



The UKIEG Annual Scientific Conference
2011

**Indoor Environments, Health and
Wellbeing**

A One-Day Conference

Organised by the **UK Indoor Environments Group**

24th February 2011

Department of Health, Skipton House, London, SE1

*Supported by the
Health Protection Agency,
Department of Health
and
Earthscan*

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History of the UKIEG

The UK Indoor Environments Group (UKIEG) was launched in 2003, with the aim to co-ordinate and provide a focus for UK activity concerned with improving indoor environments for people.

The fact that people spend the vast majority of their time inside buildings – at home, at work, in vehicles, shops, etc. – is widely acknowledged, yet while the outdoor environment has received much attention, the importance of the quality of the indoor environment in relation to human health and wellbeing is often unrecognised and under-researched. Moreover, addressing problems relating to the indoor environment, which might include issues as diverse as indoor air quality, lighting, ventilation and thermal comfort, requires a highly multidisciplinary approach and involves numerous different stakeholders. Based on these considerations, our objectives are:

- To promote the health and well being of people in indoor environments
- To promote research and research collaboration in all aspects of the indoor environment
- To increase awareness of current activity and knowledge gaps in areas concerned with indoor environments and people
- To disseminate knowledge concerned with indoor environments and people
- To promote the effective and efficient design and operation of indoor environments
- To communicate, integrate and network activity concerned with indoor environments and people
- To communicate and liaise with other relevant groups within the UK and abroad
- To promote good practice

Our Members

We currently have approximately 150 registered members with a wide range of expertise from medics to toxicologists, architects, designers, appliance manufacturers, academics, regulators, researchers, chemists, modellers, engineers, building managers, environmental health professionals, social scientists - and others working in fields connected with the built environment. Our members can choose to receive regular updates on the Group's activities and relevant news and events.

Membership

Membership is free of charge. If you would like to join the Group or ask for further information, please contact our Secretary: Isabella Myers, Isabella.Myers@hpa.org.uk.

Annual Conference 2011

The UKIEG invites members and non-members to a one day conference describing ongoing research on:

- Relationships between the indoor environment and the health and wellbeing of occupants.

Covering a range of issues, such as:

- building design
- indoor environment
- effects of climate change
- health and well-being of occupants
- policy development

The Conference will conclude with discussion on research needs

Keynote Speaker: Lynne Sullivan OBE founder of sustainableBYdesign

Lynne is a founder of sustainableBYdesign, born out of the design arm of Inbuilt which she joined as Design Director in 2008. Previously she was Director of Sustainability at Broadway Malyan Architects 2000-2008 , one of the top 25 architecture practices in the world, and Associate Director at ECD Architects 1991-2000 a practice which was unique in combining architectural services with energy and environmental consultancy. Lynne has an outstanding track record as a Project Architect specialising in sustainable and low-energy developments, of which many have won awards and competitions, been shortlisted for awards, have been exhibited as exemplars in design, and monitored as demonstration projects.

Lynne has a unique reputation in her contribution to policy and strategy for the sustainable built environment, which includes being the only architect on the Governments 2004-5 Sustainable Buildings Taskgroup, being a Member of the Governments Building Regulations Advisory Committee since 2002, and chairing the Expert Panel for the Scottish government whose report: "[A Low Carbon Building Standards Strategy for Scotland](#)" was published in 2007. Lynne is a member of the RIBAs Climate Change Programme Board, is an Architectural Adviser to the RIBA Competitions Office, and sits on the National Design Review Panel of the Design Commission for Wales.

UKIEG 2011 Scientific Conference

Indoor Environments, Health and Wellbeing.

Department of Health, 24 February 2011

Conference Programme

09:45-10.15	Registration & Coffee	
10:15	Welcome and Chairman's Introduction	Jon Ayres University of Birmingham
Morning Session		
10:20	WELLINE and ALICE	Jon Ayres
10:40	In quest of new fingerprints of exposure to VOC from consumer products	Juana Maria Delgado-Saborit University of Birmingham
11:00	Can clean-room particle counters be used as an infection control tool in hospital operating theatres?	Louise Pankhurst University College London
11:20	<i>Coffee</i>	
11:40	Changes to population exposure to PM2.5 in a future low carbon domestic stock	Clive Shrubsole University College London
12:00	KEYNOTE PRESENTATION	Lynne Sullivan OBE sustainableBydesign
12:30	<i>Lunch and Poster Viewing</i>	
13:30	<i>AGM</i>	
Afternoon Session		
14:00	Environmental conditions in primary school classrooms and cognitive performance in children	Zsolt Bako Biro University of Reading
14:20	Carbon monoxide mortality surveillance in England and Wales: A feasibility study	Giovanni Leonardi Health Protection Agency
14:40	Radon in the UK	Fero Ibrahim Health Protection Agency
15:00	Awareness and Perceptions of the risks of indoor radon	Wouter Poortinga Cardiff University
Discussion session		
15.20	Poster Session and General Discussion	
15.50	Summary/Closing Remarks	Jon Ayres
16.00	<i>Close of Meeting</i>	

