Health Effects of Modern Airtight Construction

Symposium, GSA 21st September 2016
10:00  Registration, tea/coffee

10:30  Tom Inns, Director of the Glasgow School of Art
       Welcome

10:35  Tim Sharpe, Mackintosh Environmental Architecture Research Unit
       Welcome and introduction to the network

10:50  Anthony Seaton, University of Aberdeen
       The air and how the body reacts to it

11:20  Raymond Agius, University of Manchester
       Ill-health related to air contaminants

11:50  Tea and coffee break

12:20  Ian Mawditt, Director of Fourwalls, Bristol
       The state of ventilation in the UK

12:40  Sani Dimitroulopoulou, UKIEG and Public Health England
       Healthy indoor environments: Challenges for Policymakers

13:00  Lunch break

14:00  Mich Swainson, BRE, Watford
       Observed effects of poor ventilation in modern homes

14:20  Atze Boerstra, Director of BBA Binnenmilieu, The Netherlands
       Residential ventilation, health, comfort and control: the NL experience

14:40  Pawel Wargocki, Technical University of Denmark
       Links between Ventilation and Health

15:10  Tea and coffee break

15:40  Jan Sundell, Tsinghua University Beijing
       Ventilation in homes and health

16:10  Lynne Sullivan
       What do designers need to know?

16:30  Discussion session

17:00  Close
Prof. Tom Inns

Director, Glasgow School of Art
Prof. Tim Sharpe, Director
Mackintosh Environmental Architecture Research Unit

Why are we here?
**Mackintosh Environmental Architecture Research Unit**

- Based at the Mackintosh School of Architecture
- 20 year track record of high quality research into environmental architecture.
- Operates at a unique interface between architectural design, science based research and human factors.
- User-centred, low energy, eco-sensitive architecture

- Health has always been an important issue
How Your Low Carbon Home Works

- Overview
- Heating
- Ventilation
- Hot Water
- Energy Saving Features
- Keeping it Working

Example good practice
Relevant recent projects

- EPSRC Assessment of Environmental and Energy effects of Domestic Laundering (100 + 40 houses)
- AHRC Study, sunshine and well-being in housing (40 houses)
- Scottish Building Standards - Guidance for Occupants of Low Energy Homes
- KTP with Cartwright Pickard Architects, London (20 houses on 5 sites)
- Scottish Building Standards - Research Project To Investigate Occupier Influence On Indoor Air Quality In Dwellings (200 + 40 houses)
- Technology Strategy Board (Innovate UK) Building Performance Evaluation Programme
  - Expert Evaluator
  - The Glasgow House (Phase 1)
  - Inverness expo (8 houses)
  - Bloom Court Livingston (2 + 6 houses)
  - Ti-na-Cladich, Dunoon (3 houses)
  - Queens Cross, Glasgow (6 houses)
  - Murray Place, Barrhead (3 houses)
  - Dormont Park, Dumfries (4 houses)
- Meta study of MVHR system in Domestic properties
- KTP with John Gilbert Architects, Refurbishment of existing Housing (50+ houses)
Ventilation

- Energy reduction targets
- A series of experiments
- Performance Gaps - energy and environmental performance

- Increasing importance of ventilation - energy and health
- Air tightness

- Potential unintended negative consequences
Consequences

• Poor IAQ
• Moisture
• Pollutants
• Overheating

• But what are the **actual** health effects of these in contemporary housing?
• What are the levers for change?

• How do we generate evidence based design?
HEMAC Network

• Bid to AHRC for Network Funding
• PI Prof Tim Sharpe, MEARU
• CI Prof Graham Devereux, Respiratory Group, Aberdeen University
• Dr Gráinne McGill, MEARU
• Steve Turner, Respiratory Group, Aberdeen University
Aims

• To establish a multidisciplinary network, promoting dialogue between research areas/expertise, identifying potential areas for collaboration

• To map out research context concerning low energy building design, IAQ and health

• To establish well-founded, tangible project ideas for grant applications

• Develop an online platform, to facilitate and promote sustained communication
Activities

- Steering Group
- Website

- Three events:
  - Symposium - to identify the context and problems
  - Workshop - to develop ideas for investigation
  - Sandpit - to refine these into bids and further activity

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Symposium

- Bring researchers together from various fields to discuss ideas and network
- Establish foundation for future events and collaboration
- Initiate the debate…

- What are the questions?
Research Questions

Is there a problem?
How do we measure it?
What do we do about it?

