



12th REHVA World Congress

CLIMA 2016

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www.clima2016.org

Session Program

Monday	Hal Øst	Europahallen	Det Lille Teater	Radosalen	Musiksalen	Gæstesalen	Laugstuen	Latinerstuen	Bondestuen	Harlekinsalen	Columbinesalen
Session 1	SS16 Energy Flexibility & Storage	SS12 Sustainable Energy	SS6 Building Technology	SS1 Building Retrofit	SS29 Building Performance	SS40 Heating & Cooling	SS35 Commissioning, Control & Energy Management	IS4 "title" Camfill	WS 1 Understanding HVAC	WS 2 NZEB design and construction	WS 3 Realizing (nearly) Zero Energy Hospital Buildings
Session 2	SS3 Building Retrofit	SS30 Building Performance	SS11 Sustainable Energy	SS39 Heating and Cooling	IS5 How to renovate to Active House level VELUX A/S	IS1 Ventilation systems aiming at saving energy Lindab	IS2 Motortyper og Energieffektivitet Danfoss Drives (1 hour)	WS 27 Renew-School EU IEE Renew-School	WS 4 Beat Low DeltaT Syndrome by use of the latest pump generation	WS 6 Building Commissioning, - what's in it for me? REHVA Task Force	WS 5 Nearly zero energy buildings nZEB REHVA Task Force
Session 3	SS32 Indoor Environment	SS18 Ventilation & Air Distribution	SS5 Building Technology	SS19 Ventilation & Air Distribution	IS6 Design of NZEB based on Active House	IS3 Solutions for residential and offices	WS 10 BELIMO Water solutions	WS 7 Energy efficient heat pump	WS 8 Inspections of ventilation and air conditioning systems		WS 9 Greenhouse gas reduction in buildings & healthy building
Tuesday											
Session 1	SS37 Heating & Cooling	SS36 Commissioning, Control & Energy Management	SS25 Building Performance	SS13 Sustainable Energy	SS22 Ventilation & Air Distribution	TS2 Business and technical concepts for deep energy retrofits	WS30 Integration of Energy Storage in Buildings and Districts for Demand Response	WS 28 Cost-effective deep renovation of buildings	WS 23 Quality management for building performance	WS 11 CCHVAC-REHVA	WS 12 Building and ductwork airtightness: what has changed in the past 5 years
Session 2	SS4 Building Technology	SS9 Sustainable Energy	SS27 Building Performance	SS38 Heating & Cooling	SS41 Weather & Microclimate	TS5 Energy Flexible Buildings	TS1 High temperature cooling & low temperature heating	TS 6 A fossil free building stock realized	WS 13 Dynamic solar shading in HVAC and daylight design	WS 14 Zero Internal Heating/Cooling Load Air-Conditioning	WS 15 Perspectives for assessing ventilative cooling potential in Energy Performance
Session 3	SS8 Sustainable Energy	SS31 Indoor Environment	SS23 Ventilation & Air Distribution	SS17 Ventilation & Air Distribution	SS24 Building Performance	SS28 Building Performance	WS 26 Energy Flexible Buildings	WS 16 How to make cheaper GSHPs in Europe	WS 17 Eurovent Innovation Hub	TS7 Heat pump application in nearly zero energy buildings	WS 18 European voluntary certification scheme
Wednesday											
Session 1	SS14 Energy Flexibility & Storage	SS33 Indoor Environment	SS10 Sustainable Energy	SS7 Building Technology	SS21 Ventilation & Air Distribution		WS 29 Occupant Behaviour	WS 25 Total Concept method for major reduction	WS 19 Building automation and control systems	WS 20 How to improve the quality of the works and	WS 31 Advanced airflow distribution methods
Session 2	SS26 Building Performance	SS2 Building Retrofit	SS15 Energy Flexibility & Storage	SS20 Ventilation & Air Distribution	SS34 Commissioning, Control & Energy Management	TS9 Sustainable Energy for Data Centres	TS 10 High IEQ and energy-efficient ventilation in renovated school	TS 4 High integration of renewable sources	WS 21 Coupling HVAC + Refrigeration + Lighting systems	WS 22 Agenda for Ventilation and Air Infiltration 2020	WS 24 Deep - Renewable Energy Sources

10:30-12:00 Session SS 1: Building Retrofit

Chair: Alexander Zhivov

Location: Radiosalen

- 10:30 Zoltan Magyar and Geza Barath
Comparison of calculation methods in designing a newly zero energy building refurbishment
- 10:40 Fernando Peci-López, Manuel Ruiz de Adana, Francisco Comino-Montilla and Felix Antonio-Berlanga
Installing opaque ventilated facades for energy saving in old buildings
- 10:50 Peter Op 'T Veld
MORE-CONNECT: NZE building renovation by advanced prefabricated multifunctional building elements
Joaquim Rigola, Oriol Lehmkuhl, Roser Capdevila, Joan Lopez, Jesus Castro, Deniz Kizildag and Assensi Oliva
- 11:00 NUMERICAL SIMULATION OF THERMAL AND FLUID DYNAMIC PHENOMENA AS A TOOL FOR ENERGY EFFICIENCY IN BUILDINGS. APPLICATION TO RETROFITTING EDIFICATION.
- 11:10 Virpi Leivo, Anu Aaltonen, Mari Turunen, Mihkel Kiviste, Ulla Haverinen-Shaugnessy and Liuliu Du
Ventilation rates and CO₂-levels before and after energy retrofit in Finnish apartments buildings
- 11:20 Lars Gunnarsen, Sebastian Løck, Barbara Kolarik, Jakob Klint, Philippe Scanlon and Gert Rønnow
Indoor climate quality after renovation for improved energy efficiency
- 11:30 Joaquim Monteiro and Olga Castro
Application of the nZEB methodology in the retrofitting of a typical Portuguese dwelling from the 60's.
- 11:33 Peter Foldbjerg and Jeroen Geuens
Renovation of a single family house in a social housing garden city in Brussels: Indoor climate and post-occupancy monitoring
- 11:36 Fabien Coydon, Sebastian Herkel and Hans-Martin Henning
Costs of ventilation systems for the retrofit of residential buildings
- 11:39 Åsa Wahlström, Mari-Liis Maripuu and Alireza Afshari
Market potential and business opportunities for mayor renovation of non-residential buildings with the use of the Belok Total Concept method in Nordic countries
- 11:42 Jana Bartošová Kmeťková and Dušan Petráš
An Assessment of the Renovation of Existing Residential Buildings Regarding Life Cycle
- 11:45 Jose Naveteur
Moulins Mediathèque: An exemplary renovation
- 11:48 Juan Maria Hidalgo-Betanzos, Carlos García-Gáfaró, Imanol Ruiz de Vergara-Ruiz de Azúa, César Escudero-Revilla and Jose María Pedro Sala-Lizarraga
Smart Energy Building Strategy in Social Housing: A Case of the Basque Region
- 11:51 Aleksandar Tepavcevic
Solar exposure optimization potentials of the large modernist housing estates
- 11:54 Rikard Nilsson, Åke Blomsterberg and Anne Landin
Story Extension enable Energy-Efficient Renovation
- 11:57 Rüdiger Lohse and Martina Riel
1. Business Models for Deep Energy Retrofit in a cost effective way? –Case study of an advanced EPC business and financial model
- 12:00 Regina Bokel and Stanley Kurvers
BK City Stay, Energy Renovation of a Monument after the Fire Destroyed the old Faculty of Architecture.

10:30-12:00 Session SS 12: Sustainable Energy

Chairs: Maurizio Cellura and Jeffrey Spitler

Location: Europahallen

- 10:30 Marco Noro, Andrea D'Ascanio and Renato Lazzarin
Problems and solutions of an underground water source heat pump system for a historical valuable building: an energy analysis
- 10:40 Sezgi Koçak Soylu, Çağdaş Çarkacı, İbrahim Atmaca and Ayla Doğan
Investigation of a Solar Assisted Water Source Heat Pump System for Different Solar Radiations
- 10:50 Adriana Angelotti, Luca Alberti, Matteo Antelmi, Giovanni Formentin and Cesare Legrenzi
Zoo-technical application of Ground Source Heat Pumps: a pilot case study
- 11:00 Łukasz Amanowicz and Janusz Wojtkowiak
Experimental investigation of the effect of connection angle between main and parallel pipes in multi-pipe earth-to-air heat exchangers on the total pressure losses
- 11:10 Emrah Biyik, Mustafa Araz, Orhan Ekren, Huseyin Gunerhan and Arif Hepbasli
An Optimal Controller Design for a Waste Water Source Heat Pump System
- 11:20 Mustafa Araz, Orhan Ekren, Emrah Biyik, Huseyin Gunerhan and Arif Hepbaşlı
Experimental Exergetic Performance Evaluation of a Wastewater Source Heat Pump System (WWSHP)
- 11:30 Ryozo Ooka, Hang Yin and Masanori Shukuya
Application of Exergy Analysis to Chilled Water Circuit and Heat Pump System
- 11:40 Yong Ho Hwang, Jeong Min Choi and Yeo Jin Kim
Thermal performance of earth tube system with design variables variation of residential buildings in Korea
- 11:50 Girip Alina, Calota Razvan, Ilie Anica, Liviu Drughean and Nichita Madalina Teodora
ABSORPTION HEAT PUMP DRIVEN BY SOLAR ENERGY WITH HEAT RECOVERY
- 12:00 Dietrich Schmidt, Marlen Schurig, Anna Maria Kallert, Janybek Orozaliev, Isabelle Best, Klaus Vajen, Oliver Reul, Jochen Bennewitz and Petra Gerhold
Development of an Innovative Heat Supply Concept for a New Housing Area

10:30-12:00 Session SS 16: Energy Flexibility & Storage

Chairs: Hwataik Han and Karsten Voss

Location: Hal Øst

- 10:30 Raj Gopal
Demand Response-A Process Architecture for Selection of HVAC Control Strategies for Varying Real Time Pricing Intervals
- 10:40 Emeline Georges, Pierre Garsoux, Gabrielle Masy, Gauthier De Maere D'aertrycke and Vincent Lemort
Analysis of the flexibility of Belgian residential buildings equipped with Heat Pumps and Thermal Energy Storages
- 10:50 Shintaro Ikeda and Ryoza Ooka
Optimal Adjustment Strategy for Operating Schedule of Energy System under Uncertainty of Renewable Energy Sources and Demand Changes
- 11:00 Despoina Christantoni, Simeon Oxizidis, Damian Flynn and Donal P. Finn
Investigation of Demand Response Strategies in a Mixed-Used Building
- 11:10 Jennifer Date, José A. Candanedo, Andreas K. Athienitis and Michaël Fournier
Simplified Thermal Modelling of a Multi-Zone Building for Demand Reduction & Control Applications
- 11:20 Igor Sartori, Stanislas Merlet and Karen Byskov Lindberg
Zero Village Bergen: Mismatch between aggregated PV generation and electric load in a new Zero Emissions Neighbourhood in Nordic climate
- 11:30 Hélène Thieblemont, Fariborz Haghighat, Alain Moreau, Arash Bastani and Frédéric Kuznik
Alternative Method to Integrate Electrically Heated Floor in TRNSYS: Load Management
- 11:40 Jonas Gräslund, Jenny Gode, Tomas Ekvall and Ambjörn Lätt
Load Matching in Highly Energy Performing Buildings
- 11:50 Gioacchino Morosinotto, Giovanni Puglisi, Biagio Di Pietra, Giuseppe Emmi and Danilo Sbordone
Increase of pv self-consumption through innovative managing methods of heat pumps and chillers in buildings
- 12:00 Natasa Nord, Live H. Qvistgaard and Ivar S. Tryggestad
Influence of occupant behavior and operation on performance of a residential Zero Emission Building in Norway

10:30-12:00 Session SS 29: Building Performance

Chair: Jarek Kurnitski

Location: Musiksalen

- 10:30 Bryn Pickering, Shintaro Ikeda, Ruchi Choudhary and Ryozo Ooka
Comparison of metaheuristic and linear programming models for the purposes of optimising building energy supply operation schedule.
- 10:40 Panagiota Gianniou, Alfred Heller, Per Sieverts Nielsen and Carsten Rode
Identification of parameters affecting the variability of energy use in residential buildings
- 10:50 Joel Anderson, Duane A Robinson and Zhenjun Ma
Energy Analysis of Net Zero Energy Buildings: A Case Study
- 11:00 Mads E. Andersen, Jacob Schøtt, Ongun Berk Kazanci and Bjarne Olesen
Energy performance of water-based and air-based cooling systems in plus-energy housing
- 11:10 Jacob Schøtt, Mads E. Andersen, Ongun B. Kazanci and Bjarne W. Olesen
Simulation study of the energy performance of different space heating methods in plus-energy housing
- 11:20 Thibault Quentin Péan, Luca Gennari, Ongun Berk Kazanci and Bjarne W. Olesen
Evaluation of the energy and comfort performance of a plus-energy house under Scandinavian summer conditions
- 11:30 Sarah Birchall, Marcus Gustafsson, Ian Wallis, Chiara Dipasquale, Alessandro Bellini and Roberto Fedrizzi
SURVEY AND SIMULATION OF ENERGY USE IN THE EUROPEAN BUILDING STOCK
- 11:40 Santy, Hiroshi Matsumoto and Lusi Susanti
Development of Passive House Standard for Tropical Climates (Indonesia) - The Initial Stage
- Norbert Harmathy and Zoltan Magyar
- 11:43 ENERGY PERFORMANCE IMPROVEMENT OF BUILDINGS USING DYNAMIC SIMULATION TECHNIQUES TOWARDS COMPLIANCE WITH ENERGY EFFICIENCY REGULATIONS
- 11:46 Barbara Cuniberti, Delia D'Agostino and Daniele Paci
Affordable Positive Energy House: proposal for an EU Design Contest
- 11:49 Jisoo Shim and Doosam Song
Analysis of the Heating Energy Demand of a New-Constructed Single Family House in Korea with Criteria of PHPP
- 11:52 Yongjun Sun
A New System Sizing for Net Zero Energy Buildings under Uncertainties
- 11:55 Jean-Francois Pelletier, Alain Fournier, Michael Brown and Robyn Chatwin-Davies
Integrated Design in an Arctic Community context – a case study of the Canadian High Arctic Research Station
- 11:58 Maria Ferrara, Valentina Monetti and Enrico Fabrizio
Results from cost optimal analyses across Europe: methodological aspects
- 12:01 Hande Odaman Kaya, Elif Esra Aydin and İlker Kahraman
A Comparison Between the Simulation Outputs and Actual Data of a Residential Building's Energy Consumption Calculations
- 12:04 Antoine Lefort, Antoine Fauchier-Magnan, Riad Ziour and Valentin Gavan
Performance validation of a positive energy building in France using advanced data analytics and calibrated simulation