Abstracts

WELLINE & ALICE Project Updates

Professor Jon Ayres, Institute of Occupational and Environmental Medicine, University of Birmingham, Edgbaston, Birmingham, B15 2TT

Abstract

WELLINE – Wellbeing and the Indoor Environment

The UKIEG won funding for a Collaborative Development Network grant from the Lifelong Health and Wellbeing programme managed by the MRC in 2009. The project, led by the UKIEG Chair Prof Jon Ayres, is entitled [WELLINE: Wellbeing and the Indoor Environment](#), and aimed to set up a multidisciplinary expert Network. This network examined the interactions between indoor environmental factors and key chronic diseases affecting the older population - thereby identifying effective interventions on the indoor environment which could alleviate existing cardiopulmonary, musculoskeletal or neurological conditions in older people, and/or prevent the onset and/or mitigate progression of such conditions during the life course.

The role of sustainable development – particularly the responses to Climate Change - were also be taken into account. The indoor environment was the main determinant considered. However, the impact of other important determinants (e.g. activity levels, socio-economic issues, etc.) were also addressed.

The project was completed in the summer of 2010

ALICE – Healthy Ageing: Adaptive Living in a Changing Environment (ALICE)

To date we have submitted a research proposal for this 3rd phase of the Life Long Health and Wellbeing Cross-Council Programme. This research aims to establish how behavioural patterns in, and housing conditions of, older people with chronic conditions (cardiovascular disease [CVD] and chronic obstructive pulmonary disease [COPD]) might help to explain ill health and impaired quality of life due to temperature extremes as well as from other indoor environmental factors, including indoor pollution. The study will address different age groups, divided into those who have overt CVD or COPD or who at simple screening have neither condition. We will be looking at environmental exposures, behaviour, housing characteristics, the probability of hospitalization and GP visits, and how these are affected by climate change. The research has made it through the first round

Abstracts cont.....

In Quest of new fingerprints of exposure to VOC from consumer products”

Delgado-Saborit JM, Mascelloni M, Macias B, Viant M & Harrison RM

College of Life and Environmental Sciences. University of Birmingham, Edgbaston, Birmingham, B15 2TT

Abstract

Volatile organic compounds (VOCs) are ubiquitous in indoor air with origins in outdoor air, building related materials, furniture, equipment and consumer and household related products. The rate of emission of VOCs from these materials will decay and eventually, these sources will reach a quasi steady emission rate in new buildings within weeks to months or even a year. Therefore, new buildings or recently redecorated indoor environments have been associated with high concentrations of VOCs.

Currently, there is international recognition of the contribution of indoor air to personal exposures and the associated potential health risks. The general population is exposed to different VOCs emitted from consumer products and building materials and doses of inhaled VOCs are metabolised producing several biomarkers of exposure and metabolism profiles that can be detected in the urine even at low levels of exposure.

This proposal will recruit three groups of subjects with varying exposures including occupationally exposed to VOC, subjects living or working in new or redecorated buildings and a control group. The aims are to a) characterise human exposures, lung doses and indoor microenvironment concentrations of VOCs for each group; and b) find suitable biomarkers to monitor the exposure and effects of low-level of VOCs.

The expected advances of this research are the characterization of exposures to levels of VOCs typically found in consumer and construction products and the identification of new VOC biomarkers of exposure which can be used to biomonitor inhalation doses to VOCs at low level concentrations. Additionally, new biomarkers of effect will also help researchers understand how genes and environmental exposures from consumer products affect human health. The answers to these questions will help policymakers in the regulation and industries in the formulation of consumer products preserving the health of the final user (i.e. the general population).

Abstracts cont.....

Can clean-room particle counters be used as an infection control tool in hospital operating theatres?

Pankhurst, L. J., Lai, K. M., Taylor, J., Cloutman-Green, E. A. and Hartley, J. C.

