air-conditioned buildings and less winter heating in heated buildings might reduce energy use in buildings substantially, yet have health benefits for the occupants that we did not expect, and still keep occupants as comfortable as before, or even more comfortable.”

<http://newscenter.lbl.gov>

## Briefs

### ■ Improved containment

According to recent analysis\*: “although there is a wide variation between countries, the annual emission rate of most of the fluorinated gases used in refrigeration have improved significantly in Europe over the past 10 years and now represent between 5 and 10% of the bank still contained in equipment”. In the 1980s, this figure was above 30%. “This implies that it would take between 10 and 20 years for the original mass of refrigerant charged into a system to be released in the atmosphere”. This conclusion was obtained from the reports submitted by European countries on their annual calculated emissions of greenhouse gases as part of their commitments under the Rio Convention.

\* McCulloch A. Evidence for improvements in containment of fluorinated hydrocarbons during use: an analysis of reported European emissions. *Environmental Science & Policy*. April 2009.

### ■ Hydrocarbon refrigerators soon in the US?

General Electric announced that it had submitted information to the Environmental Protection Agency (EPA) in connection with a request for approval to use isobutane, a hydrocarbon, as a refrigerant in household refrigerators. The petition was filed under the Significant New Alternatives Policy (SNAP) programme which evaluates alternatives to substances being phased out under the Clean Air Act for protection of the stratospheric ozone layer. Isobutane has been widely used in household refrigerators in Europe and parts of Asia for several years. EPA approval for the use of isobutane in US household refrigerators would allow, for the first time, use of a hydrocarbon refrigerant as a substitute for HFCs. Upon gaining EPA approval, GE plans to include isobutane in a new refrigerator currently in development for introduction in early 2010. The refrigerator will also use cyclopentane, another hydrocarbon, as the insulation foam-blowing agent to replace commonly used HFC foam-blowing agents.

[www.ecohomemagazine.com](http://www.ecohomemagazine.com)

■ In order to promote preventive measures against global warming on a worldwide scale, it is imperative to explore the behaviour of greenhouse gases that cause global warming. The Greenhouse Gases Observing Satellite **IBUKI** (GOSAT) is a collaborative project involving JAXA, the National Institute for Environmental Studies (NIES), and the Ministry of the Environment (MOE). IBUKI is the world's first satellite used to observe global greenhouse gases from space. IBUKI's mission is to provide updated data every 3 days (to be made available free of charge)

and to monitor changes in the effects of greenhouse gases. IBUKI is fitted with a high-precision sensor and uses 56 000 observation points to track the movement and absorption of greenhouse gases. IBUKI will fly around the Earth in about 100 minutes. This means that it can acquire data from a staggering number of observation points compared to observations from ground stations or by airplanes. Take a look at the Earth breathing and find out more: [www.jaxa.jp/countdown/f15/overview/ibuki\\_e.html](http://www.jaxa.jp/countdown/f15/overview/ibuki_e.html)



### ■ Permafrost: a glimpse of Alaska's History

In 1963, the Alkirk miner, an experimental tunnelling machine, was tested on the permanently frozen silt, sand and gravel of Hill 456, 10 miles north of Fairbanks, Alaska. The result was a man-made permafrost tunnel that runs 360 feet deep into 40 000 year old frozen soil, the only one of its kind in the Western hemisphere. One-fifth of the Earth's land area conceals a permafrost layer. Refrigeration units keep the tunnel artificially cooled, especially near the entrance, but despite this, the tunnel's ice tends to disappear due to sublimation. The tunnel makes it possible to observe various features of permafrost: roots of the remains of Pleistocene plants and of a steppe bison, a species extinct for at least 8000 years, are clearly visible in the tunnel surface. Scientists are working on a fungus that grows at temperatures below freezing. The ice wedges that form in cracks and the other types of ice formation come under special scrutiny: a team of Japanese and American scientists managed to produce live bacteria from a 25 000-year-old ice wedge. Geochemist Tom Douglas claims that the ice can help understand global warming. Douglas envisions a tunnel open to visitors, with a glass casing to protect the walls.

[www.alaskamagazine.com](http://www.alaskamagazine.com)

**JARN** ■ Japan Air Conditioning, Heating and Refrigeration News has launched an on-line version. Check it out! [www.ejarn.com](http://www.ejarn.com)

## Out of the ordinary



### ■ Funky flatshare fridges

Realizing that flatsharers sometimes find it difficult to share fridges, Electrolux has developed a tailored solution: stackable, colorful, multi-cabinet fridges. This design is not only practical: it's funky!