Interaction at breaks and lunch

Add your name to areas where you would like to contribute
Add research questions that you think are missing
Prof. Anthony Seaton CBE, University of Aberdeen

The air, and how the body reacts to it

Professor Seaton qualified from Cambridge University in 1962 and trained as a junior doctor in Liverpool. After senior posts in respiratory medicine in West Virginia, USA, and Cardiff, he was director of the Institute of Occupational Medicine in Edinburgh from 1978-90. He edited Thorax from 1977-81. From 1988 until he retired in 2003 he was head of the department of Environmental and Occupational Medicine in Aberdeen University. Since retiring, he is emeritus professor at Aberdeen and has rejoined the Institute of Occupational Medicine as an honorary senior consultant.

He has published seven books and over 300 papers on respiratory and occupational medicine and other topics. He chaired the UK Government’s Expert Panel on Air Quality Standards (EPAQS) and was on the Royal Society’s Working Group on nanotechnology. His research interests have been in environmental effects on health, particularly dust and chronic lung disease, air pollution and the heart, diet and the early causation of asthma, and chemicals and chronic neurological disease.
Prof. Raymond Agius, University of Manchester

Ill-health related to air contaminants

Raymond Agius is a Professor of Occupational and Environmental Medicine and Director of the Centre for Occupational and Environmental Health at the University of Manchester. He is also an honorary consultant in two Manchester University Hospital NHS Trusts. His previous workplaces included the Department of Community Medicine at the University of Edinburgh and the Institute of Occupational Medicine. His research interests encompass occupational and environmental ill health ranging from cardio-respiratory disease to psychological stress. He has conducted epidemiologic studies on air pollution in Scotland and elsewhere, as well as in methods of predicting and preventing novel respiratory hazards. He is a Fellow of the Royal Colleges of Physicians of London and of Edinburgh, a Fellow of the Faculty of Occupational Medicine of the Royal College of Physicians of London and an Honorary a Fellow of the Faculty of Occupational Medicine of the Royal College of Physicians of Ireland. He is a Past President of the British Occupational Hygiene Society. <www.agius.com>
Tea and Coffee

Foyer Space

11:50 - 12:20
Ian Mawditt, Director
Fourwalls.

The state of ventilation in the UK

Ian is a building researcher, specialising in the field of energy performance and occupant comfort. He is the founding director of Four Walls – an independent building performance and research consultancy based in Bristol. The company specialises in post-construction testing and evaluation; in-use studies of building performance, including energy use analysis, indoor air quality investigations, ventilation effectiveness; and occupant satisfaction studies.

Ian’s work and field experience help to provide an evidence base for informing building performance standards. He was part of the technical team that supports DCLG in the development of amendments to Part F and Part L of the Building Regulations. He was recently engaged by Innovate UK as an expert evaluator under the Building Performance Evaluation programme, and provided technical guidance for the Retrofit for the Future programme. Ian has also worked with organisations such as the Zero Carbon Hub, the Sustainable and Traditional Buildings Alliance, and the NHBC Foundation supplying strategic and technical support to their research programmes.
Dr. Sani Dimitroulopoulou is a Senior Environmental Scientist within the Air Pollution and Climate Change Group, Environmental Change Department in Public Health England. She is also an Honorary Senior Lecturer at the UCL Bartlett School Environment, Energy and Resources. Her research interests include air pollution related effects on health, exposure assessment to air pollution, based on modelling and monitoring of outdoor and indoor air pollution and ventilation, health impact assessments and development of environmental public health indicators.

She has over twenty year experience developed through her PhD at Imperial College, her work at Imperial College and Building Research Establishment in the UK, as well as at the National Centre for Environment and Sustainable Development (Greek Environment Agency) and the University of West Macedonia in Greece. She has published more than 60 peer-reviewed papers in international scientific journals and conferences and more than 50 technical research and consulting reports. She is a member of the Scientific Secretariat for COMEAP (Committee on the Medical Effects of Air Pollutants), Member of the Cross Government Group on Gas Safety and Carbon Monoxide, the Secretary of the UK Indoor Environments Group (UKIEG) and Member of the Executive Committee of MESAEP (Mediterranean Scientific Association of Environmental Protection).
Lunch

Seminar Room 1 - Ground floor

13:00 - 14:00
Michael Swainson PhD. is principal engineer in BRE’s HVAC Engineering and Building Diagnostics team. Over 20 years experience designing and undertaking practical investigations into the performance of heating, ventilation and air conditioning systems within buildings, both laboratory based and on site. Largely responsible for practical implementation of SAP Appendix Q for ventilation products and heat pumps. Michael was technical author of the; Installation Guidelines for systems 3 and 4 for the Domestic Ventilation Compliance Guide, supporting documentation to AD-F, NF46, Overheating in new homes and ZCH Solutions to overheating in homes, Evidence review.
Dr. Atze Boerstra, Director BBA Binnenmilieu

Residential Ventilation, health, comfort and control: the NL experience.