10:30-12:00 Session SS 35: Commissioning, Control & Energy Management

Chairs: Lone H. Mortensen and Peter Tzscheutschler

Location: Laugstuen

- 10:30 Kangji Li, Wenping Xue and Guohai Liu
An optimization framework for ventilation system operation in office environment using data interactive mechanism
- 10:40 Junqi Wang, Gongsheng Huang and Yongjun Sun
Optimal Control of Complex HVAC Systems: Event-driven or Time-driven Optimization?
- 10:50 Janne Grindheim, Robert Martinez and Trond Thorgeir Harsem
INTEGRATION OF TECHNICAL INSTALLATIONS IN HOSPITALS ALLOWS FLEXIBILITY TO ADAPT FOR CHANGING USAGE DURING LIFETIME
- 11:00 Chris Kopp, Petar Mihaylov and Tore André Haugen
Demand based controls approach from the building automation system leads to very energy efficient fan operation in a newly constructed office building
- 11:10 Dirk Müller and Johannes Fütterer
The E.ON ERC main building – a demonstration bench for building control research
- 11:20 Yves Stauffer, Simon Arberet, Elisa Olivero, Emmanuel Onillon, Laurent von Allmen, David Lindelof and Cyril M'Ahmed
NeuroCool: an adaptive, model-predictive control algorithm for ventilation and air conditioning systems
- 11:30 Andrea Costa, Germain Adell, Angel Font Fernandez, Daniele Bortoluzzi and Thomas Brian Messervy
Built2Spec project: Self-Inspection, 3D Modelling, Management and Quality- Check Tools for the 21st Century Construction Worksite
- 11:33 Ryosuke Takeuchi, Shuichiro Imahara and Toru Yano
Estimation of comfortable room temperature by survival analysis
- 11:36 Martin Becker, Thomas Köberle, Peter Knoll and Alexander Adlhoch
Hardware-in-the-Loop Environment for the Design and Test of Energy-Efficient Building Automation and Control Systems
- 11:39 Cihan Turhan, Silvio Simani, Ivan Zajic and Gülden Gökçen Akkurt
Comparative Analysis of Thermal Unit Control Methods for Sustainable Housing Applications
- 11:42 Valentin Gavan, Anna Perehinec, Sergei Agapoff and Stéphanie Derouineau
Fault detection & diagnosis to improve building energy performance and users comfort: expert rules method's principles & benefits
- 11:45 Mi-Yeon Lee, Hyung-Geun Kim and Yoon-Ji Kwon
Constructing an effective maintenance plan for zero-energy apartment buildings
- 11:48 Niall Brady and Raymond Llyod
Trust the Raw Data? The Importance of Applying Data Integrity Intelligence to Building Energy Management Systems
- 11:51 Mads Mysen, Peter Geoffrey Schild and Åsa Wahlstrøm
Functional performance check of Demand Controlled Ventilation - The load tests Max-max-min and Min-min-max
- 11:54 Hasegawa Maho and Okumiya Masaya
Commissioning of Energy Consumption and performance of Heat Source of Eco-Campus in Urban Area
- 11:57 Yves Stauffer, Elisa Olivero, Simon Arberet, Emmanuel Onillon, Laurent von Allmen, David Lindelöf and Cyril M'Ahmed
Neurocool: field tests of an HVAC control algorithm

10:30-12:00 Session SS 40: Heating & Cooling

Chair: Max Sherman

Location: Gästesalen

- 10:30 Michael Klemke, Bahar Saeb Gilani and Martin Kriegel
Dynamic simulation and experimental validation of unsteady state operation of floor heating systems
- 10:40 Alessandro Maccarini, Alireza Afshari, Göran Hultmark, Niels C. Bergsøe and Anders Vorre
Modeling of a novel HVAC system for simultaneous heating and cooling of office buildings with Modelica
- 10:50 Karsten Tawackolian, Hossein Sagheby, Daniel Brandt and Martin Kriegel
Development and tests of bionic fittings for heating nets
- 11:00 Makiko Ukai, Hiroaki Tanaka, Hideki Tanaka and Masaya Okumiya
Effective operation for heat cascade system of absorption chiller and desiccant air handling system with CHP and solar thermal
- 11:10 Peter Pärtsch
A New Procedure for Hydronic Balancing of Heating Circuits
- 11:20 Handan Öncül Özgen
An Analysis of Air Handling Units' Energy Efficiencies According to ErP (Energy Related Products) Directives
- 11:30 Hao Tang, Yong Ding and Xue Liu
Factor analysis on variable-flow reconstruction of chilled water system
- 11:40 Cem Dogan Sahin, Turgay Coskun, Ozcan Gulhan, Zeynep Durmus Arsan and Gulden Gokcen Akkurt
Humidity Control to Reduce the Chemical Degradation Risk of Manuscripts in Necip Paşa Library Tire-İzmir, Turkey
- 11:50 Jorma Railio, Lari Eskola, Petri Pyly, Markku Rantama, Harri Ripatti and Tiina Strand
Condition survey for ventilation and air conditioning systems
- 12:00 Samo Venko, Erik Pavlovič, Ciril Arkar and Sašo Medved
Experimental study of effects to mixed convection of real boundary conditions in non-empty room

10:30-12:00 Session SS 6: Building Technology

Chairs: Guangyu Cao and Karsten Duer

Location: *Det Lille Teater*

- 10:30 Marco Schmidt
Sustainable indoor comfort concepts with PCM containing building materials
- 10:40 Yashkumar Shukla, Rajan Rawal, Nidhi Agrawal, Kaushik Biswas, Devendra Jain and Deepraj Sarmah
Influence of phase change material on thermal comfort conditions in buildings in Hot and Dry Climate of India
- 10:50 Yovko Antonov, Rasmus Jensen and Michal Pomianowski
Hemp-Lime Performance in Danish Climatic Context. Thermal Conductivity as a Function of Moisture Content.
- 11:00 Arash Rasooli, Laure Itard and Carlos Infante Ferreira
Introduction to an In-situ Method for Rapid Measurement of the Walls' Thermal Resistance in Existing Buildings
- 11:10 Peep Pihelo, Targo Kalamees, Henri Kikkas, Tõnu Mauring, Margus Valge and Raimond Valler
Field Study on Hygrothermal Performance of Highly Insulated Exterior Wall in Estonia
- 11:20 Burhan Yoruk and Ahmet Arisoy
Evaporative Cooling of Walls for High Performance Buildings in Hot Climates
- 11:30 Alexandra Tamási, Géza Baráth and Zoltán Magyar
The heat transfer of a modular green façade system
- 11:33 Bernardo Buonomo, Alessandra Diana, Oronzio Manca, Sergio Nardini and Vincenzo Bianco
A numerical study on the effect of exit section on inclined ventilated roofs
- 11:36 Nooshafarin Mohammadzadeh and Soolyeon Cho
AN OPTIMIZATION APPROACH FOR INTEGRATING DIFFERENT ROOF FUNCTIONS WITH ENVIRONMENTAL IMPACTS CONSTRAINT: "A HYBRID FRAMEWORK"
- 11:39 Cara Nichole Maesano, Jens Christoffersen and Isabella Annesi-Maesano
Impact of daylight and learning capabilities.
- 11:42 Jiri Hirs, Lenka Maurerova and Jitka Mohelnikova
Daylight Analysis in the UNESCO Listed Building
- 11:45 Ali Alajmi, Hosny Abou-Ziyan and Hamad Al-Mutairi
Optimizing window system using genetic algorithm for residential buildings in hot climate
- 11:48 Martin Heine Kristensen and Steffen Petersen
Does embodied energy in windows affect their energy-efficiency ranking?
- 11:51 Yuanli Lyu, Tin-Tai Chow, Jinliang Wang and Feilong Zou
Effectiveness of distributor design on buoyant-water-flow window performance
- 11:54 Hye-Sun Jin, Jin-Hee Song, Jae-Han Lim, Seung-Yeong Song and Kwang-Woo Kim
Characteristics of Convective and Radiative Heat Transfer in the Ceiling of TABS
- 11:57 Chien-Yuan Kuo, Chun-Ta Tzeng, Ming-Chin Ho, Chi-Ming Lai and Rong-Horng Chen
Wind-tunnel studies of pedestrian-level wind environment in street canyons

10:30-12:00 Session WS 1: Understanding HVAC Operational Performance (SWEGON)

Organiser:

- SWEGON - www.swegon.com, www.swegonairacademy.com
- Cardiff University - www.cardiff.ac.uk, www.iservcmb.info

Presenters:

Petra Vladykova Bednarova, Swegon

John Woollett, Swegon

Ian Knight, Cardiff University

Scope:

This participatory workshop explores the potential for informative and practical guidelines for the operation of buildings and input for the building regulations. The aim is to discuss what information and data are needed, how it should be provided, and how it might be applied with regard to the updating of a number of standards in this area. Data from operational performance of HVAC systems and components (results from the project iSERVcmb) need to provide information about what can be achieved in the building's operation. In the workshop the focus will be on operational data from HVAC systems/components, what can be found from the data at the operational level versus legislative needs, and what opportunities exist to improve the operational performance of HVAC equipment.

Location: Bondestuen

10:30-12:00 Session WS 2: NZEB design and construction: skill gaps and interdisciplinary training of professionals (PROF/TRAC)

Organiser: PROF/TRAC - www.profrac.eu

Presenters:

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

Scope:

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 based on collaboration between architects, technical experts and managers. PROF / TRAC develops an Open Training and Qualification Platform for professionals dealing with nearly zero energy buildings targeting technical experts, architects and managers involved in nZEB design and construction. The European training and qualification scheme will be part of a life-long-life learning process for continuous development and up-skilling of professionals. The workshop will present the PROF/TRAC project that develops an Open Training Platform and Qualification Scheme for continuous professional development for engineers, architects and managers involved in nZEB design and construction. PROF/TRAC identified 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.

Location: Harlekinsalen

10:30-12:00 Session WS 3: Realizing (nearly) Zero Energy Hospital Buildings together (REHVA Task Force)

Organisers:

TVVL/Rehva and Royal HaskoningDHV www.royalhaskoningdhv.com, www.royalhaskoningdhv.com/nzeb

Presenters:

W.H. Maassen: Leading Professional - Royal HaskoningDHV, TU/e Fellow - Eindhoven University of Technology

H. Besselink: Senior Consultant - Royal HaskoningDHV, REHVA Fellow, TVVL-Delegate

T.J. Baas: Graduate Master Student Building Services - Eindhoven University of Technology

Scope:

In an interactive Workshop different groups will work on making an Academic Medical Centre and/or an inner city district energy neutral areas. In the first part of the workshop the technical possibilities to realize a nZEB Hospital will be explored on different scales. Then in the second part each group will determine how to realize this goal together, from the perspective of the different stakeholders. The differences between the Hospital campus and the inner city district will give insight in the specific challenges of each project and especially nZEB Hospital Buildings!

Location: Columbiesalen

13:30-15:00 Session IS 1: Ventilation systems aiming at saving energy (Lindab)

Location: Gæstesalen

13:30-15:00 Session IS 2: Motortyper og Energieffektivitet (Danfoss Drives)

Organiser: Danfoss Drives

Short description:

Nu har du mulighed for at høre mere om energieffektive motorer og få en opdatering på nye motortyper. Applikationsingeniør, Jesper Moos, fortæller om det sidste nye inden for feltet. Du får indblik i energieffektivitetsnormer, nye motortyper og højeffektive motorer samt viden om og løsninger med Danfoss Drives frekvensomformere.

Presentations:

Motortyper og energieffektivitet (Jesper Moos)

Location: Laugstuen

13:30-15:00 Session IS 5: How to renovate social housing to Active House level by focusing on health and comfort in the design process (VELUX A/S)

Organiser: VELUX A/S

Short description:

A European Survey on healthy homes, carried out with 14.000 respondents in 14 countries, shows that comfort, health and energy savings is the main driver for renovation of the building stock. The characteristics for the healthy home is good sleeping conditions, comfortable indoor temperature, access to fresh air, good daylight conditions and appropriate humidity levels. Those topics are a part of the evaluation of buildings based on the Active House vision and has been a part of the modernization of the social housing renovation concept RenovActiv, which is the first affordable and easy to reproduce climate renovation in Brussels. The 80 m² dilapidated semidetached house built in the 1920s has been modernized with focus on comfort, health and good indoor climate conditions.

