

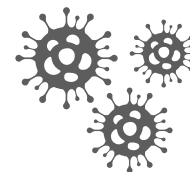
CLIMA WORK SHOPS

CLIMA World Congress is the flagship event series of REHVA in the field of building services and indoor climate quality. It attracts around 1 000 participants from around the world every 3 years.

CLIMA is the perfect meeting point of industry and academia, a unique mixture of a scientific congress, practice oriented sessions and exhibition to share knowledge, showcase technological trends and spur discussion about the challenges and trends ahead

our sector among researchers, HVAC engineers, and industry representatives.

The 14th edition will be a hybrid event, offering on-site and on-line visibility for sponsors. The venue is the brand new AHOY congress center Rotterdam, the event is hosted by our Dutch Member Association, TVVL. We expect up to 700 attendees on-site (in-line with COVID-19 safety restrictions) and minimum 1 000 online participants.



Health & Comfort

COVID-19 implications on ventilation criteria and design

Sponsor(s) REHVA

Organiser(s) .. REHVA COVID-19 Task Force: Jarek Kurnitski and Atze Boerstra

Speakers Bjarne Olesen, Jarek Kurnitski, Pawel Wargocki, Amar Aganovic

EN 16798-1 serves as a major indoor climate standard with the aim to specify IEQ design criteria for buildings with human occupancy. COVID-19 pandemic has initiated discussion and research to assess of what ratio of infections could have been prevented if buildings had been prepared with better ventilation systems that would reduce the risks associated with the aerosol-based transmission of infections. In the current standard, IAQ is dealt through perceived air quality and some specific pollutants. Ventilation sizing criteria is based on perceived air quality by the visitors (not adapted) in non-residential and occupants (adapted persons) in residential buildings that depend on the emissions from humans and building materials. Revision of the standard provides an opportunity to include infection risk-based ventilation (and filtering) criteria as well as productivity and learning performance which effects have been known for a long time but have not been addressed in standards.

The objective of the workshop is to discuss how new evidence on aerosol transmission should affect ventilation design methods/criteria and propose directions how to develop input to the revision of the standard. The following questions will be discussed:

- Bases for existing IAQ and ventilation criteria
- Relative humidity effect on the virus spread in indoor spaces
- Infection risk and event reproduction number-based ventilation (and filtration) design method
- Ventilation effectiveness importance in the design, including air distribution and room partitions/zoning

This workshop will facilitate the dialogue between researchers, HVAC professionals, consultants, manufacturers, building and occupational health authorities to find a path forward to solve a paradigm change in ventilation design.

Health & Comfort

Advanced airflow distribution methods for reducing exposure to indoor pollution and cross infection

Sponsor(s) REHVA Technology and Research Committee & SCANVAC

Organiser(s) .. REHVA Task Force on Occupant Targeted Ventilation

Speakers Prof. Arsen Melikov, Guangyu Cao, Bin Yang, Angui Li, Xianting Li, John Zhang Lin

A wide range of pollutants has been found indoors, and the adverse effect of various indoor pollutants on occupants' health has been recognized as well. In addition, both gaseous pollutants and particulate matter pollutants may spread indoors from one zone to another through an improperly designed airflow distribution system. Also, using traditional ventilation methods, influenza viruses may spread from person to person through coughing or sneezing by people in public spaces. And the COVID-19 pandemic shows clear evidence that advanced airflow distribution methods are urgently needed to reduce cross-infection and exposure to indoor pollution. Occupants' increasing exposure shows an urgent need to develop advanced airflow distribution methods to reduce exposure to various indoor pollutants.

However, the increase of the ventilation rate leads to an increase in energy consumption and the need for large and costly ventilation systems with possible penalties in thermal comfort. Instead, proper design and control of air distribution in spaces can be a better alternative. This is the focus of a new REHVA Guidebook on Occupant Targeted Ventilation. The present and future activities in guidebook preparation will be presented and discussed. Several working group members will report the details of the work on the guidebook. The goal is to inform the community, discuss the work performed on the guidebook and collect rational suggestions for improving the work on the guidebook.



