The value of developing the cold chain in hot countries is becoming increasingly obvious, particularly in India — for several years now — but also in Africa and other hot regions of the world. In this context, the IIF signed a partnership agreement with FAO in July 2011. The agreement foresees joint actions and certain actions have already been implemented (publications, regional workshops,…). The scope of postharvest losses in these countries, and the impact of these losses on food security, obliges us to take action.

Among the various obstacles encountered, the cost and the reliability of the supply of electrical energy are often cited, and chilling is more energy-consuming in hot climates. This observation should promote the development of systems based on well-known principles but for which the economic benefits (reduction in the cost of energy/addition to the cold range) are not sufficiently demonstrated. Thermal storage (of all types) is an example of an investment which merits greater attention in temperate as well as hot climates. Other technologies such as evaporative cooling are often cited among issues to be addressed. In remote regions with good solar exposure, absorption/adsorption cooling is attracting more and more interest.

Maintenance issues are often cited among issues to be addressed. In certain cases, in particular in isolated sectors, this issue can be a greater problem than energy efficiency. The same applies to difficulties encountered when ensuring temperature control within the required temperature range because of insufficient organization and human resources.

All this indicates that strong and concerted actions have already been implemented (publications, regional workshops,…). The IIF has decided to ensure that cold chain is one of its priority work areas for the coming years, drawing in particular on its recent agreement with FAO and its links with hot IIR member countries.

Didier Coulomb
Director of the IIR

The IIR Congress: a great success!

The IIR Congress which took place in Prague, Czech Republic, in August 21-26, 2011, was a great success. 944 attendees from 52 countries attended. The most numerous came from Asia (China, Japan, South Korea) and Europe. All continents were represented. 593 papers and plenary presentations were presented, and reflected the geographical distribution of the participants. As always, the greatest number of papers was on refrigerating equipment and on thermodynamics and transfer processes, but we saw a great increase of papers on heat pumps, compared with previous congresses. The papers will soon be available via the IIR’s Fridoc database. However, you will see in this issue of the Newsletter summaries of some papers providing an analysis which may interest most readers.

Apart from the rich presentations, several events took place:

- IIR statutory meetings: Management Committee, Science and Technology Council, General Conference, Asia Pacific. During every Congress, new IIR officers were nominated: Dr. Piotr Domanski replaces Dr. David Tanner as President of the Science and Technology Council; Mr. Jacques Goujon replaces Prof. Donald Cleland as Head of section C (Biologial and Food technology); Mr. Gérard Cavalier replaces Dr. Vadolk Chriz as President of Commission A2 (Liquefaction and Separation of Gases); Prof. Michael Kaufer replaces Prof. Clark Bullard as President of Commission B2 (Refrigerting Equipment); Prof. Manja Todorovic replaces Prof. John Buast as President of Commission C1 (Cryobiology, Cryomedicine); Dr. Silvia Estrada Flores replaces Prof. Bart Nicolas as President of Commission C2 (Food Science and Engineering). Mr. Richard Lawton replaces Mr. Gérard Cavalier as President of Commission D2 (Refrigerted Transport).

- IIR prizes: The Medal of Merit was awarded to Eric Granryd and Stanislav Safraža. Predrag Hrjnak received the Gustav Lorenzten Medal, Andrew Cleland received the IIR Science and Technology Medal. The Young Researchers Awards were given to Ekaterina Navasardyan, Edward Hammond, Andrew East, Ke Tang, Maria Trícka, Tatsuya Oku, Tatsunori Asakura.


- An exhibition also took place. On its booth, the IIR presented its new Web portal and revamped Fridoc database and various publications.

- Technical tours and cultural events also took place. Everybody enjoyed the congress greatly, both for professional reasons (presentations, contacts) and private reasons (cultural events and a friendly atmosphere).

The next congress will take place in Yokohama, Japan, in 2014. Before then, many conferences will take place: see the IIR agenda!

Didier Coulomb
Directeur de l’IIF
The IIR welcomes the following new members:

**Benefactor member**
Danfoss Commercial Compressors, France

**Corporate members**

Balticare Ltd, UK
Greenfield Energy Ltd, UK
Howden Commercial Compressors, UK

**Private members**

Hannu Ahlstedt, Finland; Carlos Barrantos, Colombia; Mohamed Dayi, Morocco; David Luna, Brazil; William F., Mehs, USA; Carlos Eduardo Leme Nobrega, Brazil; Paulo Vodaniatskiaa, Brazil

**Junior members**

Georg Fosel, Denmark; Haibo Hu, China; Ferdous Farzhan, Austria; Lars Finn Larsen, Denmark; Bjorn Margerison, Iceland; Yann Pecqueux, Norway; Wei Wu, China.

