Solar Air-Conditioning

Rome Airport, Italy
Thursday, September 24th, 2015
Friday, September 25th, 2015
The sixth International Conference on Solar Air Conditioning concludes the first decade of high level exchange on solar cooling science and technology. Renewable energies have dramatically increased their market share during the last years and many countries now approach 30% of renewable electricity and about 10 to 15% of renewable heat in the national energy mix. This has led to strong reduction in prices, especially for solar photovoltaics, while the solar thermal market only slowly gains importance. Cooling and air conditioning was always an optimal application for solar energy use, as the temporal coincidence between cooling need and solar energy conversion is better than most other uses of solar energy. In countries with cooling dominated climates solar air conditioning is an excellent technology to provide high own consumption of solar energy, offering interesting economic solutions, especially if electricity prices are high and long cooling operation hours are needed. While photovoltaic cooling seems to take the lead in reducing cooling costs, solar thermal cooling technologies offer more flexible and low cost thermal storage and show reliable and stable operation with a long machine lifetime. A major advantage is the strong reduction of stress on the electrical networks, which often suffer due to high peak cooling loads during summer conditions. Trigeneration systems obtained when coupling cogeneration units with thermal cooling systems are also attractive solutions for highly efficient and economic cooling and can be supported with solar thermal energy. Italy with its significant cooling requirements and its advanced refrigeration industry is an excellent host of the 2015 Solar Air Conditioning Conference. Following the 3rd Conference hosted in Palermo 2009, the 6th Conference returns to Italy to celebrate 10 years of successful networking of solar cooling researchers, industrial companies and technology developers. Rome as the conference location lies in the center of Italy’s leading economic region and is a well known host of many events on refrigeration and air conditioning.

Prof. Dr. Ursula Eicker
University of Applied Sciences Stuttgart, Germany

**Location**

Rome is the city with the highest concentration of historical and architectural riches in the world. The conference venue is located in Fiumicino a small city in the province of Rome. The hotel is next to the Leonardo da Vinci International Airport. For hotel guests there is a shuttle service available to and from Rome City Center and the Airport.

Leonardo da Vinci Rome Airport Hotel
Via Portuense, 2470
00054 Fiumicino/Rome
Italy
www.romeairporthotel.it
info@romeairporthotel.it

**Conference Chairwoman**

Prof. Dr. Ursula Eicker
University of Applied Sciences Stuttgart, Germany

**Scientific Committee**

Dr. Constantinos A. Balaras
Group Energy Conservation, Institute for Environmental Research & Sustainable Development, National Observatory of Athens, Greece

Prof. Marco Beccali
Dept. of Energy, Information Engineering and Mathematics Modeling (DEIM)Università degli Studi di Palermo, Italy

Prof. Alberto Coronas
Universitat Rovira I Virgili, Tarragona, Spain

Prof. Yan Jun Dai
Shanghai Jiao Tong University, China

Prof. Dr. Hans-Martin Henning
Fraunhofer ISE, Freiburg, Germany

Dr. Daniel Mugnier
Tecsol SA., Perpignan Cedex, France

Prof. Dr. Christian Schweigler
University of Applied Sciences Munich, Germany

Prof. Dr.-Ing. Wolfgang Streicher
University of Innsbruck, Institute for Structural Engineering and Material Sciences, Innsbruck, Austria

Dr. Kyriakos Tsiftes
University of Cyprus, Nicosia, Cyprus

Dr. Stephen White
CSIRO Energy Technology Newcastle, Australia

**Conference Focus**

- Development of technologies
- Know-how transfer
- Identification of R&D needs
- Exchange of results and ideas

**Your Advantage**

- You gain comprehensive information about the state of technology as well as latest results from research and development.
- The scope of the conference is intended to encourage a hearty open discussion of problems and future strategies to spread Solar Air-Conditioning.
- The speakers are leading scientific and business experts.
- The programme structure and the conference venue best ensure intensive experience-sharing between participants and presenters.
- The detailed proceedings book with all talks and poster contributions will be handed over at the start of the conference and will serve you well as reference works.
Programme

