

CONFERENCE ORGANIZERS



# 43<sup>rd</sup> AIVC

## 11<sup>th</sup> TightVent & 9<sup>th</sup> venticool Conference

Ventilation, IEQ and health  
in sustainable buildings

October

4-5  
2023

Copenhagen  
Denmark

# FINAL PROGRAMME



[www.aivc2023conference.org](http://www.aivc2023conference.org)

SUPPORTING ORGANIZERS





## Sponsors / Exhibitors

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## Congress Venue

**Aalborg University** A. C. Meyers Vænge 15, 2450 København -Denmark

## Registration Desk Hours

Registration Desk will be open during the following dates and times:

**Tuesday 3 October, 2023 / 19:00 – 20:00**

**Wednesday 4 October, 2023 / 08:00 – 19:00**

**Thursday 5 October, 2023 / 08:30 – 18:00**

## Poster display information

- Posters should be set up on Wednesday 4 October, 2023 from 09:00
  - Dismantling of posters should be finished by **Thursday 5 October 2023 at 16:30**
- Professional Congress Organizer and Organizers have no liability for posters left behind

## Poster dimensions

A0) size, 120CM Height x 80CM Width

## Poster presentation session

**Wednesday October 4, 2023 at 19.00 – 21.00**

Authors are kindly requested to be in front of their poster to be able to reply to any questions

## Long & Short Oral Presentation information

- Long Oral Presentations (indicated within the programme) are expected to last 12 minutes; another 3 minutes are foreseen for questions and answers (15 minutes in total)
- Short Oral Presentations (indicated within the programme) are expected to last 3 minutes; another 2 minutes are foreseen for questions and answers (5 minutes in total)

## Social Events

### Welcome Reception

**Tuesday 3 October, 2023**

**19:00 – 20:00**

Aalborg University,  
Kantine Area

### Poster Presentations & Student Competition – Industry stands – Cocktail Reception

**Wednesday 4 October, 2023**

**18:30 – 20:00**

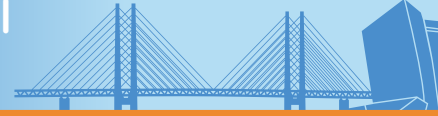
Aalborg University,  
Poster Area

### Gala Dinner

**Thursday 5 October, 2023**

**20:00 – 22:30**

Kosmopol ApS  
(Fiolstræde 44 DK-1171  
København)

Tuesday October 3<sup>th</sup>, 2023

19:00–20:00 Registration &amp; Welcome reception

**ROOM D (1.042)****Wednesday October 4<sup>th</sup>, 2023**

08:00–09:00 Registration

09:00–10:30 Opening - Plenary session

*Chairs:* Alireza Afshari, Arnold Janssens**Welcome on behalf of AIVC, venticool, TightVent**  
Arnold Janssens, *INIVE/AIVC/Ghent University***Welcome on behalf of Aalborg University Copenhagen**  
Alireza Afshari, *Aalborg University Copenhagen, Denmark***Tomorrow's Ventilation Solutions for Future Hospital Demands**  
Trond Thorgeir Harsem, *Nordconsult, Norway***Users and practices in heating and ventilating homes -  
why do they behave different than we think?**  
Kirsten Gram-Hanssen, *Aalborg University, Denmark***What we know about smart ventilation**  
Gaëlle Guyot, *Cerema, France***Dallying with DALYs: Why acceptable IAQ should consider harm**  
Benjamin Jones, *University of Nottingham, United Kingdom*

10:30–11:00

Coffee Break

Wednesday October 4th, 2023

**ROOM A (1.008)**

11:00-12:30

**Session 1A - Topical Session  
(Airborne cross infection and engineering solutions)****Chairs:** Peter V. Nielsen, Chen Zhang

The COVID-19 pandemic raises the public's attention on cross infections in the indoor environment. WHO has identified airborne transmission as a principal route for SARS-CoV-2, especially in crowded and poorly ventilated indoor environments. In fact, airborne transmission is one of the primary routes for many infectious diseases, such as anthrax, chickenpox, and influenza. The airborne cross-infection risk between people is influenced by many parameters, such as distance, relative position, respiratory activities, room ventilation, face mask, or other protection equipment. Effective control of these influencing factors can be important to mitigate airborne transmission risk between people. Many prevention measures were recommended by authorities during COVID-19, but their protective effects regarding airborne transmission are still under discussion.

The main objective of this workshop is to discuss the mechanism of airborne transmission and the engineering control solutions. Through the discussion, the workshop will find out some effective and efficient control measures to reduce airborne cross-infection risk. Discussion topics include:

1. What are the parameters influencing the cross-infection risk?
2. What are the challenges to reduce infection risk indoors?
3. How to design indoor airflow distribution to reduce the indoor exposure?
4. Are there any other engineering control solutions and what are their efficiency?
5. Where these engineering control solutions may be applied

**Opening**

Alireza Afshari, Aalborg University, Denmark

**Human exposure against airborne pathogens in an office environment**

Risto Kosonen, Aalto University, Finland

**Discussion on minimum ventilation rates for infection control**

Yuguo Li, University of Hong Kong, Hong Kong

**Mitigation of airborne transmission of respiratory viruses by ventilation – past, present and future**

Arsen Krikor Melikov, Technical University of Denmark, Denmark

**Point source ventilation effectiveness in infection risk-based post-COVID ventilation design**

Jarek Kurnitski, Tallinn University of Technology, Estonia

**Airborne transmission of disease in stratified and non-stratified flow**

Peter V. Nielsen, Aalborg University, Denmark

**Discussion with the audience**

**ROOM B (1.001)**

11:00-12:30 **Session 1B - Long Oral Presentation Session**  
(Building airtightness testing & prediction)