Abstract

Current UK guidelines for the commissioning and testing of hospital operating theatres rely on air-flow checks, identification of air circulation 'short-circuits', and measurement of airborne microbiological levels under design conditions when the theatre is idle. There is currently no guideline for infection control teams to investigate the theatre environment when an increased infection risk is suspected, or when the theatre is in use. This study aims to examine the use of clean-room particle counters as an infection control tool by monitoring particle profiles in air as a surrogate for infectious particles. Two different types of particle counter (three- and six-channel) were used to simultaneously measure particle concentrations at the theatre inlet area, two outlets, and the bed area, under design and working conditions. A significant increase in particles of all size ranges (0.3 to >10 µm diameter) was observed when people were introduced. Particle distribution was uneven, with response to environmental changes different at the two outlets. Removal efficiency varied from 52 to over 100%, due to the introduction of particles to the theatre. Within the bed area, concentrations measured under design and working conditions were significantly different; corresponding microbiological samples indicated an associated increase in airborne bacteria. This study concluded that particle counters can be used in some aspects of infection control but more studies are required to fully explore their potential.

[Abstracts cont.....](#)

Changes to population exposure to PM_{2.5} in a future low carbon domestic stock

Clive Shrubsole Bartlett School of Graduate Studies, University College, London

Abstract

As part of the ESPRC funded 'PUrE Intrawise' project and using novel modelling techniques, this study investigates changes in indoor concentrations of PM_{2.5} relating to the shift in personal exposure of the London population to PM_{2.5} as we move from the present day stock towards a 2050 low carbon scenario with highly energy efficient dwellings. The work investigates internal and external sources and sinks, interactions with external conditions and the effects on the concentration and dilution of airborne PM_{2.5}. It examines the outcome of the provision of improved air tightness and insulation levels taking into account behavioural factors as well as locational issues. A range of ventilation strategies are considered.

Abstracts cont.....

Environmental conditions in primary school classrooms and cognitive performance in children

Dr Zsolt Bako Biro, KTP Research Associate The University of Reading/Monodraught Ltd.

Abstract

Field surveys carried out at 8 primary school buildings located in Southern England showed direct association between the environmental conditions in classrooms and pupils' cognitive performance. The thermal and air quality conditions in the classrooms were found to be inadequate for teaching activities during about 35% of the school hours. The pupils and teachers in the classrooms studied were exposed to unacceptably poor air quality conditions, with CO₂ concentrations of up to 3.5 times the existing recommended levels of 1500 ppm (Building Bulletin 101) and uncomfortable thermal conditions with temperatures found to be outside the comfort range of 20-24°C.

In 16 classrooms interventions were made to improve the ventilation rate and maintain the temperature within acceptable range using a purpose built portable mechanical ventilation system. As a result of the interventions the provision of outdoor air to the classrooms was improved from the prevailing levels of about 1 L/s per person to about 7-8 L/s per person.

The results of computerized performance tasks performed by more than 200 pupils showed significantly faster and more accurate responses for Choice Reaction (by 2.2%), Colour Word Vigilance (by 2.7%), Picture Memory (by 8%) and Word Recognition (by 15%) at high ventilation rates compared to low ventilation conditions.

The present investigation provides strong evidence that poor ventilation rates and unfavourable thermal conditions in classrooms significantly reduce pupil's attention and vigilance, and negatively affect memory and concentration. The decrement in cognitive performance of pupils due to inadequate environmental conditions found here were of similar magnitude to those observed by other investigators for the effect of skipping breakfast on pupil's attention.

Abstracts cont.....

Carbon monoxide mortality surveillance in England and Wales: A feasibility study

*Girija Dabke, Rebecca Gay, Rebecca Close, Giovanni Leonardi
Health Protection Agency*

Background: Carbon monoxide is an environmental hazard that is a known cause of fatalities and hospital admissions in the UK from accidental poisoning.

Environmental public health tracking and the need for CO surveillance: This is based on supporting public health intervention and prevention activities by:

- measuring and monitoring the burden of CO poisoning over time
- identification of acute incidents to enable action
- identifying high risk groups, settings, and modifiable factors
- examining the relative contribution of exposure sources.

Mortality data is just one component of carbon monoxide surveillance, measuring the most severe outcome.

Aim: To establish baseline distribution of CO mortality by age, sex, geography and 10-year trends prior to setting up a carbon monoxide surveillance programme.

