

1st IIR International Conference on Sustainability and the Cold Chain

29th, 30th and 31st March 2010, Selwyn College, Cambridge UK



The conference will incorporate approximately 90 papers split between three parallel sessions over two days. A detailed list of individual papers, authors and their programme timings will be published on the website in February 2010.

Cold chain conference themes (approx 60 papers)

- Process and equipment design innovation
- Innovative storage and transportation
- Developments in packaging
- Modelling and predictive tools
- Food quality and food safety
- Sustainable retail refrigeration

Sustainability themes (approx 30 papers)

- Refrigerants and refrigeration in the future
- Innovative technologies
- Carbon footprinting
- Advancements in commercial refrigeration
- Energy efficiency in food and pharmaceuticals



SCIENTIFIC COMMITTEE

Andy Pearson UK, Bart Nicolai Belgium (C2), David Tanner New Zealand, Don Cleland New Zealand, Peter Domanski USA (B1), Doug Reindl USA, Gerald Cavalier France (D2), Graeme Maidment UK, Judith Evans UK, Per Lundqvist Sweden, Giovanni Cortella Italy, Robert Heap* (Chairman) UK, Sietze Van der Sluis Holland, Silvia Estrada-Flores Australia.

ORGANISING COMMITTEE

Robert Heap (Chairman), Andy Pearson (Star Refrigeration), Graeme Maidment (London South Bank University), Judith Evans (R&DT and London South Bank University), Miriam Rodway (IOR), Lisa Waters (IOR).

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	Day 1 – 29 th March	Day 2 – 30 th March	Day 3 – 31 st March						
am		<p>7.45am Registration in Borradaile room</p> <p>8.30am Introduction and welcome Conference Chairman, Mr Robert Heap (Diamond room)</p> <p>8.45am “Performance of the cold chain” by Jacques Gilpart, Cemagref</p> <p>9.15am to 10.35am – Paper Session 1</p> <table border="1"> <tr> <td>Refrigerants and refrigeration in the future</td> <td>Developments in packaging</td> <td>Food quality in the cold chain</td> </tr> </table>	Refrigerants and refrigeration in the future	Developments in packaging	Food quality in the cold chain	<p>9.30am Short courses</p> <p>Mathematical modeling (Diamond room)</p> <p>Temperature control and efficiency methodologies (Tower room)</p> <p>SIRAC Alternative technologies review (Chadwick room)</p> <p><i>(10.30 to 11am – coffee)</i></p> <p>9.00am* Technical Tours</p> <p>Refrigerated transport vehicle equipment – Hubbard (*NB departs at 8am)</p> <p>Supermarket design using carbon dioxide refrigeration systems – Tesco</p> <p>Ammonia commercial distribution centre - Kuehne and Nagel</p> <p><i>Tours depart from Porters Lodge Selwyn College</i></p> <p>12.30pm to 1.30pm - L u n c h (Dining room)</p>			
Refrigerants and refrigeration in the future	Developments in packaging	Food quality in the cold chain							
am		<p>10.35 to 11am - coffee break (Dining room)</p> <p>11am to 1pm – Paper Session 2</p> <table border="1"> <tr> <td>Refrigerants and refrigeration in the future</td> <td>Innovation in storage and transportation</td> <td>Food quality in the cold chain</td> </tr> </table> <p>1pm to 2pm - L u n c h (Dining Room)</p> <p>2pm to 4pm – Paper Session 3</p>	Refrigerants and refrigeration in the future	Innovation in storage and transportation	Food quality in the cold chain	<p>1.30pm “Towards a sustainable cold chain” Prof Donald Cleland, Massey University (Diamond room)</p> <p>2.00pm to 3.40pm – Paper Session 5</p> <table border="1"> <tr> <td>Retail refrigeration</td> <td>Modeling and predictive tools</td> <td>Innovative technologies</td> </tr> </table> <p>3.40 to 4.00 pm - coffee break</p> <p>4pm to 5pm – Paper Session 6</p>	Retail refrigeration	Modeling and predictive tools	Innovative technologies
Refrigerants and refrigeration in the future	Innovation in storage and transportation	Food quality in the cold chain							
Retail refrigeration	Modeling and predictive tools	Innovative technologies							
pm		<p>Innovation in process and equipment design</p> <p>Advances in commercial refrigeration</p> <p>Energy efficiency in food and pharmaceuticals</p> <p>4pm to 4.30pm - coffee break (Dining Room)</p> <p>4.30pm to 6.10pm – Paper Session 4</p>	<p>Retail refrigeration</p> <p>Developments in packaging</p> <p>Carbon footprinting</p>						
pm	<p>3.30pm to 6.30pm Registration SCR room</p> <p><i>Working party meetings 4pm to 5.30pm</i></p> <p>6pm- 8pm Welcome Reception SCR room</p>	<p>Innovation in storage and transportation</p> <p>Modeling and predictive tools</p> <p>Innovative technologies</p> <p>6.30pm to 7.30pm <i>Commission meetings (for those involved)</i></p> <p>7.15pm Pre-Dinner Drinks (SRC room)</p> <p>8pm Conference Dinner (Main Dining room)</p>	<p>Retail refrigeration</p> <p>Developments in packaging</p> <p>Carbon footprinting</p> <p>“Sustainable technology development” close from Andy Pearson, President-Elect of the Institute of Refrigeration (Diamond room)</p> <p>5.20 Conference ends</p>						