**Chairs:** Laure Mouradian, Iain Walker

**Acoustic method for measurement of airtightness - field testing on three different existing office buildings in Germany**

Bjorn Schiricke, DLR (German Aerospace Center), Germany

**Pulse tests in highly airtight Passivhaus standard buildings**

Xiaofeng Zheng, University of Nottingham, United Kingdom

**Correlation analysis between ACH50 and Air permeability considering the floor area of a residential buildings**

Suji Choi, Inha University, Republic of Korea

**Airtightness predictive model from measured data of residential buildings in Spain**

Irene Poza Casado, University of Valladolid, Spain

**Bridging The Mechanical / Enclosure Gap**

David de Sola, 3iVE LLC, United States of America

**ROOM C (2.1.042)**

11:00-12:30 **Session 1C - Topical Session**  
(Summer comfort and energy efficiency in hot periods:  
interest of mixed mode cooling and need of occupant feedback)

**Chairs:** Maxime Boulinguez, Gwénaëlle Haese, Arnaud Jay

*This session explores combined passive, soft and active cooling solutions, some occupant feedback and performance indicators. The presentation will be based on case studies in different climate conditions. The first part of the session will focus on windows and ceiling fan occupant behaviour model coupling methodology with Building Energy Models. This presentation will rely on a tropical case study. Then, an innovative approach to better understand hot discomfort will be highlighted based on the measurement of global human responses. This presentation will lie on an application to end users of mixed-mode cooled buildings under tropical climate conditions. Thirdly, a Windows coach for office workers will be introduced. The coach's objective is to advise occupants on the proper action to take on their windows (open or close) to optimise their thermal comfort, IAQ and energy efficiency. Feedback on two summers' experimental campaigns for occupant thermal comfort in a naturally ventilated building in a continental climate has been used to design the coach. This feedback will be presented. Finally, these works led to a new research project, CoolDown, funded by the French National Research Agency (ANR). It aims to develop new tools and methodologies to target energy and comfort performance in mixed-mode cooled buildings from early design to on-site performance. COOL-DOWN methodology will be introduced in the last presentation and will serve as a starting point for the discussion of this session.*

**Wednesday October 4th, 2023**

**11:00-12:30** **Windows and ceiling fan occupant behaviour model coupling methodology with building energy models, a tropical case study**

Maxime Boulinguez, *Université La Réunion - PIMENT, France*

**An innovative approach to better understand hot discomfort, based on the measurement of global human responses, including physiological and sensory indicators - application to end users of mixed mode cooled buildings under tropical climate conditions**

Gwénaëlle Haese, *CSTB, France*

**An IAQ and thermal comfort coach prototype to improve comfort and energy consumption thanks to adequate management of natural ventilation: development and first feedback results**

Arnaud Jay, *CEA Liten - INES, France*

**Towards an alternative cooling: Optimisation of the successive use of the cooling systems from passive to active - Development of design and control strategies of the hybrid cooling**

Arnaud Jay, *CEA Liten - INES, France*

12:30-13:30

Lunch Break



## ROOM C (2.1.042)

**13:30-14:45** **Session 2A - Topical Session  
(Energy Performance of Gas Phase Air Cleaning)**

**Chairs:** Bjarne W. Olesen, Sasan Sadrizadeh

*The session will focus on the energy performance of gas phase air cleaning. Standalone air cleaners may improve air quality by delivering a certain Clean Air Delivery Rate (CADR). For the same level of air quality, the ventilation rate can be reduced by a similar amount. However, standalone air cleaners are also using energy. Air cleaners built into the ventilation system may increase pressure drop and using some power, which both increase the energy use. A couple of studies based on models and dynamic building simulations on energy use for heating, cooling, and ventilation have been used to study the overall energy implications of using gas phase air cleaners. The results will be presented and discussed in this session.*

**13:30-14:45** **Introduction to IEA EBC Annex 78**

Bjarne W. Olesen, *Technical University of Denmark, Denmark*

**Air cleaner as an alternative to increased ventilation rates in buildings: a simulation study for an office**

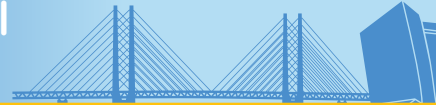
Alireza Afshari, *Aalborg University Copenhagen, Denmark*

**Exploring the Energy-Saving Benefits of Gas-Phase Air Cleaning in Nordic Buildings**

Sasan Sadrizadeh, *KTH Royal Institute of Technology, Sweden*

**Gas phase air cleaning effects on ventilation energy use and indicators for energy performance**

Dragos-Ioan Bogatu, *Technical University of Denmark, Denmark*

**ROOM B (1.001)**

13:30-14:45

**Session 2B - Topical Session  
(Revision of ISO 9972: Improvements in the reliability  
of airtightness measurements)****Chairs:** Valérie Leprince, Gary Nelson

*ISO 9972 is an international standard describing the measurement procedure and calculation methods for determining the air permeability of buildings using the fan pressurisation method. Given the impact of airtightness on building energy use, more and more tests are performed, a lot of them required by regulations. Indeed, environmental conditions during the test, and more specifically wind and temperature differences, may cause significant errors and thus increase the result uncertainty. However, when a target value must be reached in a mandatory context, knowing the test uncertainty is crucial. Recent works have underlined the need to improve the reliability of the method to measure a building's air leakage rate as described in ISO 9972.*

