

9th IIR Gustav Lorentzen Conference: 11-14 April 2010

The following technical program is based on papers received and registered at the time of design. The event organisers retain the right to alter or amend details of the event program - including times, speakers and papers presented.

Sunday 11 April 2010

17:00 - 19:30 Conference welcome function and registration - Sydney Convention and Exhibition Centre - Parkside Foyer

Monday 12 April 2010

8:00 Registration (open 8:00am) In the Parkside Foyer at the Sydney Convention and Exhibition Centre

Opening Session - in room Parkside 110

Welcome

9:00 Welcome on behalf of Australian Institute of Refrigeration, Air Conditioning and Heating, AIRAH president John Bosci

9:05 Welcome on behalf of International Institute of Refrigeration, IIR Director Didier Coulomb

9:20 Welcome on behalf of conference chair, Professor Aliakbar Akbarzadeh, RMIT University

Keynote presentations

9:25 Gordon V.R. Holness, ASHRAE president - on ASHRAE'S position and work with Natural Refrigerants

9:45 Dr Petter Nekså, SINTEF, Norway - CO₂ - A refrigerant from the past with prospects of being one of the main refrigerants in the future

10:15 Professor Risto Ciconkov - Skopje University "Ss. Cyril & Methodius", Macedonia - Natural refrigerants in developing countries, problems and suggestions

10:45 Welcome and practical information - conference organiser

10:50 Morning Tea

Room: Parkside 110A

Industrial CO₂ and NH₃ - 1

Chair - Klaas Visser

Room: Parkside 110B

Heat pumps - 1

Chair - Aliakbar Akbarzadeh

Room: Parkside G04

Special applications - 1

Chair: Joe Paul

11:50 CO₂ cooling for particle physics detectors - **Bart Verlaat - Netherlands**

A carbon dioxide domestic hot water heat pump with double wall plate heat exchanger gas cooler - **Sergio Girotto - Italy**

Distributed temperature measurements on a u-pipe thermosyphon borehole heat exchanger with CO₂ - **José Acuna - Sweden**

12:20 Compact, lightweight unitary-type air-conditioner using transcritical R744 designed for energy efficient operation in hot climates - **Pega Hrnjak - United States**

Compact brazed plate heat exchangers for CO₂ heat pump water heaters - **Reinhard Radermacher - United States**

Natural working fluids based heat recovery options for dryers in the dairy industry - **Don Cleland - New Zealand**

12:50 Lunch

Industrial CO₂ and NH₃ - 2

Chair - Ben Adamson

Heat pumps - 2

Chair: Chris Dixon

Special applications - 2

Chair - Stephen White

13:40 Air cooled chillers with ammonia - **Andy Pearson - United Kingdom**

Experimental analysis and simulation of an integrated CO₂ heat pump for low-heating-energy buildings - **Oleksandr Kotenko - Austria**

Evaporative cooling with carbon dioxide for the detectors upgrade at the large hadron collider - **Marco Oriunno - United States**

14:10 Comparative analysis of secondary CO₂ systems and water based brines in industrial and commercial refrigeration applications - **Kees van Heiningen - Netherlands**

Development of general-purpose energy system analysis software - energy flow +M - **Kohmei Nakajima - Japan**

Performance analysis of waste heat-driven cooling cum desalination adsorption cycle - **Kyaw Thu - Singapore**

14:40 Elemental modelling of an evaporator in a cascade refrigeration system - **Pradeep Bansal - New Zealand**

Analysis of the use of different heat exchangers in propane heat pumps - **Francisco Vera-García - Spain**

State of the art review of alternative refrigerants in automotive air conditioning systems - **Enio Bandarra Filho - Brazil**

15:10 An HFC-HCFC free food processing plant - the energy and environmental benefits of a two stage transcritical CO₂ refrigeration plant - **Klaas Visser - Australia**

Groundwater system with ammonia heat pumps saves 70% of energy - **Henrik Winther - Denmark**