Workshop on
The New Generation Solar Cooling & Heating Systems
(PV or solar thermally driven systems) / IEA SHC Task 53
Leonardo da Vinci Hotel Rome Airport, September 23, 2015, 14.00 – 17.30 hrs
Seminar Chairman:
Dr. Daniel Mugnier, Operating Agent, IEA SHC Task 53
Whereas renewable cooling is more and more an hot topic in the World energy issues, a new generation of solar cooling systems is appearing from labs and in the market. Consisting both in solar thermal or photovoltaic, the concepts are oriented to cost reduction and reliability. A new IEA Solar Heating and Cooling programme name Task 53 is exactly addressing this New generation.
The IEA SHC Task 53 workshop will be dedicated in presenting the latest developments and new appearing products and systems. The presentations will be mixing industry developments and concepts as well as R&D institutes research results
The workshop is free of charge for participants of the conference.
Please register via: http://www.otti.eu/registration/SAC-4880/

6th International Conference
Solar Air-Conditioning
Thursday, September 24th, 2015
09.30 Opening Address
Gabriele Struthoff-Müller, OTTI, Regensburg, Germany
Conference Chairwoman Ursula Eicker, University of Applied Sciences Stuttgart, Germany

OPENING SESSION
Chair: Marco Beccali, Information Engineering and Mathematics Modeling (DEIM), Università degli Studi di Palermo, Italy
09.45 Market and technology development of solar cooling in Italy
Livio de Santoli, AICARR, Rome, Italy
10.05 Successful large scale projects on solar cooling - energetic and economic performance
Christian Holter, Solid, Graz, Austria
10.25 New Generation solar cooling and heating systems with IEA SHC Task 53: overview and first results
Daniel Mugnier, Tecsol S.A., Perpignan, France

10.45 Discussion
11.00 Coffee Break

SESSION 1: THERMALLY DRIVEN SOLAR AIR CONDITIONING COMPONENTS, PART 1
Chair: Christian Schweigler, Munich University of Applied Sciences, Germany
11.45 Experimental evaluation of an ammonia-lithium nitrate absorption cooling system
Wilfrido Rivera, Universidad Nacional Autónoma de México Instituto de Energías Renovables, Temixco, Morelos, México
12.00 Experimental experiences with an enhanced directly air-cooled water/LiBr absorption chiller
Myrea Richter, ILK Dresden, Dresden, Germany
12.15 Experimental performance of a chemisorption chiller driven by hot water with temperature up to 75 °C
Rogério Gomes Oliveira, Federal University of Santa Catarina, Araranguá, Brazil
12.30 Discussion
12.45 Lunch and visit to the poster exhibition

SESSION 2: THERMALLY DRIVEN SOLAR AIR CONDITIONING COMPONENTS, PART 2
Chair: Alberto Coronas, Universitat Rovira I Virgili, Tarragona, Spain
14.15 Modeling and experimental study of an ammonia-water falling film absorber
Delphine Triche, French Alternative Energies and Atomic Energy Commission (CEA) French Environment and Energy Management Agency (ADEME), Le Bourget du Lac, France
14.30 Development of an advanced solar sorption refrigerator prototype
Andrea Frazzica, CNR ITAE, Messina, Italy
14.45 Evaluation of eutectic salt mixture as thermal energy storage material for high temperature solar cooling applications
Sergio Pintaldi, RMIT University CSIRO Energy, Mayfield West, Australia
15.00 Discussion

POSTER SESSION
Chair: Costas Balaras, Group Energy Conservation, Institute for Environmental Research & Sustainable Development, National Observatory of Athens, Greece
15.20 PO 1 Experimental study and validated model of a latent heat storage system at medium temperature for solar heating and cooling applications
PO 2 Experimental and theoretical investigation on a high efficient solar absorption cooling system combined with an air-source heat pump: A case study
Yao Zhao, Shanghai Jiao Tong University, Shanghai, China