*To address these challenges, Cerema has launched a project to review ISO 9972 and has set up a working group of international experts in the field of building airtightness testing to identify the relevant issues with the current standard and propose improvements. This project aims to lay a foundation for a thorough review and revision of the current ISO 9972 standard and this session will present the first results towards this revision.*

13:30-14:45

**Introduction to the project of ISO 9972 revision**

Valérie Leprince, Cerema, France

**On the integration of envelope pressure inhomogeneity and autocorrelation  
in fan pressurization uncertainty analysis**

Martin Prignon, Buildwise, Belgium

**Statistical analysis of the correlations between buildings  
air permeability indicators**

Bassam Moujalled, Cerema, France

**Proposal for new implementations in ISO 9972**

Benedikt Kölsch, Cerema, France

**Discussion with the audience**



**Wednesday October 4th, 2023**



## ROOM C (2.1.042)

13:30-14:45

Session 2C - Long & Short Oral Presentation Session  
(Climate change & Resilient cooling)

**Chairs:** Yun Gyu Lee, Pilar Linares

**Which design parameters impact the resilience to overheating in a typical apartment building?** (Long Oral Presentation)

Abantika Sengupta, *KU Leuven, Belgium*

**Renewable ventilative cooling? Insights from an Irish perspective** (Long Oral Presentation)

Adam O' Donovan, *Munster Technological University, Ireland*

**Urban context and climate change impact on the thermal performance and ventilation of residential buildings: a case-study in Athens** (Long Oral Presentation)

Maria Kolokotroni, *Brunel University London, United Kingdom*

**Thermography-based assessment of mean radiant temperature and occupancy in healthcare facilities** (Long Oral Presentation)

Paul Seiwert, *RWTH Aachen University, Germany*

**Analyzing natural ventilation and cooling potential in a communal space building in Belgium under future climate conditions** (Short Oral Presentation)

Shiva Khosravi, *Archipelago Leuven, Belgium*

**A study of indoor environment and window use in French dwellings monitored during a summer with heatwaves** (Short Oral Presentation)

Mathilde Hostein, *Cerema/ENTPE, France*

**Importance of thermal stack effect in ventilative cooling concepts for residential buildings** (Short Oral Presentation)

Diederik Verscheure, *Vero Duco NV, Belgium*

14:45-15:00

Room Change

**ROOM A (1.008)**

15:00-16:30

**Session 3A - Topical Session****(Real performance of (smart) residential ventilation - performance assurance, fault detection, continuous commissioning)****Chairs:** Gaëlle Guyot, Jakub Kolarik

*This topical session is organized by the fourth subtask of the IEA EBC Annex 86 Energy Efficient IAQ Management in residential buildings entitled "Ensuring performance of smart ventilation". One of our focus points is the quality assurance of implemented residential ventilation systems & strategies, whether they can be called "smart" or not.*

*In this topical session, we want to present and discuss results and experiences from different stakeholders representing both industry and academia, regarding real performance of residential ventilation. Furthermore, we want to discuss how do their data stand against existing quality management approaches and inspection protocols for residential ventilation. Can we identify the crucial issues specific to "smart systems"? We aim to discuss examples of approaches to ensure reliable operation beyond the commissioning phase.*

15:00-16:30

**Welcome and introduction****Gaëlle Guyot**, Cerema, France**Performance 2 project - Winter IAQ campaigns in 13 dwellings equipped with Humidity-based DCV systems: analyses of the ventilation performance after 15 years of use****Adeline Melois**, Cerema, France & **Juan Rios**, Aereco, France**Checking and assuring real IAQ and energy performances through demand control and cloud connectivity****Ivan Pollet**, Renson, Belgium**Data driven models for fault detection - Combining thermal and indoor air quality grey box models****Gabriel Rojas**, University of Innsbruck, Austria**Evaluation of supply temperature set-points and airflow imbalance using smart ventilation data****Kevin Smith**, Technical University of Denmark, Denmark**Technologies in balanced ventilation systems to maintain optimal performance in energy and comfort****Bart Cremers**, Zehnder Group, The Netherlands**Discussion**

Wednesday October 4th, 2023

**ROOM B (1.001)****15:00-16:30** **Session 3B - Topical Session**  
**(Building and ductwork airtightness regulations in various countries)****Chairs:** Irene Poza Casado, Nolwenn Hurel

*In 2008 a series of Ventilation Information Papers (VIP)s (from VIP 17 to VIP 27) were published by the AIVC, detailing the "Trends in the building ventilation market and drivers for changes" for 10 countries. Regulations have however evolved a lot in most countries since then. A new series of VIPs is being developed to get an update on the current regulations in European countries regarding building and ductwork airtightness. They include for both, when relevant, information on: national requirements and drivers: airtightness indicator, requirements in the regulation, energy programs, airtightness justifications, sanctions, etc.; if it is included in the energy calculations and how; the airtightness test protocol: qualification for the testers, guidelines, requirements on measuring devices; tests performed: tested buildings/ductworks, database, evolution with time; guidelines to build airtight buildings/ductworks.*

*Eight VIPs have been already published in this new series, and most of them have already been presented at the last AIVC Conference in Rotterdam (for Belgium, Czech Republic, Estonia, France and Greece). Contributions from other countries are in preparation, and a total of about 15 publications is expected to give an overview of the building and ductwork airtightness trends in various countries. Some of them are presented in this Topical Session.*

