June was an important month in the life of the International Institute of Refrigeration Froid (IIF). Its statutory meetings (Publications Sub-Committee, Management Committee, Science and Technology Council, Executive Committee) and its centenary celebrations were held in Paris during the same week. The latter are described fully in the Focus. Concerning the statutory meetings, I would like to emphasize the will to concentrate the IIR's strategy on three axes: enhanced marketing and outreach of the IIR, more aggressive and differentiated policy with respect to various IIR stakeholders and greater involvement of young people. A working party is handling further work on the actions embodied in this draft strategic plan and will focus particularly on the revamping of our Fridoc database and different marketing policy to be applied to it. Discussion on the IIR's role, activities and communication on issues such as global warming were fruitful and will be valuable for future discussion and actions. I was re-elected Director for the 5 years to come (2009-2014). I intend to make use of these years in order to make our actions even more relevant, visible and influential for the 100 years to come.

Didier Coulomb,
Director of the IIR

The Centenary in Paris and future events

A joint IIR/French Refrigeration Association (AFF) conference was held in Paris on June 12, 2008 in order to celebrate the centenaries of both organizations. It was combined with the IIR statutory meetings on June 10, 11 and 13 and with various festivities: a gala dinner, a reception at the French Ministry of Foreign Affairs, a visit of the ice storage houses at the Château de Versailles (17th century). Medals were also awarded, particularly the IIR Medal of Merit to Fritz Steimle, former President of the General Conference.

The conference itself brought together 437 attendees at UNESCO and was really appreciated, thanks to the quality of the speakers and debates on future challenges and technologies. You can consult the papers on our Web site: www.iifiir.org. The proceedings will be available soon. We will also give you more information on some of the presentations and the debates in dedicated articles in this issue of the Newsletter. You will also be able to view and to download a video on the IIR, via our Web site, specially produced for this event and also for other events in the coming months and years. A booklet relating the history of refrigeration use and technologies has also been published and was distributed to the attendees; you can see it on our Web site.

Among all this information, I would like to emphasize a few conclusions: we tried to show people the state of the art of refrigeration technologies and uses that are not sufficiently well-known (cryogenics, health…). Even people who are not involved in the refrigeration sector were interested: it is perfectly possible to clearly and briefly explain refrigeration uses and technological and economic challenges. There are a lot of innovations that are not sufficiently well-known and people were interested in setting up further contacts with speakers. The answers for the future (for instance, new refrigerants) are controversial but a debate is possible and useful. This conference was a major event. Other events will soon be organized and we hope that they will be just as successful. In The Netherlands, after a seminar on Kammerlingh Onnes held in Leyden on May 21, there will be a conference in Arnhem on September 23, 2008. There will be a conference in New Zealand on October 14, 2008. All IIR and IIR-co-sponsored conferences in 2008 will present the centenary. This was the case in Prague (Cryogenics 2008) in April and in Cavtat and Zurich in May 2008. The video was shown in

J'ai été réélu dans ma fonction de Directeur pour les cinq ans à venir (2009-2014). Je compte mettre à profit ces quelques années pour donner encore davantage de pertinence, de lisibilité et d’aura à nos actions, pour les 100 ans à venir.

Didier Coulomb,
Directeur de l'IIF
Moreover, we will continue in 2009! Several national associations will celebrate their centenaries in 2009, along the lines of France. The Netherlands and Serbia in 2008. For instance, 2009 will officially be Refrigeration Year in Russia, and all exhibitions and conferences will benefit from this official distinction. We have a remarkable opportunity to promote refrigeration, which we must not miss!

The 4th CE Food Congress, co-sponsored by the IIR, took place in Cavtat, Croatia, on May 14-17, 2008. Papers presented various technologies and European studies on nutrition and food, including food refrigeration.

Shanghai and Prague
Two important Conferences on cryogenics took place in April 2008: the IIR co-sponsored conference ICCR2008 in Shanghai, China on April 6-9 and the IIR conference Cryogenics 2008 in Prague, Czech Republic, on April 22-25. The history of cryogenics was presented at both conferences, especially in Prague where several lectures explained the history of helium liquefaction which began 100 years ago: other anniversaries!