**STEFC-TFE opens largest cold store in cold store in Madrid**

SDF-Iberica, a subsidiary of STEFC-TFE, has opened a 15 100 m² fresh and frozen food facility in Torrejon near Madrid at a cost of 23 million €. The new facility provides 116 100 m³ of temperature-controlled storage. The site has an energy-storage system based on eutectic nodules, providing 25% of the refrigeration energy needed. SDF expects to make savings of at least 15%. The facility also features low-GWP refrigerants and LED lighting.

**Conference update**

- The 42nd International Congress on Heating, Air Conditioning and Refrigeration will be held in Belgrade, Serbia, on November 29-30, 2011. Didier Coulomb was invited and presented a paper, and the annual Pile Cristal conference in Dinan, France, was held on October 6-7, 2011. The Director presented discussions on F-gases at European and international levels. The President of the Executive Committee, Joe Paul, presented a paper on heat pumps.
- The 10th IIR-Gustav Lorentzen Conference on Natural Working Fluids (GL2012) will be held in Delphi, the Netherlands on June 25-27, 2012. Abstracts are due now and full papers are to be submitted by December 24, 2011. Check out the plenary speakers and download the pre-programme: www.gl2012.nl info@gl2012.nl
- The 10th International Conference on Phase-Change Materials and Storries for Refrigeration and Air Conditioning will take place in Kobe, Japan, on July 29–August 1, 2012. Abstracts are due December 31, 2011 and full papers are to be sent by April 30, 2012. www2.kobe-u.ac.jp/~komoda/pcms/index.html heroc@kobe-u.ac.jp
- The 42nd International Congress on Heating, Air Conditioning and Refrigeration will be held in Belgrade, Serbia, on November 30-December 2, 2011. Register now! www.kgh-kongres.org
- The 10th IIR-Gustav Lorentzen Conference on Natural Working Fluids (GL2012) will be held in Delphi, the Netherlands on June 25-27, 2012. Abstracts are due now and full papers are to be submitted by December 24, 2011. Check out the plenary speakers and download the pre-programme: www.gl2012.nl info@gl2012.nl
- The 10th International Conference on Phase-Change Materials and Storries for Refrigeration and Air Conditioning will take place in Kobe, Japan, on July 29–August 1, 2012. Abstracts are due December 31, 2011 and full papers are to be sent by April 30, 2012. www2.kobe-u.ac.jp/~komoda/pcms/index.html heroc@kobe-u.ac.jp
- The 42nd International Congress on Heating, Air Conditioning and Refrigeration will be held in Belgrade, Serbia, on November 30-December 2, 2011. Register now! www.kgh-kongres.org
- The 10th IIR-Gustav Lorentzen Conference on Natural Working Fluids (GL2012) will be held in Delphi, the Netherlands on June 25-27, 2012. Abstracts are due now and full papers are to be submitted by December 24, 2011. Check out the plenary speakers and download the pre-programme: www.gl2012.nl info@gl2012.nl
- The 10th International Conference on Phase-Change Materials and Storries for Refrigeration and Air Conditioning will take place in Kobe, Japan, on July 29–August 1, 2012. Abstracts are due December 31, 2011 and full papers are to be sent by April 30, 2012. www2.kobe-u.ac.jp/~komoda/pcms/index.html heroc@kobe-u.ac.jp
- The 42nd International Congress on Heating, Air Conditioning and Refrigeration will be held in Belgrade, Serbia, on November 30-December 2, 2011. Register now! www.kgh-kongres.org
- The 10th IIR-Gustav Lorentzen Conference on Natural Working Fluids (GL2012) will be held in Delphi, the Netherlands on June 25-27, 2012. Abstracts are due now and full papers are to be submitted by December 24, 2011. Check out the plenary speakers and download the pre-programme: www.gl2012.nl info@gl2012.nl
- The 10th International Conference on Phase-Change Materials and Storries for Refrigeration and Air Conditioning will take place in Kobe, Japan, on July 29–August 1, 2012. Abstracts are due December 31, 2011 and full papers are to be sent by April 30, 2012. www2.kobe-u.ac.jp/~komoda/pcms/index.html heroc@kobe-u.ac.jp
- The 42nd International Congress on Heating, Air Conditioning and Refrigeration will be held in Belgrade, Serbia, on November 30-December 2, 2011. Register now! www.kgh-kongres.org
- The 10th IIR-Gustav Lorentzen Conference on Natural Working Fluids (GL2012) will be held in Delphi, the Netherlands on June 25-27, 2012. Abstracts are due now and full papers are to be submitted by December 24, 2011. Check out the plenary speakers and download the pre-programme: www.gl2012.nl info@gl2012.nl
- The 10th International Conference on Phase-Change Materials and Storries for Refrigeration and Air Conditioning will take place in Kobe, Japan, on July 29–August 1, 2012. Abstracts are due December 31, 2011 and full papers are to be sent by April 30, 2012. www2.kobe-u.ac.jp/~komoda/pcms/index.html heroc@kobe-u.ac.jp
- The 42nd International Congress on Heating, Air Conditioning and Refrigeration will be held in Belgrade, Serbia, on November 30-December 2, 2011. Register now! www.kgh-kongres.org
- The 10th IIR-Gustav Lorentzen Conference on Natural Working Fluids (GL2012) will be held in Delphi, the Netherlands on June 25-27, 2012. Abstracts are due now and full papers are to be submitted by December 24, 2011. Check out the plenary speakers and download the pre-programme: www.gl2012.nl info@gl2012.nl
- The 10th International Conference on Phase-Change Materials and Storries for Refrigeration and Air Conditioning will take place in Kobe, Japan, on July 29–August 1, 2012. Abstracts are due December 31, 2011 and full papers are to be sent by April 30, 2012. www2.kobe-u.ac.jp/~komoda/pcms/index.html heroc@kobe-u.ac.jp
- The 42nd International Congress on Heating, Air Conditioning and Refrigeration will be held in Belgrade, Serbia, on November 30-December 2, 2011. Register now! www.kgh-kongres.org
- The 10th IIR-Gustav Lorentzen Conference on Natural Working Fluids (GL2012) will be held in Delphi, the Netherlands on June 25-27, 2012. Abstracts are due now and full papers are to be submitted by December 24, 2011. Check out the plenary speakers and download the pre-programme: www.gl2012.nl info@gl2012.nl
- The 10th International Conference on Phase-Change Materials and Storries for Refrigeration and Air Conditioning will take place in Kobe, Japan, on July 29–August 1, 2012. Abstracts are due December 31, 2011 and full papers are to be sent by April 30, 2012. www2.kobe-u.ac.jp/~komoda/pcms/index.html heroc@kobe-u.ac.jp