Energy

Deep energy renovation of buildings for HVAC professionals

Sponsor(s) REHVA

Organiser(s) .. TECHNOLOGY AND RESEARCH COMMITTEE

Speakers Tomasz Cholewa, PhD, DSc, CEng (PE), Ilinca Nastase, Jarek Kurnitski, Marija S. Todorovic

The decarbonisation of the buildings sector is vital to deliver on the EU's 2030 and 2050 climate and energy objectives, given that buildings are responsible for 40% of total energy consumption and 36% of energy-related greenhouse gas emissions in the EU. That is why, decarbonisation of the EU building stock requires energy renovation at a large scale: almost 75% of the EU's building stock is inefficient according to current building standards, and 85-95% of the buildings that exist today will still be standing in 2050. Across the EU, deep renovations that reduce energy consumption by at least 60% are carried out only in 0.2% of the building stock per year. Two thirds of the energy used for heating and cooling of buildings comes from fossil fuels.

However, numerous barriers stand in the way of higher renovation rates, such as:

- low awareness of the current energy and resource profile of buildings and the benefits of renovation,
- lack of trust in the energy savings that renovation will achieve.

Taking the above into account and the fact that the majority of energy in existing buildings is used by HVAC, it is crucial to address these topics.

For example, minimize loads and focus on the renovation of HVAC systems and the increase of energy efficiency of existing systems. The modernization of HVAC systems can play a very important role during deep renovations of existing buildings in order to achieve in practice the calculated energy savings by operating the existing HVAC.

The main objective of this workshop is to present:

1. Utility and widely applicable concepts for the renovation of existing buildings, underlining the critical role of HVAC professionals in the process;
2. Good practices that are widely applicable, have been validated and demonstrated with proven practices during field studies, that document the actual energy and cost savings, and/or realistic estimates from Life Cycle Analysis (LCA) that different renovations will achieve.
3. Practical guidelines applicable to different geographical locations and climate zones that have different priorities for heating/cooling during the renovation of existing buildings.

Health & Comfort

Low relative humidity in indoor air – an important element of indoor air quality

Sponsor(s) Swegon

Organiser(s) .. Swegon

Speakers Mikael Börjesson, Timo Schreck, Pawel Wargocki

In the recent years, indoor air quality research has been focused on air pollutants including VOCs and other species, Radon, particles, and dust etc. The aim was to define permissible levels of these pollutants to avoid the risks to comfort, health and other outcomes such as productivity and learning. Such information is important to equip buildings with technological solutions. There was less discussion on relative humidity and its importance as a modifier of the responses as well in the context of direct effects.

Relative humidity is usually discussed in the context of the thermal comfort criteria as well as perceived air quality because enthalpy of air modifies the perception of air quality. However, relative humidity seems to play much more important role in the context of IAQ and should be discussed on its own and consequently the methods allowing its control in the buildings.

The negative effects of high humidity (>70-80%) are well documented but these levels are rare and unusual. It is important to focus on low end and levels below 20-30% which are prevalent in a large population's occupying buildings, especially during cold winters and when the continuous ventilation with outdoor air is in place. Few studies looked at these levels, some documenting potential negative effects.

There is also a need to look at the effects of low RH for vulnerable populations as most of the work (if not all) is done with healthy people. What about the elderly and otherwise weak people? The discussion should also be potential adaptation to low RH.

Finally, the transmission of pathogens should be discussed in connection with low relative humidity especially that flu and common cold occur usually during winters with low RH indoors.

This workshop wants to initiate debate on the importance of low RH and which levels should create actionable decisions. We need more scientific studies of negative impact of dry indoor air in wellbeing and health.

One other reason for this debate is that the modern humidity recovery equipment in ventilation systems, control strategies and many humidity sources (mechanical and natural), gives new opportunities to minimize the energy costs and avoiding risks to have too high humidity levels in the buildings. Humidity control and humidity optimization is not so expensive as assumed if it is done.

Health & Comfort

7 Essentials of Healthy Indoor Air

Basic requirements for HVAC systems for healthy indoor air quality

Sponsor(s) BELIMO

Organiser(s) .. BELIMO

Speakers M. George Hoekstra, Martyn Wyss, Mikko Gisin

Belimo has interviewed consulting engineers and experts in the ventilation sector around the world to identify the priorities when aspiring to create a healthy indoor air environment in a building. In the process, seven essential factors for ensuring healthy indoor air in non-residential buildings have emerged.