**15:00-16:30** **Introduction: Presentation of the series of AIVC VIPs on building and ductwork airtightness regulations**  
Nolwenn Hurel, PLEIAQ, France**Building and ductwork airtightness in Norway:  
national trends and requirements**

Tormod Aurlien, NMBU, Norway

**Building and ductwork airtightness in The Netherlands:  
national trends and requirements**

Niek-Jan Bink, ACIN Instrumenten, The Netherlands

**Building and ductwork airtightness in Spain:  
national trends and requirements**

Irene Poza Casado, University of Valladolid, Spain

**Building and ductwork airtightness in Latvia:  
national trends and requirements**

Andrejs Nitijevskis, IRBEST Ltd, Latvia

**Air tightness and its impact on energy consumption in multi-family residential buildings in Montenegro (Short Oral Presentation)**

Esad Tombarevic, University of Montenegro, Montenegro



Wednesday October 4th, 2023

**ROOM C (2.1.042)**

15:00-16:30

**Session 3C - Topical Session  
(Resilient Cooling of Buildings meets Resilient Cooling in Cities)****Chairs:** Hilde Breesch, Patryck Czarnecki

*In this interactive session the challenges of resilient cooling of buildings and their relation to their urban surroundings will be addressed. After a short presentation of main outcomes of EBC Annex 80 Resilient Cooling of Buildings, the audience will work in small groups on a prepared set of building cases and challenges. With the Technology Profiles from Annex 80 and the Resilient Cooling Guidelines at hand different solutions shall be discussed and most suitable ones identified. The discussion of these different approaches in the plenum shall foster peer learning and create a better understanding of the nexus of resilient cooling of buildings and resilient cooling in cities.*

15:00-16:30

**Resilient Cooling Technology Profiles from the EBC Annex 80**  
Peter Holzer, Institute of Building Research & Innovation, Austria**Resilient Cooling Guidelines from the EBC Annex 80**  
Vincenzo Corrado, Politecnico di Torino, Italy**Work in small Design Groups****Open discussion and collective conclusion in plenum**

16:30-17:00

Coffee Break

**Wednesday October 4th, 2023**



## ROOM A (1.008)

17:00–18:15

### Session 4A - Short Oral Presentation Session (Indoor Air Quality & Health)

**Chairs:** Max Sherman, Pawel Wargocki

#### **Health risks of residential indoor and outdoor exposure to fine particle-bound phthalates**

Jiayao Chen, *University College Dublin, Ireland*

#### **HEPA filters to improve vehicle cabin air quality – advantages and limitations**

Dixin Wei, *Volvo Cars, Sweden*

#### **Experimental study of an innovative wet scrubber concept in regards to particle filtration and pressure loss**

Nhat Nguyen, *RWTH Aachen University, Germany*

#### **An evaluation of CO2 emission rates by Chilean school children**

Nicolas Carrasco, *Pontificia Universidad Catolica de Chile, Chile*

#### **The Effects of Bedroom Mechanical Ventilation on Health and Sleep Quality**

Jeongwon Kim, *Dankook University, Republic of Korea*

#### **Analysis of PM2.5 indoor-outdoor ratio in lobby floor according to configurations of entrance**

Soyi Park, *Inha University, Republic of Korea*

#### **Proposal of an effort-benefit diagram to compare unit and room air-change rates applied to a literature review**

Sven Auerswald, *Fraunhofer ISE, Germany*

#### **Experimental Investigation of Indoor Air Quality in an Open Office Environment**

Mustafa Zeki Yilmazoglu, *Untes Heating Air Conditioning Corp., Turkey*

#### **Hygienic Air Handling Unit Certification Program: the new necessity for a guaranteed indoor air quality**

Ali Nour Eddine, *Eurovent Certita Certification, France*

#### **Car traffic or emissions from heating sources: What is responsible for IAQ?**

Katarzyna Ratajczak, *Poznan University of Technology, Poland*

#### **Monitoring VOCs' concentrations in a circular biobased residential building using low-cost sensors (Student Competition)**

Yannick Thienpont, *KU Leuven, Belgium*

#### **Smart & Predictive Air Quality Solution**

Paul Brasser, *Prometech, The Netherlands*

#### **Energy Implications of Increased Ventilation in Commercial Buildings to Mitigate Airborne Pathogen Transmission**

David Artigas & Sean M. O'Brien, *Simpson Gumpertz & Heger Inc., United States of America*