Methods: ONS mortality data was obtained for all CO deaths registered from 1998-2008. Data was analysed for mortality by age, sex, time of year, geography and trends over ten years.

Key findings: This study has demonstrated the feasibility of outcome tracking as part of the Environmental Public Health Tracking Programme;

- There is a declining trend in CO deaths in England and Wales over 10 years;
- Significant differences exist in accidental CO mortality between geographical regions, age groups, sexes and seasonal variation.
- Information available to us was insufficient to examine sources of accidental CO poisoning (housing/ fire/ work related).

Recommendations: More detailed analysis should be carried out to understand the decline in mortality and the geographic variation and determine whether there is a link between age, sex and location, deprivation and seasons.

Further cross agency work should be undertaken to compare mortality data with other sources of data to understand the circumstances of each death, and thus identify sources of preventable CO exposure in order to help design more effective prevention strategies.

Abstracts cont.....

Radon in the UK

Fero Ibrahimi, Health Protection Agency, Centre for Radiation Chemical and Environmental Hazards, Chilton, Didcot, Oxon, OX11 0RQ

Abstract

Radon is a naturally occurring, colourless and odourless radioactive gas that enters buildings from the ground. Epidemiological studies provide confirmation that radon is a cause of lung cancer. In fact radon is the largest source of ionising radiation exposure to the UK public, causing around 1000 lung cancer deaths annually. Those people with prolonged exposure to high levels in buildings, and in some underground locations, will have a higher risk. The risk appears to be approximately linear with no evidence for a threshold below which there is no risk. Smokers and recent ex-smokers have a higher risk from radon than long-time ex-smokers and never-smokers. Individual risk can easily be reduced by preventing radon entering buildings either during construction, or by retrospective remediation.

Radon is present throughout the UK, with higher levels in the South-West, Midlands, Yorkshire and Wales, but many small pockets of high radon exist elsewhere, including parts of London, Scotland and Northern Ireland. The HPA is a leading organisation in addressing radon exposure in homes and workplaces, including; radon mapping, large-scale survey techniques, provision of advice to members of the public and training for professionals and organisations. The HPA works closely with national, devolved and relevant local governments and with other radon professionals in BRE, BGS and HSE. This presentation will briefly introduce the topic of radon to UKIEG members.

Abstracts cont.....

Awareness and Perceptions of the Risks of Indoor Radon

Dr Wouter Poortinga, Welsh School of Architecture, Bute Building, King Edward VII Avenue, Cardiff, Wales, CF10 3NB. Tel: 02920 874 755; Email: PoortingaW@cardiff.ac.uk

Abstract

In this project a population survey (n=1,578) was undertaken to examine peoples' awareness and perceptions of the risks of radon in radon-affected areas in England and Wales; and to explore whether they vary according to the likelihood of exposure, participation in the radon roll-out programme, and geographic location.

This study found that awareness of radon is high in radon-affected areas in England and Wales. However, many residents are not aware of the potential adverse health effects and generally do not feel personally at risk. Probably as a result, very few express concern about radon. These findings show that there is more scope for raising awareness of the potential health effects of indoor radon. In this context, the findings that people are generally open to receive more information about radon and have high levels of trust in institutions that are involved in the radon roll-out programme can be considered encouraging.

The study further suggests that the radon roll-out programme has been effective in raising awareness of radon. People living in local authorities that had participated in the radon roll-out programme were more likely to be aware, feel informed, and have tested than people living in local authorities that had not participated. Similar results were found for people living in 'actionable' areas as compared to those living in 'non-actionable' radon-affected areas.

Finally, the study found that whilst awareness of radon was high in Southwest England, it was lower in the rest of England, and in particular in Wales. Very few people in Wales were either aware of radon, that they live in a radon-affected area, or of the potential health consequences. The low testing rate shows that more needs to be done in Wales to raise awareness of radon.

Posters

Using the British experience in Greece. A sustainable proposal for Larisa City

Filippos Iliadis¹, Charalampos Kyriakidis², Anastasia Sioutopoulou³

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Abstract

Environmental planning is related to sustainable development which is one of the main goals of all the modern countries. After many studies in this really significant matter, plenty of opinions on how planning process should take place have been mentioned in order people to enjoy their leaving by increasing their quality of life and simultaneously by protecting the environment. This main issue started concerning Greece, which, despite the economical crisis that it strongly faces, looks for sustainable proposals to mitigate its environmental matters. Thus, international experience could be used in order to give answers on how spatial and environmental problems are going to be faced.