This workshop should help define the KPIs for each 7 essentials of healthy indoor air.

The Essentials of Healthy Indoor Air:

1. Continuous and reliable measurement, display and monitoring of indoor air quality
2. Accurate amount of air to the zone and controlled removal of contaminated air
3. Well-designed air dilution and airflow pattern
4. Active pressurisation of envelope and spaces
5. Correct temperature and humidity conditioning
6. Effective filtration
7. Proper amount of outdoor air

Energy

Deep Renovation Concepts



PURMO
GROUP

Sponsor(s) PURMO GROUP Ltd

Organiser(s) .. Purmo Group

Speakers Mikko Iivonen, Jarek Kurnitski, Clemens Felsmann, Michele De Carli

In the energy-efficient renovation of buildings, the thermal insulation and the airtightness of the building envelope, including windows and exterior doors, are improved to almost meet the requirements of new construction. Building services systems, such as heating, water and ventilation systems, as well as electrical and telecommunications systems, will also be modernized to be more functionally efficient and energy efficient.

This Workshop presents renovation concepts that can achieve the desired level of energy performance, which in many European countries is considered to have an EP value of less than 75 kWh / m² per year. The goal of deep renovation is to achieve at least 60% energy savings compared to the initial consumption.

Digitization

The Future of HVAC as a Service

Sponsor(s) LG Electronics Air Solution Europe

Organiser(s) .. LG Electronics Air Solution Europe

Speakers Pierre-Thomas Louis de Soultrait, Gianluca Figini

The digital transformation is nothing new, but it is still a transformation that is ongoing day-by-day in every facet of our world. Today, sustainability, the sharing economy and digitalization all work together to make our homes and our lives more efficient and user-friendly and the HVAC industry needs to continue to forge new paths toward innovation and integration.

We are the leaders of a transformation that has the power to shape the way we live our lives, the way we occupy spaces and the impact we can have on the future of this planet. Often considered a slow-moving industry, HVAC is now at the forefront of a major shift in both technology and mindset as we attempt to revolutionize the way both buildings consume energy and the way people consider energy as it applies to their day-to-day.

From climate change and COVID-19 to consumer expectations and evolving technologies, the task of our industry is more demanding than ever before. But, it's also more rewarding. If a house can work better for the people in it, while reducing its carbon footprint and overall cost, don't we want everyone to have access to that? What about an office space that inspires people to reinvent their routines and the way we work? Or consider a retail shop or restaurant that operates smoothly around its customer, as comfort is only something we notice when we don't have it. And that can make or break a business.

Sometimes it's easy to get caught up in the demands of our industry and we forget that we have an impact on the daily lives of real people. And what we also

have to remember is that we are those people too. Buildings are an often overlooked aspect of our lives but our industry of smart, integrated solutions is paramount to a revolution that could change the way people engage with spaces the in which their lives take place.

So, let's take a collective step back together in order to reimagine a different future that works better for everyone.

This workshop will deep dive into the potential future of the HVAC industry when it comes to sustainable, shared and digitalized solutions and will allow participants to open our minds to what that future could look like through the unique, collected lens of experts from across the industry.

We will brainstorm, shake up the way we workshop and come together in a format where there is no wrong answer and all ideas are welcome to answer a few key questions: How can industry players collaborate to make HVAC a positive contributor to climate change while helping end-users enjoy more efficient spaces? How can HVAC technology be a key player in Europe's and the world's climate goals? What are our individual roles as industry players in shaping this change? How can governments go further in supporting the end-users' adoption of sustainable HVAC technologies? What can the industry do to empower end-customers about HVAC topic, trends, subsidies and more? What does HVAC as a service look like, what are the limitations and how far can we imagine taking it?