**In the news**

**Markets and figures**

- A study* by KWA Business Consultants on oil and gas production (1.9 PJ) and refrigeration plants in various industrial and drug industry has an electrical energy consumption of 18% of total electricity consumption in the industrial sector. A study** by KWA Business Consultants on the annual energy consumption of refrigeration plants in various industrial and non-industrial sectors in The Netherlands was presented during the GL2012 conference. The industrialsector (including the food and drug industry) has an electrical energy consumption of 200 PJ primary energy in total. Refrigeration consumes 35 PJ, which is an 18% share. Within the industrial sector, bulk chemical industry (9.0 PJ), refrigerated warehouses (2.0 PJ), oil and gas production (1.9PJ) and...
dairy (1.8 PJ) are the subsectors with the highest electricity consumption related to refrigeration. The non-industrial sectors have an electrical energy consumption of 96 PJ in total, of which refrigeration uses 21 PJ, i.e. a 22% share. Supermarkets are one of the sub-sectors of the non-industrial sector with the highest electricity consumption related to refrigeration (6.7 PJ), along with data centres (2.6 PJ), hotels and restaurants (2.8 PJ), air-conditioned offices (2.5 PJ), hospitals (2.1 PJ) and above all, household refrigeration (2.1 PJ) with a consumption related to refrigeration of 34 PJ primary energy.

(1) The energy consumption of refrigeration installations and refrigerant changes in Dutch industrial sectors. Pernitz et al.

HFC news

Increasing pressure on HFCs

Policy-makers worldwide are increasing pressure to reduce HFC use.

. On the occasion of the International Day for the Preservation of the Ozone Layer on September 16, 2011, United Nations Secretary General Ban Ki-moon said “Parties to the Montreal Protocol are now considering further amendments, including proposals to bring HFCs, under the Protocol in a manner that would complement existing efforts under the UN Framework Convention on Climate Change and its Kyoto Protocol. HFCs do not deplete the ozone layer but are highly potent greenhouse gases, and their consumption has been increasing rapidly as they are being used to replace HCFs. I urge Parties and industries to seize the opportunity provided by the HCFC phase-out to leapfrog HFCs wherever possible.” www.un.org/apps/news/story.asp?NewsID=3958&Cr=0z1&Cr1=#

