

REHVA Workshops at CLIMA 2016 conference in Aalborg May 22-25, 2016

The REHVA workshops will take place parallel to other sessions at CLIMA 2016 conference. Each workshop will focus on a specific question (or questions). The result of the workshop will be an international action plan, a list of research needs, outline for a guideline, a policy statement, etc. The results will be presented to the congress participants in a summary report that will be sent to all participants after the conference and published on the website. To have more information on the workshops, please read the short descriptions online.



	Meeting Room 8	Meeting Room 9	Meeting Room 10
MONDAY – 23 May			
11.00 - 12.30	WS 1 Understanding HVAC Operational Performance SWEGON	WS 2 NZEB design and construction: skill gaps and interdisciplinary training of professionals PROF/TRAC	WS 3 Realizing (nearly) Zero Energy Hospital Buildings together REHVA Task Force
13.00 - 14.30	WS 4 Beat Low DeltaT Syndrome by use of the latest pump generation GRUNDFOS	WS 5 Nearly zero energy buildings nZEB REHVA Task Force	WS 6 Building Commissioning, -what's in it for me? REHVA Task Force
15.00 - 16.30	WS 7 Energy efficient heat pumps, from "Standard" performances to "Seasonal performance" Eurovent Certita Certification	WS 8 Inspections of ventilation and air conditioning systems REHVA Task Force	WS 9 Greenhouse gas reduction in buildings & healthy building SAREK
TUESDAY – 24 May			
11.00 - 12.30	WS 10 BELIMO Water Solutions Energy Efficiency in modern buildings Belimo	WS 11 CCHVAC-REHVA	WS 12 Building and ductwork airtightness: what has changed in the past 5 years, what is likely to change in the next 5 years? TightVent, AIVC, QUALICheck
13.00 - 14.30	WS 13 Dynamic solar shading in HVAC and daylight design ES-SO/EQUA/SWEGON	WS 14 Zero Internal Heating/Cooling Load Air-Conditioning system SHASE	WS 15 Perspectives for assessing ventilative cooling potential in Energy Performance regulations venticool, IEA Annex 62, AIVC, QUALICheck
15.00 - 16.30	WS 16 How to make cheaper GSHPs in Europe/How to diffuse GSHP in Europe Cheap-GSHPs/EU project	WS 17 Eurovent Innovation Hub - Adding value to your buildings: Efficient air curtain technologies made in Europe Eurovent Association	WS 18 European voluntary certification scheme: a tool linking environment and energy to market value Sustainable Business Alliance
WEDNESDAY- 25 MAY			
11.00 - 12.30	WS 19 Building Automation and Control Systems: continuous operational energy use optimization REHVA & eu.bac Task Force	WS 20 How to improve the quality of the works and compliance of Energy Performance Certificates? QUALICheck	WS 23 Quality management for building performance: Closing the gap between design and operation QUANTUM
13.00 - 14.30	WS 21 Coupling HVAC + Refrigeration + Lighting systems in shopping centres: technology solutions and modelling approach IIF-IIR and EURAC	WS 22 Agenda for Ventilation and Air Infiltration 2020 and beyond: knowledge gaps, research priorities and the need for innovation AIVC	WS 24 Energy Refurbishments REHVA Task Force

Short descriptions of the REHVA Workshops at CLIMA 2016

WS 1: Understanding HVAC Operational Performance

Monday, May 23, 11.00-12.30 (Meeting room 8)

Organiser: SWEGON

Presenters: Petra Vladykova, Swegon, John Woollett, Swegon, Ian Knight, Cardiff University

Short description: The impending requirement for near zero Energy Buildings (nZEB) needs the efficient consumption of energy by services. This presents requirements for data to support understanding of how to achieve this in practice. This participatory workshop explores the potential for informative and practical guidelines for facility managers, REHVA Guidebook and input for building regulations. The aim is to discuss what information and data are needed, how it should be done and provided, and how it might be used in the light of the updating of a number of Standards in this area, including ISO 52000-1, prEN 16798-17 and prCEN/TR 16798-18.

