

# WINDSOR CONFERENCE 2014

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## COUNTING THE COST OF COMFORT

### THE WORKSHOP PROGRAMME

The workshops are designed to enable participants to explore, in depth, some of the issue, ideas and progress within specific fields of the broad spectrum of research encompassed by the subject of thermal comfort. Some of the workshops deal more with information exchange while others are designed to stimulate new thinking on the way we approach different aspects of the subject. There is some overlap and while attending one workshop necessarily means you miss another, we hope that the system of reporting back on the deliberations of each workshop in the post Windsor 2014 Report will mean that the richness and detail of the conversations in each workshop will be captured and shared later with all the delegates.

Workshop leaders are asked to liaise with Kevin Bowe on getting the papers for their own workshops onto a suitable computer and screen in their allotted room, and to make sure the arrangements for presenting their own workshop are in place after liaising with Jonida Murataj who will co-ordinate the workshop arrangements. In addition workshop leaders should negotiate with other delegates who attend their workshop to ensure that the conversations and progress of the workshops are captured and report on to be later fed back to the delegates as a whole.

#### **WORKSHOP 1: Comfort, User Behaviour and Energy Efficiency**

**Invited Chairs: Jens Pfafferot and Atze Boestra**

11<sup>th</sup> April 2014: 16.30 – 18.30 - Flitcroft Room (2 Hours)

It is widely accepted that the adaptive approach to thermal comfort may be applied to passively cooled buildings and the static approach to air-conditioned buildings. Though the standards (e.g. EN 15251 or ASHRAE 55) give precise definition that the adaptive approach should only applied to buildings without any kind of mechanical cooling, there is an on-going discussion on the application of the adaptive or a hybrid approach to mixed-mode buildings or low-energy buildings with limited cooling capacity (e.g. mechanical night ventilation or thermo-active building systems), respectively. In recent years, more and more buildings have been built in or retrofitted towards low-energy or even zero-energy standard. Consequently, most new and retrofit office buildings use low-energy cooling with limited cooling capacities. Hence, owners, planners and architects ask for good building practice and a legislative binding procedure for the classification of thermal comfort in low-energy buildings. Interactive discussion will explore aspects of thermal comfort and user behaviour especially for buildings with low-energy cooling concepts.

## **WORKSHOP 2: Designing Comfortable Schools in current and future climates**

**Invited Chairs: Despoina Telli and Azadeh Montazami**

11<sup>th</sup> April 2014: 16.30 – 18.30 – Hodgson Room (2 Hours)

The health and performance of students and teachers in school buildings are influenced by indoor environmental parameters such as noise levels, indoor temperature, humidity, air quality and light. Providing good environmental conditions with minimum energy use in schools has always been a concern in design guidelines around the world. The growing necessity to save energy in an uncertain future whilst providing a good indoor environment suggests that school designers should approach design more holistically in order to provide comfort and at the same time reduce the gap between design and achieved building performance. The workshop opens with a short presentation on four key topics introduced by the workshop leaders, based on their own research experiences. Then three papers will be presented that have been chosen to illuminate the issues and a lively discussion will hopefully shed light on the topics. The core topics School Design Guidelines correct, Climate Change, Behaviours and researching into related attitudes.

## **WORKSHOP 3: Overheating in Buildings**

**Invited Chair: Fergus Nicol**

11<sup>th</sup> April 2014: 16.30 – 18.30 – Greening Room (2 Hours)

While it is clear that humans are highly adaptable in terms of comfort temperature, and that this should be reflected in the development of guidelines and legislation for acceptable temperature bands in a given location, it is paramount to consider the physiological limits of high temperature. The results of even a relatively small increase in core temperature can result in delirium, convulsions and coma, and too high an exceedence of a safe core temperature can be fatal. (Epstein et al. 2004) An adaptive model of thermal comfort may project comfort at surprisingly high temperatures, but it is crucial to include in any model the limits of the physiological adaptability of the human body. Clearly, the point at which the body can no longer regulate a safe temperature should be the absolute limit in any situation, regardless of projected thermal comfort level at that temperature. As temperatures around the world break records, and growing numbers of heat waves are associated with power outages (eg, recently during the record Australian Summer temperatures) the basic assumptions about what are 'normal temperatures' as defined in Guidelines, how hot can it actually get and still be considered comfortable and how can discomfort be alleviated at high temperatures should all be opening discussed, and will be in relation to the presented 3 papers.

## **WORKSHOP 4: Dynamic Thermal Environments: What are their underlying mechanisms? How can we create, control and evaluate them?**

**Invited Chair: Yingxin Zhu**

11<sup>th</sup> April 2014: 16.30 – 18.30 – Sandby Room (2 Hours)

Although PMV has been widely used all over the world, it is developed based on the experiment in climate chamber with static and homogeneous thermal environment. In fact, the dynamic and inhomogeneous thermal environment is more universal. Many published investigations show that the human body has a wider acceptant temperature range in free-running buildings than that in air-conditioned buildings.