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KEYNOTE PRESENTATIONS

The role of Sustainability - Introduction and Welcome

Robert Heap MBE, Conference Chairman. Robert Heap is Chairman of the Planning Committee for the conference and Chairman of the International Refrigeration Committee of the Institute of Refrigeration. He is an Honorary President of the IIR Science and Technology Council, and a former President of the Institute of Refrigeration.



Current Performance of the Cold Chain

Jacques Gilpart, Cemagref and French Institute of Industrial Refrigeration

This session will draw on recent research at Cemagref into measuring and improving performance of the cold chain.

Prof Jacques Gilpart is an expert in cold chain research and is based at Cemagref in Paris, France. He is an expert on refrigeration technologies, their energy consumption and on the environmental impact of refrigeration systems, as well as on the performance of the food cold chain. He is author and/or co-author of more than 80 scientific and technical papers in these fields. He is French delegate to the IIR, member of B2 commission and member of the "ice slurry" and of the "refrigerant charge reduction" working parties of the IIR. He also is regional editor of the International Journal of Refrigeration. Since October 2009, he has begun moving from his position at Cemagref to launch a private engineering department and to hold a teaching position in the French Institute of Industrial Refrigeration.

Towards a Sustainable Cold Chain

Prof Don Cleland, Centre for Postharvest and Refrigeration Research, Massey University, Palmerston North, New Zealand

The food cold chain is an essential component of the urbanised and industrialised world. Recently there has been growing awareness of the unsustainable nature of modern life due to resource depletion and environmental impact. This paper will examine the sustainability of cold chains by analysing product environmental footprints for a range of refrigerated foods produced in a variety of countries and consumed in the UK. The main environmental impacts of the cold chain are due to refrigerant leakage and energy use, although water use and construction materials can also be important factors. The impact increases with both length of storage and/or transport so eating local seasonal production after minimal storage is usually the most sustainable option. Imported counter-seasonal food can be more sustainable than storage of local production but the difference may not be large. On-going efforts to reduce refrigerant leaks, transition to non-ODP and low GWP refrigerants such as natural refrigerants, and improve energy efficiency are all high priority ways to improve sustainability of the cold chain. If year-round supply of perishable products is demanded, then refrigerated storage offers a relatively low cost and low impact solution that is better than most other preservation methods or high rates of food wastage.

Professor Cleland is Head of the School of Engineering and Advanced Technology at Massey University, New Zealand. He is Vice-President of the Science and Technology Council of the International Institute of Refrigeration, a Fellow of ASHRAE, the Institution of Professional Engineers of NZ, the Institute of Refrigerating, Heating and Air-Conditioning Engineers of NZ and the NZ Institute of Food Science and Technology, and an Honorary member of the Australian Institute of Refrigeration, Air-Conditioning and Heating. He is a researcher and educator in the fields of energy efficiency, refrigeration technology, food engineering and the refrigerated supply chain (cold-chain). His research has provided a suite of performance prediction methodologies that are used by industrial refrigeration practitioners to optimise the design and operation of cold chain technologies.