ECSLA
The General Assembly of ECSLA (European Cold Store and Logistics Association) took place on June 17, 2008 and enabled a debate with the European Commission on the phase-out of HCFCs, which could be implemented earlier than 2010. The IIR co-sponsored a side-event, organised by ECSLA and the Dutch Refrigeration Association, to present the video of the IIR and his opinion on the important issue of HCFC phase-out.

Conference update
Don’t miss the 8th IIR-Gustav Lorentzen Conference on Natural Working Fluids (GL2008), the event in this field, to be held on September 7-10, 2008 in Copenhagen, Denmark. With over 150 papers, this will be a milestone event. paul.jaremussen@teknologisk.dk
www.iir-gl-conference-2008.dk

IIR 2008 - HVAC Energy Efficiency Best Practice Conference will be held in Melbourne on September 18-19, 2008. This cutting-edge event will cover solar air conditioning and heating of buildings, comfort and indoor environmental quality in energy efficient buildings and energy efficiency building integration.

brendan@airah.org.au www.airah.org.au

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
• The 3rd 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: vitkp@ameslab.gov
• The 8th Conference on Phase-Change Materials and Storables is to be staged by the IIR working party in this field in Karlsruhe, Germany on June 3-5, 2009. Contact stefanie.tolmie@hs-karlsruhe.de laurence.fournaison@cemegref.fr to present a paper and register.
• The 3rd 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 mclinden@nist.gov www.iirboulder2009.org
• For an update on the state of the art in the compressors field, register for the 7th 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@internet.sk www.internet.sk/zvchkt

Briefs
• Codex Alimentarius: Quick Frozen Foods Code adopted
The recommended International Code of Practice for the Processing and Handling of Quick Frozen Foods (QFF) has just been adopted at Step 5 and then directly at step 8 (final adoption) at the 31st Session of the Codex Alimentarius Commission (FAO/WHO organization) in Geneva on July 1, 2008 (137 countries were present). As mentioned during the session, the IIR started the task assigned to it by the Codex Secretariat in 2000, as a way to practically associate an intergovernmental organization with scientific and technical expertise; 10 experts prepared the first draft presented in 2001. We would like to thank all those involved. The US representation then took over, and there were several versions taking into account the observations of the Codex member countries; lastly, Thailand hosted a final and constructive Task Force meeting last February in Bangkok. The final version of the QFF Code will be placed on the Web site of the IIR very soon.

• CERTE Sub-Commission meeting
The annual meeting of Sub-Commission (SC) D2 on Refrigerated Transport (CERTE), which took place in Prague, Czech Republic, was the occasion to discuss numerous technical questions on tests. It was decided to enlarge the scope of the SC and increase the number of members. Geron Johansson was renewed as President of the SC and representative to the WP11 at the UN commission. Eric Devin was appointed Secretary. Gérard Cavalier, President of IIR Commission D2, presented IIR activities and projects underway, in particular 2 new D2 working parties. The SC adopted several proposals related to the draft ATP guide. Topics such as test stations accreditation, air-distribution devices, small containers, K coefficient evaluation methods, etc. were also discussed. The next CERTE meeting will take place in Portugal in June 2009. Consult the full report on the Commission D2 Web site (section “Information”): www.certefire.org/com/index-com.php?com=D2

• News from Australia

• Dutch gold medals
The Dutch Refrigeration Association, Nederlandse Vereniging voor Koude, is celebrating its 100th anniversary this year and has awarded the prestigious Kamerlingh Onnes Medal to two well-known professors in the IIR network: Prof. Horst Kruse from Hanover (former President of Commission B2) and Prof. A.T.A.M. De Waele (member of Commission A1). www.nrvk.nl
New publications

- The French version of the Red Book (Recommendations for the Processing and Handling of Frozen Foods) is on sale! The 4th edition of this IIR reference publication – prepared by Mr Leif Bøgh-Sørensen and several international experts – gives an update on the principles of freezing, quick-freezing, storage and thawing of food, with a focus on physical, physicochemical, nutritional and biochemical aspects, as well as microbiology, hygiene, packaging, transport, presentation and retail sale.

- International Dictionary of refrigeration: Chinese now!