**ROOM B (1.001)**

17:00-18:15

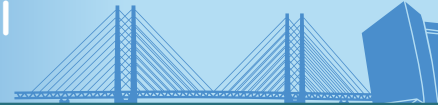
**Session 4B - Short Oral Presentation Session  
(Ventilation strategies & thermal comfort)****Chairs:** Jaap Hogeling, Maria Kolokotroni**Reflections on alternative modelling approaches regarding  
occupants' window operation behaviour***Christiane Berger, Aalborg University, Denmark***Development of air supplied ceiling radiant air conditioning system  
using the Coanda effect (Student Competition)***Satoshi Noguchi, the University of Kitakyusyu, Japan***Wind Tunnel Experiment of Wind-Induced Single-sided Ventilation  
under Generic Sheltered Urban Area***Zitao Jiang, Osaka University, Japan***A study on desiccant system regenerated by waste heat from  
home-use solid oxide fuel cell cogeneration system***Keita Mizuno, Misawa Homes Institute of Research & Development Co., Ltd., Japan***Method for Evaluating an Air-Conditioning System with Natural Ventilation  
by Coupled Analysis of a Building Energy Simulation Tool and  
Computational Fluid Dynamics (Student Competition)***Ryuichi Yasunaga, the University of Kitakyushu, Japan***Performance comparison of different ventilation strategies  
in elderly care homes in Belgium***Hilde Breesch, KU Leuven, Belgium***Sea Water Air Conditioning (SWAC): A Resilient and Sustainable Cooling Solution  
for hot and humid climates - Energy Performance and Numerical Modeling***Kanhan Sanjiv, University of French Polynesia, French Polynesia***The Effects of Lowering Temperature Setpoints on Perceived Thermal Comfort  
-An experimental study in office buildings (Student Competition)***Beatriz Coutinho, University of Coimbra - ADAI, Portugal***Long-term energy performance of dew-point indirect evaporative cooler under  
the climate change world scenario (Student Competition)***Maria Jesus Romero-Lara, University of Cordoba, Spain***On the assessment of the pressure coefficient on the mixed ventilation modeling***Marcos Batistella Lopes, Associacao Paranaense de Cultura - APC - PUCPR, Brazil***Construction of operational control rules for an earth-to-air heat exchanger  
through transfer reinforcement learning (Student Competition)***Yuki Adachi, the University of Kitakyusyu, Japan***Ventilation and Thermal Performance Examination of Slot Line Diffuser for  
Perimeter Usage by CFD Simulation***Shaoyu Sheng, Osaka University, Japan***Optimization and metamodelization based on machine learning of a new neuro  
human thermal model***Mohamad El Kadri, Centre Scientifique Et Technique Du Batiment (CSTB), France*

**Wednesday October 4th, 2023**



## **ROOM A (1.008)**

18:15-19:00	Industry Presentations <b>Acin Instrumenten, BCCA, Blowerdoor, DooApp, Lindab, Mez-Technik, Renson, Retrotec, Soudal, Velux, WindowMaster</b>
19:00-21:00	Poster presentations & Student Competition – Industry stands – Cocktail reception with snacks

**ROOM A (1.008)**

09:00-10:30

**Session 5A - Topical Session  
(The Role of Building Ventilation on Building Decarbonization)****Chairs:** Núria Casquero-Modrego, Iain Walker

Decarbonization of buildings leads to a significant reduction of CO2 emissions, which is essential in order to meet climate goals. However, this is a complex undertaking, especially when decarbonization is an emergent topic for the construction sector and households. Building ventilation is connected with many factors related to building decarbonization. Considering building ventilation requirements is essential when improving the energy efficiency of buildings (for example when improving the airtightness of existing buildings). Appliance electrification aspects of building decarbonization may also provide opportunities for better IAQ for the occupants and consequently decreasing the possibility of health issues. Furthermore, designing and proposing better building ventilation strategies can help us to meet climate goals. This session aims to bring people with expertise in building ventilation and IAQ, who are working on assessing building ventilation and IAQ strategies for building decarbonization. The goal is to generate a dialogue that addresses the relationship between building ventilation and climate change and promote awareness of the need to integrate ventilation and building decarbonization research.

09:00-10:30

**Quantifying the Potential Health Impacts of Unvented Combustion in Homes - A Meta-Analysis**

Nuria Casquero-Modrego, LBNL, United States of America

**How to create a performance-based regulation on ventilation  
- the French Experience**

Valérie Leprince, Cerema, France

**Comparative Analysis Between Indoor Temperatures of Dwellings at Urban Scale During a Typical and Extreme Summers in a Temperate Climate**

Ainhoa Arriazu-Ramos, University of Navarra, Spain

**Decarbonization and IAQ in Spain: a roadmap**

Marta Sorribes Gil, IETCC-CSIC, Spain

**Discussion Time: The Role of Building Ventilation on Building Decarbonization**



**Thursday October 5th, 2023**



## **ROOM B (1.001)**

09:00-10:30

**Session 5B - Long Oral/Topical Presentation Session  
(Indoor Air Quality & ventilation)**

**Chairs:** Simon Jones, James McGrath

**Ventilation behaviour of occupants driven by outdoor temperature:  
12 case studies**

*Sonia Garcia-Ortega, IETCC-CSIC, Spain*

**Indoor air quality in Austrian classrooms – Assessing different ventilation  
strategies with a citizen science approach**

*Simon Beck, University of Innsbruck, Austria*

**Measurement of ventilation effectiveness and indoor air quality  
in toilets at mass gathering events**

*Filipa Adzic, University College London, United Kingdom*

**Impact of the building airtightness and natural driving forces  
on the operation of an exhaust ventilation system in social housing in Chile**

*Gilles Flamant, Pontificia Universidad Catolica de Chile, Chile*

**Metal Oxide Semiconductor sensors (MOS) for measuring Volatile Organic  
Compounds (VOC) - performance evaluation in residential settings**

*Jakub Kolarik, Technical University of Denmark, Denmark*

**Towards performance-based approaches for smart residential ventilation:  
a robust methodology for ranking the systems and decision-making**

*Baptiste Poirier, Cerema, France*

**ROOM C (2.1.042)**

09:00-10:30

**Session 5C - Topical Session**

(Importance of good resilient building design and standards to ensure good ventilative cooling performance to reduce overheating and environmental impact)