HFC news

The European Parliament approved on September 14, 2011 a resolution stressing that “the F-gas Regulation has fallen far short of its objective of providing the necessary incentives to significantly reduce emissions of F-gases”. The report “calls on the EC to consider further amendment of the F-gas Regulation after 2015”. That “the EC should commission a study of implementation costs of the F-gas Regulation”. www.europarl.europa.eu/en/

HFC news

Unreported HFC-23 emissions

A report published in Geophysical Research Letters says that Western Europe’s emissions of HFC-23 are around twice as high as the official data from the framework of the Kyoto Protocol. In particular, Italy is found to be emitting 10-20 times more HFC-23 than it reports. HFC-23 is a by-product in the manufacture of HCFC-22 with a very high GWP (14 000) and long life (200 years), which makes destroying HFC-23 not currently mandated by the F-gas Regulation. The report is based on analyses by Empa – the Swiss Federal Laboratories for Materials Science and Technology – which use a special gas chromatograph mass spectrometer enabling the emission levels of more than 50 halogenated greenhouse gases to be precisely evaluated, making it possible to identify the emission sources regionally. www.empa.ch/plugin/template/empa/3108207--/4a2

HFC news

New projections regarding F-gas emissions

A study recently published by Ghosh et al. predicts that global emissions of Kyoto Protocol fluorinated gases (HFCs + SF6 + PFCs) will amount to 4 GT CO2 eq. in 2050 if no mitigation measures are taken, with HFC emissions only representing 3.65 GT CO2. This represents 5.9% of the total greenhouse gas emissions in 2050 (67.7 GT CO2), with HFCs accounting to 5.4%. This figure is about half as high as HFC emissions projected by Velders et al. in 2009. According to this study, most F-gas emissions in 2050 will be generated by commercial refrigeration (41%). The stationary air-conditioning sector will account for around 21% and the mobile air-conditioning sector for about 13%. Developing countries will account for 75% of total emissions of F-gases. www.tandfonline.com/doi/abs/10.1080/20430779.2011.579352

(1) Increasing pressure on F-gas emissions until 2050, Gschrey et al.

(2) The large contribution of projected F-gas emissions to future climate forcing, Velders et al.

F-gas: new legislative measures next year

The European Commission published on September 9, 2011 a consultation on the application, effects and adequacy of the F-gas Regulation. In its conclusion, the Commission points out that “If all its current provisions are fully applied in all Member States, the Regulation, together with the Montreal Protocol and the Kyoto Protocol, would be possible to avoid almost half of projected emissions by 2050, stabilising EU-27 emissions at today’s levels of 110 million tonnes of CO2 eq. However, in the context of the overall EU objective to cut emissions by 80-95% by 2050, the stabilization of F-gas emissions at today’s levels is not adequate and the analysis shows that already available or emerging low-GWP technologies are technically feasible and can be cost-effective in many application areas.” This report identifies options for additional cost-effective reductions of F-gases in the EU. The Commission has also launched a public consultation of stakeholders on these options.

HCFC phase-out at risk from illegal trade

The phase-out of HCFCs under the Montreal Protocol could be undermined by black market trade unless enforcement agencies are prepared, according to the report Risk Assessment of Illegal Trade in HCFCs, jointly produced by the Environmental Investigation Agency (EIA) and UN Environment Programme (UNEP).

Given the booming production, of demand for, HCFCs across developing countries, combined with on-going demand and limited supply due to the restrictions in place in developed countries, the market conditions appear to be in place for a possible repeat of the wide scale smuggling seen during the CFC phase-out,” said EIA report co-author Julian Newman. The situation in Europe illustrates how illegal trade can arise as a result of a phase-out. As of January 2010, demand for HCFCs within the EU must be met by using either recycled or recycled HCFCs, with the demand for HCFCs for refrigeration and air-conditioning equipment servicing remains higher than legal supplies can satisfy.

In Europe, there’s a risk that such demand could undermine the ban on importation and use of virgin HCFCs which came into force at the beginning of 2010; with the cost of HCFC-22 in the EU ranging from € 18-30 per kilo and the chemical available from developing countries at about € 2 per kilo, excluding shipping, the incentive for smuggling to step in to meet the demand is clear. There’s little doubt that the emergence of a global black market in illegal HCFCs is a very real and significant threat.” added J. Newman. “What’s different this time around is that we have the prior experience gained in combating CFC smuggling. www.racplus.com/news/asda-succesfully-tests-honeywell-s-r407f-refrigerant/867456/article

R32, a short-term candidate to replace R22 in China

HFC-32 attracted attention during ICR2011 in Prague: it was the subject of 12 papers. This represents 6% of all papers presented, and 3% of those related to HCFC phase-out regionally. This includes papers on the production, use and market situation of HFC-32, as well as reports on HFC-32 in China. This is likely related to the fact that, unlike other compounds, it is currently not mandated by the Montreal Protocol.