[www.tuvie.com/electrolux-flatshare-fridge-stackable-fridge-by-stefan-buchberger](http://www.tuvie.com/electrolux-flatshare-fridge-stackable-fridge-by-stefan-buchberger)

■ Cool music in an igloo: listen to Terje Isungset and his orchestra <http://news.bbc.co.uk/1/hi/world/europe/7911661.stm>

The ice instruments would melt under normal concert conditions, so the Norwegian group records and gives concerts in cold places such as the Ice Hotel in Jukkasjarvi, Sweden, and an artificial igloo at a ski resort in Northern Italy. The group has produced *Iceman* is, a CD of its ethereal music. <http://home.online.no/~isungz/CD.htm>



## Technology

### Refrigerated storage trends

■ Several cold store building projects illustrate trends currently observed in the refrigerated storage field:

- by building in Harnes the largest cold store in **France**, frozen chip producer Mc Cain intends to house under one roof in April 2010 its stocks spread over 8 smaller local cold stores. This will lead to a considerable reduction in transport costs. Thanks to this unique high-density central store – 112 m long, 100 m large and 38 m high, with a total capacity of 68 000 pallets – and the use of the most advanced building techniques available, the costs for energy are expected to be 45% less than existing situations in conventional stores. At a temperature of -24°C, 9 cranes in 7 aisles and 2 main warehouse areas will automatically handle frozen food such as French fries. Automated roll and chain conveyors over 700 m long will link the two main areas and ensure fast flow of products between production, incoming goods, the storage warehouse, picking zones and distribution.

- Inland Cold Storage has just opened a state-of-the-art warehouse facility in Stockton, California, **US**. This 12 000 m<sup>2</sup> distribution centre with a capacity of 15 200 fully racked pallet positions includes the following: storage for both frozen and refrigerated foods, from -20 to +45°C, an enclosed refrigerated 18-m dock with 20 dock doors, RFID scanning and real time inventory tracking.

- EastPack, one of the largest kiwi fruit pack houses in **New Zealand** was the first to implement the new RFID and indoor vehicle management supply chain solution from Peacock Bros. which continuously tracks the movement of all the fork lift vehicles and pallets within centimetres. This continuous monitoring allows full inventory reporting on where the stock is located, quantity, expiration date, as well as analysing the performance of indoor vehicles to ensure optimal efficiencies within the warehouse.

[www.sdexec.com](http://www.sdexec.com) [www.recordnet.com](http://www.recordnet.com)  
[www.ferret.com.au](http://www.ferret.com.au)

### Temperature tracking in real time

■ Refrigeration transport companies are increasingly introducing temperature tracking systems. **Pomona Terre Azur**, located in Brittany, France, launched embarked Masternaut computer technology in 22 lorries in 2008. The computers are linked to a Mastercold temperature monitoring system. The lorries deliver chilled goods to caterers and the system aims at keeping customers informed about delivery times and obtaining temperature curves in real time. The cold chain control system completes the GPS (Global Positioning Service) and staff monitoring systems. Data from probes is sent via GPRS (General Packet Radio Service) systems to information storage and processing servers and any abnormal sign triggers an automatic alarm.

Also in Brittany, another precursor, **Scarmor**, which delivers fresh produce and dry frozen products to around 40 shops, has been testing the Elomobile solution on 2 lorries over the last year and extended its use to 6 other vehicles in February 2009. The main aim is to alert drivers in real time as soon as an abnormal temperature is recorded. Thus, the staff do not have to make manual temperature recordings during the night. E-mail or text alerts are envisaged. If the system is connected to a computer, the probes send temperature recordings to the driver's cabin via active RFID labels. Where the system is self-contained, it sends data via radio to the transporter.

*Supply Chain Magazine*, March 2009

### "Smart" fridges

■ "Smart" fridges that stay cool by talking to each other, run on renewable electricity (photovoltaics, wind turbines) and are capable of negotiating the most energy efficient way to keep food cold have been developed by researchers from CSIRO's Energy Transformed Flagship. The fridges work as a network of distributed fridges, each with control technology that allows them to communicate with each other via a network to share and store the energy provided by renewable-power generators.