  The Chinese-English-French Terms volume of the International Dictionary of Refrigeration was published recently. It comprises 4400 terms in Chinese along with the terms in English and French. The layout is the same as that of the basic English-French Terms and Definitions volume. An alphabetical index of the English terms completes the volume. You can find out more and order it (€50) through our publishing partner, Peeters, either on line www.peeters-leuven.be/boekoverz.asp?nr=8518 or by e-mail: order@peeters-leuven.be


  You can also order these volumes via www.iir.org

News from IIR members

- The President of the French Refrigeration Association (AFF), Louis Lucas, has been replaced by Patrick Antoine, former General Director of UNICLIMA. The handing-over took place at the end of the joint IIR-AFF Centenary conference, on June 12, 2008. The IIR is grateful to Louis for his work conducted in close co-operation with the IIR and wishes Patrick Antoine all the best in his new task.

- Founded in 2003, Playcube, a new corpora- te member of the IIR based in France, has developed FreezCube, a simple monitoring device which provides useful information related to the safety of frozen foods stored in freezers. FreezCube confirms that the freezer's temperature is -18°C or lower, informs that the thawing has occurred – even if the products have re-frozen – and allows evaluation of the time remaining for safe food consumption. It is composed of 4 coloured liquids which react in ways similar to those of foods. If a power failure occurs, the coloured liquids melt inde- pendently in the lower chamber in a variable manner as they approach the following temperatures: blue (-10°C), green (-6°C), yellow (-2°C) and red (0°C). www.freezecube.com freezecube@freezecube.com

- Linde is older than the IIR! 125 Years of Linde, a fine document tracing the origins and subsequent expansion of the company, includes fascinating information on Carl von Linde and his first machines, brewery tech- nology, air liquefaction, oxygen technology, the founding of Air Products, industrial gases and the launching of liquid hydrogen auto- mobile technology. It is available in 6 languages (German, English, French, Spanish, Italian and Czech):


- The number of drugs (e.g. targeted thera- pies, new vaccines, anti-diabetic drugs and blood derivatives) transported and kept at a controlled temperature is growing rapidly and these products are increasingly sensiti- ve to temperature variations. In order to ensure zero risk (deterioration of the main active ingredients during transport and exter- nal handling, health risk for patients, loss of control by the original manufacturer, etc.), these products require “intelligent” packag- ing that is often tailor-made. An understand- ing of the regulatory environment on national and international levels is essential. For this reason Sofrigam supported the 1st round table 2008 “Pharmaceutical distribu- tion, how to preserve the quality of the cold chain” held in May 2008. www.sofrigam.com

- Pôle Cristal is holding a conference “Les Rendez-vous de Pôle Cristal” in Dinan (western France) on October 6-10, 2008. The first day will cover Industrial refrigeration: which Forecasts for 2010 and Beyond? And the second day will be devoted to Thermodynamic Systems to Save Energy in Buildings. To submit a paper and register: m.landais@pole-cristal.tm.fr www.pole-cristal.tm.fr

- The world’s longest and most powerful superconductor power transmission cable has been connected to the commercial power grid in Holbrook, New York, United States, by the Long Island Power Authority (LIPA) and American Superconductor. The 600-m long cable is cryogenically cooled thanks to the advanced technologies of Air Liquide. This project demonstrates the operation of a high voltage superconductor cable in an urban commercial power grid. Capable of transporting up to 2400A (574 MVA in a 138 kV system), the superconductor cable is the first such high-voltage electric cable in the world to be operating in a real transmission system. This cable transports more energy than all of the previously demonstrated high- temperature superconductor (HTS) cables together and is capable of powering 300 000 homes. Besides Air Liquide, the Long Island project involved the US Department of Energy and Nexans, the worldwide leader in the cable industry. Superconductor cables can transport three to five times more ener- gy than traditional cables. Capable of trans- porting electricity without resistance at a temperature below its critical point, this cable can transport three to five times more energy than traditional cables. Capable of trans- porting electricity without resistance at a certain lower temperature (in this case at -200°C), the HTS cables avoid energy loss along the cable. In order to use the excep- tional properties of superconductor mate- rials, it is necessary to keep the cables below their critical temperature through an appro- priate refrigeration system using liquid nitrogen: cryogenics is thus the key to supercon- ductivity.

In the news

The HCFC phase-out challenge (3)

- The decision taken in September 2007 by the signatory countries of the Montreal Protocol to accelerate by 10 years the HCFC phase-out schedule entered into force and became binding to all Parties on May 14, 2008 (see the official notification: http://unpt treaty.un.org/English/CNs/12007_1001/1100_1096Pdf.pdf).