**Chairs:** Christoffer Plesner, Jannick K. Roth

*The purpose of this session is to discuss and showcase how ventilative cooling can be part of the following three key elements, in which the building sector are facing:*

*Resiliency: Robustness and resilience are key indicators when designing future buildings in terms of ventilative cooling.*

*Indoor climate: The focus on the indoor climate including limiting overheating is a main point due to rapid changes in the outdoor environment, fx. climate change.*

*Environmental impact: Sustainability will be, and is already, a key parameter when assessing technologies in the built environment.*

*All three above mentioned key elements are to some extent bound to standards and legislation. Hence, standards and legislation are essential to push new requirements, while setting the bar for future building design.*

09:00-10:30

**Introduction**

**Christoffer Plesner**, VELUX A/S, Denmark & **Jannick Roth**, WindowMaster International A/S, Denmark

**Update on Resilient cooling and indicators from the IEA EBC Annex 80**

**Peter Holzer**, Institute of Building Research & Innovation, Austria

**Resilient Ventilative cooling in Design Practice: Where next?**

**Paul O'Sullivan**, Munster University, Ireland

**Life cycle assessment: A design element for ventilation system selection**

**Jannick Roth**, WindowMaster International A/S, Denmark

**Lessons Learned from Irish Schools: Early-stage Insights on Overheating**

**Paul O'Sullivan**, Munster University, Ireland

**Resilient cooling in office buildings: case study in Belgium**

**Hilde Breesch**, KU Leuven, Belgium

**Design procedures for ventilative cooling integrated in new standards**

**Christoffer Plesner**, VELUX A/S, Denmark & **Jannick Roth**, WindowMaster International A/S, Denmark

**Questions and open Discussion**

10:30-11:00

Coffee Break

**Thursday October 5th, 2023**



## ROOM A (1.008)

**11:00-12:30** **Session 6A - Topical Session**  
(The role of carbon dioxide and particulate matter for assessing ventilation and respiratory disease transmission in buildings)

**Chairs:** Justin Berquist, Svein Ruud

*The objective of this topical session is to discuss some of the potential applications and limitations of CO<sub>2</sub> and PM concentration measurements for assessing ventilation and filtration performance, IAQ, and respiratory disease transmission in buildings. Researchers with a breadth of expertise and publications in this area will present their research. The session programme outlined below includes the individuals selected to present, the expected presentation titles, and the corresponding presentation objective.*

**11:00-12:30** **Sensitivity Analysis of CO<sub>2</sub> Concentrations as Ventilation Metrics**  
Oluwatobi Oke, National Institute of Standards and Technology, (NIST),  
United States of America

**Evaluation of Uncertainties of Using CO<sub>2</sub> for Studying Ventilation Performance and Indoor Airborne Contaminant Transmissions**  
Liangzhu (Leon) Wang, Concordia University, Canada

**Effects of ventilation on airborne transmission: particle measurements and performance evaluation**  
Huijuan Chen, Research Institute of Sweden (RISE), Sweden

**Impact and benefits of the air cleaning measures implemented in two schools**  
Liang (Grace) Zhou, National Research Council Canada (NRC), Canada

**ROOM B (1.001)**

11:00-12:30

**Session 6B - Long Oral Presentation Session  
(Indoor Environmental Quality)****Chairs:** Alireza Afshari, Sonia Garcia**Critical reflections on indoor-environmental quality constructs**Ardeshir Mahdavi, *TU Graz, Austria***Ventilation and sleep quality**Pawel Wargocki, *Technical University of Denmark, Denmark***Applicability and sensitivity of the TAIL rating scheme using data  
from the French national school survey**Pawel Wargocki, *Technical University of Denmark, Denmark***An investigation of MVHR system performance based on health and comfort  
criteria in bedrooms of low-carbon social housing in South-Wales, UK**Faisal Farooq, *Cardiff University, United Kingdom***Impact of optimized residential ventilation with energy recovery  
on health and well-being**Martin Kremer, *RWTH Aachen University, Germany***A detailed investigation of the impact of an innovative dynamic façade system  
on indoor environmental quality in offices**Magdalena Hajdukiewicz, *Eindhoven University of Technology (TU/e),  
The Netherlands*

**Thursday October 5th, 2023**



## ROOM C (2.1.042)

11:00-12:30 **Session 6C - Long Oral Presentation Session  
(Ventilative cooling & Natural Ventilation)**

**Chairs:** Dong Hwa Kang, Jensen Zhang

**A methodology for evaluating the ventilative cooling potential in early-stage building design**

Valentina Radice Fossati, *Eurac Research, Italy*

**Ventilation reliability: A pilot study on window opening behaviour in a primary school (Student Competition)**

Lara Tookey, *Massey University, New Zealand*

**A survey of building design practitioner perceptions of ventilative cooling in their building design processes**

Maha Sohail, *Munster Technological University, Ireland*

**Can naturally ventilated office buildings cope with dusty outdoor air?**

Evangelos Belias, *EPFL, Switzerland*

**Distribution of Particulate Matter Concentration and Temperature Stratification Examined by Zonal Model and Experimental Measurements in Room with A Novel Portable Displacement Ventilation Cooling Unit**

Toshio Yamanaka, *Osaka University, Japan*

**Thermal comfort and risk of draught with natural ventilation - assessment methods, experiences and solutions**

Jannick Roth, *Windowmaster International A/S, Denmark*

12:30-13:30

Lunch Break



## ROOM A (1.008)

13:30-14:30 **Session 7A - Long Oral Presentation Session  
(Air Cleaning)**

**Chairs:** Wouter Borsboom, Arnold Janssens

**Evaluation of sensor-based air cleaners to remove PM2.5 and TVOC from indoors with pollutant sources of smoking and burning candles (Student Competition)**