Presentations:

Healthy Home Barometer – a European survey in 14 countries

by Lone Feifer, Programme Director, Sustainable Living in Buildings, VELUX Group

Comfort requirement in Active House projects

by Kurt Emil Eriksen, Secretary General, Active House Alliance

RenovActive a renovation project based on energy saving, health and comfort

by Peter Foldbjerg, Head of knowledge centre on Daylight, Energy and Indoor Climate at VELUX Group

Location: Musiksalen

13:30-15:00 Session SS 11: Sustainable Energy

Chair: Natasa Nord

Location: Det Lille Teater

- 13:30 Ivan Verhaert, Jef De Schutter, Oliver Gerin, Bart Bleys, Eddy Janssen and Simon Binnemans
A methodology to design domestic hot water production systems based on tap patterns.
- 13:40 Werner Stutterecker, Richard Krottil, Rudolf Aschauer and Johann Aschauer
Decentralized Hot and Cold Water Production with Peltier Elements
- 13:50 Nathanael Beeker, Paul Malisani and Nicolas Petit
Statistical properties of domestic hot water consumption
- 14:00 Kaiser Ahmed, Petri Pylsy and Jarek Kurnitski
Hourly Consumption Profiles of Domestic Hot Water for Finnish Apartment Buildings
- 14:10 Maria Alberdi-Pagola, Rasmus Lund Jensen and Søren Erbs Poulsen
A performance case study of energy pile foundation at Rosborg Gymnasium (Denmark)
- 14:20 Wonjun Choi and Ryozo Ooka
Multi heat injection rate thermal response test and corresponding parameter estimation method to determine performance dependence in saturated porous formation
- 14:30 Jeffrey Spitler, Saqib Javed and Rachel Grundmann
Calculation Tool for Effective Borehole Thermal Resistance
- 14:40 Lucile Soudani, Monika Woloszyn, Antonin Fabbri, Jean-Claude Morel and Anne-Cécile Grillet
Energy evaluation of rammed earth wall on long term in-situ measurements
- 14:50 Pingfang Hu, Zhi Huang, Fei Lei, Na Zhu and Lu Xing
Thermal performance analysis of the coaxial borehole heat exchanger

13:30-15:00 Session SS 3: Building Retrofit

Chairs: Kjeld Svidt and Åsa Wahlström

Location: Hal Øst

- 13:30 Tiziana Buso, Cristina Becchio, A. Zerrin Yılmaz and Stefano P. Corgnati
Energy efficiency and financial performance of a reference hotel – proposing a global cost-benefit analysis
- 13:40 Rita Streblov, Katrin Ansoorge, Christophe Armbrorst and Dirk Müller
Genetic Algorithm for a combinatorial optimization for energy retrofit of buildings
- 13:50 Pawel Krawczyk, Alireza Afshari, Niels Christian Bergsøe, Graves Simonsen and Nikolaj Haaning
Improving the energy performance in existing non-residential buildings in Denmark using the Total Concept method
- 14:00 Paul Cooper, Michael Tibbs, Clayton McDowell, Georgios Kokogiannakis and Stephen Choi
Building Characterisation and Retrofit Decision Support-Tools for Upgrading Homes of Low-Income Older Australians
- 14:10 Zaid Romani, Abdeslam Draoui and Francis Allard
Development of a fast Multicriteria decision method for sustainable building refurbishment in France
- 14:20 Riccardo Capperucci, Wim Maassen and Wim Zeiler
Roadmap to nZEB Hospital Buildings - Case Study: Existing Policlinic Building
- 14:30 Kalle Kuusk, Targo Kalamees and Peep Pihelo
Experiences from Design Process of Renovation of Existing Apartment Building to nZEB
- 14:40 Marco Ferreira, Manuela Almeida and Ana Rodrigues
Cost Effective Energy and CO2 Emissions Optimization in Building Renovation Annex 56 methodology and its application to a case study
- 14:50 Miloš Čokić and Marija S. Todorović
DEEP ENERGY REFURBISHMENT OF AN OLD TRADITIONAL VILLAGE HOUSE TO APPROACH ZERO FOSSIL ENERGY AND HEALTHY IEQ STATUS

13:30-15:00 Session SS 30: Building Performance

Chairs: Jakub Kolarik and Jaume Salom

Location: Europahallen

- 13:30 Maria-Anna Chatzopoulou, James Keirstead, David Fisk and Christos N. Markides
Characterising the impact of HVAC design variables on buildings energy performance, using a Global Sensitivity Analysis framework
- 13:40 Thomas Schütz, Hassan Harb, Marcus Fuchs and Dirk Müller
Optimal Design of Building Energy Systems for Residential Buildings
- 13:50 Manuel Ziegler, Alexander David and Thomas Bednar
How energy efficiency arrangements influences and simplifies the HVAC design at Austria's biggest Plus-Plus-Energy Office Building
- 14:00 Kevin de Bont, Kristian Gvozdenovic, Wim Maassen and Wim Zeiler
nZEB design in the Netherlands: an overview of recent projects
- 14:10 Tuomo Niemelä, Risto Kosonen and Juha Jokisalo
Cost-Effective Measures of New Low Energy Office Buildings in Cold Climate
- 14:20 Aymeric Novel
From Design Stage to Performance Measurement and Verification - Velux China Headquarter High Performance Office Project
- 14:30 Marc Azar and Samer Hassanie
Calibrating Symphonies
- 14:33 Baizhan Li, Xinyi Li, Runming Yao and Qin Li
An investigation of energy consumption in public buildings in Chongqing, China
- 14:36 Yong Ding, Xue Liu and Hao Tang
Analysis on operation of office building air condition system based on the energy consumption monitoring platform
- 14:39 Marc Delghust, Yves De Weerd and Arnold Janssens
Variations in Residential Space Heating Profiles At Room Level: the Influence of Building and System Characteristics
- 14:42 Ki Uhn Ahn, Yong Se Kim, Young Min Kim and Cheol Soo Park
Impact of Occupant Behavior on Energy Prediction
- 14:45 Ilse Schoenmakers, Wim Zeiler and Gert Boxem
Kritical Performance Indices for energy use analysis of University Medical Centres: the case of isolation rooms
- 14:48 Deuk-Woo Kim, Ji Youn Lim and Seung-Eon Lee
Applicability of statistical shape analysis for estimating mean shape of building groups
- 14:51 Domenico Iatauro, Paolo Signoretti and Luciano Terrinoni
Simplified Method for estimating Energy Need for Heating and the Minimum Energy Performance Requirements in Buildings through Regression Models
- 14:54 Mitsuhide Yasuda, Tatsuo Nobe and Masanari Ukai
Proposal of method to extract the typical partial load characteristics
- 14:57 Axel Seerig, Andrii Zakovorotnyi and Dominic Jurt
Monte-Carlo methods for the occupancy uncertainty issue in thermal building simulations
- 15:00 Griet Verbeeck and Wesley Ceulemans
Lessons learned for energy policy from the analysis of the energy performance certificates database

13:30-15:00 Session SS 39: Heating and Cooling

Chairs: Karel Kabele and Olena Kalyanova Larsen

Location: Radiosalen

- 13:30 Sandy Jorens, Ivan Verhaert and Kenneth Sørensen
Design Optimization of Air Distribution Systems in Non-Residential Buildings
- 13:40 E. Moustapha Doumbia and Martin Kriegel
Influence of the Cross-sectional Shape on the Pressure Drop at 90 Degree Elbow Duct Fittings
- 13:50 Francisco Comino, Manuel Ruiz de Adana and Fernando Peci
Experimental study of the moisture removal capacity of a desiccant wheel activated at low and high temperature
- 14:00 Martin Hoffmann, Abdul Azem, Paul Mathis and Dirk Müller
Bypass Design of Heat Exchangers in Air Handling Unit as a Function of Expected Operating Hours
- 14:10 Nina Kopmann, Fridolin Krause, Mark Simmer, Kristian Huchtemann and Dirk Müller
Dynamic test bench for the analysis of the operating behavior of radiators under controllable boundary conditions
- 14:20 Hyo-Jun Kim and Young-Hum Cho
A Study on the Control Method with Ventilation requirement of VAV System in Multi-Zone
- 14:30 Jiri Dostal, Vaclav Prajzner and Vladimir Havlena
Convection Oriented Heat Exchanger Model - Identification
- 14:33 Waleed Abdelmaksoud and Mahmoud Kassem
A Study of Heat Transfer and Pressure Drop on Finned-Tube Heat Exchangers
- 14:36 Vladimira Linhartova and Vladimir Jelinek
Heat Recovery of the Refrigeration System in the Ice Arena
- 14:39 Paul Mathis, Henning Freitag, Tobias Maria Burgholz, Max Rohn, Markus Hans Schraven and Dirk Müller
Heat transfer enhancement of free convection flows in vertical 2D-channels with Kármán vortex streets – an experimental study
- 14:42 Sung-Joon Lee, Hui-Jeong Kim, Hye-Won Dong and Jae-Weon Jeong
Energy performance and applicability comparison of two different type of liquid desiccant assisted evaporative cooling systems
- 14:45 Dong-Seob Yoon, Joon-Young Park, Sung-Joon Lee and Jae-Weon Jeong
Removal efficiency for airborne particles and VOCs in liquid desiccant dehumidifier
- 14:48 Mustafa Fatih Evren, Abuzer Kadir Özsunar and Birol Kılıkış
Experimental Determination of the Optimum Radiant to Convective Heat Transfer Split for Hybrid Heating System
- 14:51 Miklos Kassai and Laszlo Kajtar
Investigation of cooling energy saved by air-to air heat-and energy exchangers in different climate European countries
- 14:54 Lukas Lundström
Mesoscale Climate Datasets for Building Modelling and Simulation
- 14:57 Gyeong-Mok Nam, Won-Hwa Hong, Gyu-Yeob Jeon and Youn-Kyu Seo
A Study on Categorizing Subway Station Areas in Seoul
- 15:00 Chi-Ming Lai and Shuichi Hokoi
Experimental investigations on the thermal performance of ventilated BIPV curtain walls

13:30-15:00 Session WS 27: How to achieve deep retrofit of school buildings in Europe (RENEW school)? (EU IEE Renew-School)

Organiser: EU IEE

Speakers:

Armin Knotzer, AEE Intec: RENEW school and Austrian deeply renovated schools

Jørgen Rose, Danish Building Research Institute: Examples of deep-renovation in school buildings

Pawel Wargocki, DTU Byg: Do new and renovated European schools and kindergartens secure high indoor environmental quality?

Christian Anker Hviid, DTU Byg: Robust façade designs

Scope:

Schools desperately need upgrading to improve the indoor climate to the benefit of all pupils, and to save energy in the context of the European nZEB goals. Several efforts and projects like IEA-Annex 61, Renew School, SchoolVentCool, School-of-the-Future have shown that it can be done and documented the benefits.

Pre-fabricated timber elements are widely used for new schools and day-care centers but lacks momentum when it comes to renovation of schools. Despite the obvious advantages: renovation during the summer holidays, better quality control and no relocation of pupils.

This workshop seeks to disseminate knowledge about deep renovation and pre-fabrication methods, to discuss and disclose the barriers, and to motivate massive-scale pre-fabricated façade renovations in Denmark and in Europe.

Location: Latinerstuen

13:30-15:00 Session WS 4: Beat Low DeltaT Syndrome by use of the latest pump generation (GRUNDFOS)

Organiser: Grundfos www.grundfos.com

Presenters:

Chair: Jens Nørgaard **Grundfos A/S**

Co-chair: Anders Nielsen **Grundfos A/S**

Co-chair: Adam Vrbka **Grundfos A/S**

Co-chair: Karin Schjødt Nielsen **Grundfos A/S**

Scope:

Maintaining the correct temperature difference in a HVAC system is of great importance. A too low temperature difference leads to increased water flow and hence an increased risk of noise. All though noise is a serious problem in eg. apartment buildings, the biggest disadvantage is undoubtedly the increased flow and the derived consequences, which are numerous. Eg. condensing boilers may not be able to operate in condensing mode, and increased pipe pressure losses leads to increased pumping cost. If the system is directly connected to a District Energy system, also this network is affected. Besides this, it is often a struggle to control the temperature difference in eg. one-pipe HVAC systems. Not only HVAC systems may be operated inefficiently. Large DHW circulation systems are by tradition fitted with constant speed pumps that are running at maximum speed 24/7. This will lead to overflow, increased heat losses and pump power overspending. Latest HVAC pump generations are much more than pumps. They offer innovative control modes that will reduce the consequences of the challenges described above. Control modes such as constant differential and constant temperature mode are designed to increase system controllability and efficiency.

Location: Bondestuen

13:30-15:00 Session WS 5: Nearly zero energy buildings nZEB (REHVA Task Force)

Organiser:

Jarek Kurnitski - REHVA Vice President, Tallinn University of Technology

Presenters:

Ryozo Ooka, Tokyo University

Jonas Gräslund, Skanska

Background:

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 issue 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.

Location: Columbinesalen

13:30-15:00 Session WS 6: Building Commissioning, -what's in it for me? (REHVA Task Force)

Organiser: REHVA Commissioning Task Force

Presenters:

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

Scope:

Today there is demand for Building Commissioning in almost all building projects. Many building owners have realized that the technical complexity of buildings has increased and it is necessary to manage the quality of any building work to fulfill the requirements of the owner. However, the requests for commissioning services often lack basic knowledge of how to set up the commissioning organization, the leadership, the scope, the activities in the pre-design, design, construction and operations phases, and the money needed for the investment in this quality management process. Main objectives:

- Provide insights into how Building Commissioning is performed, how it interacts with sustainability measures and how it influences the value of buildings.
- Map market demand for tools, guidance, certifications, investigations and documentations in the future work with Building Commissioning
- Map knowledge gaps to give input to the REHVA Commissioning Task Force elaborating a REHVA Building Commissioning Guidebook focusing on the commissioning of retrofits.

Location: Harlekingsalen

15:30-17:30 Session IS 3: Solutions for residential and office applications – nZEB meets comfort and affordability (Daikin)

Organiser: Daikin

Short description:

Daikin is leading the market in providing innovative solutions to meet future energy and comfort requirements. Combining different technologies in Daikin advanced HVAC solutions allow affordable high energy efficient solutions in new and existing buildings providing comfort and healthy indoor environment.

This interactive session will give an overview of the different possibilities and will show examples on achieved performances.

Presentations:

Bernard Dehertogh - New generation VRV as a total HVAC solution for Commercial market

Pietro Consalvo – Daikin Applied and Air Handling Solutions

Henk Kranenberg – Altherma as a total solution for Residential market

Henk Kranenberg – Video impression on recently opened new Technology and Innovation Center (Euro 300 mio investment)

Location: Gæstesalen

15:30-17:30 Session IS 6: Design of Nearly Zero Energy Buildings based on the Active House Specification (Active House Alliance)

Organiser: Active House Alliance

Short description:

The Active House Alliance has developed an Active House label, with the purpose to label buildings that has been designed with a combined focus on indoor comfort, energy efficiency and environmental impact. In order to design and develop an Active House the parameters Comfort, Energy and Environment, has to be balanced equally. The session will in details explain the background of the label, the vision, the specification and the use of the tools. Participants will get a detailed introduction to the calculation methodology and a detailed intro to the calculation tool, and how to apply for a label. The calculation tool will be shared with the participants in a shareware version.