Digitization + Energy

Efficiency beyond the building: the leverage of advanced HVAC control systems in the management of Energy Communities

Sponsor(s) Enerbrain

Organiser(s) .. Enerbrain

Speakers Tiziana Buso, Attilio Di Sabato

The workshop will introduce the principle of operation of Artificial Intelligence-based advanced BACS and focus on how these algorithms can be exploited to reach optimal performance of the HVAC systems with respect to different objective functions, ranging from occupants' comfort requests to community level energy self-sufficiency.

Specifically, the participants will exchange ideas on whether, how, and to which extent indoor environmental conditions and preferences - maintained through the remote management of the HVAC systems - can target flexible set-points, to be varied based on the energy use profiles and on the renewable energy production patterns both at the building level and at the community level as

well as the needs of grid balancing. The discussion will thus explore the role of HVAC in Demand Side Management (DMS).

The Energy Communities introduced by the recast of the Renewable Energy Directive (RED II) and the Internal Electricity Market (IEM) represent an interesting new frontier for the application of advanced BACS in DMS services. In this framework, the possibility of cooperation with providers of energy flexibility services and the available business models to propose optimized HVAC-related management services will also be explored, opening up the discussion to the available opportunities from Country to Country.

Energy

Sustainable Finance in Building Projects: The EU Taxonomy & Financial Risks of the Performance Gap

Sponsor(s) QUEST project, H2020

Organiser(s) .. QUEST project <https://project-quest.eu/>

Speakers Stefan Plessler, Frank Hovorka, Ole Teisen, Ivo Martinac, Cormac Ryan

The first part of the EU Taxonomy, on Climate Change Mitigation & Adaptation, entered into force on 1 January 2022 and aims to provide a common language on what economic activities can be labelled as 'sustainable'. Investments going into sustainable building projects are often perceived as a risk as financial actors are not always able to assess the technical risks involved in construction projects. This lack of understanding creates uncertainty if their investments will bring the impact on building performance they're looking for since building projects don't always deliver on the predicted performance during the operational phase, the so-called "Building Performance Gap". When building projects don't deliver on the expected sustainable impact, they're also not Taxonomy-aligned and can't be part of a "green portfolio".

This workshop will focus on bridging the gap between the financial community and technical expertise in building projects through the integration of Quality Management Services (e.g. Technical Monitoring, Building Commissioning, Green Building Certification). These services help to detect and mitigate the technical risks in the early-development stage of a building project and ensure that the "performance gap" between desired and

actual energy performance is minimized. Within this context the Taxonomy will be discussed as this creates a common language for both investors, architects and building services engineers and aims to bridge the gap between all actors.

The workshop will be tailored towards building professionals on the topic of working with financial actors, the impact of the EU Taxonomy on these relations and how quality management can support. The session will start with a keynote speech by the outgoing REHVA President Frank Hovorka, on sustainable finance and impact of the Taxonomy. This will be followed by interactive presentations on quality management services, a practical methodology on how to integrate them in building projects and how they can support projects to be aligned with the Taxonomy. During and in-between the presentations questions will be asked to the audience to create discussions and exercises will be done to get their input.

This workshop will have 60 minutes of interactive presentations and 30 minutes of panel discussions with open inputs from the audience. During this open session both the panel and the audience can share their experiences to engage with financial actors and the impact of the EU Taxonomy.

Learning & Education + Energy

CEN-CE scheme roll-out: harmonised training and certification of experts on EPB standards

Sponsor(s) /

Organiser(s) .. EPB Center

Speakers Andrei Lițiu (moderator), Johann Zirngibl, Laurent Socal, Cătălin Lungu

Learning and education is undergoing a shift in both terms of process and delivery channels. Buildings, in addition to the ongoing digital transformation, are now acknowledged as key areas to contribute to EU's energy and climate targets. This will result in a fast-paced evolution of the sector across the value chain and the need for continuous learning and education for keeping up both the pace of innovations with regards to building technology (retraining) and the scale of renovation activities (upskilling the additional workforce).

Maintaining a constant exchange of information will be needed between universities, manufacturers, policy makers and practitioners (designers, installers, operators, auditors) to guarantee the feedback loop is closed and all lessons learned captured, while taking into consideration the sector's language gap.