Li Rong, *Aarhus University, Denmark*

**Developing methodology for testing of gas-phase air cleaners based on perceived air quality**

Pawel Wargocki, *Technical University of Denmark, Denmark*

**Evaluating the impact of air cleaning on bioaerosols and other IAQ indicators in Belgian daycare facilities**

Sarah Paralovo, *VITO, Belgium*

**Removal of Odorants in Nursing Homes Using Air Cleaners**

Stig Koust, *Danish Technological Institute, Denmark*



Thursday October 5th, 2023

**ROOM B (1.001)**

13:30-14:30 **Session 7B - Long Oral Presentation Session  
(Ventilation & infection risk)**

**Chairs:** Gaëlle Guyot, Jelle Laverge

**What can CO2 measurements tell us about ventilation  
and infection risk in classrooms?**

Carolanne Vouriot, *University of Cambridge, United Kingdom*

**Indoor air modelling and infection risk assessment  
in a naturally ventilated patient room**

Natalia Lastovets, *Tampere University, Finland*

**Performance of Local Ventilation System Combined with Underfloor  
Air Distribution as Preventative Measures for Infectious Diseases  
in Consulting Room (Student Competition)**

Jun Yoshihara, *Osaka University, Japan*

**The numerical investigation of human micro-climate  
with different human simulators**

Haruna Yamasawa, *Osaka University, Japan*

**ROOM C (2.1.042)**

13:30-14:30 **Session 7C - Topical Session  
(Personalized Environmental Control Systems (PECS)  
operation and evaluation)**

**Chairs:** Dragos-loan Bogatu, Bjarne W. Olesen

*The session will introduce IEA-EBC Annex 87 and discuss aspects related to PECS operation and evaluation. Current indoor environmental quality (IEQ) and energy performance evaluation methods alongside used key performance indicators (KPIs) will be described. Examples of both traditional and advanced control strategies will be presented. A secondary objective of the session is to gather input from the conference audience on the aforementioned topics.*

13:30-14:30 **Introduction to IEA EBC Annex 87**  
Bjarne W. Olesen, *Technical University of Denmark, Denmark*

**Indoor environmental quality (IEQ) and energy performance  
evaluation of PECS**

Douaa Al-Assaad, *KU Leuven, Belgium*

**Physiological sensing for thermal comfort assessment**

Dragos-loan Bogatu, *Technical University of Denmark, Denmark*

14:30-14:45 **Room Change**

Thursday October 5th, 2023

**ROOM A (1.008)****14:45-16:15** **Session 8A - Topical Session  
(Post Pandemic Pontifications)****Chairs:** Benjamin Jones, Max Sherman

*The COVID-19 pandemic highlighted the importance of indoor air quality and appropriate ventilation in buildings to prevent airborne disease transmission. As we move into the endemic phase, it remains crucial that we continue to prioritize effective ventilation and air cleaning to keep occupants as healthy as possible. This topical session will cover the latest research on airborne transmission mechanisms, including implications for ventilation system design, sizing, and operation. Presenters will share case studies of transmission mitigation and lessons learned from the pandemic response. There will be an emphasis on strategies for improving air quality in public buildings within the constraints of operating budgets. Attendees will gain practical knowledge to assess systems to make impactful upgrades, and communicate the ongoing importance of ventilation and air quality to stakeholders in a post-pandemic context. The goal is to ensure the health, safety, productivity, and wellbeing of building occupants now and in the future.*

**14:45-16:15** **ASHRAE 241-2023 Control of Infectious Aerosols (Long Oral Presentation)**Max Sherman, *University of Nottingham, United Kingdom***Can the Wells-Riley model universally assess airborne pathogen infection risk?**  
(Long Oral Presentation)Benjamin Jones, *University of Nottingham, United Kingdom***Flow dynamic of human cough and measuring techniques: A review**  
(Long Oral Presentation)Chen Zhang, *Aalborg University, Denmark***Evaluating the impact of air cleaning and ventilation of airborne pathogens and human bio-effluents at two primary schools in Belgium**  
(Long Oral Presentation)Klaas De Jonge, *Ghent University, Belgium***Review of international standards describing air cleaner test methods**  
(Long Oral Presentation)Hannelore Scheipers, *Ghent University, Belgium***Rethinking different ventilation strategies in a post-pandemic era:  
a CFD assessment (Short Oral Presentation)**Alicia Murga Aquino, *Kobe University, Japan***How the COVID Pandemic and the Energy Crisis Have Influenced Indoor  
Environmental Conditions in non-residential Buildings (Short Oral Presentation)**Aurora Monge, *University of Navarra, Spain*



Thursday October 5th, 2023

**ROOM B (1.001)**14:45-16:15 **Session 8B - Long Oral Presentation Session****(Impact factors on IAQ)****Chairs:** Marie Coggins, Andy Persily

**The impact of increased occupancy on particulate matter concentrations in mechanically-ventilated residential buildings in a subtropical climate**