Sustainable technology development – conference conclusion

Dr Andy Pearson, President-Elect of the Institute of Refrigeration

The closing presentation will bring together the sustainability and cold chain conference themes looking forward towards a strategy for sustainable development.

Andy Pearson is the Managing Director of Contracts for Star Refrigeration. He is an expert in innovative solutions to refrigeration applications, using the full range of refrigerant options. A member of the conference planning group he is also chairman of the Institute of Refrigeration Technical Committee, a UK representative on the BSI, CEN and ISO Refrigeration Safety committees, and member of the IIR Commission E1 – Air Conditioning.

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SHORT COURSES

Delegates can choose to attend *one* tour or one short course only as these are running in parallel. Presentations from the short courses are included on the CD rom and datastick to be provided on registration.

1 - Mathematical Modeling

This short course will provide an overview of principles, technology and applications of mathematical modelling for improving efficiency of cooling operations. The programme for the three hour session will include:

- Modelling of refrigeration processes with an emphasis on modelling of the refrigeration cycle, heat load etc. by Don Cleland, Massey University, New Zealand
- Heat and mass transfer in foods during refrigeration by Bart Nicolai, BIOSYST-MeBioS, Belgium
- Computational fluid dynamics by Alan Foster, London South Bank University and R&DT, UK
- Quality modelling and predictive microbiology by Annemie Geeraerd, BIOSYST-MeBioS, Belgium

This course is designed and chaired by Prof Bart Nicolai, Division head of the Flanders Centre of Postharvest Technology (BIOSYST-MeBioS) at the Katholieke Universiteit Leuven, Belgium. Bart's primary research interests include Postharvest technology, Nondestructive quality measurements, Heat and mass transfer, Postharvest physiology, Mathematical modeling, Refrigeration technology and Metabolomics

2 - Temperature control and energy efficiency in the cold chain

Beginning with an introduction to the cold chain concept and its relation to energy efficiency this course will cover:

- Innovative energy efficient systems in industrial food processing by David Pearson, Star Refrigeration, UK
- Temperature control and energy efficiency in cold storage by Prof Don Cleland, Massey University, New Zealand
- Mobile refrigeration including types of system, thermal performance, benchmarks and quality by Dr Silvia Estrada-Flores, Food Chain Intelligence, Australia
- Retail refrigeration including temperature variability, performance benchmarks, energy saving features by Judith Evans, London South Bank University and R&DT, UK
- Domestic refrigeration including temperature variability, benchmarking performance, microbiology and energy saving by Stephen James, the Grimsby Institute, UK.

This course is designed and chaired by Dr Silvia Estrada-Flores Principal Consultant, Food Chain Intelligence, Australia

3 - Alternative technologies review and action workshop

SIRAC, the UK's network for sustainable innovation in refrigeration and air conditioning was set up in 2008 to accelerate the adoption of new more efficient technology in the market place, by improving links between business and academia. In this workshop delegates will be invited to review and evaluate some of the most innovative solutions to making cooling more sustainable currently under development.

- Absorption and Adsorption
- Air cycle
- Trigeration
- Electrocaloric and Magnetic
- Solar cooling.



Experts will present the technologies which they believe will be able to make the greatest contribution to reducing carbon emissions to a panel of business experts who will question and challenge their assertions. This will be followed by an interactive workshop which will help delegates to challenge their own assumptions of what it means to become a sustainable refrigeration and air conditioning technology.

The workshop will be chaired by Prof Graeme Maidment, Professor of Refrigeration at the Faculty of Refrigeration Engineering at London South Bank University, where he manages a £2 million portfolio of refrigeration and air conditioning sustainability research. He is also chairman of the SIRAC Network which is funded by the EPSRC in the UK. The interactive workshop will be facilitated by Chris Seeley a skilled action researcher and social scientist, who has been working with the SIRAC network since its inception.