15:40 Afternoon tea

Industrial CO₂ and NH₃ - 3

Chair - Stefan Jensen

Heat pumps - 3

Chair: Joe Paul

Special applications - 3

Chair: Marc Chasserot

16:10 Ultra low charged air-cooled ammonia chillers - **Pega Hrnjak - United States**

100kW CO₂ water heat source heat pump development and study for the global food processing industries - **Motobumi (Mike) Ono - Japan**

On-site testing of a novel indirect evaporative cooler - **Frank Bruno - Australia**

16:40 CO₂ Refrigeration systems for offshore process cooling - **Ben Adamson - Australia**

An experimental study on performance assessment of a transcritical CO₂ heat pump system under varying refrigerant charge - **Neeraj Agrawal - India**

Modeling and parametric analysis of silica-gel desiccant wheels - **Ramadas Narayanan - Australia**

17:10 Individually controlled evaporators in ammonia systems - high-efficiency systems for energy reduction in Industrial refrigeration plants with ammonia - **Anders Mønsted - Denmark**

Reversible R744 (CO₂) heat pumps applied in public trains - **Petter Nekså - Norway**

17:40 IIR Meeting Commission B1 & B2 - Room G: 05

IIR Meeting Commission E1 & E2: Room G:07

19:00 - 23:00 Conference dinner - Sydney Convention and Exhibition Centre - Bayside 2