(1) Experimental research on quasi-two stage compression heat pump using HFC-32, Xu et al. www.empa.ch/plugin/template/empa/3108207--/4a2
“Loophole” in the US HCFC-22 phase-out plan

Five of the leading US air-conditioning manufacturers - Carrier, Daikin/McQuay, Trane, Johnson Controls and Lennox - wrote on August 15, 2011 to the EPA calling for an amendment to the Final Rule published at the end of 2009 which “bans the sale or distribution of air-conditioning and refrigeration appliances containing HCFC-22, HCFC-142b, or blends containing one or both of these controlled substances as the refrigerant”. While the Appliance Rule bans the sale and distribution of appliances that are uncharged, say the companies, “The Appliance Rule allows major components of an air conditioner or refrigeration unit to be shipped “dry” or with a holding charge containing an inert gas and then charged with refrigerants on-site. This situation creates a gaping loophole in the Appliance Rule and allows the continued widespread use of HCFC-22.”

According to industry estimates, the R22 units are being offered to homeowners and businesses with failed units as a low cost option to replacement. As a result, R22 units will account for 10-20% of all sales in the US.


Natural refrigerant news

Tesco opens first CO2 refrigeration store in China

Early August 2011, Tesco opened its 97th store in China, yet this is the first to feature a CO2 refrigeration system. The 8635 m² supermarket includes a fresh area of 2000 m² and is located in the Cloud Nine Shopping Mall in the Minhang district of Shanghai. The store is the first in China to adopt a CO2 refrigeration system. According to Tesco, the Shanghai store uses 25% less energy than standard store designs.

Designed, installed and commissioned by Shanghai Zhangji Electric & Electrical Engineering Co., Ltd., the system is a cascade CO2/R404A one, with a low-temperature system capacity of about 60 kW at -33°C, and a medium-temperature system capacity of about 260 kW at -9°C. The exhaust heat from the refrigeration system is recovered and reused to meet the store’s hot water needs. The use of low outdoor temperatures in winter and in transitional periods will generate considerable energy savings.

www.r744.com

Chinese manufacturer starts production of propane room ACs

Chinese air conditioner manufacturer Gree Electric Appliances Inc announced in July 2011 the official opening of a production line for room air conditioners running with propane (R290). The company will manufacture approximately 100,000 units of room air conditioners per year. The claim is backed by international safety standards and exceeds the minimum efficiency requirements for air conditioners within many countries and regions, including China, India, Australia, Europe and the US.

www.technologisk.dk

MAC news

CO2 AC systems in German buses

During the 12th Karlsruher Fahrzeugklima Symposium in September 2011, new approaches in mobile air-conditioning systems (MAC) in buses were presented and an overview of a number of CO2/MAC buses in Germany was given. Out of a total of 26 buses equipped with CO2 mobile air-conditioning systems (MAC) in Germany, 22 buses are still in operation today. The currently oldest bus belongs to Saar-Pfalz-Bus and has been using a CO2 MAC system since 2004. The good experiences have encouraged the regional transport company to acquire in total 5 buses with CO2/MAC in 2011, while the public transport company of Berlin (BVG) integrated 7 buses with CO2 MAC into their fleet in 2010. In 2010, the regional transport company of Kurfreness (KKH) introduced in Kassel for the first time a bus equipped with a reversible CO2/MAC, which not only cools but also heats the bus. The average COP of the system, calculated from the ratio of cooling/heating performance to motor output, was 3.54 (3.1 in A/C mode, 3.8 in heat-pump mode)

www.r744.com

R1234yf tested for bus AC

Tests co-funded by the Spanish Ministry of Science and Innovation and run bus AC system company Hispacold suggest that HFO-1234yf is a near drop-in replacement refrigerant for HFC-134a in the tested Hispacold’s 125 roof top bus air-conditioning units. Performance results were not detailed but Hispacold reported a 99.77% reduction in direct emissions.

www.racplus.com/news

R1234yf car AC launched

Delphi Automotive will introduce an air-conditioning system featuring one of the industry’s first uses of R1234yf. The system will be installed in a European vehicle and was unveiled at Frankfurt International Motor Show (IAA). Delphi is supplying the compressor and condenser for the vehicle. To enable compatibility with R1234yf, Delphi is using a new compressor lubricant that improves performance and system durability and can also be used with R134a.

www.greenaccongress.com

Briefs

New Zealand: lessons learnt from cold store explosion

A recent coronial inquest into the explosion in April 2008 of a cold store in Tamahere, New Zealand, following a hydrocarbon refrigerant leak, has revealed a number of deficiencies. The incident, which caused the death of a fireman, was due to a pipe rupture provoking the leakage of some of the 400 kg of refrigerant that was used in a direct exchange cooling system. Icepak Coldstore’s gas detection and ventilation systems were inadequate for the type of refrigerant used (95% propane) which is heavier than air. The plant’s refrigeration system was reportedly prone to leaks, needing constant maintenance and experienced ongoing problems.