Presentations:

Active House vision and label: Kurt Emil Eriksen, Active House Alliance

Specifications and calculations: Amdi Schjødt Worm, Senior Consultant, Danish Technological Institute

Location: Musiksalen

15:30-17:30 Session REHVA: REHVA Student Competition

Location: Albatrosstuen

15:30-17:30 Session SS 18: Ventilation & Air Distribution

Chairs: Francis Allard and Paul Cooper

Location: Europahallen

- 15:30 Davide Cali, Rune Korsholm Andersen, Tanja Osterhage, Mark Wesseling, Dirk Müller and Bjarne Olesen
Analysis and modelling of occupants' behavior related to the interaction with windows in refurbished low energy buildings
- 15:40 Pil Brix Purup and Steffen Petersen
Simulation of Natural Ventilation in the Early Design of Near Zero Energy Buildings
- 15:50 Ryohei Itsuaki, Tomoyuki Chikamoto, Hiromasa Tanaka, Yu Goto, Hisashi Fujita, Noriaki Imori and Hiroshi Harashima
Ventilation Performance and Operational Improvement of the High-Rise Office Building with the Cross Ventilation System in Osaka, Japan
- 16:00 Massimo Fiorentini, Georgios Kokogiannakis, Warwick Jackson, Zhenjun Ma and Paul Cooper
Evaluation methodology and implementation for natural ventilation control strategies
- 16:10 Valerie Leprince and François Rémi Carrié
Comparative analysis of window airing models proposed in prEN 16798-7 and influence of internal resistances
- 16:20 Tine Steen Larsen, Christoffer Plesner and Valérie Leprince
Calculation methods for single-sided natural ventilation - simplified or detailed?
- 16:30 Shadi Maraqa, Geoffrey Van Moeseke, Andre de Herde, Kevin Siau and Cecile Goffaux
Enhancing natural ventilation in patients' wards in a Belgian hospital by integrating some ventilation concepts from vernacular architecture
- 16:40 Risto Kosonen, Ilari Ranta-Aho and Juha Jokisalo
Methods to prevent the stack effect in high rise residential buildings
- 16:50 Ryo Takano, Takashi Kurabuchi and Sihwan Lee
Research on the grasp of cross-ventilation performance by using the ventilation tower in residential buildings
- 17:00 Özgür Bayer and Erkan Kütük
Investigation of Natural Ventilation in a Public Place in Winter Season with the Comparison of Experimentation and CFD Results
- 17:10 Xiaoying Wu, Szu-Cheng Chien, Majid Sappar and Zhe Zhang
Assessment of Natural Ventilation Performance of High-rise Residential Buildings in Tropical Climate
- 17:20 Felix Antonio Berlanga, Ines Olmedo, Manuel Ruiz de Adana and Fernando Peci
Influence of the air renovation rate on the risk of cross infections in a hospital room with a combined radiant and mixing ventilation system

15:30-17:30 Session SS 19: Ventilation & Air Distribution

Chair: Takashi Kurabuchi

Location: Radiosalen

- 15:30 Pierre Bragança, Kodjovi Sodjavi and Amina Meslem
THERMAL COMFORT IN HEATING CONDITIONS WITH A CEILING MOUNTED DIFFUSER COMPARISON OF LOBED AND CONVENTIONAL DIFFUSERS
- 15:40 Joanna Polak, Guangyu Cao, Laurent Georges and Øyvind Skreiberg
Experimental Study of the Temperature Distribution inside Two Zones Separated by an Air Curtain System
- 15:50 Henning Freitag, Paul Mathis and Dirk Müller
Experimental Investigation of a Turbulent Free Jet in Ducts with Single Wall Openings and Gradient Rectangular Cross-Sections
- 16:00 Wonseok Oh and Shinsuke Kato
Evaluating Thermal Environments of Air Conditioned Rooms based on Equivalent Temperature by using a Thermal Manikin Simulation
- 16:10 Shogo Kamata, Masanari Ukai, Tatsuo Nobe and Tatsuya Yada
Development of Variable Coanda Nozzle for Air-Conditioning Stadium Seats
- 16:20 Benjamin Zielke and Martin Kriegel
Maximizing the jet length of rectangular free jets
- 16:30 Laurent Georges, Guangyu Cao and Hans Martin Mathisen
Further investigation of the convective heat transfer between rooms through open doorways
- 16:40 Balázs Both, Zoltán Szánthó and Róbert Goda
Air velocity and turbulence distribution in a slot-ventilated room
- 16:50 Frédéric Ransy, Samuel Gendebien and Vincent Lemort
Description of a Modelica-based thermal building model integrating multi-zone airflows calculation
- 17:00 Tarek Aissa and Steven Lambeck
Spatial modelling of air distribution for controller design using Takagi-Sugeno Fuzzy Systems
- 17:10 Byeong Ho Yu, Byeong-Mo Seo, Jung-Eun Son and Kwang Ho Lee
Impacts of Thermal Decay on the Energy Performance Degradation in UFAD (Underfloor Air Distribution) System
- 17:20 Jin Ryu, Doosam Song and Chanwoul Jeong
A Study on the Heat, Vapor and Pollutants Movement owing to the Airflow in High-rise Residential Buildings

15:30-17:30 Session SS 32: Indoor Environment

Chairs: Henrik N. Knudsen and Hua Qian

Location: Hal Øst

- 15:30 Steffen Petersen and Stine M. L. Pedersen
Desktop polling station for real-time building occupant feedback
- 15:40 Bernd Wegener and Moritz Fedkenheuer
Assessing Housing Wellbeing in Sustainable Buildings and a Large-Scale Test
- 15:50 Tim Beuker and Atze Boerstra
Effect of Bedroom Ventilation on Perceived Sleep Quality in Dutch Houses
- 16:00 Ahsan Iqbal and Alireza Afshari
Post Occupancy Evaluation of 23 Newly Renovated Apartments in Copenhagen - Occupants' Perception
- 16:10 Jens Christoffersen, Anna Karina Hammelev Hansen, Karsten Andersen, Peter Foldbjerg and Thorbjørn Færing Asmussen
Indoor climate in two renovated Danish schools: Measurements of Temperature, sound levels, use of electrical light and CO2
- 16:20 Aleksejs Prozuments, Anatolijs Borodinecs, Darja Strutinska, Anna Nefedova and Bykova Iuliia
Survey-based study on sportsmen performance under different air parameters in sport halls
- 16:30 Karoline Veum Solberg, Guangyu Cao, Maria Justo Alonso and Jens Petter Burud
Field study of the indoor climate in an energy efficient building in Norway
- 16:40 Luca Zaniboni, Andrea Gasparella, Matthias Schuß, Kristina Kiesel, Giovanni Pernigotto and Ardeshir Mahdavi
Indoor Comfort Evaluation of a Health Care Facility: a Case Study
- 16:50 Peter Foldbjerg, Thorbjørn Færing Asmussen, Lone Feifer and Jens Christoffersen
Interaction between high daylight levels and thermal comfort in five single-family houses after a full year of measurements
- 17:00 Ambrose Dodoo and Leif Gustavsson
Climate change impacts on overheating risk and primary energy use for space conditioning of a Swedish multi-story building
- 17:10 Atze Boerstra, Eline Vermeulen, Peter Foldbjerg and Raymond van Hattum
ANALYZING INDOOR ENVIRONMENTAL PERCEPTION IN ACTIVE HOUSES

15:30-17:30 Session SS 5: Building Technology

Chairs: Åke Blomsterberg and Marcel Loomans

Location: Det Lille Teater

- 15:30 Hagar Elarga, Michele De Carli and Ernesto Benini
Overall energy evaluation for different integration methods of PV modules in facade building
- 15:40 Chen Zhang, Per Heiselberg and Olena Larsen
A Simplified Tool for Predicting the Thermal Behavior and the Energy Saving Potential of Ventilated Windows
- 15:50 Olena Kalyanova Larsen, Rasmus Lund Jensen, Tore Dahl Iversen and Jakob Hedegaard
Experimental performance investigation of glazing system combined with internal roller blinds
- 16:00 Elif Esra Aydin, Hande Odaman Kaya and İlker Kahraman
Effects of Optimizing the Shading Device Orientation to Energy Consumption in Office Buildings
- 16:10 Peter Hartman, Lucia Maňková and Michal Krajčák
The effect of internal coloured surfaces on our biological response to daylight: an experimental study
- 16:20 Helle Foldbjerg Rasmussen, Elpida Vangeloglou and Mads Mårbjerg
Evaluation of daylight in buildings in the future
- 16:30 Francesco De Luca, Raimo Simson and Jarek Kurnitski
Energy and daylighting performance design of skylights and clerestories in a large hall retail building
- 16:40 Ruben Delvaeye, Ludwig Stroobant, Ralf Klein, Peter Hanselaer, Peter D'Herdt, Hilde Breesch and Wouter Ryckaert
Monitoring of daylight controlled dimming systems and occupancy in three equivalent classrooms
- 16:50 Jeong Eun Son, Yeo Beom Yoon, Rashmi Manandhar and Kwang Ho Lee
Analysis of the Thermal Loads Load Variations Affected by Window Orientation, Transmitted Solar and Blind Parameters
- 17:00 Soo Cho and Seokhyun Kim
A Study on the Development of Measuring Equipment of the Solar Heat Gain Coefficient by Use a Natural Sunlight
- 17:10 Seokhyun Kim, Soo Cho and Younghum Cho
A Fundamental Study about Development of the Guideline of shading Design for energy saving according to Energy simulation in Office Buildings in Korea
- 17:20 Steinar Grynning, Bjørn Petter Jelle, Arild Gustavsen and Berit Time
Multilayer Glazing Technologies: Key Performance Parameters and Future Perspectives

15:30-17:30 Session WS 10: BELIMO Water solutions (BELIMO)

Organiser: BELIMO Automation AG - www.belimo.eu

Presenters:

Dr. Marc Thuillard - Belimo Automation AG

Dipl. Ing. Forest Reider - Belimo Automation AG

Dipl. Ing. Christian Luchsinger - Belimo Automation AG

Scope:

- Hydraulic Balancing:
- Pressure independence for 4-pipe systems
- New solution for cooling coil management
- Case study 1 MIT, Boulder
- Case study 2 Singapore
- Case study 3: Hospital Ludmillenstift, Germany

Location: Laugstuen

15:30-17:30 Session WS 7: Energy efficient heat pump, from "standard" performances to "seasonal" performance - Eurovent Certita Certification

Organiser: Eurovent Certita Certification www.eurovent-certification.com

Presenters:

Chair: Erick Melquiond **Eurovent Certita Certification**

Presentation: Sandrine Marinhas

Scope:

Electrically driven Heat Pumps for space heating and/or cooling (outdoor air/recycled air, extracted air/fresh air, outdoor air/water, exhaust air/water, (ground)water/recycled air, water (loop)/recycled air, glycol water/water or glycol water on geothermal collector, glycol water/water on solar collector, glycol-water/water mix or glycol-water, (ground)water/water, ground/ground, ground/water, water/ground, outdoor air/ground); electrically driven HP used for heating swimming pools water; electrically driven dual-mode HP, i.e. designed for space heating and domestic hot water production, HP used to collective sanitary hot water; gas absorption HP; engine-driven gas heat pumps; variable refrigerant flow systems; hybrid appliances comprising a liquid or gas fuel-fired generator and an electrically driven HP.

Location: Latinerstuen

15:30-17:30 Session WS 8: Inspections of ventilation and air conditioning systems (REHVA Task Force)

Organiser: REHVA Task Force

Presenters:

Jorma Railio, REHVA
Ian Knight, Cardiff University

Scope:

Practical approaches to implementation of Inspections required by the EPBD will be discussed. Alternative approaches, such as continuous monitoring of the performance of ventilation and air-conditioning systems, and condition surveys of existing systems, will also be introduced and discussed.

Location: Bondestuen

15:30-17:30 Session WS 9: Greenhouse gas reduction in buildings & healthy building (SAREK)

Organiser: [SAREK](#)

Presenters:

Prof. Kwang Ho Lee, Hanbat University - Moderator

Prof. Hwataik Han, Kookmin University

Prof. Doosam Song, Sungkyunkwan University

Prof. Jae-Weon Jeong, Hanyang University

Dr. Kihoon Kim, CEO of SAEEC Co.

Prof. Jin Chul Park, Chung-Ang University

Scope:

The speakers will introduce recent research and practical topics include innovative home ventilation strategies, desiccant assisted air conditioning system, phase-change material with cool roof, and performance simulation in sustainable building design, following the general energy conservation trends under the climatic conditions of Korea.

Location: Columbinesalen

10:30-12:00 Session SS 13: Sustainable Energy

Chairs: Rasmus Lund Jensen and Zoltán Magyar

Location: Radiosalen

- 10:30 Yan Lei, Hu Pingfang, Zhu Na, Lei Fei and Xu Linghong
The post-evaluation of a practical ground source heat pump system based on data mining technology
- 10:40 Ari Laitinen
Energy saving potential of air-to-air heat pumps in detached houses in Nordic climate
- 10:50 Fabian Ochs, Dietmar Siegele, Georgios Dermentzis and Wolfgang Feist
Variable Speed Exhaust Air Heat Pump with enhanced deicing control
- 11:00 Kristian Huchtemann, Hannes Engel, Philipp Mehrfeld, Markus Nürenberg and Dirk Müller
Testing method for evaluation of a realistic seasonal performance of heat pump heating systems: Determination of typical days
- 11:10 Orhan Ekren, Ahmet Yilanci, Murat Kara, Mehmet Akif Ezan, Cagri Metin and Emrah Bıyık
Experimental Performance Evaluation of a Solar Assisted Magnetic Heating-Cooling System
- 11:20 Ralf Dott, Christian Winteler, Thomas Afjei and Bernd Hafner
Key Facts for High Efficient Solar Ice Storage Heat Pump Systems
- 11:30 Huai Li, Wei Xu, Jianlin Wu, Zhen Yu and Caifeng Gao
Operation Analysis of Ground Source Heat Pump System in a Nearly Zero Energy Building of China
- 11:33 Gratiela Maria Tarlea, Galina Prica and Ana Tarlea
Study on Optimizing the Heat Pumps with Ground Thermal Source
- 11:36 Ana Picallo, Estibaliz Perez Iribarren, Alberto Apaolaza and Jose Maria Sala
THERMOECONOMIC APPROACH TO THE DIAGNOSIS OF A DHW MICROCOGENERATION PLANT
- 11:39 Martin Thalfeldt, Jarek Kurnitski and Eduard Latošov
The Effect of Exhaust Air Heat Pump on District Heat Energy Use and Return Temperature
- 11:42 Elena Bee, Alessandro Prada and Paolo Baggio
Air to water heat pumps for residential buildings: evaluation of the performance in northern Italian climate
- 11:45 Elisa Van Kenhove, Peter De Vlieger, Jelle Laverge and Arnold Janssens
Towards energy efficient and healthy buildings: trade-off between Legionella Pneumophila infection risk and energy efficiency of domestic hot water systems
- 11:48 Tomoki Inagaki, Gyuyoung Yoon and Hideharu Niwa
Performance Prediction and Design Strategy of Earth-to-Air Heat Exchanger
- 11:51 Patricia Monzó, Alberto Lazzarotto, José Acuña, Johan Tjernström and Mikael Nygren
Monitoring of a borehole thermal energy storage in Sweden
- 11:54 Siwei Lou, Danny H.W. Li, Ulysse Arliguié, Eric W.M. Lee and Joseph C. Lam
Estimation of output energy performance of fixed and sun-tracking photovoltaic systems in practical environment
- 11:57 Thibault Quentin Péan, Luca Gennari, Ongun Berk Kazanci, Eleftherios Bourdakakis and Bjarne W. Olesen
Influence of the environmental parameters on nocturnal radiative cooling capacity of solar collectors
- 12:00 Florin Iordache and Horatiu Dragne
Dynamic thermal modeling for a system that uses a compression heat pump