This is the topic of this paper which focuses on the developing of a new “landscape” in the urban fabric of Larissa, which is medium size city that, however, plays an important role in the country. This “landscape” will function as a model of an environmental supra Culture and Recreation Park. The idea for such a development derived from a similar example in England and more specifically from an area at East London, where a green chain links leisure areas, creating a spatial system of culture and entertainment within a framework of environmental planning of cities. It is believed that the implementation of successful examples of English cities will contribute to the development of the Greek cities, which they often face problems of aesthetics and environmental protection.

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³ Student in the Department of Planning and Regional Development, Polytechnic School, University of Thessaly, Greece.

Posters cont.....

Comparative Study of environmental indicators of the United Kingdom in accordance to the other countries of the European Union

Filippos Iliadis⁴, Charalampos Kyriakidis⁵, Anastasia Sioutopoulou⁶

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Abstract

The subject of this paper is the comparison of some environmental indicators of the United Kingdom in accordance to the rest countries of the European Union. The used indicators reflect, partially, a variety of environmental issues in order to indicate a general idea for the current environmental state of the United Kingdom. Simultaneously the fact of the comparison between the United Kingdom and the rest countries of the European Union is highly important since, apart from the finding of its current state (quality analysis) it is also possible a quantity analysis with countries that share a common environmental policy through relevant instructions. Finally, it is ventured a general conclusion of the situation and it is presented a general hierarchy of the countries based on their current environmental state. It is believed that through this procedure of comparison, it will be possible to conclude the efficiency of the current environmental policies in the United Kingdom and through that to move forwards a detection of missing points or flaws in order to face them.

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Posters cont.....

Design guidance for people with dementia and for people with sight loss

Sarah Buchanan, Thomas Pocklington Trust

Aims of the review

The review focused on design guidance literature related to homes and living environments for people with dementia and for people with sight loss. The aim was to:

- assess the degree of convergence between the two sets of guidance
- identify areas where they may conflict
- highlight gaps in the scope or content of the guidance.

Main findings

- Design guidance relating to dementia tends to discuss buildings providing care homes or 'extra care' housing (i.e. staffed facilities) or day centres. The documents pay limited attention to design within ordinary domestic-scale dwellings or design detail that aims to promote independent living.
- Design guidance for people with sight loss focuses on design that maximises independence. The emphasis is on people living in their own homes and the guidance contains a higher level of detail and more precise specifications than that relating to people with dementia.
- Despite these different approaches, there are common principles between the two sets of guidance. There are also further principles that apply to accommodation for people with dementia but are not typically covered by guidance relating to sight loss.
- There is potential for design guidance for people with dementia to conflict with that for people with sight loss, and vice versa.

AGM



UK INDOOR ENVIRONMENTS GROUP ANNUAL GENERAL MEETING, London, 24th February 2011

AGENDA

1. Welcome and Chairman's Report
2. Changes to Constitution
3. Status of Committee membership
4. Topics for the next UKIEG annual conference
5. Venue for next UKIEG annual conference
6. Future Directions of UKIEG
7. AOB: Motions/Comments from the floor

Constitution of the UK Indoor Environments Group

Articles Of Association

1. The Group shall be known as the “UK Indoor Environments Group” or “UKIEG”.
2. The primary aim of the Group shall be to co-ordinate and provide a focus for UK activity concerned with improving indoor environments for people.
3. Membership shall be open to anyone and in particular those with an active interest and involvement in the indoor environment field. All membership applications will be considered by the UKIEG Committee (see 6 below), which has the right to refuse and also to terminate membership.
4. There normally shall be at least one meeting of Members per year, usually in autumn, to include the UKIEG Annual General Meeting.
5. The UKIEG Committee shall allocate places should it be necessary to restrict attendance at any meeting.
6. Membership of the UKIEG Committee
 - i The Officers of the UKIEG Committee shall be as follows:
 - Chairman
 - Vice Chairman
 - Committee Secretary
 - Membership Secretary
 - ii There shall in addition be up to 4 Ordinary Members of the Committee
 - iii The Officers and Ordinary Members of the Committee shall be elected in accordance with Article 8.
 - iv The Committee shall be free to co-opt additional Ordinary Members, with a term of office up to the next AGM, as necessary.
7. Duties of Officers of the Committee
 - i Chairman: shall normally chair the meetings of the Committee.
 - ii Vice-Chairman: shall deputise for the Chairman **and be Chairman elect**.
 - iii Committee Secretary: shall assist with the Committee's affairs, including maintaining the minutes of meetings of the Committee.
 - iv Membership Secretary: shall maintain a current listing of the membership.
 - v Committee: shall organise all the UKIEG scientific meetings/conferences; shall assist in organising and hosting meetings of the Committee; shall approve new members of the Group (and, if necessary, terminate individual membership); shall liaise with other organisations sharing a common interest; and shall provide comments specifically on topics relating to the work of the Group and the interests of its members, as appropriate.