  In developing countries, production and consumption are to be phased out by 2030 and they are to be in operation by 2013 (see Newpaper No. 33 and 34). For China, the HCFC phase-out is a real challenge for the industry since, according to JARN, China is the largest HCFC-22 producer and consu- mer in the world and more than 80% of pro- ducts use HCFC-22 in the industrial refrigeration area. During the International Symposium organized by CRAA (China Refrigeration and Air-Conditioning Industry Association) in December 2007 in Beijing, participants emphasized that the industry had succeeded in totally phasing-out CFCs in China by July 1, 2007, which was two and a half years before the deadline regulated by the Montreal Protocol, but agreed that the task was more complicated with HCFC phase- out. A representative from the State Environmental Protection Administration (SEPA) considered that “the speeding-up of the HCFC substitution will have a big impact on the Chinese HVAC&R for a long time”. Reported by Appliance Magazine", another representative from SEPA noted that “China’s one-refrigerant era is at a close”. Regarding how will China choose HCFC-alternative refrigerants, he expressed that “the most important thing is that Chinese enterprises should produce alternative refrigerants with independent intellectual property” but “hope to win low-priced patented technology transfer”. Many Chinese manufacturers use R-410A (HFC) in air conditioners for export and a small number of air conditioners are sold in China using R-410A but this HFC solution does not seem fully accepted and for example is considered as “transitional” by one head of the Chinese air-conditioners manufacturer because of its global warming impact. Much attention has been paid to the possible use of natural refrigerants, including CO2, amm- onia, and hydrocarbons but some manufactu- rers point out the flammability and toxicity hazards and the high cost of reengineering products.

1. JARN; March 25, 2008

2. www.ApplianceMagazine.com

Trends and Figures

- Global air-conditioning market

  The new BSRIA review of the world air- conditioning (AC) market in 2007 shows a significant increase, since global AC sales were valued at USD 62 billion as compared...
to USD 55 billion in 2006. Globally, Asia Pacific is the largest regional market (USD 28 billion), followed by America (USD 15 billion) and Europe (USD 15 billion). The Middle Eastern, African and Indian market was valued at USD 5 billion.

China and India, which are almost equal in market value in 2007 (USD 12 billion) but China is expected to become the world’s largest market in 2008 thanks to a faster growing. The most rapidly growing market in China was forecast to be 26% compared with 2006), followed by Greece (+42%), Russia (+41%), Indonesia (+35%) and Spain (+33%). In terms of products, VRF (Variable Refrigerant Flow) has continued to be the best performance, and is expected to grow by about 15% in value during 2006-2011. Minisplit units of over 5 kW will also show strong growth of about 10% during the same period. Centrifugal chillers are expected to grow slightly better than other chillier types, reflecting strong growth in large construction projects, mostly in the Middle East, Brazil, Russia, China and India. Another study from JARN estimates that China is now the largest AC manufacturing base as well as the biggest AC market in the world in terms of number of units with a market size of 24.5 million units in 2007 (+15% compared to 2006), followed by US at 16.9 million (+1%), Europe at 8.6 million and Japan at 8.0 million.

**European food industry**

The average quantity of foodstuffs consumed each year by a typical European is 530 kg, 340 kg of which is either refrigerated or quick-frozen. Therefore, 172 million tonnes of foodstuffs are transported annually under controlled-temperature conditions: 22 million tonnes of frozen or quick-frozen food and 150 million tonnes of chilled food. The European food industry employs over 3.6 million people. It is the biggest European industrial sector, ahead of the automobile, chemical and mechanical industries.

**Illegal trade in ODS**

Some recent facts show the difficulty to tackle the illegal disposal of CFC appliances and CFCs and HCFCs trading issues:

- The German business magazine Capital divulged that CFC-containing refrigeration apparatus discovered a car shredder plants in Germany and estimated that these are not isolated cases. Capital also uncovered evidence of the illegal export of waste fridges and freezers containing CFCs outside Europe. According to RAL Quality Assurance Association, more than 3 million tonnes of CO2 are being released each year from waste toppers. They find their way to dedicated fridge recycling plants but are not always being treated using the best available technology. Although CFCs are banned in Europe since October 2000, it is estimated that 230 million CFC-charged domestic refrigerators and freezers are still in service in EU countries. Recovering CFCs before disposal has been mandatory since 2006 and concerns CFC refrigerators but also CFC-11 Europe. In 2008, RAL conducted an operation which revealed the existence of illegal CFC trafﬁcking. Moreover, CFCs and cyclopentanes need different treatment and disposal of ozone-depleting substances (ODS) – as crimes in all Member states.  