10:30-12:00 Session SS 22: Ventilation & Air Distribution

Chairs: Shinsuke Kato and Markus Rösler

Location: Musiksalen

- 10:30 Beat Frei, David Burkhardt, Jochen Lang, Urs Greber, Dominic Jurt and Heinrich Huber
Measurement of air flow rates in evacuation stairwells of high-rise buildings by tracer gas methods
- 10:40 Kevin Michael Smith and Svend Svendsen
Control of Single-room Ventilation with Regenerative Heat Recovery for Indoor Climate and Energy Performance
- 10:50 Vojtěch Mazanec and Karel Kabele
The personal ventilation system with air temperature customization using a Peltier effect
- 11:00 Nina Schultz, Eugen Lichtner and Martin Kriegel
Unsteady Displacement Ventilation in Office Environments with Varying Thermal Loads
- 11:10 Yosuke Inoue, Takashi Kurabuchi, Jinya Takeuchi and Hajime Yoshino
Study of Efficiency of HVAC systems based on Optimization of Server Practical Form in Data Center by CFD
- 11:20 Daria Zukowska, Marie Wolsing, Malene Grysbæk and Christian A. Hviid
Field study of diffuse ceiling ventilation performance in a landscape office
- 11:30 Katarzyna Ratajczak and Edward Szczechowiak
Installation of decentralized ventilation system for ventilation of an indoor swimming pool
- 11:33 Katarzyna Ratajczak and Edward Szczechowiak
Evaporation rate in indoor swimming pools – monitoring of evaporation at a swimming pool facility and the impact of bathers on evaporation
- Clelia Moraes and Narciso Grimaldi Gomes
- 11:36 PROPOSAL of the DRAIN in PIPELINE of AIR CONDITIONING PIPE of COMMERCIAL AIRCRAFT with UNDER FLOOR AIR DIFFUSER and PERSONAL VENTILATION
- 11:39 Xiuyuan Du, Baizhan Li, Hong Liu, Yuxin Wu, Tengfei Cheng and Kechao Xia
Effect of nozzle air supply temperature and volume on flow field of a typical nozzle in aircraft cabin
- 11:42 Philippe Andre, Cleide Aparecida Silva, Elisabeth Davin, Sébastien Delclaye, Jules Hannay, Jean Lebrun and Vincent Lemort
About the use of CO₂ as tracer gas for identification of air renewal; combination with co-heating test
- 11:45 Hainan Zhang, Shuangquan Shao and Changqing Tian
Performance investigation and field test on integrated system of mechanical refrigeration and thermosyphon for free cooling of data centers
- 11:48 Jinya Takeuchi, Takashi Kurabuchi, Hajime Yoshino, Yosuke Inoue, Hirotaka Kakehashi, Maika Miyajima and Sihwan Lee
Evaluation Method on Air-Conditioning Efficiency and Recirculation Efficiency in Data Center
- 11:51 Gratiela Maria Tarlea, Ion Zabet and Ana Tarlea
Modeling of Thermodynamic Processes for One Stage Refrigeration System with Scroll Compressors
- 11:54 Zuzana Strakova and Peter Pribyl
The Hygienic Ventilation in Combination with Radiant Heating for Industry Buildings
- 11:57 Francesco Guarino, Sonia Longo, Marina Mistretta, Marco Ferraro, Giovanni Tumminia, Vincenzo Antonucci and Maurizio Cellura
The Role of Natural Ventilative Cooling in NZE Temporary and Emergency Shelters Design: a Mediterranean Case Study

10:30-12:00 Session SS 25: Building Performance

Chairs: Kwang-Woo Kim and Rune Korsholm Andersen

Location: *Det Lille Teater*

- 10:30 Marco Ortiz, Stanley Kurvers and Philomena Bluysen
Energy consumption and Comfort in Homes
- 10:40 Ayako Yasuoka, Tsuyoshi Ueno and Toshiyuki Miyanaga
A survey on residential air conditioner in Japan: Selection processes and methods of use
- 10:50 Simona D'Oca, Stefano Corgnati, Anna Laura Pisello and Tianzhen Hong
Introduction to an occupant behavior motivation survey framework
- 11:00 Henrik N. Knudsen, Rune Korsholm Andersen, Anders R. Hansen and Kirsten Gram-Hanssen
House Owners' Interests and Actions in Relation to Indoor Temperature, Air Quality and Energy Consumption
- 11:10 José Alberto Diaz and María José Jiménez
Experimental assessment of occupancy patterns of rooms in an office building. Comparison of different approaches
- 11:20 Anna Laura Pisello, Veronica Lucia Castaldo, Cristina Piselli, Claudia Fabiani and Franco Cotana
Can we assume that peers behave the same? Results from a continuous monitoring campaign in an office building
- 11:30 Kurt Emil Eriksen
Status on national legislation for implementing Nearly Zero Energy Buildings
- 11:40 Nicholas Zibin, Radu Zmeureanu and James A. Love
A bottom-up method to calibrate building energy models using Building Automation System (BAS) trend data
- 11:50 Ana Tisov, Jan Siroky and Jakub Kolarik
Key figures for joint assessment of indoor environmental quality (IEQ) and energy consumption in modern buildings – a literature review
- 11:53 Samer Hassanie and Ivo Martinac
A Holistic Approach to Building Performance: A Case Study of an Office Building in Sweden
- 11:56 Anastasios Ioannou, Laure Itard and Wim Kornaat
Occupant behaviour related to energy use in the residential sector: results from the Ecommon monitoring campaign.
- 11:59 Asaki Chiba, Takashi Akimoto, Takeshi Kondo and Yasuko Adachi
The Energy Reduction Effect due to Lifestyle Changes
- 12:02 Aya Hagishima, Ryosuke Fukami, Zaki Sheikh Ahmad, Naoki Ikegaya, Nur Fadhilah H M Hanip and Jun Tanimoto
Cross cultural comparison of occupants' behavior towards space cooling in residences between Japan and Malaysia
- 12:05 Huseyin Gunhan Ozcan, Huseyin Gunerhan, Nurdan Yildirim Ozcan, Gokhan Demirkiran and Elif Esra Aydin
A Comparative Study on Thermal Load Calculation Methods for a Residential Building
- 12:08 Yanjie Lv, Deyu Sun, Shicong Zhang and Wei Xu
Ultra-low-energy building new fresh air ventilation system heat load calculation under different operating strategies
- 12:11 Dimitrios-Stavros Kapetanakis, Eleni Mangina, El Hassan Ridouane, Konstantinos Kouramas and Donal Finn
FORECASTING COMMERCIAL BUILDING HEATING LOADS: A COMPARISON USING REAL AND SYNTHETIC DATASETS

10:30-12:00 Session SS 36: Commissioning, Control & Energy Management

Chairs: Ardeshir Mahdavi and Steffen Petersen

Location: Europahallen

- 10:30 Simon Harasty, Steven Lambeck and Alessio Cavaterra
Model predictive control for preventive Conservation using artificial neural networks
- 10:40 Philipp Krimmel, Nico Goldschmidt, Robin Meier, Horst Schulte and Birgit Müller
Model based control for an Optimized Dehumidification with air bypass
- 10:50 Norbert Sterl, Matthias Schuss and Ardeshir Mahdavi
Exploring the energy saving potential of model-predictive controls via dynamic co-simulation
- 11:00 Saeed Sayadi, George Tsatsaronis and Tatiana Morosuk
Reducing the Energy Consumption of HVAC Systems in Buildings by Using Model Predictive Control
- 11:10 Julian Buderus, Arno Dentel and Wolfram Stephan
Model predictive control for air conditioning systems in production sites
- 11:20 Hussain Syed Asad, Richard Kwok Kit Yuen and Eric Wai Ming Lee
Disturbance Modeling with Subspace Identification Method
- 11:30 Markus Gwerder and Bruno Illi
Application of Model Predictive Cold Storage Management in a Demonstrator Building
- 11:40 Krzysztof Arendt, Ana Ionesi, Muhyiddine Jradi, Ashok Singh, Mikkel Baun Kjærgaard, Christian Veje and Bo Nørregaard Jørgensen
A Building Model Framework for a Genetic Algorithm Multi-objective Model Predictive Control
- 11:50 Krystyna Dawson
Long & winding road from policy targets to building performance
- 12:00 Luka Lackovic and Harald Garrecht
Energy efficient buildings and share of energy surplus - SWIVT-Project

10:30-12:00 Session SS 37: Heating & Cooling

Chair: Kai Siren

Location: Hal Øst

- 10:30 Hye-Won Dong, Su-Young Jo and Jae-Weon Jeong
Energy Saving Potentials of Desiccant-enhanced Evaporative (DEVap) Cooling System with District Heat Source
- 10:40 Joon-Young Park, Sang-Hyeon Cho and Jae-Weon Jeong
Statistical analysis of the liquid desiccant system operation parameters in hot and humid climates
- 10:50 Stefan Vandaele and Hiroshi Aihara
Optimisation of VRF systems in buildings by monitoring
- 11:00 Kousuke Kibo, Shinichi Kasahara, Takuya Kotani, Yoshinori Yura, Masafumi Hirota, Yuta Teranishi, Yoichi Miyaoka, Katsuaki Nagamatsu and Takashi Namiwo
Development of high efficiency VRF systems under partial heat load for commercial buildings
- 11:10 Qi Cheng, Shengwei Wang and Wenjie Gang
Performance evaluation for the optimal design of chiller plants concerning uncertainty and reliability
- 11:20 Hashim Elzaabalawy, Ahmed El-Assy and Mohamed Abdelaziz
An Analytical Approach to Optimize the Performance of the Bypass for Two-Way Control Valves in Chilled Water Central Air-Conditioning Systems
- 11:30 Christian Struck, Kees Blok De, Jan Wit De, Herbert Berkhout, Annemarie Weersink, Pawel Owzcarek and Willem Brus
Towards the application of thermo-acoustic cooling in office buildings: performance governing parameters and models for performance predictions
- 11:40 Jiajia Gao, Xinhua Xu, Gongsheng Huang and Hang Wan
Enhanced Space Temperature Control of an Air-conditioning System with Small-scale ON/OFF Chiller
- 11:50 Chi Yan Tso, Ka Chung Chan, Chili Wu and Christopher Y.H. Chao
Experimental Investigation of a Zeolite 13X/CaCl₂ – Water Adsorption Cooling System

10:30-12:00 Session TS 2: Business and technical concepts for deep energy retrofits of public buildings (IEA EBC Annex 61)

Location: Gæstesalen

- 10:30 Ove Morck, Alexabder Zhivov and Ruediger Lohse
Best practices of Deep Energy Retrofit building projects from around the world
- 10:40 Alexander Zhivov and Rüdiger Lohse
How to Achieve a Deep Energy Retrofit (DER) with Major Building Renovation
- 10:50 Jørgen Rose, Kirsten Engelund Thomsen and Ove Christen Mørck
Comprehensive Renovation of an Old Multi-Storey Office Building - Analysis and Monitoring
- 11:00 Alexander M. Zhivov and William Wolfe
A Parametric Study of Core Energy Efficiency Measures Used in Deep Energy Retrofits for Dining Facilities and Child Development Centers in U.S. Climate Zones
- 11:10 Galina Stankevica, Andris Kreslins, Anatolijs Borodinecs and Renars Millers
Achieving deep energy retrofit in Latvian public building - simulation study.
- 11:20 Claudio Nägeli and York Ostermeyer
Less than the sum of its parts – Economic and Environmental Challenges in designing Deep Energy Retrofit Concepts, the Case of Sweden

10:30-12:00 Session WS 11: CCHVAC-REHVA

Organiser: Guangyu Cao

Presenters:

Chair persons from REHVA: Prof. Jarek Kurnitski - Prof. Corgnati Stefano Paolo, Vice President of REHVA

Chair persons from CCHVAC: Prof. Wei Xu President of CCHVAC - Prof. Xu Zhang Tongji University

Scope:

The objective of the workshop is to discuss the latest policies, design guidelines/standards and regulations regarding the development of nZEB and energy efficient HVAC solutions for nZEB in EU and China. Attendees will get an overview about the development of policies, design guidelines/standards and regulations of nZEB in selected countries.

Location: Harlekingsalen

**10:30-12:00 Session 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)**

Organisers: TightVent, AIVC, QUALICHeCK

Presenters:

Chairs: François Rémi Carrié and Benjamin Jones

Presenters: Dr. Marc Thuillard,

Dipl. Ing. Forest Reider,

Dipl. Ing. Reto Hobi,

Dipl. Ing. Christian Luchsinger

Background:

Looking 5 years behind, it is clear that significant progress has been made in several European countries with regard to building airtightness. On the other hand, this concern is still lagging behind in many regions and/or building sectors, although relevant in terms of energy savings and indoor environmental quality. In addition, very few European countries have taken steps to foster airtight ductworks.

Scope:

All European climates, all building types.

Location: Columbinesalen

10:30-12:00 Session WS 23: Quality management for building performance: Closing the gap between design and operation (QUANTUM)

Organiser: IGS, TU Braunschweig, Germany - www.igs.bau.tu-bs.de

Presenters:

- Stefan Plessner - IGS, TU Braunschweig, Germany
- Michele Liziero - EnergyTeam SPA, Italy
- Jan Mehnert - synavision GmbH, Germany
- Niels Delaere - Factor4, Belgium

Scope:

The tremendous advances in technology and the integral approach to building concepts enable us to design, build and operate highly energy efficient buildings - principally. Unfortunately, complexity of hydraulics and automation has also increased. As a result, we face a new risk with high intensity: tackling the lack of quality in building performance will be the decisive challenge for buildings.