achieving
recognition



	Room: Parkside 110A	Room: Parkside 110B	Room: G04
	Supermarket / Commercial Refrigeration 1	CO ₂ Scientific - 1	Dew-point cooling
	Chair: Lars Reinholdt	Chair - Pradeep Bansal	Chair - Klaas Visser
9:00	Evolution of CO ₂ systems design based on practical experiences from supermarket installations in Northern Europe - Hans Matthiesen - Denmark	Cooling of superheated refrigerants flowing inside mini and micro tubes study of heat transfer and pressure drop, CO ₂ case study - Mahmoud Hammad - Jordan	A closer look at evaporative adiabatic wet bulb cooling and diabatic dew-point cooling, using water (R718) as refrigerant. Part A - Peter G.H. Uges - Netherlands
9:30	Market introduction of commercially viable CO ₂ supermarket refrigeration systems - Tobias Siemel - Germany	Evaluation of a variable suction gas heat exchanger in a liquid chiller system using carbon dioxide as refrigerant - Håvard Rekstad - Norway	A closer look at evaporative adiabatic wet bulb cooling and diabatic dew-point cooling, using water (R718) as refrigerant. Part B - Peter G.H. Uges - Netherlands
10:00	CO ₂ -only refrigeration systems with two-stage gas coolers for the Australian climate - Michael Bellstedt - Australia	Investigation of performance enhancement of transcritical vapor compression system with discontinuous fins - Pamela Reasor - United States	Parameters affecting the performance of a dewpoint cooler consisting of a counter flow heat exchanger using water as refrigerant - Martien Janssen - Netherlands
10:30	Morning tea		
	Supermarket / Commercial Refrigeration 2	Thermal storage / HVAC / Ejectors - 1	Sorption - 1
	Chair - Michael Bellstedt	Chair - Mike Dennis	Chair - Stephen White
11:00	The evolution of CO ₂ refrigeration from trial to roll out in Tesco stores - Andy Campbell - United Kingdom	Salt slurries as secondary refrigerant - Carlos Infante Ferreira - Netherlands	Recent developments of sorption chillers in Europe - Paul Kohlenbach - Australia
11:30	CO ₂ Supermarket refrigeration system for hot climates - Sergio Giroto - Italy	Performance comparison of a static ice-bank and dynamic ice slurry cool thermal energy storage systems - Marino Grozdek - Croatia	Air Conditioning with liquid sorption solution - Uwe Franzke - Germany
12:00	An overview of development and test capabilities for CO ₂ commercial refrigeration systems - Tobias Siemel - Germany	Experimental investigation of heat transfer tubes in a phase change thermal energy storage system - Frank Bruno - Australia	Preliminary experimental results of a liquid desiccant cooling system and comparison with empirical correlations - Alberto Coronas - Spain
12:30	Lunch		
	Supermarket / Commercial Refrigeration 3	Thermal storage / HVAC / Ejectors - 2	Sorption - 2
	Chair: Andy Pearson	Chair: Frank Bruno	Chair - Uwe Franzke
13:30	Energy efficiency comparison of the CO ₂ cascade and the R404A and R22 conventional system for supermarkets - Alessandro da Silva - Brazil	Experimental investigation on the effect of mixing length on the performance of two-phase ejector for CO ₂ refrigeration cycle with and without heat exchangers - Ariel Marasigan - Japan	Single phase heat transfer study of Lithium Bromide in a brazed plate heat exchanger - Geydy Luz Gutiérrez Urueta - Spain
14:00	Heat recovery on CO ₂ systems in supermarkets - Lars Reinholdt - Denmark	Experimental investigation of different ejector geometries for R-744 transcritical systems - Petter Nekså - Norway	Thermodynamic simulation of alternative absorption heat pumping processes using natural refrigerants - Oleksandr Kotenko - Austria
14:30	The study of a two-stage compression CO ₂ cycle with two different temperature evaporators - Hong Hyun Cho - Korea	Experimental study on working stability in transcritical CO ₂ system with ejector - Guangming Chen - China	Australian Solar Cooling Interest Group - Paul Kohlenbach - Australia
15:00	Afternoon tea		
		Chair - Michael Bellstedt	
15:30	Montreal Protocol and uptake of natural refrigerants: Forum discussion		
	CO ₂ Scientific - 2	Thermal storage / HVAC / Ejectors - 3	Sorption - 3
	Chair - Don Cleland	Chair: Pega Hrnjak	Chair - Alberto Coronas
16:30	In-tube condensation heat transfer of CO ₂ at low temperatures: A review - Pradeep Bansal - New Zealand	1-D Computational model of a motive nozzle for the R744 two-phase ejector - Krzysztof Banasiak - Poland	Thermal conductivity enhancement of binary nanoemulsions for absorption application - Yong Tae Kang - Korea
17:00	Effect of polyolester oil on the pool nucleate boiling heat transfer coefficient of carbon dioxide - Yoshinori Takaishi - Japan	A prognosis of ejector cooling - Mike Dennis - Australia	Measurements of vapor-liquid equilibrium properties for the binary refrigerant, carbon dioxide and dimethyl ether - Yohei Kayukawa - Japan
17:30	An experimental study of CO ₂ thermodynamic cycles - Cláudio Melo - Brazil		Effect of the approach to equilibrium factor in an absorption cycle with integrated compression booster - Rubén Ventas Garzón
19:00 - 22:00 Dinner function - harbour cruise (departs from Convention Centre wharf)			