WS 2: NZEB design and construction: skill gaps and interdisciplinary training of professionals. The PROF-TRAC Training and Qualification Platform

Monday, May 23, 11.00-12.30 (Meeting room 9)

Organiser: PROF/TRAC

WS Leaders: Peter Op't Veld, HIA, Karel Kabele, REHVA

Presenters: Philippe Moseley, EASME, Peter Op't Veld, HIA, Anita Derjanecz, REHVA

Panel discussion: Jos Bijman, TVVL, Juan Travesi, ATECYR, Branimir Pavkovic, HKIS, Michael Mast, DANVAC

Short description: Nearly Zero Energy Building construction and renovation require a huge contribution from the building sector and is a challenge for the construction industry. A successful design and construction process towards nZEB requires innovative design processes and technologies based on an integrated design approach and multi-disciplinary work teams. This approach is not yet common as the building sector works in a fragmented process. Especially the collaboration between architects, technical experts and managers is necessary to develop mutual understanding of each other's disciplines and combine skills to achieve optimal nZEB construction and retrofitting in terms of quality, energy efficiency and cost effectiveness. The workshop will present the PROF/TRAC project that develops an Open Training Platform and Qualification scheme for Continuing Professional Development for engineers, architects and managers involved in nZEB design and construction. PROF/TRAC identifies skills gaps and professional profiles needed for nZEB construction and refurbishment, and develops a voluntary training and qualifications scheme involving REHVA Member Associations and

training providers from the Architects' Council of Europe (ACE), Housing Europe. Several REHVA Member Associations have joined the platform or expressed interest in being involved in the scheme and in attending the Train the trainer sessions. The workshop will be also an opportunity to present the first achievements, to exchange about the experiences of the 4 project partner REHVA Members (ATECYR, DANVAC, HKIS, TVVL) and to discuss about the involvement of other REHVA Members in the PROF/TRAC Training and Qualification Platform.

WS 3: Realizing (nearly) Zero Energy Hospital Buildings together

Monday, May 23, 11.00-12.30 (Meeting room 10)

Organisers: TVVL/Rehva and Royal HaskoningDHV

Presenters: H. Besselink, Royal HaskoningDHV, W.H. Maassen

Short description: Legislation from the EU in 2020 will set much stricter requirements on the energy consumption of buildings and the way the energy is generated. This workshop will identify which performance requirements are facing us and how we can fulfill to these requirements.

Ultimately, the (nearly) Zero Energy Buildings (nZEB) legislation will be mandatory. The most sustainable performances will be achieved if the different stakeholders have an interest in the sustainable project. Therefore the different possibilities to achieve these performances and how they can be translated into costs and revenues for each stakeholder are important.

In an interactive workshop different groups will work on making 2 example cases energy neutral areas: an innercity district in the Rotterdam Port Area energy (Merwevierhavengebied) and an academic hospital in Amsterdam (VU-VUmc campus). In the first part of the workshop the technical possibilities on different scales will be explored. Then in the second part the group will determine how to realize this goal together from the perspective of the different stakeholders. The differences between the cases will give insight in the specific challenges of each project and especially nZEB Hospitals!

WS 4: Beat Low DeltaT Syndrome by use of the latest pump generation

Monday, May 23, 13.00-14.30 (Meeting room 8)

Sponsor: GRUNDFOS

Organiser: Jens Nørgaard, Grundfos

Presenters: Carsten Østergaard Pedersen, Grundfos, Anders Nielsen, Grundfos, Karin S. Nielsen, Grundfos, Jens Nørgaard, Grundfos

Short description: Chilled water systems are often suffering from low return water temperatures and hence low ΔT syndrome. The undesired effects of this condition are numerous and it leads to reduced system performance and efficiency. It is explained how the latest Grundfos pump generation can discover low ΔT syndrome and adapt the pressure in the system until the right flow and the correct ΔT is restored. Grundfos pump generation may be controlled by fluid temperature difference and how this can be utilized in HVAC systems. The advantage of this procedure is described. Constant temperature mode is utilized in domestic hot water applications, installation and the benefits of this. The latest pump generation may be utilized in large boiler shunt installations and how risk is reduced by this procedure.