Dr. Atze Boerstra is founder and managing director of BBA Indoor Environmental Consultancy, a consultancy company specialised in indoor air quality and thermal comfort based in The Hague. He is a fellow at the Eindhoven University of Technology, REHVA fellow and honorary member of the Dutch chapter of ISIAQ (International Society of Indoor Air Quality and Climate). Atze was recently elected as vice-president of REHVA.
Assoc. Prof. Pawel Wargocki graduated from Warsaw University of Technology with honours in 1990. He received his PhD from the Technical University of Denmark in 1998, where he has been teaching and performing research ever since. He has more than 20 years of experience in research on human requirements in indoor environments. He is internationally known for his seminal work demonstrating that poor indoor environmental quality affects performance of office work and learning. Other work influenced requirements for ventilation and air cleaning.

Recent research includes studies on emissions from humans including effects of exposure to CO2, on sleep quality and on performance of green buildings. He has collaborated with leading research institutions, universities, and industrial partners around the world such as National University of Singapore, Jiao Tong University in Shanghai, Syracuse Center of Excellence, United Technologies and Google. He was President and is a long-standing board member of the International Society of Indoor Air Quality and Climate (ISIAQ), Vice President of Indoor Air 2008, and Chair of ASHRAE committees. Currently he is the member of ASHRAE’s Research Administration Committee. He has received several awards for his work including Rockwool Award for Young Researchers, ASHRAE Ralph Nevins Award, ISIAQ’s Yaglou Award and Best Paper Award in Indoor Air. He is the Secretary of Academy of Indoor Air Sciences. Published intensively.
Tea and Coffee

Foyer Space

15:10 - 15:40
Jan Sundell is a Swedish multidisciplinary scientist, with a Master’s degree in HVAC engineering from Royal Inst. of Technology, 1969, and a MD degree in environmental medicine from Karolinska Inst (1994). He has been involved in several governmental inquiries, about allergies, and environmental health. He has worked for NKB (the Nordic countries), WHO, and EU about ventilation and health. JS has been professor at the Technical University of Denmark, UT Tyler and now at Tsinghua University and Chongqing University, China. He has led a multitude of multidisciplinary scientific reviews, on indoor air and ventilation, VOCs and health, indoor pets and health, indoor particles and health, but also on breastfeeding and allergies.

His primary research focuses is on human exposure to air pollutants and health. He has initialized several large epidemiological studies to examine children’s exposure to indoor air pollutants and associated adverse health effects, in Sweden, Bulgaria, Denmark, Texas, South Korea, Taiwan, Singapore and China. His research has resulted in 200 peer-reviewed scientific articles. JS was Editor-in-chief of Indoor Air Journal from 2000-2010 and a founding member of the International Society of indoor Air Quality and climate (ISIAQ) and of the International Academy of Indoor Air Sciences (President 2005-2008). Many scientific Awards, including the highest award in indoor air sciences, “The Pettenkofer Award” 2011.
Lynne Sullivan, LSA studio

What do designers need to know?

Lynne Sullivan is a practising Architect and was founding Partner of sustainableBYdesign, finalists in all three 2010-2012 BRE UK Passivhaus Housing Competitions, specialising in low-energy new and retrofit projects in a range of sectors, including a European funded demonstration project at Thamesmead to Passivhaus EnerPhit standard. Previously Lynne was Sustainability Director for 9 years at Broadway Malyan, and for 10 years Associate Director at ECD Architects, where she was co-author and winner of the UKs first government-sponsored Zero CO2 housing competition.

Lynne now acts as a design consultant and collaborator, sits on local and national design review panels, and has authored and chairs a number of policy review and research projects for UK governments and others, including the Expert Panel for the Scottish Government whose report “A Low Carbon Building Standards Strategy for Scotland”, first published in 2007, was updated in 2013.

She was awarded an OBE for services to Architecture in 2011, chairs the Good Homes Alliance, and is a member of the UK Government’s Green Construction Board.
Discussion

Is there a problem?
How do we measure it?
What do we do about it?
Health Effects of Modern Airtight Construction

Thanks for participating!

https://hemacnetwork.com

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