The set of EPB standards anchored in the EPBD and bringing added value to day-to-day activities of practitioners are the lynchpin between policy, standardization and practice. The EPB standards and related tools were however not enough, training was missing to create the needed communication bridges and overall community as described above.

CEN-CE scheme is now here! Join this workshop to understand the CEN-CE scheme's concept, how it's currently being rolled out, by REHVA and EPB Center, across Europe in cooperation with REHVA MAs (e.g. AIIR) and how to get involved and become a certified trainer in your country.

The 90 minutes shall be split into 45 minutes presentations and 45 minutes interaction with the audience (including live polls and specific topic selection).

Energy

Support, consultancy and services for the implementation and practical use of the set of Energy Performance of Buildings standards

Sponsor(s) /

Organiser(s) .. EPB Center

Speakers Jaap Hogeling (moderator), Pau Garcia Audi, Xu Wei, Drake Erbe, Dick van Dijk

The set of EPB standards, stemming from the Energy Performance of Buildings Directive (EPBD), bring added value to day-to-day activities of practitioners thus represent the lynchpin between policy, standardization and practice with regards to building energy performance. Many EPB standards are already, in addition to CEN, included in the ISO 52000 series which will eventually integrate all EPB standards, making the set of EPB standards a global framework with the potential to bring together all actors in between policy makers and practitioners.

Experience has shown that having available just the standards and related spreadsheets is not enough to reap all the benefits they bring. An EPB

platform creating the needed communication bridges and overall community is essential for the implementation and practical use of the set of Energy Performance of Buildings standards.

EPB Center aims to fill this gap! Join this workshop for getting an overview of the implementation of the EPB standards (EU, China and USA), learn about the publicly available resources provided by the EPB Center and how & which EPB Center tailored consultancy and services packages could ensure your organization unleashes the full potential of the set of EPB standards and becomes a front-runner in the race to net zero (positive) both energy and carbon buildings.

Energy

Trigeneration systems based on heat pumps with natural refrigerants and multiple renewable sources

Sponsor(s) TRI-HP project, H2020

Organiser(s) .. TRI-HP project

Speakers Daniel Cabronell, Maïke Schubert, Alireza Zendejboudi, Xabier Peña Anton, Thibault Péan, Thomas Friedrich

TRI-HP project will develop and demonstrate flexible energy-efficient and affordable trigeneration systems. The systems will be based on electrically driven natural refrigerant heat pumps coupled with renewable electricity generators (PV), using cold (ice slurry), heat and electricity storages to provide heating, cooling and electricity to multi-family residential buildings with a self-consumed renewable share of 80%. The innovations proposed will reduce the system cost by at least 10-15% and decrease greenhouse gas emissions by 75% compared to gas boilers and air chillers.

This workshop will facilitate the dialogue between technology developers and HVAC designer experts to discuss the most prominent barriers

and identify country-specific but also EU-wide innovation diffusion pathways, towards full market deployment of innovative, renewable heating and cooling applications.

The workshop will be split into three parts: In the first part, TRI-HP partners will briefly describe the innovations of the developed systems, while in the second part, they will answer targeted questions by “the jury” - made up by two HVAC designer experts from two different European countries. The third part of the workshop will be open for audience questions and be encouraged to participate in the discussion.

Digitization

Digital transformation facilitating building performance convergence and enabling operational rating

Sponsor(s) U-CERT project, H2020

Organiser(s) .. U-CERT project

Speakers Andrei Litiu (moderator), Peter op 't Veld, Jan Cromwijk, Dick van Dijk, Pablo Carnero

The main scope is to raise awareness/promote, collect feedback and explore use cases on the U-CERT digital tools while also presenting the overall contribution of U-CERT in the evolution process of Building Performance Assessment and Certification at both EU and national level.

The content will be tailored to building professionals illustrating the practical implementation of U-CERT digital tools on the U-CERT case studies and how this creates value to be swiftly captured in day-to-day activities by both designers and installers.

The U-CERT digital tools facilitate the convergence of building performance calculation methodologies leveraging the set of CEN/ISO EPB standards and enable the inclusion, next to asset rating only, of measured building performance and building operational rating (normalized measured building performance) creating complementing/new services that building professionals can swiftly include in their existing offering or expand it.