WS 5: Nearly zero energy buildings nZEB

Monday, May 23, 13.00-14.30 (Meeting room 9)

Presenters: Jarek Kurnitski, REHVA Vice President, Prof. Tallinn University of Technology, Ryozo Ooka, Tokyo University, Jonas Gräslund, Skanska

Short description: This REHVA nZEB Task Force workshop will discuss nZEB technical, regulatory and policy progress with the aim to provide input to REHVA nZEB technical definition (2013) revision. nZEB WS will focus on recent developments in national applications in EU, Japan and US by rising an open issues in nZEB definitions and requirements. The essential question of nZEB buildings, how well buildings with on-site production fit to central energy system, is discussed based on recent results from Sweden. This study is developing a method of how to quantify the consequences of carbon dioxide emissions for energy efficiency and renewable energy solutions and investigate how the relevant time steps shall be chosen in order to be able to calculate which solutions provide the best addition of renewable energy at the same primary energy performance level when considering load match and grid interaction issues which is not obvious.

WS 6: Building Commissioning in Europe

Monday, May 23, 13.00-14.30 (Meeting room 10)

Presenters: Ole Teisen, Sweco Danmark A/S, Frank Hovorka, UNEP Financial Initiative, Sustainable Building Alliance, Ian Knight, Welsh School of Architecture, Cardiff University, Thomas Toftgaard Jarlov, Copenhagen Airports

Short description: REHVA is planning to produce handbooks and other material that support the use of Building Commissioning in Europe. Attending this workshop will provide new insights into how Building Commissioning is performed, how it interacts with sustainability measures and how it influences the value of buildings. It will also allow you to bring your own ideas to the table, and influence future work into Building Commissioning in Europe! The Workshop will start with 4 different angles on

Commissioning from the moderators. This includes introductions to The Commissioning Process, the way it is described by IEA, the International Energy Agency, and the way it is performed in various countries. Also, an overview of benefits from Building Commissioning as it is done today and expected benefits from tomorrow's Building Commissioning Process. After the introductory presentations, the workshop then starts. The moderators will facilitate the participants in finding topics to work with in the REHVA Commissioning Task Force, and to include in future publications. We intend to map market needs, elements we can foresee will be included in the future Commissioning processes, as well as demands for information about the Commissioning Process. Participants are invited to bring their anecdotes and experiences with gnarly Building systems to the plenum. We will have a good time discussing probable solutions and processes that can prevent the repetition of previous nightmares, and add more value to the Commissioning process.

WS 7: Energy efficient heat pumps, from "Standard" performances to "Seasonal performance"

Monday, May 23, 15.00-16.30 (Meeting room 8)

Organiser: Eurovent Certita Certification

Speakers: Sandrine Marinhas, Eurovent Certita Certification

Short description: Since first application to our products in 2013, residential and higher capacity air-conditioners, chillers and heat pumps are progressively moving from nominal (COP) to seasonal performance (SCOP and η_s) in heating mode and (EER, SEER, SEPR and $\eta_{s,c}$) in cooling mode, and associated minimum requirements and labelling schemes are set up. Calendar and details of the corresponding regulations and associated standards and certification documents will be presented, focused on the consequences for the end-users, the manufacturers, the laboratories and the organisation of certification.

WS 8: Inspections of ventilation and air conditioning systems

Monday, May 23, 15.00-16.30 (Meeting room 9)

Presenters: Jorma Railio, REHVA, Ian Knight, Cardiff University

Short description: Activities supporting the practical implementation of inspections required by the EPBD will be discussed in a participatory workshop format. From experiences in Member States, only a fragment of the mandatory inspections have been done, but there are encouraging experiences of alternative approaches. Now that the European standards for ventilation and air conditioning inspections have been revised and merged into the new prEN 16798-17 and prCEN/TR 16798-18, it is time for REHVA to collect the experiences and existing knowledge into a practical Guidebook.