QUANTUM, a research project within Europe's Horizon 2020 framework, 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 discuss current risks for building performance and present a specific quality management approach as a promising answer. Three innovative tools will be demonstrated to show how we can effectively introduce quality management in building projects to improve building performance.

Location: Bondestuen

**10:30-12:00 Session WS 28: Cost-effective deep renovation of buildings
(EU H2020 MORE-CONNECT, EU H2020 REFURB and IEA EBC Annex 56)**

Organiser:

- EU H2020 MORE-CONNECT
- EU H2020 EE REFURB
- IEA EBC Annex 56

Speakers:

- Manuela Almeida
- Peter Op 't Veld
- Tine Steen Larsen
- Ove Christen Mørck

Short description:

The social and environmental urgency of large-scale integrated retrofitting of the European building stock is widely acknowledged. However, the building sector has not been able yet to devise a structural, large-scale retrofitting process and systematic approach. There is an urgent need for cost-effective solutions to accelerate deep renovation of buildings. Important is to promote deep renovation is to use the right balance between the energy conservation and efficiency measures for one side and the measures and technologies that promote the use of renewable energy on the other. As well as the optimization of material use versus energy reduction.

New opportunities like the application of prefabricated modules for building renovation could be one of the solutions for this. A combination of product innovation, fully automated production processes and new market models have the potential to reduce costs, reduce the renovation time and disturbance for occupants and, at the same time, enhance quality and performances, both in terms of energy efficiency as indoor climate.

In this workshop the latest finding a from key projects on cost-effective deep renovation will be presented as an introduction to further discussions. Projects addressed will be:

- H2020 MORE-CONNECT: Development and advanced prefabrication of innovative, multifunctional building envelope elements for Modular Retrofitting and smart Connections
- H2020 EE REFURB: Regional process innovations for Building renovation packages opening markets to zero energy renovations
- IEA EBC Annex 56: Cost Effective Energy and Carbon Emissions Optimization in Building Renovation

Location: Latinerstuen

10:30-12:00 Session WS 30: Integration of Energy Storage in Buildings and Districts for Demand Response and Renewable Integration (IEA ECES Annex 31)

Organiser:

IEA ECES Annex 31: "Energy Storage with Energy Efficient Buildings and Districts: Optimization and Automation". Task A: Modelling of storage for demand response and renewable integration; optimization of Design and Automation.

Speakers/agenda:

1. Annex 31 Introduction and recent work on District, Building and Systems Modelling (Haghighat et al.) 15mins.
2. Modelling of Storage in Low Energy Buildings and Districts: Methods and Tools Overview (Tuohy et al.) 15mins.
3. Regional and District perspectives from Denmark: ENERGYplan, and 4GDH (Lund et al.) 30mins

Location: Laugstuen

13:30-15:00 Session SS 27: Building Performance

Chairs: Andreas K. Athienitis and Tine Steen Larsen

Location: Det Lille Teater

- 13:30 Anne Kirkegaard Bejder and Mary-Ann Knudstrup
Designing Holistic Zero Energy Homes in Denmark
- 13:40 Birgit Rader and Ardeshir Mahdavi
Supporting integrated approaches to the design of buildings and their technical systems
- 13:50 Camilla Brunsgaard
Sustainability Certification (DGNB) and Design Process in the Case of four Healthcare Centres
- 14:00 Fabiana Cambiaso
ZEB and public spaces energyplus. Architectural and urban integration of active energy systems: criteria and guidelines
- 14:10 Jochen Müller, Michaela Lambertz and Franziska Schüttler
How to ensure that well-planned and certified green buildings are also well performing?
- 14:20 Ece Kalaycıoğlu and Ayşe Zerrin Yılmaz
A Methodology of Building Design In A Green Settlement to Achieve Maximum CO2 And Energy Consumption Reduction
- 14:30 Kevin de Bont, Wim Zeiler and Joep van der Velden
Integral Design method to support nZEB design: a real project experiment
- 14:33 Torben Østergård, Steffen E. Maagaard and Rasmus L. Jensen
Thermal comfort in residential buildings by the millions - Early design support from stochastic simulations
- 14:36 Adrian Sansoldi Lamano, Zhou Jian and Bharath Seshadri
INTEGRATED PERFORMANCE-BASED DESIGN APPROACH FOR LABORATORY INTENSIVE BUILDINGS: A CASE STUDY IN SINGAPORE
- 14:39 Roser Capdevila, Oussama Souaihi, Joan López, Joaquim Rigola, Oriol Lehmkihl and Assensi Oliva
ENERGY SIMULATION OF A SINGLE FAMILY DWELLING AS A TEST BENCH FOR CLIMATE CONTROL SYSTEM ASSESSMENT
- 14:42 Saqib Javed, Roman Lechner and Jan Behrens
Testing and Validation of TEKNOSim: A Building Energy Simulation Program
- 14:45 Borja Badenes, Marco Belliardi, Adriana Bernardi, Michele De Carli, Maria Di Tuccio, Giuseppe Emmi, Antonio Galgaro, Samantha Graci, Luc Pockele, Arianna Vivarelli, Sebastian Pera, Javier F. Urchueguía and Angelo Zarrella
DEFINITION OF STANDARDIZED ENERGY PROFILES FOR HEATING AND COOLING OF BUILDINGS
- 14:48 Souaihi Oussama, Joan Lopez, Roser Capdevila, Joaquim Rigola, Oriol Lehmkuhl and Assensi Oliva
A COMPLETE ANALYSIS OF THE HEAT, AIR AND MOISTURE TRANSFER ON BUILDING PERFORMANCE
- 14:51 Hawra Askari and Hasim Altan
Intelligent Sustainable Government Buildings in the UAE
- 14:54 Rofaïda Lahrech, Jean Robert Millet, Bassam Moujalled, Julien Borderon, Laurent Reynier, Constance Lancelle and Philippe Cardon
How does predicted energy consumption meet measured energy consumption in low energy buildings: case study?

13:30-15:00 Session SS 38: Heating & Cooling

Chair: Maria Kolokotroni

Location: Radiosalen

- 13:30 Stefan Holberg, Ricardo Losada, Klavs Kamuk and Finn Nielsen
Coating to Prevent Frost: Less Defrosting - More Energy Efficiency
- 13:40 Joseph Firrantello, William Bahnfleth, Ross Montgomery and Paul Kremer
Field Study of Energy Use-Related Effects of Ultraviolet Germicidal Irradiation of a Cooling Coil
- 13:50 Tsuyoshi Ueno, Hiroyuki Kitahara and Toshiyuki Miyana
Development of Heat Source Characteristic Model of Room Air Conditioner During Heating Peiod
- 14:00 Juan Prieto, Jordi Ortiga, Xabier Peña, Laura Alonso, Khaled Gommed, Gershon Grossman and Alberto Coronas
Experimental analysis of a hybrid liquid desiccant system with non-adiabatic air-solution contactors
- 14:10 Yi Guo, Zhenjun Ma, Ali Al-Jubainawi, Paul Cooper and Long Nghiem
Development and Performance Evaluation of A Liquid Desiccant Air Conditioning System with Hybrid Electrodialysis and Thermal Regeneration
- 14:20 Matthias Winkler, Florian Antretter, Christoph Mitterer and Hartwig M. Künzle
Chilled Water Wall
- 14:30 Deniz Yilmaz, Ali Özyurt and Özkal Sönmez
Experimental and Numerical Analysis of a Heat Pump Driven Chilled Ceiling and Floor Heating Systems in a Test Room
- 14:40 Christian Fieberg
Regenerative Cooling of Buildings using an Open Sorption Cycle
- 14:50 Xiaofeng Niu, Guoying Xu, Qing Xu, Yue Zhang and Jiying Ou
Characteristics of microcapsulated phase change material used in auto internally-cooled liquid desiccant system

13:30-15:00 Session SS 4: Building Technology

Chair: Michal Pomianowski

Location: Hal Øst

- 13:30 Nils Rage, Ongun Berk Kazanci and Bjarne Wilkens Olesen
Validation of a numerical model of hanging acoustic ceiling combined with TABS
- 13:40 Nils Rage, Ongun Berk Kazanci and Bjarne Wilkens Olesen
Numerical simulations of the effect of hanging sound absorbers on TABS
- 13:50 Pouria Fatalian, Kliment Kostadinov, Jelle Laverge and Wim Boydens
Performance study of concrete core activation for office buildings in a hot-humid climate
- 14:00 Amandine Piot, Arnaud Jay, Laury Barnes-Davin, Damien Rogat and Etienne Wurtz
Observation of the energy exchanged by a concrete slab submitted to solar radiation in winter: small scale experimentation
- 14:10 Nicolas Vermeulen, Matheo Cornelis, Wim Boydens, Jelle Laverge and Thomas Bockelandt
A comparative study on concrete core activation and chilled ceilings in geothermal, nearly zero energy office buildings
- 14:20 Li Liang, Wei Wang, Jiyang Liu, Fenghua Qin and Linhua Zhang
Field Study on the Performance of Intermittently Operated Radiant Floor Heating System in an Office
- 14:30 Ralf Gritzki, Claudia Kandzia, Markus Rösler, Christian Scheer and Clemens Felsmann
Numerical and experimental study of thermo-active textiles for energy-efficient heating and cooling of rooms
- 14:40 Maarten Sourbron, Bram van der Heijde, Burt Battel, Robbe Vande Ginste, Damien Picard and Lieve Helsen
Design of a controller model for a concrete core activation floor having air cavities
- 14:50 Manuel Andrés Chicote, Ana Tejero González, Eloy Velasco Gómez and Francisco Javier Rey Martínez
The Potential of Thermo-Active Building Systems (TABs) in Southern Europe: a Simulation Study

13:30-15:00 Session SS 41: Weather & Microclimate

Chairs: Kwang Ho Lee and Gratiela Maria Tarlea

Location: Musiksalen

- 13:30 Parham Mirzaei, Dave Olsthoorn, Michael Torjan and Fariborz Haghighat
Building's Indoor Thermal Condition in Various Urban Neighbourhoods
- 13:40 Laura Glasberg, Milena Vuckovic, Kristina Kiesel and Ardeshir Mahdavi
The Microclimate of Urban Courtyards: A Case Study
- 13:50 Hu Du, Phil Jones and Simon Lannon
Creating localised near future weather data for predicting the performance of buildings in the UK
- 14:00 Adriana Bernardi, Michele De Carli, Maria Di Tuccio, Giuseppe Emmi, Antonio Galgaro, Samantha Graci, Sebastian Pera, Arianna Vivarelli and Angelo Zarrella
A DATA BASE FOR EUROPEAN CLIMATIC DATA FOR ENERGY POTENTIALS AND MAPPING
- 14:10 Livio Mazzarella and Martina Pasini
On time-alignment of weather data in Building Performance Simulation
- 14:20 Marania Hopuare, Anthony Jamelot, Franck Lucas, Charlotte Besnard and Pascal Ortega
High resolution wind regimes over Tahiti to assess natural ventilation potential
- 14:30 Kristina Kiesel, Milena Vuckovic and Ardeshir Mahdavi
The scope and implications of the urban microclimate variance: a case study
- 14:40 Clelia Moraes, Priscila Watanabe, Narciso Grimaldi Gomes and Fernanda De Prince Calegher
Sustainable buildings with mechanical ventilation HVAC ventilation strategy: Challenges and alternatives

13:30-15:00 Session SS 9: Sustainable Energy

Chairs: Eckhard Groll and Christian A. Hviid

Location: Europahallen

- 13:30 Natasa Nord, Maren E. Ingebretsen and Ivar S. Tryggestad
Possibilities for transition of existing residential buildings to low temperature district heating system in Norway
- 13:40 Jorn K. Gruber, Matteo Favero and Milan Prodanovic
Feasibility Study for the Installation of On-Site Energy Resources in a Public Building
- 13:50 Bahar Saeb-Gilani, Barbara Giorgi, Max Bachmann and Martin Kriegel
Potential analysis of heat sharing at different temperature levels in a district
- 14:00 Daniel Rohde, Trond Andresen and Natasa Nord
Interaction between a building complex with an integrated thermal energy system and a district heating system
- 14:10 Seda Genc, Eray Bozkurt and Nurdan Yildirim
Zero Energy Olive Oil Production Plant Design by Using Waste Valorisation
- 14:20 Tomoyuki Chikamoto, Yoichi Kobayashi, Kentaro Sekine and Myonghyang Lee
Thermal Storage Radiation Air-conditioning System from the Concrete Slab that uses Underground Heat and Solar Heat Directly
- 14:30 René L. Kobler, Ralf Dott, Gregor Steinke and Achim Geissler
GEMEN: Implementation of Power-to-Gas in the Building Sector
- 14:40 Carolina Carmo, Olivier Dumont, Mads P. Nielsen and Brian Elmegaard
Renewable Energy based Cogeneration Systems for nZEB Residential Buildings: a review

13:30-15:00 Session TS 1: High temperature cooling & low temperature heating in buildings (IEA EBC Annex 59)

Location: Laugstuen

- 13:30 Tao Zhang, Xiaohua Liu, Jun Liu and Yi Jiang
Similarity and distinction of exergy and entransy analyses in air-conditioning system
- 13:40 Youness Ajaji and Philippe André
Analysis of HVAC indoor terminal units by using T-Q diagram: An experimental study
- 13:50 Haida Tang, Xiaohua Liu and Yi Jiang
Study of the Equivalent Thermal Resistance in Periodic Heat Transfer Processes
- 14:00 Cristina Becchio, Annamaria Buonomano, Francesca Cappelletti, Stefano Paolo Corgnati, Tiziano Dalla Mora, Adolfo Palombo, Fabio Peron and Piercarlo Romagnoni
Towards nZEBs: experiences in Italy
- 14:10 Francois Randaxhe, Vincent Lemort and Jean Lebrun
Towards nzeb goal for newly built office buildings in Europe using high temperature cooling.
- 14:20 Bowen Guan, Xiaohua Liu and Tao Zhang
Performance evaluation and experimental study on heat recovery device
- 14:30 Ogun Berk Kazanci, Masanori Shukuya and Bjarne W. Olesen
Effects of Floor Covering Resistance of a Radiant Floor on System Energy and Exergy Performances

13:30-15:00 Session TS 5: Energy Flexible Buildings (IEA EBC Annex 67)