PO 3 Energy performances and life cycle assessment of advanced solar DEC freecool units
Pietro Finocchiaro, University of Palermo, Palermo, Italy

PO 4 System efficiency for cascading of adsorption chillers
Angelus Dillmann, Hochschule Kempten, Kempten, Germany

PO 5 A novel strategy for PV based solar air conditioning
Alberto Coronas, Universitat Rovira i Virgili, Tarragona, Spain

PO 6 Adapted monitoring procedure for new generation solar cooling & heating systems
Bettina Nocke, AEE INTEC - Institut für Nachhaltige Technologien, Gleisdorf, Austria

PO 7 DHW/cooling hybrid strategy for solar cooling: two successful year monitoring results
Daniel Mugnier, Tecsol S.A., Perpignan, France

PO 8 5 years of operating experience of a solar driven adsorption chiller/heat pump
Björn Nienborg, Fraunhofer ISE, Freiburg, Germany

PO 9 First operation year of world’s most powerful solar cooling operation in USA
Moritz Schubert, S.O.L.I.D., Graz, Austria

PO 10 Integration of different solar cooling technologies in the cooling supply of a data center
Antoine Dalibard, Stuttgart University of Applied Sciences, Stuttgart, Germany

PO 11 Climate control in the production of forest plants – using photovoltaics to power an innovative forestry incubator
Marco Hernandez Velasco, Dalarna University, Falun, Sweden

PO 12 Solar cooling simulation for planning and optimization
Andreas Witzig, Vela Solaris AG Polysun, Winterthur, Switzerland

PO 13 Theoretical analysis of a direct solar-regenerated liquid desiccant system augmented by a flat plate bottom reflector
Fernando Manuel Gómez Castro, University of Applied Sciences Stuttgart, Stuttgart, Germany

PO 14 A simple tool for life cycle assessment of solar heating and cooling System
Marco Beccali, Università degli Studi di Palermo, Palermo, Italy

PO 15 Simulation of solar air conditioning system for hot climates: such as Pakistan
Muhammad Asim, University of Manchester, Manchester, U.K.

PO 16 Dynamic simulation and economic analysis of solar cooling systems in Europe
Valeria Palomba, CNR-ITAE, Messina, Italy

PO 17 Storage selection and design for increased PV power self-consumption with heat pumps
Edo Wiemken, Fraunhofer ISE, Freiburg, Germany

PO 18 SolarHybrid – project overview and first results
Hilbert Focke, ASIC - Austria Solar Innovation Center, Wels, Austria

16.05 Coffee break and visit to the trade and poster exhibition

SESSION 3: PHOTOVOLTAIC DRIVEN SOLAR AIR-CONDITIONING SYSTEMS
Chair: Wolfgang Streicher, Universität Innsbruck, Austria

16.45 Simulation, optimization and economic analysis of solar stand-alone reverse cycle air conditioning system for typical Australian homes mechanical engineering
Gazinga Abdullah, University of South Australia/ Barbara Hardy Institute University of South Australia/ Barbara Hardy Institute, Adelaide, Australia

17.00 Potential application of new emerging cooling technologies for solar air conditioning
Joan Carles Bruno, Universitat Rovira i Virgili, Tarragona, Spain

17.15 Improved model of combined PV solar cooling and free cooling system
Andrejs Snegirjovs, HSR University of Applied Sciences, Rapperswil, Switzerland

17.30 Analytical simulation of an inverter heat pump driven by the grid and PV panels simultaneously
Francisco J. Aguilar Valero, University Miguel Hernández, Elche, Spain

17.45 Discussion

18.00 End of the first conference day

18.15 Social Hour in the Leonardo da Vinci Rome Airport Hotel

Friday, September 25th, 2015

SESSION 4: THERMALLY DRIVEN SOLAR AIR CONDITIONING: SYSTEM TECHNOLOGY
Chair: Stephen White, CSIRO Energy Technology, Newcastle, Australia