	Room: Parkside 110A	Room: Parkside 110B	Room: Parkside G04
	Supermarket / Commercial Refrigeration 4	Compressors + expanders - 1	Sorption - 4
	Chair - Stefan Jensen	Chair: Klaas Visser	Chair - Kiyoshi Saito
9:00	Development of CO ₂ freezer for commercial use - Satoshi Imai - Japan	Flooded compression in CO ₂ scroll compressors - Ian Bell - United States	Influence of solution heat exchanger efficiency on the performance a simple effect H ₂ O-LiBr absorption system - Gedy Luz Gutiérrez Urueta - Spain
9:30	Ammonia and CO ₂ combined package systems for commercial and industrial applications - Andrey Andrusenko - Australia	Latest developments in compressors and refrigeration systems using the refrigerant R744 (CO ₂) - Manuel Fröschle - Germany	Solar Cooling in Australia: The future of air-conditioning? - Paul Kohlenbach - Australia
10:00		Evaluation of suction valve failure modes applied in CO ₂ compressor - Eduardo Luis Gaertner - Brazil	Vapor pressure of alkylate working pairs for absorption refrigeration cycles with high temperature driving heat - Mahmoud Bourouis - Spain
10:00	Morning tea		
	Hydrocarbons	Compressors + expanders - 2	Sorption - 5
	Chair - Ben Adamson	Chair: Reinhard Radermacher	Chair - Paul Kohlenbach
11:00	Preliminary tests about heat transfer during flow boiling of carbon dioxide and propane blend - Alfonso William Mauro	Reduction of heat transfer inside compressor combined with expander - Masanobu Wada - Japan	Experimental evaluation of a small capacity H ₂ O-LiBr absorption heat pump in cooling and heating modes - Jerko Labus - Spain
11:30	Safe use of hydrocarbon based chillers and application solution - Alexander Pachai - Denmark	Determining the tribological properties of lubricant-refrigerant mixtures - Margrit Junk - Germany	Statistical study of experimental results for an adiabatic absorption system - Gedy Luz Gutiérrez Urueta - Spain
12:00	Performance assessment of air conditioners with HC-290 - Atul Padalkar - India	Improvement of vane motion in a rotary vane expander for a CO ₂ heat pump cycle - Hyun J. Kim - Korea	Thermally-driven ammonia-water absorption systems - Vasile Minea - Canada
12:30	SolarChill technology - solar powered direct drive refrigerators with hydrocarbon refrigerants - Per Henrik Pedersen - Denmark		Development of a small scale ammonia/water absorption chiller - Thomas Brendel - Germany
13:00	Lunch		
14:00	Closing session - in room Parkside 110		
14:30	Afternoon tea and facility tours		

FACILITY TOURS

Must be booked at registration desk. Places are strictly limited.

Bitzer Technology Centre

Leave at 13:30

We are running a facility tour to BITZER Australia's Technology R&D Centre. Opened in May 2005 BITZER Australia's R&D centre is at the forefront of natural refrigerant systems development in Australia.

The facility operates a CO₂ LR cascade system with an Ammonia high side & a 2 stage transcritical plant all cable of LT, MT & HT temperatures bands

Botany Bay Petrochemical Plant

Leave at 14:30

We have organised a site visit to a petrochemical plant installation only 30 minutes from the conference venue, to view a large, cutting-edge ethylene-propane cascade refrigeration system. This has a capacity of over 600 kW, operating down to -100°C, with compressor drive motors up to 1600 kW and which is understood to be the lowest temperature oil-flooded screw compressor operating in the world. It includes a stainless steel screw compressor on the ethylene stage due to the low temperature. The system was commissioned in 2001 and has run since then without major maintenance. The system designer will be present on the tour.

Heatcraft Innovation Centre

Leave at 14:30

Heatcraft are offering a tour of their innovation centre. The centre demonstrates efficiency & operations of equipment by evaluating the quality and performance of the equipment under controlled ambient conditions. Items of interest include: CO₂ Cascade Demonstration System, CO₂ Evaporator, Multi Compressor Rack, condensing units and more.

Visit to CSIRO Energy Centre*

The CSIRO Energy Centre is a state of the art research laboratory with research into solar technicalities and distributed energy. CSIRO has a significant research program in solar air conditioning. Conference delegates are invited to inspect these facilities on **Friday 16th April at 10am**.

*Please note – Newcastle is a 2 – 2.5 hour drive north of Sydney. Delegates will have to make their own travel arrangements. Maps will be available upon registration for this tour.

ARBS EXHIBITION

ARBS is the largest industry air conditioning, refrigeration and building services exhibition in the southern hemisphere, attracting over 10,000 visitors. ARBS focuses on best practice sustainability, energy efficiency and compliance. ARBS is held at the exhibition centre next door from 12-14th April. Admission is free.