Location: Gæstesalen

- 13:30 Søren Østergaard Jensen and Anna Joanna Marszal-Pomianowska
IEA EBC Annex 67 Energy Flexible Buildings
- 13:40 Reino Ruusu, Sunliang Cao, Ala Hasan, Juha Kortelainen and Tommi Karhela
Developing an Energy Management System for optimizing the interaction of a residential building with the electrical and thermal grids
- 13:50 Christian Finck, Rongling Li and Wim Zeiler
Operational load shaping of office buildings connected to thermal energy storage using dynamic programming
- 14:00 Glenn Reynders, Jan Diriken and Dirk Saelens
Quantifying active demand response potential: impact of dynamic boundary conditions
- 14:10 Anna Marszal-Pomianowska, Iker Diaz de Cerio Mendaza, Per Heiselberg and Birgitte Bak-Jensen
Application of high-resolution domestic electricity load profiles in network modelling. A case study of low voltage grid in Denmark
- 14:20 Jérôme Le Dréau
Demand-side management of the heating need of residential buildings
- 14:30 Konstantin Klein, Doreen Kalz and Sebastian Herkel
Study on load shifting potential for the heating and cooling of an office building under consideration of variable grid conditions in Germany
- 14:40 Theis Heidmann Pedersen, Michael Dahl Knudsen, Rasmus Elbæk Hedegaard and Steffen Petersen
Handling Stochastic Occupancy in an Economical Model Predictive Control Framework for Heating System Operation in Dwellings
- 14:50 Rasmus Elbæk Hedegaard, Theis Heidmann Pedersen, Michael Dahl Knudsen and Steffen Petersen
Identifying a comfortable excitation signal for generating building models for model predictive control: a simulation study
- 15:00 Michael Dahl Knudsen, Rasmus Elbæk Hedegaard, Theis Heidmann Pedersen and Steffen Petersen
Model Predictive Control of Space Heating and the Impact of Taxes on Demand Response: A Simulation Study

13:30-15:00 Session TS 6: A fossil free building stock realized based on low temperature district heating (IEA DHC Annex TS1)

Organiser: IEA DHC Annex TS1: "Low Temperature District Heating for Future Energy Systems"

www.iea-dhc.org

Short description:

Low temperature district heating offers a fairly easy and cost effective way to realize a fossil free heating system compared to solutions based on renewable energy production on each building. The utilization of low network temperatures is an economically competitive approach to the heating energy supply of communities because of the easy integration of inexpensive renewable or waste heating energy into the supply systems. From an economic point of view, relatively high price stability and be expected due to the use of locally available renewable, or surplus energy sources. It can be seen from a number of analyzed case studies / community developments that especially for new areas a district heating supply offers a very attractive way to supply heating energy, even to low energy or even passive houses. Most technical challenges on the grid and heat production side have been solved over the last years, but the integration of these ideas into the building stock, especially for existing buildings offers a lot of challenges, as there is the hygienic domestic hot water preparation in low temperature grids or the installation of low temperature room heating systems. The session should enable the exchange of knowledge and viewpoints from district heating and building technology experts with respect to overcome the technical barriers for a further development of this promising technology in the existing building stock. It is closely related to the joint research project within the frame of the international Energy Agency District Heating and Cooling program, the Annex TS1 on "Low Temperature District Heating for Future Energy Systems".

Presentations:

- 1) Successful Implementation of Low Temperature Heating Systems in Communities. Dr. Dietrich Schmidt, Fraunhofer IBP, Germany.
- 2) Technologies for supply of heating and hot water to buildings based on low temperature district heating. Prof. Svend Svendsen, DTU, Denmark.
- 3) Building solutions for low temperature heat supply. Oddgeir Gudmundsson, DANFOSS, Denmark.
- 4) Technical, ecological and environmental Evaluation of different district heat supply and space heating concepts. Dr. Markus Blesl, University of Stuttgart, Germany.
- 5) Improved interfaces for enabling integration of low temperature and distributed heat sources – requirements and examples. Prof. Natasa

Location: Latinerstuen

13:30-15:00 Session WS 13: Dynamic solar shading in HVAC and daylight design (ES-SO/EQUA)

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

Scope:

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.

Location: Bondestuen

13:30-15:00 Session WS 14: Zero Internal Heating/Cooling Load Air-Conditioning system (SHASE)

Presenters:

Chair: Dr. Kato

Co-Chairs: Dr. Zhang, Dr. Hiyama

Scope:

Commercial buildings (including office building, department et.al), public buildings (school, hospital, government buildings, hotels et.al) and buildings with air conditioning system in any climates are of the scope of this work.

Location: Harlekinsalen

13:30-15:00 Session WS 15: Perspectives for assessing ventilative cooling potential in Energy Performance regulations (venticool, IEA Annex 62, AIVC, QUALICHeCK)

Organisers:

Venticool, IEA Annex 62, AIVC, QUALICHeCK

Presenters:

Peter Holzer

François Rémi Carrié

Background:

Ventilative cooling—i.e., the use of natural or mechanical ventilation strategies to cool indoor spaces—can be very effective to reduce the cooling energy demand in buildings in summer or mid-season conditions. While energy simulation tools can to some extent be used to assess ventilative cooling potential, finding the appropriate trade-off between accuracy and simplicity for regulatory Energy Performance methods is very challenging.

Scope:

All climates, all building types.

Location: Columbinesalen

15:30-17:30 Session Competition: World Student Competition

Location: Albatrosstuen

15:30-17:30 Session SS 17: Ventilation & Air Distribution

Chairs: T.T. Chow and Pawel Wargocki

Location: Radiosalen

- 15:30 Gordon Sharp
Increasing Lab & Commercial Building Airside Energy Efficiency While Still Improving IEQ
- 15:40 Hansjörg Rotheudt and Martin Kriegel
Short Circuit Flows in Cleanrooms with Mixing Ventilation
- 15:50 Alžběta Kohoutková and Karel Kabele
Case study of ventilation strategy in a room with gas appliances
- 16:00 Maya Myoki, Takashi Kurabuchi and Sihwan Lee
Prediction of Air Quality in a Hallway of an Apartment where a Gas Water Heater is installed
- 16:10 Sasan Sadrizadeh and Peter Ekolind
A new principle of ventilation system for operating rooms: Temperature-Controlled Air Flow
- 16:20 Y. Huo, Y.W. Ng and W.K. Chow
A Study on Gas Explosions in Garages: LPG as Fuel or for Air-Conditioner?
- 16:30 Shenglan Xiao and Yuguo Li
An evaluation of different control measures on SARS airborne transmission in a hospital with a multi-zone modelling method
- 16:40 Shenglan Xiao and Yuguo Li
Multi-route transmission of influenza in a hospital ward
- 16:50 Christian A. Hviid and Julian Lessing
Experimental study of the heat transfers and passive cooling potential of a ventilated plenum designed for uniform air distribution
- 17:00 Hua Qian, Qi Zhou and Xiaohong Zheng
Evaluation of nature ventilation to reduce airborne in general hospital wards by long term field measurement in Nanjing
- 17:10 Qi Zhou, Hua Qian and Haigang Ren
Numerical study of potential of natural ventilation for reducing airborne infections
- 17:20 Valeria Hofer and Martin Kriegel
The Effect of Particle Source Position and Air Supply Location on Contaminant Dispersion in Displacement Ventilation Systems

15:30-17:30 Session SS 23: Ventilation & Air Distribution

Chairs: Francois Remi Carrie and Ryozo Ooka

Location: Det Lille Teater

- 15:30 Olli Seppänen, Jorma Railio and Tiina Strand
Proposed improvements in Finnish ventilation regulations for better IAQ and energy efficiency
- 15:40 Pierandrea Magagna, Michael Schmidt, Mohammad Reza Adili, Michele De Carli and Wilmer Pasut
Energy performance comparison of decentralized vs. centralized mechanical ventilation systems
- 15:50 Anders Olsen, Lillian Katrine Kofod and Rasmus Wiebe Johansen
Eco-friendly Breathing Zone Ventilation with Textile Ducts
- 16:00 Steffen Petersen and Thorbjörn Persson
Thermal Comfort Performance of a suspended ceiling system with non-perforated tiles as diffuse ventilation air inlet
- 16:10 Yusuf Cihat Aydin and Parham A. Mirzaei
The Wind Driven-ventilation Enhancement in Low-Rise Traditional Turkish Houses
- 16:20 Panu Mustakallio, Zhecho Bolashikov, Tetiana Mialyk, Risto Kosonen and Arsen Melikov
Energy efficiency potential of radiant and convective room units with utilization of building thermal mass in cooling design conditions
- 16:30 Henning Freitag, Paul Mathis and Dirk Müller
Influence of Thermal Boundary Conditions on the Entrainment Behavior of an Active Chilled Beam
- Li Wang, Shinsuke Kato, Weirong Zhang, Hyeon Hwang, Taiki Sato and Kentaro Sekine
- 16:40 Influence on Indoor Thermal Environment by Different Location Sensors and Range of Temperature Control for active chilled beam in an Office Room with Liquid Cooling Air-conditioning System
- 16:50 Sasan Sadrizadeh and Peter V Nielsen
Modelling of coughed droplets in a hospital ward
- 17:00 Pei Zhou, Caroline Fong and Alvin C.K. Lai
Numerical simulation for bioaerosol removal of applying negative ionizers in a ventilated room
- 17:10 Ryo Sekine, Tatsuo Nobe, Masanari Ukai, Hiroshi Muramatsu and Hanako Sugawara
Evaluation of an Air Conditioning System Using Climate Properties in a Hospital

15:30-17:30 Session SS 24: Building Performance

Chair: Jan Hensen

Location: Musiksalen

- 15:30 Corentin Kuster, Michele De Carli, Giuseppe Emmi and Giulia Alessio
A simplified calculation method to evaluate heating and cooling loads of buildings
- 15:40 Andreas Hantsch, Ronny Mai and Uwe Franzke
Energy Efficiency of Cooling Generation in Buildings
- 15:50 Søren Gedsø and Arnkell Petersen
Heating and Cooling Simulation in BIM in Norway
- 16:00 Frans Joosstens and Laure Itard
How to use Building Information Systems for a transition towards Sustainable Building Operation
- 16:10 Johan Groeneveld and Wim Zeiler
Building performance simulation from a BIM: How easy is it really?
Ljiljana Marjanovic-Halburd and Jackline Baragu Kibe
- 16:20 A CASE STUDY INVESTIGATING THE OPPORTUNITIES FOR BETTER OPERATIONAL & MANAGEMENT EFFICIENCY ARISING FROM BIM MODEL PROCESSES
Sen Huang, Mats Vande Cavey, Raymond Sterling, Wangda Zuo, Lieve Helsen, Alberto Giretti, Marco Bonvini, Zheng O'Neill, Michael Wetter, Andrea Costa, Gesa Benndorf,
- 16:30 Ralf Klein, Bing Dong, Marcus Keane and Ando Andriamamonjy
IEA Annex 60 Activity 2.3: model use during operation, approach and case studies
- 16:40 Freja Nygaard Rasmussen and Harpa Birgisdóttir
Life cycle embodied and operational energy use in a typical, new Danish single-family house
- 16:50 Harpa Birgisdottir and Freja Nygaard Rasmussen
Technical systems' share of embodied energy in Danish building LCA cases
- 17:00 Tatsuo Oka, Keizo Yokoyama and Makoto Yamamoto
Introduction of Annex 57 - Evaluation of Embodied Energy/CO₂eq for Construction Worldwide and Measures to Reduce Them-
- 17:10 Sihem Guernouti and Myriam Humbert
Integration of the stochastic models of occupancy behavior schedules in BES tool for accurate prediction of energy consumption

15:30-17:30 Session SS 28: Building Performance

Chair: Peter Holzer

Location: Gæstesalen

- 15:30 Gabrielle Masy, Youness Ajaji, Pauline Abrahams, Sebastien Declaye, Jean Lebrun and Philippe Andre
Energy performance of buildings: bridging the gap between research and practice
- 15:40 Salah Imam, David Coley and Ian Walker
Studying the relation between energy modellers' literacy and the performance gap
- 15:50 Sekhar Kondepudi, Duwaraka Yoganathan, Jodi Neovino and Sumanth Manthapuri
Using Sensors and the Internet of Things to better understand Energy Behavior in a Commercial Office Building
- 16:00 Constantinos A. Balaras, Elena G. Dascalaki, Kalliopi G. Droutsa and Simon Kontoyiannidis
ACTUAL & CALCULATED HEATING ENERGY CONSUMPTION IN HELLENIC DWELLINGS USING DATA FROM EPCs AND FIELD STUDIES
- 16:10 Barbara Wauman, Dirk Saelens and Hilde Breesch
Assessment of simplified calculation method for energy use for heating in school buildings
- 16:20 Guillaume Ansanay-Alex, Yassine Abdelouadoud and Pascal Schetelat
Statistical and Stochastic Modelling of French Households and Their Energy Consuming Activities
- 16:30 T.J. Baas, W.H. Maassen, H.N. Maaijen and W. Zeiler
Predicting Energy Savings for Energy Performance Contracting: the Impact of the Energy Performance Gap
- 16:40 Vincenzo Corrado, Ilaria Ballarini, Simona Paduos and Elisa Primo
The energy performance assessment of nZEBs: limitations of the quasi-steady state approach
- 16:50 Lone H. Mortensen
Danish Sector Guide for Calculation of the Actual Energy Consumption
- 17:00 Ian Knight, Keith Sims, Mark Durdin and Afroditi Konidari
Implementing the use of Operational Data in buildings
- 17:10 Jaap Hogeling
The flexible approach of the CEN and ISO standards on Energy Performance of Buildings assesment procedures supports the implementation and use at EU and global level.
- 17:20 Eline Himpe and Arnold Janssens
Data-driven modelling of the energy use in dwellings using smart meter data