TECHNICAL TOURS

Delegates can choose to attend **one** tour **or** one short course only as these are running in parallel. Delegates will be invited to select their option on booking. Presentations from the short courses are included on the conference CD.

1 - Energy efficient two-stage ammonia cold store and chill application

Kuehne and Nagel, Wellingborough - This installation of 10,000m² of frozen and chill storage space inside an existing ambient warehouse was completed in 2008 in just 18 weeks. The store has a two-stage pumped circulation ammonia refrigeration plant providing cooling to a -25°C cold store and +2°C chill chamber. Designed and installed by Star Refrigeration, the plant includes a number of energy efficiency enhancements including integrated compressor/cooler control, defrost on demand and heat recovery for the underfloor heater mat. A guided tour of the facility will include a walk around the two temperature controlled chambers and the refrigeration plant room. Star Refrigeration staff will be on hand to answer any questions you may have regarding the refrigeration plant.

(Maximum 20 delegates – 1 hour journey by coach departing at 9am from the Porters Lodge, Selwyn College)

2 - Commercial cooling and refrigerated transport equipment manufacturing facility

Hubbard Products Ltd, Otley (part of the worldwide Zanotti group) serves the cool chain supply sector offering a wide range of direct drive, alternator drive, diesel drive and stand alone electrical units for panel vans, box body vehicles and truck and trailer combinations. Hubbard supplies cooling equipment to many of the UK's supermarket home delivery services whilst also offering the full range of units from European transport refrigeration market leaders, Zanotti S.p.A. Visitors will be taken on a tour of the manufacturing facility. This will include the sheet metal production area, the copper shop and paint bay. They will see the various product assembly lines and cells in action as well as the final test facilities. They will be able to inspect the in house environmental test facility and development workshop, and the design engineering department with 3D CAD systems. There will be examples of commercial & transport product ranges on display and senior sales and design personnel will be on hand to answer questions about activities and products.

(Maximum 20 delegates – 1.5 hour journey by coach departing at 8am from the Porters Lodge, Selwyn College)

3 - Carbon Dioxide Transcritical refrigerating system at a zero carbon supermarket

Designed as the world's first zero-carbon store the Tesco Store at Ramsey, Cambridgeshire will even sell surplus energy generated by an on-site Combined Heat and Power plant, back to the National Grid. Ramsey is one of the first Tesco stores which uses a transcritical carbon dioxide system supplied by Star Refrigeration in 2009. Andy Campbell, Head of Refrigeration, Environmental for Tesco will also be available to discuss with participants on the tour the management of this new site and the Tesco approach to sustainable supermarket refrigeration.

(Maximum 20 delegates – 1 hour journey by coach departing at 9am from the Porters Lodge, Selwyn College)



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ADDITIONAL MEETINGS TAKING PLACE DURING THE CONFERENCE

Working Parties

Pharmaceuticals cold chain
Refrigerated display cabinets
Energy labelling in the cold chain

Commissions

D2 transport
D1 storage and display
C2 food science

Exhibition

Sponsors and exhibitors information available in the Diamond room throughout the conference.



GENERAL INFORMATION FOR DELEGATES

Booking for the conference

Full delegate fees include:

- Two full days of conference proceedings on 30th and 31st March with access to approximately 90 papers and up to 150 delegates from a world wide audience of experts in the cold chain and sustainability
- Copies of all papers, key note presentations and slides from the three short courses on a CD rom *as well as on a memory stick* to allow easy reference and reading of papers and abstracts
- Social events to help you make contacts with delegates who are experts in your field – welcome reception, pre-dinner drinks and conference dinner on 30th March.
- Lunch and refreshment breaks on 30th and 31st March
- Accommodation, including breakfast and free WIFI on the nights of the 29th and 30th March

The prices are as follows:

Book before 31st January to take advantage of discounted rates,

Full conference including accommodation as above (IOR, IIR members and speakers)	£470.00*
Full conference including accommodation as above for all others	£540.50*
Full conference as above <i>excluding accommodation</i> at Selwyn (IOR, IIR members and speakers)	£305.50*
Full conference as above <i>excluding accommodation</i> for all others	£364.25*