Meetings which took place with industry bodies such as IRHACE during the inquest focused on the adequacy of the existing regulatory regime and training opportunities and could lead to the implementation of a new licensing scheme for refrigeration and air-conditioning contractors.


Soaring rare earth prices: impact on inverter ACs

Roughly 100 g of rare earth elements are used in a 1.1 kW inverter compressor, and recycling of these elements is proving difficult. In China, soaring rare earth prices are expected to raise the cost of inverter compressors by 30% (roughly USD15). China currently produces over 90% of the world’s rare earth elements. However, Australia, Brazil, Canada and the USA are endeavouring to raise their production.

www족보아이비경시경계

Find out how efficient your cold store is!

Perhaps you know how much energy your cold store uses each year, but have you ever wondered how your cold store stands against similar-sized stores with similar functions. The survey is totally confidential: no data will be divulged. Sign up for the ICE-E benchmarking survey: http://coldstoresurvey.technologisk.dk

The ICE-E EU project aims to reduce energy consumption and greenhouse gas emissions from the European food cold storage sector through application of energy-efficient equipment choices in compliance with the EU’s energy and environmental policies.

www.jarn.org

The European Commission develops plan designed to slash food waste

The European Commission (EC) intends to slash the 800 million tonnes (379 kg per person) of food currently wasted annually by consumers and the industry. Roughly 42% of total food waste is generated by consumers, 39% by food manufacturers, 5% by retailers and 14% by the catering sector. Waste slashing will be the main focus of a EC study on optimization of food packaging through biobased, biodegradable, active and intelligent packaging will play key roles.

www.foodproductiondaily.com

Chilled foods are not so wasteful

The UK Chilled Foods Association (CFA) has...
Ammonia21.com community to be launched soon
Ammonia21.com, launched 3 years ago, is about to launch its community, a gateway to the first global online natural refrigerants community. It will enable users to interact with peers around the world, find new business and project partners or set up meetings at upcoming events. www.ammonia21.com

The European Cold Storage and Logistics Association (ECSLA) has appointed a new Secretary General: Frank O. Baumeister took over this role on September 1, 2011. www.ecsla.be

Out of the ordinary
Panasonic and Accenture join forces to create a smart city in Fujisawa, Japan
Panasonic and Accenture have launched a partnership to create a new “smart city” in Fujisawa, a coastal city located in the Kanto region of Japan. The project involves the development of a low-carbon, high-quality living environment utilizing sensor and energy-efficient technologies.

Technology
ICR2011 highlights
During the IIR Congress in Prague, a complete session was devoted to carbon capture and storage (CCS). Berstad et al.1 stressed that according to ICA, out of the targeted global annual CO2 emissions reductions, 50% by 2050 compared to 2005 levels –, CCS from power generation and industry is estimated as being about 19% of the mitigation potential. Neksa et al.2 gave an overview of current and possible application of refrigeration technologies for CO2 capture. The carbon capture routes within power production can be divided into post-combustion, pre-combustion and oxy-combustion. Capture from industrial point sources may often be compared to the boundary conditions of post-combustion capture.

Post-combustion capture from power production is associated with capture from flue gases containing relatively low concentrations of CO2 at pressures close to atmospheric. The most commonly evaluated (in combination with oxyfuel technique for atmospheric flue gas) is to capture CO2 from the flue gas at atmospheric pressure, often denoted anti-sublimation. Pre-combustion capture is related to capture of the CO2 before combustion. From a shifted synthesis gas as fuel in a gas turbine. The syngas is produced by gasification of coal or reforming of natural gas. Gasification and oxygen blown reformers require oxygen from an air separation unit (ASU). The conventional technology for air separation utilizes cryogenic separation. Separation of CO2 from the shifted synthesis gas is the other process step where refrigeration technologies may be utilized.