WS 10: BELIMO Water Solutions - Energy Efficiency in modern buildings

Tuesday, May 24, 11.00-12.30 (Meeting room 8)

Organiser: BELIMO Automation AG

Presenters: Dr. Marc Thuillard, Dipl. Ing. Forest Reider, Dipl. Ing. Reto Hobi, Dipl. Ing. Christian Luchsinger

Short description: The proper balancing of hydraulics flows is an important factor contributing to the stability of HVAC in a building. Balancing can be achieved through different approaches using an electronic or a mechanic pressure-independent valve. Besides balancing an electronic solution can be expanded to a performance device, known as Energy Valve, capable of monitoring and optimizing energy consumption. This concludes the introduction. This talk will focus on electronic balancing methods and discuss two approaches for achieving this goal. The first method uses an electronic pressure-independent valve (ePIV). In state of the art office buildings the main comfort demand is more and more on cooling with a general low heating demand. Therefore a 4-pipe system with one heat exchanger like heating/cooling ceiling is likely and very common. To run such a system in an efficient way it is important that the pump runs efficient, independent on the load. For reaching this, different flows for heating and cooling are required combined with the lowest possible pressure loss. The advantages and disadvantages of mechanic and electronic pressure-independent solutions are highlighted with three different examples in relation with the established Belimo 6-Way Zone-Valve. During the discussion, we will show how the ePIV can be expanded into an even more intelligent HVAC device by adding two temperature sensors, resulting into an Energy Valve. Experimental results obtained during field tests at Massachusetts Institute of Technology (MIT), Boston and University of Colorado, Boulder: Saving energy and primary costs by preventing DeltaT degradation. Test at Nanyang Technical University (NTU), Singapore. We will show how the measurement of air enthalpy can enhance very significantly the function of the Energy Valve. Case study Hospital – Ludmillenstift / Germany: through a case study demonstrating how hydraulic problems can be discovered, monitored, analyzed and finally solved with the Belimo Energy Valve. A too low and/or too high flow results in wrong Energy transmission and will have a huge impact on patient comfort, energy bill and maintenance cost.

WS 12: Building and ductwork airtightness: what has changed in the past 5 years, what is likely to change in the next 5 years?

Tuesday, May 24, 11.00-12.30 (Meeting room 10)

Organisers: TightVent, AIVC, QUALICHeCK

Chairs: François Rémi Carrié and Benjamin Jones

Presenters: Dr. Marc Thuillard, Dipl. Ing. Forest Reider, Dipl. Ing. Reto Hobi, Dipl. Ing. Christian Luchsinger

Short description: The objective of this workshop is to discuss the major developments regarding building and ductwork airtightness in the past five years and the expected changes in the near future.

WS 13: Dynamic solar shading in HVAC and daylight design

Tuesday 24 May, 13.00-14.30 (Meeting room 8)

Organisers: ES-SO, European Solar-Shading Organization in collaboration with EQUA and Swegon

Presenters: Ann Van Eycken, ES-SO, Anders Hall, ES-SO, Per Sahlin, EQUA

Short description: The impact of solar radiation on the heat and light balance of a room is profound and, consequently, shading devices, glass, and control strategy are the first things to consider in HVAC and daylight design. Unfortunately, doing this is easier said than done. Not only do you need models that capture the correct physics of modern glazing and shading, but these models must also interact with a room model that accounts for all the physical processes that come together in the final room heat and light balance. Naturally, one must have correct product data for all involved components and be able to describe control action that reflects real systems. Today, these systems may well couple artificial and natural daylight with the thermal state of the room. The workshop starts with a presentation of a new quality assured database for shading products under the auspices of ES-SO and continues with the introduction and demonstration of a new tool chain for the complex design task.

WS 14: Zero Internal Heating/Cooling Load Air-Conditioning system

Tuesday, May 24, 13.00-14.30 (Meeting room 9)

Chair: Dr. Kato

Co-Chairs: Dr. Zhang, Dr. Hiyama

Short description: Dealing with the whole indoor air to maintain a comfortable thermal environment has been the main solution of the building air-conditioning system for many years. Recently, owing to the development of radiant heating/cooling systems and personal ventilation, a new trend has arisen where heat is dissipated to several independent areas, providing custom heat loads; this even provides us with the possibility of creating a zero heating/cooling load environment. In other words, it allows us to deal with the heat load from each heat source before the heat diffuses into the space. This solution enables us to utilize lower level heat sources, for instance chilled water at high temperatures. It also ensures more uniform temperature distribution and a more comfortable indoor thermal environment with improved energy efficiency. The attempt to realize zero internal heating/cooling load was first carried out for data centers and recently, in Japan, a liquid cooling air-conditioning system for office buildings was developed and will soon be used in real buildings. In this workshop,

we will report the progress we have made in this field, followed by a discussion. Because the success of the zero internal heating/cooling load system is based on many different experiments and attempts, any presentation related to this topic is welcome. The aim of the workshop is to come up with a list of research gaps and questions and identify additional concerns regarding this topic.