**Briefs**

**US supermarkets:** CO2 gains ground

Being already largely used in Europe, CO2 refrigeration systems might see important development in North American supermarkets. The medium-size retail chain Price Chopper Supermarkets has installed a cascade system using CO2 in the low-temperature stage in its frozen food and ice cream department in the state of New York. The system, using smaller line sizes, allows significant reduction in the weight of copper used: 39% as compared with a comparable direct-expansion unit according to Hill Phoenix, the US manufacturer. Besides its negligible GWP, CO2 is far less expensive than HFC refrigerant alternatives: USD 1.1 versus US 16-17 per kg. Already in April 2008, the leading supermarket retail chain Food Lion unveiled the first US grocery store using CO2 as a secondary refrigerant with a medium-temperature stage using water-glycol. The first CO2 cascade system has been operating successfully in a store in Montpellier, USA, since 2006.

**Green buildings**

Moscow City Tower is to be Europe’s tallest and the world’s second tallest building. The 600-m naturally ventilated tower designed by Norman Foster will accommodate 25,000 people – a city unto itself – and the designer is aiming for LEED gold accreditation. The internal temperature will be maintained at 21°C in winter and 23°C in summer and the building is designed to cope with extremely cold temperatures in winter and 23°C in summer. The tower will feature an “energy highway” that will transfer waste heat from the commercial and office areas to the hotel and residential floors. Second energy options will transfer energy horizontally to pre-heat ventilation air and domestic hot water and to provide low-grade heating of underfloor systems. The building will have no boilers and will draw on waste heat from an adjacent cogeneration plant via Moscow’s district heating system. Over 60 air-handling units will supply fresh air and summer precooling will be performed using pipework embedded in the concrete basement walls. Photovoltaic cells on the tower’s mast will power the external lights. 

**MAC: CO2 or HFO-1234yf?**

The SAE Alternate Refrigerant Symposium held in Phoenix, USA, on June 10-12, 2008, provided an opportunity for the various stakeholders of the global automotive industry to present their results on the next-generation refrigerant in mobile air conditioning (MAC) and their test results with CO2 and HFO-1234yf, the two main options now considered in the industry. The German Automotive Association (VDA) specified that it would not be a drop-in solution but that R-1234yf could reach the same efficiency for CO2 MAC systems but were still considered to replace HFC-134a. The German Automotive Association (VDA) stated that R-1234yf could reach the same efficiency for CO2 MAC systems but were still hesitant about a final choice for CO2. General Motors (USA) stressed that CO2 might be used in both civil and criminal penalties. Fines of USD 32 500 per kg can be imposed.

1. www.raf-online.org  
2. RPF; March 2008  
4. www.arap.org/frp.html
temperatures should not exceed 5°C. The study indicated that the mean temperature was 6°C, with 70% of refrigerators operating at average temperatures above 5°C. Less than 2% of refrigerators operated below 5°C and 33% ran at temperatures above 5°C throughout the monitoring period. Find out more: steve.james@bristol.ac.uk

Qatargas has just announced that it has signed a sales and purchase agreement to sign 2 million tonnes per annum (mtpa) of liquefied natural gas (LNG) under a 25-year contract with Cornubia LNG Corporation (CNOCO). The LNG will be delivered into five terminals in China, Fujian LNG Terminal and Guangdong LNG which are already operational, with Shanghai LNG Terminals due to open in 2010. The company is expanding its operations and has announced plans to construct four new LNG processing trains which will see an increase of LNG production from 10 mtpa today to 42 mtpa by the end of the decade. www.qatargas.com

Cryogen-Expo will take place on November 1-13, 2008 in Pavilion No 5, Expocentre Fairgrounds, in Moscow, Russia. This major exhibition held under the auspices of the IIR, the International Academy of Refrigeration and the Ukrainian Association of Industrial Gases Manufacturers will feature exhibitors in a broad range of cryogenic domains including helium, LNG, hydrogen, industrials and rare gases and vacuum equipment. info@mirexpo.ru www.mirexpo.ru