08.30 An experimental investigation on dehumidification system using solid desiccant coated heat exchanger with heat recovery
Yan Jun Dai, Shanghai Jiao Tong University, Shanghai, China
08.45 New solar desiccant and evaporative Cooling unit based on fixed and cooled adsorption beds and wet heat exchangers assisted by a building integrated solar PV/T generator
Marco Beccali, Information Engineering and Mathematics Modelling (DEIM), Università degli Studi di Palermo, Italy

09.00 Operating conditions of a NH3/H2O chiller for trigeneration systems – chiller adaption and first results
Werner Pink, Pink GmbH, Langenwang, Austria

09.15 Applicability of a desiccant dew-point cooling system independent of external water sources
Lorenzo Bellemo, Technical University of Denmark, Kgs Lyngby, Denmark

09.30 Hybrid Libr absorption chiller boosted by high speed turbo-compressor
Christian Schweigler, University of Applied Sciences Munich, Munich, Germany

09.45 Discussion

10.10 Coffee break and visit to the poster exhibition

SESSION 5: THERMALLY DRIVEN SOLAR AIR CONDITIONING: CONTROLLING
Chair: Hans-Martin Henning, Fraunhofer ISE, Freiburg, Germany

10.50 Optimized generic control strategies for solar thermal cooling systems
Björn Nienborg, Fraunhofer ISE, Freiburg, Germany

11.05 Influence of fan’s control strategies on heat rejection potential
Matteo D’Antoni, EURAC Research, Bolzano, Italy

11.20 Control method for increasing efficiency over solar heating and cooling system
Lee Dong Kyu, Hyundai Engineering and Construction Company, Yongin, South Korea

11.35 Pump efficiency and adaptability in solar cooling applications
Martin Helm, Bavarian Centre for Applied Energy Research (ZAE Bayern), Garching, Germany

11.50 Discussion

12.10 Poster award
Award Ceremony: Two Winners
Committee:
Costas Balaras, Group Energy Conservation, Institute for Environmental Research & Sustainable Development, National Observatory of Athens, Greece
Wolfgang Streicher, Universität Innsbruck, Austria
Constanze Bongs, Fraunhofer ISE, Freiburg, Germany

12.20 Lunch and visit to the poster exhibition – Meet the poster award winners

SESSION 6: SYSTEM DESIGN: DESIGN TOOLS, SIMULATION, ENGINEERING
Chair: Yanjun Dai, Shanghai Jiao Tong University, Shanghai, China

13.30 A method to guarantee the performance of solar heating and cooling systems
Daniel Mugnier, TECSOL, Perpignan, France

13.45 Solar absorption air-conditioning in Saudi Arabia: a simulation study
Ahmed Al-Mogbel, King Abdulaziz City for Science and Technology (KACST), Riyadh, Saudi Arabia

14.00 Solar assisted trigeneration in the food logistics industry
Ursula Eicker, University of Applied Sciences Stuttgart, Stuttgart, Germany

14.15 A solar cooling system for a data center in South Africa
Tobias Schwind, Industrial Solar GmbH, Freiburg, Germany

14.30 Discussion

14.50 Coffee break

SESSION 7: PRACTICAL EXPERIENCE: OPERATION, MAINTENANCE, ENERGY PERFORMANCE, COST PERFORMANCE
Chair: Kyriakos Tsiftes, University of Cyprus, Nikosia, Cyprus

15.20 Technical and economic assessment of SHC plants – Compilation of 10 best practice examples of IEA SHC Task 48
Daniel Neyer, University of Innsbruck, Innsbruck, Austria

15.35 First performance results of solar cooling in Jordan based on highly efficient absorption chillers
Christopher Paitazoglou, Technische Universität Berlin, Berlin, Germany

15.50 High efficiency mirrorless solar thermal as economically viable solar air cooling driver
Jonathan Koifman, TVP Solar, Meyrin, Switzerland