WS 15: Perspectives for assessing ventilative cooling potential in Energy Performance regulations

Tuesday, May 24, 13.00-14.30 (Meeting room 10)

Organisers: venticool, IEA Annex 62, AIVC, QUALICheck

Chairs: Peter Holzer and François Rémi Carrié

Short description: The principal objective of this workshop series is to discuss the status, needs, and perspectives on developments to consider ventilative cooling in energy performance assessment methods.

WS 16: CHP Workshop How to make cheaper GSHP in Europe/How to diffuse GSHP in Europe

Tuesday, May 24, 15.00-16.30 (Meeting room 8)

Chairs: Michele De Carli, University of Padova, Robert Gavriluic, Faculty of Building Services Engineering Bucharest

Presenters: Javier F. Urchueguía, David Bertermann, Luc Pockele

Short description: The market of heat pumps in Europe is increasing. Even though the most efficient solution is represented by GSHP, air to water heat pumps are mostly used in residential and commercial buildings, due to the lower investment costs. Based on the experience of the speakers and based on the recent work began in the Horizon 2020 European Project "Cheap-GSHPs" the workshop intent is to show the recent advances in the frame of the drilling and in the heat pump solutions to improve the market of the GSHPs. Discussion will be driven on current limits and potentialities of the GSHPs. In particular the discussion will be on the possible introduction of a CEN standard committee or working group on the GSHP systems.

WS 17: Eurovent Innovation Hub - Adding value to your buildings: Efficient air curtain technologies made in Europe

Tuesday, May 24, 15.00-16.30 (Meeting room 9)

Organiser: Eurovent Association

Presenters: Francesco Scuderi, Morten Schmelzer

Short description: By attending this Eurovent workshop, participants of CLIMA 2016 will learn how to save energy by applying the best performing air curtains for their construction projects. Which ISO standards should be applied for measuring air curtain performance? How state-of-the-art air curtains can contribute to

a healthier indoor environmental quality? We will the upcoming Eurovent rating standard for air curtains. It makes sound economic sense to create an efficient and invisible door that keeps the cold and hot inside. Air curtains can be even more effective when used in air conditioned or cold storage buildings. Thermozone technology with its precisely adjusted air velocity gives even protection throughout the opening and contributes to a better indoor air quality. Effective air curtains provide an efficient separation with the lowest possible energy consumption, regardless of whether it is the heat or the cold that project engineers want to keep out. This Eurovent workshop provides for a hands-on introduction to state-of-the-art air curtain technology, allowing you to make valid choices concerning your building projects.

WS 18: European voluntary certification scheme: a tool linking environment and energy to market value

Tuesday, May 24, 15.00-16.30 (Meeting room 10)

Chair: Frank Hovorka

Co-chair: Johann Zirngibl

Presenters: Frank Hovorka, Carolina Mateo Cecilia, Johann Zirngibl, Jana Bendžalová

Short description: Multinational property owners and developers, financial institutions (including UNEP-FI) and building professionals are demanding international standardisation and uniform conditions in energy performance certification in order to enhance the comparability, transparency, coherence, reliability and accuracy in the Union. The EPBD requires adopting a voluntary common European certification scheme (VCS) for the energy performance of non-residential buildings. This workshop will describe how to create this common tool, able to be used Europe wide, and how it can be integrated in existing environmental certification schemes.