Cryogenic applications

Cooling largest outer-space telescope

In his presentation on cryogenic applications at the IIR-AFF centenary conference in Paris (see Focus), Philippe Lebrun, President of the IIR’s Section A, mentioned cryogenic detectors of cosmic signals and cited Herschel probe as an example. The Herschel telescope containing 2400 litres of helium, sufficient for a 3-year mission launched by the European Space Agency (ESA) dedicated to the observation of the universe in the infrared and submillimetric realms (wavelength from 60-670 μm), an as yet mainly unexplored part of the electromagnetic spectrum. Measuring 9 m x 4 m and weighing over 3 tonnes, it will be launched on October 31, 2008, from Kourou, Guyana. Equipped with a 3.5-m diameter mirror, it will be the largest outer-space telescope ever constructed.

The main aims of the mission are related to the origins of the universe as it will first probe molecular clouds, which are considered as veritable young star nurseries, in order to understand the first stages of star formation. It will then map the universe in order to discover galaxies on the point of taking shape, in particular by observing remnants of the history of the universe from the Big Bang until now. In order to do this, it is equipped with HIFI, an ultra-high resolution spectroscope, and two cameras (SPIRE and PACS). Observing these wavelengths requires instruments cooled to extremely low temperatures, close to absolute zero (-273°C), partly in order to compensate for the instruments’ own thermal emissions that are likely to create undesirable radiation. The satellite is cooled and thus be equipped with a 2400-litre superfluid helium reserve supply, which can maintain the focal plane at -271°C, the detection planes require even lower temperatures (around 300 millicelcius Kelvin) which are obtained thanks to a very complex system implying several cryogenic refrigerators. One of the technical challenges involved is that unlike other satellites, the instrumental plane is on the top of the satellite and cooled to be immersed.

http://ifu.cea.fr

Major cryogenic storage project

Thames Cryogenics is setting up one of the most ambitious cryogenic storage projects in Europe. The UK Biobank, based in Stockport, Oxfordshire, aims to recruit around 500 000 people across the UK between the ages of 40 to 69 and to track their health over the course of the next 30 years. The study, which involves more than 20 British universities, will require a facility in which to store about 15 million samples of blood and urine and preserve them for future research: the samples will be stored in liquid nitrogen at temperatures below -200°C. This very low temperature ensures that even very unstable substances in the blood can be measured decades later. This system will consist of 30 high efficiency vapour phase freezers, inventory systems, liquid nitrogen distribution piping, oxygen depletion monitoring, remote temperature monitoring and alarm, plus a complete extraction system.

www.ukbiobank.ac.uk

Paris district cooling is growing

A presentation of the Paris district cooling system by François Dupoux, President-General Director of Climespace (operator of the district cooling system during the IIR-AFF centenary conference) attracted a lot of interest. Many participants were surprised to learn that district cooling system in Paris (installed in 1994) was the largest in Europe – along with Stockholm – in terms of installed refrigerating capacity: 240 MW. The system has 6 central refrigerating plants (using mostly R-134a reciprocating compressors, cooled 73% by Seine river water), 1 chiller water storage tank, and 2 ice storage tanks located on both banks of the Seine. The distribution network is currently 70 km (+ 3 km per year) long and 450 buildings – including the Louvre museum, the Forum des Halles, the French parliament, the Garnier opera house, etc. – are connected. By 2012, several additional central plants should increase the refrigerating capacity to 370 MW. F. Dupoux presented figures regarding the operating conditions of refrigerated capacity per subscribed kW: 0.65 as compared with 1.25 for typical water chillers; measured COP: 3.8 (energy savings of 30-40%); refrigerant emissions: 6.8 g/kW (2% as compared to 10% for older water chillers). He mentioned other advantages such as a drastic reduction in health hazards (lounda, oxidative biocides) and noise. See F. Dupoux’s presentation: www.ifiifor.org More at www.climespace.fr