In oxy-combustion, fuel is burnt with oxygen instead of air. In this way, high CO2 concentrations in the flue gas can be obtained. After conditioning out the water content in the flue gas, CO2 is captured from the flue gas using cryogenic, mono CO2 and non-condensation refrigerants, before pressurization for transport in a compression and purification unit (CPU). The oxygen used in the fuel combustion is produced in an ASU. Low-temperature technology is utilized in the ASU. The conventional technology to air separation utilizes cryogenic separation. Separation of CO2 from the shifted synthesis gas is the other process step where refrigeration technologies may be utilized.

Improving insulation thanks to vacuum
Vacuum insulation panels (VIPs) are currently being launched in many insulation applications: aeronautics, marine, building domestic/commercial and transport (air, rail, road, and sea) and insulated containers for the transport of heat-sensitive products such as vaccines, blood and medicines.

Conventional insulation materials rely on gases trapped in a vacuum vessel; this requires using a minimum amount of material (or very high porosity above 90%). The main contributor to heat transfer is the captured gas, generally air, which has a thermal conductivity of 0.025 W/mK. Therefore the most efficient solution is to remove the gas from the vessel. However, this is a formidable task due to its high thermal inertia, the air resistance and to the relatively high pressure necessary to achieve good thermal performance.

VIPs are a porosity core material (fibrous filter, fibreglass, open polymer foams, pellets, “pyrogenated” silica which has the advantage of a certain amount of nanoscopic pores increasing the durability, etc.) wrapped in a water-tight film. VIPs are made by sealing the core material in a barrier film (polyethylene) and then covered with another film, usually a polyethylene film (EVA or polycarbonate), and a protective sealing layer.

The insulation is obtained by evacuating the vessel, applying low pressure, or for the VIPs currently being launched, by applying a vacuum to the vessel. The heat transfer is eliminated by the vacuum, and thus the insulation performance is improved.

In order to achieve the best performance, the gap between the insulation devices and the object to be insulated must be minimized. The thickness of the protective film and the ideal film bonding are of key importance. For this reason, VIPs are often accompanied by “fixing devices” which are used to create a better bond between the insulation and the object to be insulated. These devices are usually composed of a metal frame and an adhesive or a thermoplastics film. Different fixing devices are available, depending on the type ofVIPs. They may be used to achieve a better bond between the VIPs and the object to be insulated. 

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

The reason for the USD 742-million project was to take over this role on September 1, 2011. www.ecsla.be

European Cold Storage and Logistics Association (ECSLA)
www.ecsla.be

New business and project partners or set up meetings at upcoming events.

new business and project partners or set up meetings at upcoming events.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.

VIPs can increase the thermal performance of insulated containers (up to 240 hours) and/or facilitate the transport of chilled prepared foods.
reduce their thickness. VIP refrigerated containers allow for controlled-temperature shipping lasting 7-10 days as their performance is 3 times better than conventional polyurethane (up to 76 hours) and consequently 4.5 times higher than that of polystyrene (48 hours). According to Kacimi and Labranque II, their success requires improvements in efficiency and lower costs, for instance simply thanks to a protective layer with a resistant material. The re-use of the insulated boxes will also make them profitable and justify their high price.

Briefs

**Edible carrot films display food packaging potential**

Barrier properties exhibited by carrot-based edible films demonstrate potential for their use as packaging for a variety of food types, according to recent research from China. The study performed at Jilin University aimed to produce composite edible film with carrot puree and to examine how levels of other components – i.e. carboxymethyl cellulose (CMC), corn starch and gelatin – affected its mechanical and barrier properties. The research led by Xinwei Wang was based on carrots because of their nutritional value and the fact that few vegetable-based products had been developed.

Carrots contain water, protein, cellulose substances and pectic – and adding these components could lead to the formation of a cost-effective and biodegradable film. “Obtaining films with good oxygen permeability (OP) and desirable film mechanical properties would be an indication of the possible use of carrot as an alternative source of packaging. Carrot films may have a potential to be commercial because they can be used as food or food packaging”, they added. The study was published in the journal Food and Bioproducts Processing. www.foodproductionanddaily.com

**Kawasaki Heavy Industries (KHI) developed a small, high-efficiency centrifugal chiller that uses water as refrigerant. [www.ejarn.com](http://www.ejarn.com)**

**Watch a video showing cryoabloration of oolver tumour at Fuda Hospital, China:** www.youtube.com/watch?v=dyaDC XZ/b5k&feature=related

Another video shows how cryosurgery relieves chronic foot pain: www.youtube. com/watch?v=9qalMEJE

Regulations - Standardization

**Australia to set up a carbon price for HFCs**

On September 13, 2011, the Australian Government introduced to the Parliament a set of Bills that aim to cut emissions of greenhouse gases by 15% million tonnes CO₂ eq. a year. The carbon price would introduce a carbon charge on imports of synthetic greenhouse gases – including HFCs – and equipment containing such gases. The applicable carbon charge has been fixed at AUD 23 (about € 16.9) per tonne CO₂ eq, from July 1, 2012 and will rise by 2.5% each year until July 1, 2018. The price mechanism will then become an emissions trading scheme, in which the price will be determined by the market. This would mean a charge of about € 22 per kg of HFC-134a by July 2012.