German Hernandez Herrera, *Universidad Politécnica de Madrid (UPM), Spain*

**On-Site Capture Efficiency of Kitchen Range Hood Based on Particle Diameters and Exhaust Flow Rates**

Shinhye Lee, *Seoul National University, Republic of Korea*

**An investigation of cooking-related pollutants in the residential sector**

Daniela Mortari, *University Savoie Mont Blanc, France*

**Fine dust measurement in ducts of balanced ventilation systems**

Bart Cremers, *Zehnder Group Zwolle, The Netherlands*

**The Impact of Deep Energy Renovations on Indoor Air Quality and Ventilation in Irish Dwellings**

Hala Hassan, *University of Galway, Ireland*

**Financial impact of leaky ductwork in buildings – a calculation tool to raise awareness**

Nolwenn Hurel, *PLEIAQ, France*

16:15-16:45

Coffee Break

**ROOM D (1.042)**16:45-18:15 **Closing session****Chairs:** Arnold Janssens, Alireza Afshari

**Decoding 30 Years of Insights: Conclusions from ISIAQ's Landmark Webinar Series on Indoor Air Quality and Climate**

Ying Xu, *Tsinghua University, China*

**Summing up of the "Smart ventilation, IAQ & Health" track**

Benjamin Jones, *University of Nottingham, United Kingdom*

**Summing up of the "Building and ductwork airtightness" track**

Valerie Leprince, *Cerema, France*

**Summing up of the "Ventilative and resilient cooling" track**

Hilde Breesch, *KU Leuven, Belgium*

**Best paper/poster award & Student Competition awards**

**Announcement of 2024 conference**

**Closing**

20:00

**Gala Dinner (ticket required)**

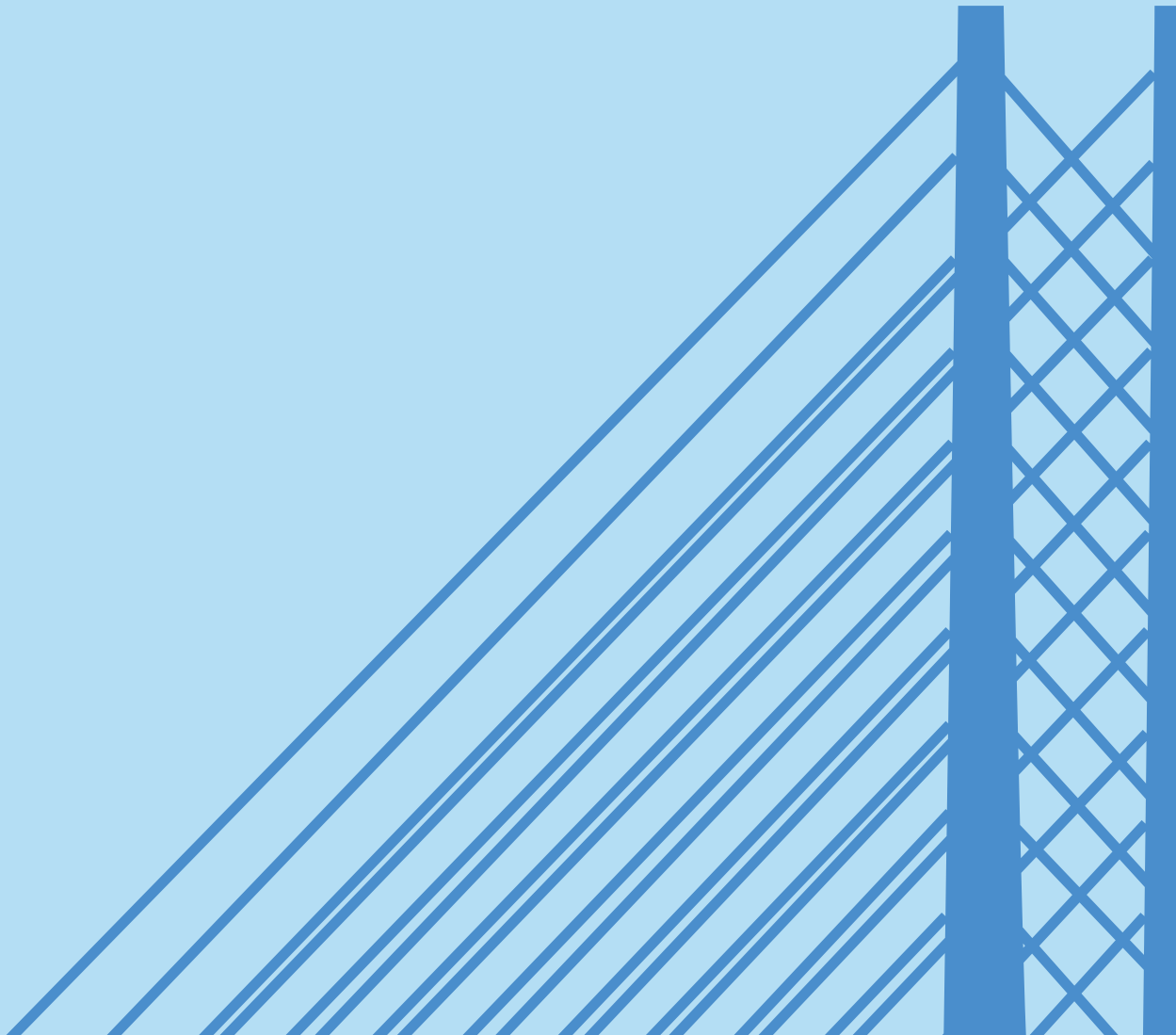


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## 11<sup>th</sup> TightVent & 9<sup>th</sup> venticool Conference

Ventilation, IEQ and health  
in sustainable buildings

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