Micro-refrigeration

Future computer chips will probably generate 10 times more heat than today’s microprocessors and will require new types of cooling systems. Currently, computers are usually cooled thanks to fans and small devices called heat sinks, but the miniaturization of cryogen-Expo, British Columbia, Canada and Eckhard Groll, member of IIR Commission B2, focuses on designing miniaturized cryogenics for advanced cryogenic refrigerators. The compressors use penny sized diaphragms, made of ultra-thin sheets of a plastic called polyimide and coated with an electrically conductive metallic layer allowing the diaphragm to be moved back and forth to produce pumping action using electrical charges, a process called electrostatic diaphragm compression. The engineers were also among the first to precisely measure flow boiliing and vaporization inside microchannels sometimes thinner than a human hair. They have also developed a computational model for compressor design, making it possible to determine how many diaphragms to use, how to stack them (in parallel or in series). In one direction pressure rises; in the other, more volume is pumped. Berstch, a PhD student created mathematical equations for the design of miniaturized evaporators. Learning how to manufacture the devices at low cost is another major challenge, with industry requiring a cost of USD 30 each.

www.purdue.edu

Intelligent fridges

It is estimated that networked fridges will be widely used by 2015. How do consumers feel about such fridges that monitor product use, create shopping lists and arrange deliveries online? A recent survey involving 4600 shoppers in 8 countries shows that in the UK, although 52% of those surveyed predicted that this technology will be widely used within 7 years, only 25% of respondents find the concept appealing and only 10% say they’d like to use a networked fridge. However, in China and Spain, shoppers were less enthusiastic to embrace a future governed by fridges: 52% of Chinese and 45% of Spanish respondents are highly attracted to networked fridges technology.


The Economist, in an article entitled Fridges of the World Unite! describes how energy-saving smart appliances could save energy. The US Department of Energy’s Pacific Northwest National Laboratory (PNNL) has completed the first residential trial of its “Grid Friendly Appliance” controller – a small device that listens to AC frequency of the electricity supplied by the grid. When there is too much demand on the grid, the hum goes flat and the device shuts off the appliance for 2 minutes. Following the initial trial involving 150 households, PNNL is to conduct a broader trial involving 1000 households.

RLTeC, a UK firm, is exploring another energy-saving avenue: it has developed software called Dynamic Demand that is fitted to appliances in order to manage fluctuations in power demand and supply. Research has demonstrated that millions of appliances fitted with this device could improve the stability of the electricity grid and facilitate the deployment of variable-output renewable energy sources such as wind or solar power. The technology could save up to 2 million tonnes of CO2 emissions in the UK and save GBP 80 million in energy-balancing costs.

www.economist.com www.rltec.com
IIR Agenda

IIR conferences

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<tr>
<th>Date</th>
<th>Location</th>
<th>Conference Name</th>
<th>Website</th>
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<tr>
<td>Sept. 18-19</td>
<td>Melbourne</td>
<td>HVAC Energy Efficiency Best Practice Conference</td>
<td><a href="http://www.airah.org.au">http://www.airah.org.au</a></td>
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<td>May 12-15</td>
<td>Des Moines</td>
<td>3rd International Conference on Magnetic Refrigeration at Room Temperature</td>
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<td>June 3-5</td>
<td>Karlsruhe</td>
<td>8th Conference on Phase-Change Materials and Sorbents</td>
<td><a href="http://www.IIRBoulder2009.org">http://www.IIRBoulder2009.org</a></td>
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<td>June 23-26</td>
<td>Boulder</td>
<td>3rd Conference on Thermophysical Properties and Transfer Processes of Refrigerants</td>
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<td>Sept. 30 - Oct. 2</td>
<td>Piatnica</td>
<td>7th International Conference on Compressors and Coolants - Compressors 2009</td>
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Briefs

- Development of liquid-ammonia-based CO₂ capture is pacing up
- Accessible and free evaporative solution

The regional United Nations Development Programme, in the mid 1990s and consists in two earthenware pots of different diameters, one placed inside the other. The space between the two pots evaporates, a temperature drop occurs. This reduces the temperature of the inner container by several degrees compared with the surrounding environment and helps preserve the perishable foods inside.

There are many other ingenious applications of evaporative cooling using porous clay to cool vessels. Such cooling has been used in Qena in Upper Egypt for over three millennia. People in Burkina Faso also soak pots in cool vessels. Such cooling has been used in Qena in Upper Egypt for over three millennia. People in Burkina Faso also soak pots in cool vessels. Such cooling has been used in Qena in Upper Egypt for over three millennia. People in Burkina Faso also soak pots in cool vessels.