The fridges work together to decide when to cool down, and thus consume power, based on how much surplus power will be available. They anticipate power shortages and change their running schedules accordingly to use as little power as possible during these times. The fridges can also store energy: the surplus electricity produced by solar panels can be used to lower the fridge temperature a few degrees more than necessary to create a thermal energy store which will keep the fridge's contents cold during the night. CSIRO emphasizes that using less electricity is always preferable to generating more and is the simplest way to reduce greenhouse gas emissions. CSIRO is currently seeking commercial partners to further develop the technology. [www.csiro.au](http://www.csiro.au)

### Briefs

■ **Open units or with glass doors?**

When glass doors are used in refrigeration

units, the energy savings are as a rule indicated as being "up to" 40%. Very often these figures are based on experience in a typical climate (25°C and 60% air humidity) with standard opening frequencies of 6 openings per hour. But how high are the savings under market conditions and higher opening frequencies? The results of a comprehensive test series run by the Hauser Company which were presented at the DKV conference in Ulm, Germany, are a useful decision-making aid for supermarket operators. They show that using glass doors in refrigeration units allows significant energy savings; however, several parameters which can increase the payback time are to be taken into account, particularly the need to design the system for maximum temperatures and air humidity in the summer and for maximum door opening frequency. Moreover, if all wall-mounted refrigeration shelves in a food market were fitted with glass doors, it must be remembered that temperatures can be very high in the summer and consequently the incorporation of an air-conditioning system becomes absolutely essential, but leads to high additional costs. Finally, the study suggests that in many cases, using glass doors really makes sense with temperature-sensitive products like minced meat or other meat products but is not really cost-effective with dairy products.

[www.refripro.eu/index.php?lg=en&id\\_actu=0323](http://www.refripro.eu/index.php?lg=en&id_actu=0323)

■ **Optimized freight hub**

A new temperature-controlled freight hub in Christchurch International Airport, New Zealand, was opened by Hellmann Worldwide Logistics on March 12, 2009. "The facility has been predicated on environmental, efficiency and energy-conscious criteria and reinforces a commitment to customers and the perishable and ambient logistics industry", explains Hellmann Managing Director Chris McCagney. This optimized plant, which represents an investment of about 1 million USD, predominantly uses ammonia as the primary refrigerant with glycol as the secondary fluid. McCagney says "We have invested considerably in an optimized heat transfer system so that we spend less energy in cooling the primary refrigerant, and in an energy-efficient water cooling system as opposed to a traditional energy-hungry air cooling system. So, in addition to reduced carbon emissions, our facility will use between 15-20% less power than traditional plants."

The facility has a 700 m<sup>2</sup> enclosed canopy for all-weather handling and high-speed roller doors leading into the 6-m-high cool-chain area, which includes a 330 m<sup>2</sup> environmental loading area into which all products are received. Alongside are two 100 m<sup>2</sup> chillers and a 60 m<sup>2</sup> pallet-racked-freezer running at -18°C for temporary storage where shipments are held pending delivery to the airlines or container loading. The facility can hold 8 reefer containers on power at any one time and is capable of holding 1500 ambient pallet equivalents in secure high-stud racking.

[www.scoop.co.nz/stories/BU0903/S00223.htm](http://www.scoop.co.nz/stories/BU0903/S00223.htm)

■ In Newsletter No. 35, we reported on research, especially at Purdue University, on the design of miniature evaporators and compressors. Still in the testing phase, but already considered a technological innovation,

# IIR Agenda

## IIR conferences

2009	May 7-9	Ohrid Macedonia (FYROM)	<b>Ammonia Refrigeration Technology</b> Risto Ciconkov: ristoci@ukim.edu.mk www.mf.ukim.edu.mk/web_ohrid2009/ohrid-2009.html	<b>IIR Conference</b> B2 with B1, D1
	May 11-15	Des Moines United States	<b>3<sup>rd</sup> International Conference on Magnetic Refrigeration at Room Temperature</b> Vitalij K. Pecharsky: vitkp@ameslab.gov www.ucs.iastate.edu/mnet/thermag/home.html	<b>IIR Conference</b> A1, B2, E2
	June 3-5	Karlsruhe Germany	<b>8<sup>th</sup> Conference on Phase-Change Materials and Slurries</b> Stefanie Tolmie: stefanie.tolmie@hs-karlsruhe.de Laurence Fournaison: laurence.fournaison@cemagref.fr Fax: +49 721 925 1915 www.hs-karlsruhe.de/servlet/PB/menu/1081092/index.html	<b>IIR Conference</b> B1, B2, D1
	June 23-26	Boulder United States	<b>3<sup>rd</sup> Conference on Thermophysical Properties and Transfer Processes of Refrigerants</b> Piotr Domanski: piotr.domanski@nist.gov Mark McLinden: mark.mclinden@nist.gov Fax: +1 301 9758973 www.IIRBoulder2009.org	<b>IIR Conference</b> B1
	Sept. 30 - Oct. 2	Castá Papiernicka (Slovak Republic)	<b>7<sup>th</sup> International Conference on Compressors and Coolants - Compressors 2009</b> Peter Tomlein: zvazchkt@isternet.sk Fax: +421 2 45646971 www.isternet.sk/szchkt	<b>IIR Conference</b> B1, B2 with E1, E2
2010	April 12-14	Sydney Australia	<b>9<sup>th</sup> IIR-Gustav Lorentzen Conference on Natural Working Fluids (GL2010)</b> David Leach: david@airah.org.au Fax: +61 3 9614 8949 www.airah.org.au	<b>IIR Conference</b> B1, B2 with E1, E2
	August 21-26	Prague Czech Republic	<b>23<sup>rd</sup> IIR International Congress of Refrigeration: Refrigeration for Sustainable Development</b> Ladislav Cervinka: icaris@icaris.cz	<b>IIR Congress</b> All Commissions
2011				