The level of the Australian carbon charge is somewhat higher than the HFC tax level in Denmark (€ 17.5/kg of HFC-134a in 2011) but lower than the tax level in Norway (€ 39/kg of HFC-134a) or the proposed tax in Sweden that if introduced would result in a tax of about € 35/kg of HFC-134a. www.ammonia21.com www.acrcnews.com/news

**The Government of Argentina recently published the No. 98/2011 regulation specifying stricter energy efficiency standards for all freezers, refrigerators and other refrigeration appliances imported to or sold in Argentina. Under this regulation, all freezers and refrigerators covered must meet the level C energy efficiency requirements or higher; the lowest efficiency standard was D in the past. This new regulation entered into force on September 1, 2011. www.ejarn.com/news.asp?id=46278**

**New Chinese CO₂ heat pump standard**

On June 1, 2011 a new Chinese CO₂ heat pump standard was formally implemented. Standard GB/T26181-2010 is for hermetic motor-compressors for household and similar-use heat pump water heaters using CO₂ refrigerant, and is expected to accelerate the launching of new products on the Chinese market. The new standard determines requirements for compressor cooling capacity, the COP and noise levels, and is based on the characteristics of products envisaged for the Chinese market. The standard has been developed in anticipation of the launching of CO₂ heat-pump water heaters on the Chinese market in 2012. www.R744.com

**IIR conferences**

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 25-27</td>
<td>Deift, Netherlands</td>
<td>10th IIR-Gustav Lorentzen Conference on Natural Working Fluids (GL2012)</td>
</tr>
<tr>
<td>July 29</td>
<td>Kobe, Japan</td>
<td>10th IIR International Conference on Phase-Change Materials and Sturmes for Refrigeration and Air Conditioning</td>
</tr>
<tr>
<td>August 1</td>
<td>Dresden, Germany</td>
<td>12th Cryogenics 2012</td>
</tr>
<tr>
<td>October 25-26</td>
<td>Valencia, Spain</td>
<td>3rd IIR Workshop on Refrigerant Charge Reduction in Refrigerating Systems - RCR 2012</td>
</tr>
<tr>
<td>August 31</td>
<td>Yokohama, Japan</td>
<td>ICR2016 – 24th International Congress of Refrigeration (ICR 2016)</td>
</tr>
</tbody>
</table>

**IIR Conference**

- Commissions B1, B2, D1, E1, E2
- Commissions B1, B2, D1

**IIR Congress**

- All commissions

---

**IIR-co-sponsored conferences**

2011

- Belgrade - Serbia - November 30-December 2
  40th International Congress on Heating, Air Conditioning and Refrigeration
  Branko Todorovic: todorob@eunet.rs
  www.kgh-kongres.org
  Commissions B1, B2, D1, E1, E2

2012

- West Lafayette - USA - July 16-19
  14th International Refrigeration and Air Conditioning Conference at Purdue
  - 2nd International High-Performance & Green Buildings Conference at Purdue
  - 2nd International Compressor Engineering Conference at Purdue
  hercorg@purdue.edu
  https://engineering.purdue.edu/Herick/Events
  Commissions B1, B2, E1, E2

- Opatija - Croatia - September 18-20
  EuroSun 2012
  hss@trht.hr
  Commissions B1, B2, E1, E2

2013

- Houston - United States - April 16-19
  LNG 17
  kermitice@lng17.org _rclarkke@etf.com.au
  www.lng17.org
  Commission A2

- New Chinese CO₂ heat pump standard
  On June 1, 2011 a new Chinese CO₂ heat pump standard was formally implemented. Standard GB/T26181-2010 is for hermetic motor-compressors for household and similar-use heat pump water heaters using CO₂ refrigerant, and is expected to accelerate the launching of new products on the Chinese market. The new standard determines requirements for compressor cooling capacity, the COP and noise levels, and is based on the characteristics of products envisaged for the Chinese market. The standard has been developed in anticipation of the launching of CO₂ heat-pump water heaters on the Chinese market in 2012. www.R744.com