WS 19: Building Automation and Control Systems: continuous operational energy use optimization

Wednesday, May 25, 11.00-12.30 (Meeting room 8)

Workshop leaders: Peter Hug, eu.bac, Andrei Litiu, eu.bac

Presenters: Bonnie Brook, eu.bac, Stefano Corgnati, REHVA, Simona D'Oca (REHVA), Valentina Fabi (REHVA), Andrei Litiu, eu.bac, Roland Ullmann, eu.bac

Short description: The aim of the workshop is to interactively discuss about the crucial role of building automation and control systems in continuously optimizing energy use during the operation phase of buildings while at the same time ensuring adequate indoor environment quality and enabling occupants' behaviour change. The participants will learn about existing tools that help assess how well a building (new or existing) is equipped for energy use optimization and will be granted the opportunity to provide feedback on the ongoing work of REHVA & eu.bac's Task Force on Building Automation, Controls and Building Management.

WS 20: How to improve the quality of the works and compliance of Energy Performance Certificates?

Wednesday, May 25, 11.00-12.30 (Meeting room 9)

Organisers: QUALICHeCK

Chair: Peter Wouters

Presenters: Peter Wouters, Jarek Kurnitski, Francois Durier, Heike Erhon-Kluttig, Susanne Geissler

Short description: To address these quality and compliance challenges, the objectives of this workshop are to discuss the following questions: What is the status on the ground in terms of quality and compliance? What steps could be taken to improve the situation? What are key aspects to consider for effective compliance frameworks? The discussions will be preceded by presentations summarising key findings of the QUALICHeCK project on these issues.

WS 21: Coupling HVAC + Refrigeration + Lighting systems in shopping centres: technology solutions and modelling approach

Wednesday, May 25, 13.00-14.30 (Meeting room 8)

Organisers: Eurac Research, Institute for Renewable energy, IIF-IIR, International Institute of Refrigeration

Short description: This workshop is intended to present and discuss tools and solutions for an effective energy-retrofit of shopping malls. It will take advantage of the participation of experts from the CommONEnergy project, who will bring their expertise and open a fruitful debate on the outcomes of the project. The result of the workshop can be an outline for a guideline on the energy-refurbishment of shopping malls.

WS 22: Agenda for Ventilation and Air Infiltration 2020 and beyond: knowledge gaps, research priorities and the need for innovation

Wednesday, May 25, 13.00-14.30 (Meeting room 9)

Organisers: AIVC

Short description: Taking into account the challenges we have in energy saving, there is a clear need for innovative and smart ventilation systems both in terms of comfort and health addressing challenges associated with renovation and new buildings. This session will discuss the need for advancing knowledge on ventilation in future buildings, it will discuss research priorities and the list the areas where the innovation is necessary. The broad areas that need to be addressed in the context of advancing ventilation in the future will be identified prior to the workshop together with the short list of priorities and innovations. This will be done by contacting relevant stakeholders in research and industry. The list will be discussed and supplemented by the workshop participants. The voting will be completed to identify the priorities that need to be quickly addressed and methods for their implementations.

WS 23: Quality management for building performance: Closing the gap between design and operation

Wednesday, May 25, 11.00-12.30 (Meeting room 10)

Chair: Stefan Plesser, Head of the Energy and Quality Management Group, IGS - TU Braunschweig

Co-chair: Karel Kabele

Presenters: Stefan Plesser, IGS - TU Braunschweig, Jan Mehnert, synavision GmbH, Niels Delaere, Factor4, Michele Liziero, EnergyTeam SPA

Short description: QUANTUM develops and demonstrates pragmatic services and appropriate tools supporting quality management for building performance in the design, construction, commissioning and operation phase as a means to close the gap between predicted and actual energy performance in European buildings. The workshop will present the current stage of quality management for building performance and discuss its role as key action within the life cycle of buildings. It addresses especially building owners, engineers, facility management and contracting companies with their individual perspective on quality. REHVA will set up a Task Force around this topic exchanging related knowledge and using the project outcomes to elaborate a REHVA Guidebook. The workshop aims also to launch the Task Force.



Sponsored by



REHVA, the Federation of European Heating, Ventilation and Air Conditioning Associations represents 100,000 HVAC experts in 26 European countries. REHVA is the leading professional organization in Europe, dedicated to the improvement of health, comfort and energy efficiency in all buildings and communities www.rehva.eu.