Embraco's new miniature compressor (one model fits in the palm of the hand) can be used in a range of applications, such as information technology, telecommunications, equipment for the medical and military areas, among others. It uses R-600a or R-134a as a refrigerant. The product is forecast to be available on the market in March 2010.  
<http://scanref.com/news-archive.html>



**■ Impact of shade trees on electricity use**  
A recent study conducted on 460 single-family homes in Sacramento, California, shows that shade trees on the west and south sides of a house can reduce the summer electricity bill by about USD 2500 a year. Of course, the fact that shade can reduce air-conditioning needs is not groundbreaking news, but this study is the first to give precise facts and figures on several aspects such as optimal tree locations. For instance, a tree planted on the west side of a house can reduce net carbon emissions from summertime electricity use by 30% over a 100-year period.  
[www.sciencedaily.com](http://www.sciencedaily.com)

## Regulations-Standardization

### European Union

**■ New EU energy labelling rules and efficiency requirements will apply to household equipment including refrigerators and freezers, after a committee of experts approved them on March 31, 2009. The new energy labels are based on the existing A to G labelling scheme but new efficiency classes that "go beyond A" will progressively be added. For example, an "A-20%" rating will indicate a product that is 20% more efficient than a current A class model. For refrigerators, current A+ and A++ ratings will be replaced with A-20% and A-40% by January 2011. Efficiency standards for refrigerators and freezers will be tightened up in 3 stages. In July 2010, models with a current efficiency rating of class B and below will be removed from the market. Current class A models will be banned from 2012 and the requirements will be tightened further in 2014. The decisions taken by this committee must be scrutinized by the European Parliament and the Council of Ministers before being formally adopted by the commission. These measures are expected to result in annual electricity savings of 6 TWh by 2020 from refrigerators and freezers.  
<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/09/1516>**

## IIR-co-sponsored conferences

### 2009

**■ Taipei – Taiwan - May 20-22**  
**4<sup>th</sup> Asian Conference on Refrigeration and Air Conditioning - ACRA2009**  
**Prof. Yang-Cheng Shih:** acratapei@acr.org.tw  
Fax: +886-2-87733713  
<http://www.acra2009.org>

**■ Rome – Italy - October 8-9**  
**47<sup>th</sup> AICARR International Conference**  
**Ornella Perra:** convegnoroma@aicarr.it  
Renato Lazzarin: renato@gest.unipd.it  
Fax: +39 02 67479262  
<http://www.aicarr.it/news.asp?ID=11>

**■ Tokyo – Japan - November 27-29**  
**Constant Progress in Cryomedicine - Cryomedicine Update 2009**  
**Noboru Motomura:** noboru@motomura.org  
Fax: +81 3 5684 3989  
<http://homepage2.nifty.com/cryomedicine>

### 2010

**■ Oran – Algeria - April 18-21**  
**LNG I6 - Liquefied Natural Gas LNG Conference Secretariat - Oran:**  
lngl6-secretariat@avl.sonatrach.dz  
Fax: +213 41 489 190  
<http://www.lngl6.org>

**■ West Lafayette – United States - July 12-15**  
**13<sup>th</sup> International Refrigeration and Air Conditioning Conference at Purdue**  
**Virginia (Ginny) Freeman:** herlconf@ecn.purdue.edu  
Fax: +1 (765) 494-0787  
<https://engineering.purdue.edu/Herrick/Events>

## China

**■ The revised 'Room Air Conditioner Energy Efficiency Restricted Value and Energy Efficiency Grade' Chinese standard was recently promulgated. The new standard has raised the base grade of air conditioner energy efficiency from 5 (2.6 energy efficiency ratio) to 2 (3.2 energy efficiency ratio) and has reduced the number of grades from 5 to 3. The new standard was enforced as of March 2009 and will eliminate on a compulsory basis nearly 90% of air conditioners that have high energy consumption.  
[www.chinainfoworld.com](http://www.chinainfoworld.com)**



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