8. Election of Members of the Committee
 - i Officers and Ordinary Members of the Committee shall be elected by delegates to the Annual General Meeting.
 - ii Nominations for Committee membership shall be required to be proposed and seconded by members at least two weeks prior to the Annual General Meeting.
 - iii Officers and Ordinary Members of the Committee shall be elected for a period of three years and a maximum of 2 further terms subject to re-election.
9. Changes to the constitution shall be made only at an Annual General Meeting and then only by agreement of at least two-thirds of the members. Proposed changes should be provided to the Committee Secretary in good time. Written proxy votes concerning constitutional matters shall be accepted at Annual General Meetings.
10. The UKIEG Committee, by majority agreement of its Members or at least 20 ordinary members of the Group, shall have the power to call an Extraordinary General Meeting of the Group, at a minimum of 28 day's written notice to the Membership.
11. Membership Fee – Membership of the UKIEG is free, but this shall be subject to annual review by the Committee. An annual Membership fee may be charged at the discretion of the Committee; if an annual fee is required, the level of the fee for the following year shall be ratified at the Annual General Meeting.
12. Conference Registration Fee – A registration fee for the annual UKIEG conference (and/or other meetings as appropriate), to be set by the Committee, shall be levied on delegates attending the meeting and delegates shall be notified of it in advance; at the discretion of the Committee, the fee may be waived or reduced for invited speakers.

UKIEG Committee Members

Chairman: Prof Jon Ayres

Jon is Professor of Environmental and Respiratory Medicine and Director of the Institute of Occupational and Environmental Medicine at the University of Birmingham. He has research interests in the health effects of air pollution both indoor (ETS and biomass) and outdoor using epidemiological and human challenge approaches.

Vice-Chair: Dr Marcella Ucci

Marcella is a Lecturer in Facility and Environment management at the Bartlett School of Graduate Studies, University College London. She is an architect with specialist research interests in facility and environment management, air quality and health within buildings, and energy efficiency.

Secretary: Isabella Myers

Isabella Myers is a member of the Department of Health Toxicology Unit at Imperial College and provides support to the Air Pollution Unit at the Health Protection Agency. She is a scientific member of the Secretariat for the Committee on the Medical Effects of Air Pollutants; provides a link between policy and research initiatives and provides scientific input into policy development on both outdoor and indoor air pollution issues relating to health, including the effects of the built environment and that of climate change.

Committee Member: Prof Paul T C Harrison

Paul is the Director of *PTCH Consultancy Limited* and Visiting Professor at Cranfield University, having previously been Director of the Institute of Environment and Health. He is a toxicologist with specialist interest in indoor air pollution. He is co-founder of the UKIEG.

Committee Member: Dr Nicola Carslaw

Nicola is a Senior Lecturer in Environmental Science at the Environment Department at the University of York. She is an atmospheric chemist and her research involves using detailed chemical models to try and understand the chemical processing that occurs both indoors and outdoors.

Committee Member: Dr Sean Semple

Sean is a Senior Lecturer at the University of Aberdeen and also Director of the [Scottish Centre for Indoor Air](#). He is an occupational hygienist with an active interest in methods of assessing personal exposures to air pollution in both

indoor and outdoor environments. His particular interests lie in measuring Environmental Tobacco Smoke levels and in the relationship between biomass fuel smoke concentrations and respiratory health in the developing world.

Committee member: Dr Derrick Crump

Derrick is Director of the Institute of Environment and Health at Cranfield University where he is responsible for their research and consultancy work including projects on chemical risk assessment, epidemiology, biomonitoring and indoor pollution. He is an environmental chemist with a particular interest in the measurement and evaluation of indoor air pollutants.

Committee member: Prof Derek Clements-Croome

Derek is Emeritus Professor at the University of Reading. Chairman of CIBSE Natural Ventilation and Intelligent Buildings Group. Editor for Intelligent Buildings International Journal. Board member of BCO. Member of UK Green Building Council.

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