After 31st January the following increased fees will be charged

Full conference including accommodation as above (IOR, IIR members and speakers)	£581.00
Full conference including accommodation as above for all others	£640.00
Full conference as above <i>excluding accommodation</i> (IOR, IIR members and speakers)	£416.50
Full conference as above <i>excluding accommodation</i> for all others	£475.50

All prices include VAT at 17.5%. *The 17.5% rate comes into effect on the 1st January 2010, therefore there is a reduction of 2.5% on bookings received before this date.

Additional nights' accommodation are available at Selwyn College before or after the event at a cost of £82.80 if booked through the conference organisers (lisa@ior.org.uk). Please enquire for details.

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On line booking procedure

All conference places must be booked on line at www.icccuk2010.com accompanied by payment by credit card. You will receive an acknowledgement letter, receipt and invitation to select your short course or tour, as well as details of accommodation arrangements.

Accommodation on site

Accommodation is included in the standard booking fee and is based on the Selwyn College site in modern single en suite study bedrooms complete with free WIFI. You will be able to collect your bedroom key from the Porters Lodge at Selwyn College on arrival.



There are no twin/double rooms available at the College.

Meals and Dining

The following meals are included in the delegate package and are served in the vaulted main Dining Hall:

Breakfast on the 30th and 31st March (all residential delegates)

Lunch on the 30th and 31st March

Dinner on 30th March

A bar is also available on site for conference delegate use.



Accompanying persons programme

A programme for accompanying persons will be tailored to the interests of those taking part. An accompanying persons fee of £58.75 will include the welcome reception and conference dinner. Additional excursions or entry fees such as exhibition entrance or bus tours of the town will be payable if required.

Please note that there is no twin or double room accommodation at Selwyn College. Contact the local tourist board at Visit Cambridge www.visitcambridge.org for suggested hotels with double occupancy rooms.

The hotels closest to Selwyn Collage are Doubletree by Hilton Cambridge, The Royal Cambridge, The Lensfield Hotel De Vere University Arms Hotel or the Regent Hotel.

Book on line at www.icccuk2010.com

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TRAVELING TO CAMBRIDGE

Selwyn College was founded in 1882 it is a historic building set in its own grounds. Cambridge city centre is just a short stroll away through the beautiful college gardens and the riverside.

Arriving by air

Cambridge is within easy reach of UK airports. London Stansted is the nearest international airport to Cambridge, located just 30 miles to the South of the city, with easy access by train, coach or taxi.

Arriving by train

There is a fast and frequent rail service from London King's Cross & London Liverpool Street to Cambridge.

There are excellent connections from Scotland & the North via Peterborough, and regional services from Birmingham, the Midlands, East Anglia or the Northwest.

Selwyn College is a 30 minute walk from Cambridge train station or taxis and local buses are available outside the station.

Arriving by Eurostar

For those arriving into London St Pancras by Eurostar it is 15min walk to King Cross station where trains run to Cambridge in less than an hour.

For detailed travel advice see the www.visitcambridge.org website

A map and directions to the college is available at <http://www.sel.cam.ac.uk/college/College-Facilities/Directions/>

Registration on arrival at Selwyn College

To register for the conference please make your way to the registration desk in the Senior New Common Room area where you can collect your bag including cd, datastick, abstract booklet and other information. Please register during one of the following times:

- 29th March 2009 at 3.00pm – 7.30pm in the Senior New Common Room
- 30th March 2009 at 7.45am onwards in the Borradaile Room

Residential delegates must also register at the Porters lodge at Selwyn College to collect your accommodation key card.

QUERIES AND FURTHER INFORMATION

If you have any queries about the conference, venue or your booking contact the conference organiser:

Lisa Waters
Institute of Refrigeration
Kelvin House, 76 Mill Lane, Carshalton, SM5 2JR
lisa@ior.org.uk tel +44 (0) 208 647 7033 fax +44 (0) 208 773 0165
The Institute of Refrigeration is a registered charity no 250 081

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