16.05 Discussion

16.20 Closing remarks
Conference Chairwoman Ursula Eicker, University of Applied Sciences Stuttgart, Germany

16.30 End of the Conference
Supporting Organisations

You will meet

- Planners, architects, engineers and scientists active in air-conditioning, solar thermal and cooling
- energy policy makers
- manufacturers
- industry representatives
- other attendees

Organisation Committee

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Information about OTTI

OTTI (Ostbayerisches Technologie-Transfer Institut e.V.) was founded in 1977 as a non-profit-organisation. Our main goals are to provide state-of-the-art information and to establish networks between people from industry, science, and administration by providing conferences and workshops. Over the years we have expanded our offers, now reaching from specific technology areas like material sciences to management training. Our energy department is one of the leading European organisers of international conferences and seminars in the field of renewable energies. The goal is to provide events where our international participants from science and industry can share their knowledge and experience, and present new technologies designed to increase the efficient use of renewable energies. We work closely together with our scientific committee representing experts from industry and research from all over the world. Our highly motivated and experienced team is always looking for new topics to provide interesting conferences on visionary topics. The topics of our conferences comprise mini-grids, smart grids and mobility, photovoltaics, solar thermal energy, solar air-conditioning and biomass energy. Furthermore, we offer courses in the fields of building, construction and the efficient use of energy. Besides lectures and workshops OTTI offers accompanying trade exhibitions or technical tours. It is very important for us to create an atmosphere in which our participants can meet and share their knowledge and experience. Therefore, we offer long breaks and common meals to get into contact with other people. Do you have any questions? Our team is always willing to help you.

For more detailed information please visit www.otti.eu

Travel Information

More information you will find under www.solaircon.com/info/conference-venue-accommodation.html

Accommodation

Conference Venue
Leonardo da Vinci Rome Airport Hotel
Via Portunese, 24700054 Fiumicino/Rome, Italy
www.romeairporthotel.it
info@romeairporthotel.it

The Leonardo da Vinci Rome Airport Hotel has an OPTION for participants until June 30th, 2015. Reference code is OTTI. Hotel rate: 100 Euro per day and person (incl. breakfast)
Registration Conditions

You will receive your registration documents with receipt of your registration. The participation fee is VAT-exempt and due net with receipt of the invoice. Please transfer the invoice amount not later than 14 days before the conference starts. Otherwise a copy of the transfer order must be presented at the conference desk. All bank charges have to be covered by the transmitter. Entrance to the conference can only be permitted if OTTI has received the payment. OTTI reserves the right to make modification and amendments of any kind for urgent reasons.

In the case of a cancellation of your registration up to 30 days before the seminar takes place, we do not raise a cancellation fee. For cancellations made within a period of 30 to 15 days before the start of the seminar, we charge a service fee of €120. In the event of cancellations made later than 15 days before the seminar, or in the case of absenteeism, the total participation fee will be charged, unless you are able to provide evidence of a deviating amount of damages or expenses.

The cancellation must be in written form. The person representing the contracting party may be replaced at any time but a written notice is necessary not later than 4 days before the conference starts. Irrespective of legal basis, OTTI shall only be liable for property damage and pecuniary loss which occurred due to intent or gross negligence. The place of fulfilment and jurisdiction is Regensburg, Germany.

Registration

If registered until August 10th, 2015
Per Person: €740,00
Member of OTTI and supporting organisations: €640,00

If registered after August 10th, 2015
Per Person: €780,00
Member of OTTI and supporting organisations: €720,00

Fees cover the admission to all sessions, invitation to all coffee breaks, conference lunches, the social hour and the conference proceedings.

Workshop The New Generation Solar Cooling & Heating Systems (PV or solar thermally driven systems) / IEA SHC Task 53 is free of charge for participants of the conference, but they have to register.

Only online registration available.
To register for the conference please visit: www.otti.eu/registration/SAC-4880

The conference language is English.