Beside, people prefer more natural wind than mechanical wind in which occupants has better thermal comfort. Another finding is if the occupants have the ability to control the thermal environment, their thermal comfort will be improved and energy can be saving effectively. Some of these phenomena have been demonstrated in adaptive thermal comfort model, but what is the reason of these phenomena?

If dynamic thermal environment can help to improve indoor thermal environment and save energy, how should we create and control it, and how to evaluate the effect?

### **WORKSHOP 5: Daylight and Comfort**

**Invited Chairs: Luisa Brotas and Jan Wienold**

12<sup>th</sup> April 2014: 16.30 – 18.30 – Flitcroft Room (2 Hours)

As issues like the cost of energy and the comfort impacts of more extreme weather events begin to matter more to building users and management because of their comfort, productivity and budget implications, the vital relationship between optimising the daylight performance of buildings while minimising the comfort penalties of doing so become increasing key to the success of building designs. New metrics on daylight, glare, visual comfort, adaptation and dynamics of light as well as its relation with artificial light and controls are pivotal to this agenda. In this workshop three papers on the subject will be presented and discussed in relation to the many different aspects and benefits of comfort in well-lit buildings that do not tend to overheat, central issues to this 2014 Windsor Conference.

### **WORKSHOP 6: Using Statistics Correctly to analyse Comfort and Behaviours**

**Invited Chairs: Jane Galbraith, Rex Galbraith and Michael Humphreys**

12<sup>th</sup> April 2014: 16.30 – 18.30 – Sandby Room (2 Hours)

This workshop will open with a general discussion on the difficulty of 'coping with' thermal comfort data and then go on to elaborate the assumptions made by taking a case study dataset from a very hot climate in the Dammam region of the Gulf. The ways in which this summer time dataset has already been analysed will be reviewed and then the three Chairs will put forward suggestions on how to improve the methodology in the spirit of building on what the authors have already done. In particular with this study assistance is being sought to get a clearer handle on the relationship between comfort, humidity and temperature in the very hot climates of the Gulf. Participants will be invited to join in the discussions with questions and alternative solutions where appropriate in a wide ranging, expert and open debate on the challenges of optimally applying statistics to the complex analysis and presentational challenges that comfort research present.

### **WORKSHOP 7: Instrumentation and Climate Chamber Design**

**Invited Chairs: Andreas Wagner and Marcel Schweiker**

12<sup>th</sup> April 2014: 16.30 – 17.30 – Greening Room (1 Hour)

This workshop deals primarily with questions regarding the experimental design, sensor equipment and questionnaires for assessing adaptive comfort and interactions of occupants with their environment for semi-controlled climate

chambers. This discussion will be going alongside with issues of the design and implementation of semi-controlled climate chambers with reference to projects where not only closed Laboratory studies are undertaken but also research on mixed mode environments such as those with opening windows and ceiling fans. New methods of evaluating sensation, perception and acceptance are being experimented with in various international laboratories. Finally, this workshop aims to start a discussion beyond classical comfort studies towards the validity of the assessment of the complex relationship between occupants thermal satisfaction and behaviour within such climate chambers.

### **WORKSHOP 8: Negotiated Comfort**

**Invited Chair: Gary Raw**

12<sup>th</sup> April 2014: 17.30 – 18.30 – Greening Room (1 Hour)

The temperatures to which people heat their homes result from a complex, continuous and dynamic negotiation, rather than a simple comfort temperature. This negotiation operates at two levels – between household members (who may desire different temperatures or other ways of feeling comfortable) and between objectives (e.g. being comfortable, keeping healthy, saving money, protecting the environment and avoiding conflict). This results in householders using a greater or lesser palette of possible means of achieving (or compromising on) comfort, depending on a set of competing priorities and the social and economic status of individuals within the household. The workshop aims to draw on participants' research and experience to fill in some of the key parameters in this negotiation.

### **WORKSHOP 9: Standard prEN15251 and new standard ISO-DIS 17772**

**Invited Chair: Bjarne Olesen**

12<sup>th</sup> April 2014: 17.30 – 18.30 – Hodgson Room (1 Hour)

This workshop will deal with the *Revised Standard prEN15251* and *New Standard ISO-DIS 17772* on indoor environmental criteria for design and energy calculation of buildings and HVAC systems. EN15251 standard includes indoor environmental input parameters for the design and assessment of energy performance of buildings. It is a basic standard for the EPB standards dealing with design and energy performance of buildings including heating, cooling, ventilation and lighting systems together with acoustic. The standard recommends criteria for the indoor environment (thermal comfort, air quality, illumination and acoustic) which must be used as input parameters in several other EPB standards for design and energy calculations. The new standard will be rewritten to include only normative text. It will then be accompanied by+ a technical report (guideline, TR15251). An important new part will be a series of standardized occupant schedules to be used in energy calculations. In parallel a similar ISO standard NW17772 is being developed. The workshop will present the draft standards and accompanying technical report followed by a discussion of some of the issues. Reference and comparison to ASHRAE standard 55-2013 and 62.1-2013 will also be drawn to put the issues in both a European and a US perspective.