15:30-17:30 Session SS 31: Indoor Environment

Location: Europahallen

- 15:30 Xiaohong Zheng, Hua Qian, Hongsheng Zhang, Guoying Xu and Jin Ye
Measurement of Particle Concentration in Treatment Room during Traditional Chinese Acupuncture & Moxibustion Therapy
- 15:40 Zhijuan Shao, Jinnan Wang, Zhi Gao, Vu Trung Hieu Nguyen and Jun Bi
Comparison of indoor concentration of PM2.5 between different residences
- 15:50 Maija Virta and Suhaas Mathur
Indoor Air Quality Improvement in School Building in Delhi
- 16:00 Rode Carsten, Marc Abadie, Menghao Qin, John Grunewald, Jakub Kolarik and Jelle Laverge
IEA EBC Annex 68 project on IAQ Design and Control in Low Energy Residential Buildings
- 16:10 Waleed Abdelmaksoud and Essam Khalil
Indoor Air Quality and Outdoor Air Requirement for Personal Ventilation System in Office Spaces
- 16:20 Mitesh Kumar
Indoor Air Quality of Schools: A Case Study Approach
- 16:30 Sang-Hyeon Cho, Min-Hwi Kim and Jae-Weon Jeong
Indoor Air Quality Improvement Effectiveness of Airside Economizer applied Air Quality Index
- 16:40 Michala Balounová, Karel Kabele and Stefano P. Corgnati
Condensation risk assessment and IEQ in Pigrimage chapel of Holy Stairs
- 16:50 Iñaki Gomez-Arriaran, Isabel Sellens-Fernández, Moises Odriozola-Maritorea, Estibaliz Pérez-Iribarren and Zaloa Azkorra Larrinaga
THE SAMPLE SIZE EFFECT TO OBTAIN THE MOISTURE BUFFER VALUE
- 17:00 Sander Kik, Wim Zeiler, Sander Kik and Gert Boxem
Indoor Air Quality of common working areas in schools
- 17:10 Motoya Hayashi, Haruki Osawa and Hoon Kim
A study on the influence of dwellers' ignorance of ventilation upon indoor air quality
- 17:20 Younhee Choi and Doosam Song
A measurement of water vapor generation rate for various activities in a multi-residential building in Korea

15:30-17:30 Session SS 8: Sustainable Energy

Chair: Svend Svendsen

Location: Hal Øst

- 15:30 Haichao Wang, Risto Lahdelma, Elnaz Abdollahi and Xiangli Li
Accounting for the regulation of district heating (DH) system
- 15:40 Jacopo Vivian, Angelo Zarrella and Michele De Carli
Analysis of a wastewater based low temperature district heating system with booster heat pumps for new and existing residential buildings
- 15:50 Fabio Zanghirella, Jonata Canonaco, Giovanni Puglisi and Biagio Di Pietra
Introducing distributed solar thermal heat in a small-scale district heating system
- 16:00 Daniele Basciotti, Markus Koefinger, Charlotte Marguerite, Olatz Terreros, Giorgio Agugiario and Ralf-Roman Schmidt
Methodology for the Assessment of Temperature Reduction Potentials in District Heating Networks by Demand Side Measures and Cascading Solutions
- 16:10 Juan Jerez, Cristian Cuevas and Adelqui Fissore
Experimental validation of SDHW systems and parametric study on their performance based on dwelling characteristics
- 16:20 Carsten Wemhoener, Raphael Schweizer, Andreas Mueller and Thomas Afjei
Activated building surfaces for space heating and cooling
- 16:30 Gökhan Demirkiran, Hüseyin Günhan Özcan, Nurdan Yıldırım Özcan and Hüseyin Günerhan
Modelling and Dynamic Simulation of a Thermal Zone with Solar Aided Air Conditioner in Summer
- 16:40 Jin-Hee Song, Hye-Sun Jin, Jae-Han Lim, Yoon-Bok Seong, Seung-Yeong Song and Kwang-Woo Kim
Electric Power Generation Efficiency of the Louver-type BIPV in an Urban Building through Annual Field Measurement
- 16:50 Liangliang Sun, Yanping Yuan, Xiaoling Cao, Bo Lei and Nanyang Yu
Parameter Evaluation and Optimum Design of Building-Integrated Photovoltaic-Thermal Modules
- 17:00 Eun-Jin Moon, Jae-Han Lim, Yoon-Bok Seong and Kwang-Woo Kim
The Characteristics of Power Losses in Photovoltaic Module depending on Shading Patterns and Solar Irradiance
- Wenye Lin, Zhenjun Ma and Paul Cooper
- 17:10 Thermal Performance Evaluation and Optimal Design of Buildings with Integrated Air-Based Photovoltaic Thermal Collectors and Phase Change Materials Using the Hooke-Jeeves Pattern Search Method
- 17:20 Zafer Utlu and Iremgül Utlu
Investigation of usage of 100% renewable energy in building sector in Turkey

15:30-17:30 Session TS 7: Heat pump application in nearly zero energy buildings (IEA HPT Annex 40)

Organiser: IEA HPT Annex 40: "Heat pump concepts for nearly Zero Energy Buildings" <http://www.annex40.net>

Short description:

Political strategies are focusing on nearly Zero Energy Buildings (nZEB) as next step for high performance buildings to be introduced as standard for new buildings in the time frame of 2021-2030 in different parts of the world. Therefore, evaluations for both energy-efficient and cost-effective technical building systems are required. Heat pumps are seen as promising candidates for the application in nZEB due to the following characteristics

- • With adequate system design heat pumps are highly efficient, enabling a nearly zero energy balance with less on-site generation
- • Heat pumps can cover both heating and cooling needs with the same generator in multifunctional use
- • Heat pumps can convert surplus electricity of on-site generation to heating or cooling energy, offering demand response capability to the grid

In Annex 40 heat pump application in nZEB has been investigated in the nine participating countries CA, FI, DE, JP, NO, NL, SE, CH and US. The final workshop of IEA HPT Annex 40 will give an overview of the Annex 40 work and contributions of the participating countries regarding

- • State of nZEB definitions and implications on heat pump use
- • Results of case studies and efficient system solutions
- • Technology developments of heat pumps for nZEB
- • Field-monitored heat pump performance and optimization potentials

As conclusion perspectives on heat pump application in nZEB are given.

Presentations:

1. Introduction to heat pumps in nZEB and contributions to IEA HPT Annex 40, Prof. Carsten Wemhoener, IET, HSR UAS Rapperswil, Switzerland (paper 525)
2. Heat Pump for nZEB in Canada – System Assessment and Technology Developments, Roberto Sunyé, Ph. D., CANMET Energy, Canada
3. Energy and Efficiency Analysis of Heat Pump Systems in Non-residential Buildings by means of Long-Term Measurements, Dr. Doreen Kalz, Fraunhofer Institute of Solar Energy systems, Germany
4. Heat pumps in energy and cost efficient nearly zero energy buildings in Finland, Prof. Risto Kosonen, Aalto University, Finland
5. Policies and practices towards nZEB in Japan, Prof. Dr. Masaya Okumiya, Nagoya University, Japan
6. The definition of nearly Zero Energy Buildings in the Swedish building code and its implications on heat pumps, Ola Gustafsson, SP, Sweden
7. Results from IEA HPT Annex 40 on heat pump application in nearly Zero Energy Buildings. Carsten Wemhoener, Raphael Schweizer, Roman Schwarz. Switzerland.

Location: Harlekinsalen

15:30-17:30 Session WS 16: How to make cheaper GSHPs in Europe/How to diffuse GSHP in Europe (Cheap-GSHPs/EU project)

Organisers: EU H2020 Cheap-GSHP Project - www.cheap-gshp.eu

Presenters:

Chair : Prof. Michele De Carli, Ph.D. University of Padova, Italy

Co-chair: Prof. Robert Gavriliuc, Ph.D. Romanian Geoexchange Society

Scope:

Based on the experience of the speakers and based on the recent work begun in the Horizon 2020 European Project “Cheap-GSHPs” the workshop’s 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 potential 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.

Location: Latinerstuen

15:30-17:30 Session WS 17: Eurovent Innovation Hub - Adding value to your buildings: Efficient air curtain technologies made in Europe (Eurovent Association)

Organiser: Eurovent Association

Presenters:

- Francesco Scuderi
- Morten Schmelzer

Scope:

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 performances,
- How state-of-the-art air curtains can contribute to a healthier indoor environmental quality,
- All about 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.

Three learning points:

1. How to reduce energy demands by applying highly efficient air curtains to construction projects (Return on Investment)
2. How to improve your buildings' indoor air quality through state-of-the-art air curtain technology (health and safety)
3. How to choose the right air curtains for your system (size and installation)

See Eurovent: [**AIR CURTAINS GUIDEBOOK - FIRST EDITION - MARCH 2016**](#)

Location: Bondestuen

15:30-17:30 Session WS 18: European voluntary certification scheme: a tool linking environment and energy to market value (Sustainable Business Alliance)

Organiser: SB Alliance - www.sballiance.org

Presenters:

Part 1: Frank Hovorka - **SB Alliance** (chairman)

Part 2: Carolina Mateo Cecilia - **Valencia Institute of Building – IVE** (architect)

Part 3: Johann Zirngibl - **CSTB** French Scientific and Technical Center for Building (project leader)

Part 4: Jana Bendžalová - **ENBEE** (Environment & Building Energy Efficiency Consultancy)

Scope:

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 VCS under preparation will be the first common scheme based on CEN and ISO standards issuing European wide a common energy certificate for non-residential buildings. This workshop will describe the development of this common tool (VCS), able to be used Europe wide, and how it can be integrated in existing environmental certification schemes.

Location: Columbaesalen

15:30-17:30 Session WS 26: Energy Flexible Buildings (IEA EBC Annex 67 & Fraunhofer)

Read more: [http://clima2016.org/UserFiles/IEA%20topical%20sessions%20and%20workshops/WS_26-\(2\).pdf](http://clima2016.org/UserFiles/IEA%20topical%20sessions%20and%20workshops/WS_26-(2).pdf)

Location: Laugstuen

10:30-12:00 Session SS 10: Sustainable Energy

Chairs: Stefano Corgnati and Jorma Railio

Location: *Det Lille Teater*

- 10:30 Elisa Carlon, Markus Schwarz, Alessandro Prada, Marco Baratieri, Andrea Gasparella and Christoph Schmidl
Biomass-based heating and hot water supply systems for prefabricated, high energy performance houses: a comparison of system configurations and control strategies
- 10:40 Freek Van Riet, Havid El Khaoui, Filip Hulsbosch, Gunther Steenackers and Ivan Verhaert
Exploring the novel software Hysopt: a comparison of hydronic heat distribution systems of an apartment building
- 10:50 Romain Bonabe de Rougé, Thomas Tirtiaux, Pierre Picard, Pascal Stabat and Dominique Marchio
Experimental analysis of a gas micro-cogeneration based on internal combustion engine and calibration of a dynamic model for building energy simulation
- 11:00 Peter Holzer, Renate Hammer and Michael Cervený
Renewable Urban Heat Supply for Domestic Housing in the City of Vienna
- 11:10 Aaron Gillich, Andy Ford, Mark Hewitt and Edward Thompson
Cold Water Heat Networks and the Thermal Storage Revolution
- 11:20 Levent Bilir and Nurdan Yildirim
Investigation of a Small Scale Wind Turbine-Heat Pump Hybrid System for a Detached House
- 11:30 Adrian Retezan, Ioan Silviu Dobosi, Remus Retezan and Silviana Brata
ASPECTS REGARDING ENERGY CONSUMPTION
- 11:33 Frantisek Vranay, Clayton Stone, Marek Kusnir and Daniela Kaposztasova
The Application of Combined Renewable Energy Systems in Smart Buildings
- 11:36 Dietrich Schmidt, Patrick Schumacher, Norman Gerhardt and Fabian Sandau
TECHNOLOGY ASSESMENT IN A FUTURE CROSS SECTORIAL HEAT AND POWER MARKET
- 11:39 Clara Good and Francesco Goia
Integrated ground source heat pumps and solar thermal systems for zero energy buildings
- 11:42 Leon Gaillard, Stéphanie Giroux-Julien, Kévin Taurines and Christophe Ménézo
Simulation study of heat recovery from flat roof photovoltaic systems by mechanical ventilation for a wine warehouse in France
- 11:45 Huseyin Gunerhan
Thermal Analysis of a Flat-Plate Solar Collectors in Parallel and Series Connections
- 11:48 Luca Zaniboni, Andrea Gasparella, Matthias Schuß, Kristina Kiesel, Giovanni Pernigotto and Ardeshir Mahdavi
Evaluation of On-site PV-based Electrical Energy Production: a Case Study
- 11:51 Sandra Šlihte, Maija Križmane and Egīls Dzelzītis
The Effect of Reducing Supply Temperature in Fourth Generation District Heat Networks on Design of In-house Heat Substations
- 11:54 Zissis Ioannidis, Annamaria Buonomano, Andreas Athienitis and Ted Stathopoulos
Double Skin Façades Integrating Photovoltaic Panels: A Comparative Analysis of the Thermal and Electrical Performance
- 11:57 Arif Hepbasli
Towards Developing An Exergy Management System Standard and Its Application to a University Building
- 12:00 Joaquim Monteiro and Olga Castro
Impact of using solar heat pumps for domestic hot water in Portuguese residential buildings.
- 12:03 Monika Lipska
“Use of alternative water sources based on a rainwater in the multi-dweling Urban Building 2030”

10:30-12:00 Session SS 14: Energy Flexibility & Storage

Chairs: Ala Hasan and Anna Joanna Marszal-Pomianowska

Location: Hal Øst

- 10:30 Bernardo Buonomo, Davide Ercole, Oronzio Manca and Sergio Nardini
Numerical simulation of thermal energy storage with phase change materials in aluminum foam
- 10:40 Uros Stritih, Eneja Osterman and Vincenc Butala
Annual operation of LHT storage system for offices
- 10:50 Olivier Dumont, Carolina Carmo, Dickes Rémi, Emeline Georges, Sylvain Quoilin and Vincent Lemort
Hot water tanks : how to select the optimal modelling approach?
- 11:00 Uroš Stritih, Saeid Seddegh, Wonjun Choi, Nikolaos Stathopoulos, Mohamed El Mankibi, Enrico Fabrizio, Mahmood Mastani Joybari, Fariborz Haghighat and Ryozo Ooka
Integration of Thermal Energy Storage Components with Buildings – Recent Development and Challenges
- 11:10 Simpore Sidiki, Garde François, David Mathieu, Marc Olivier and Castaing-Lasvignottes Jean
Design and dynamic simulation of a Compressed Air Energy Storage system (CAES) coupled with a building, an electric grid and a photovoltaic power plant.
- 11:20 Su-Gwang Jeong, Seong Jin Chang, Seunghwan Wi, Yujin Kang and Sumin Kim
Thermal evaluation of high heat storage montmorillonite with phase change material containing exfoliated graphite nanoplatelets
- 11:30 Zuzana Čermanová, Jana Peráčková, Lenka Jágerská and Veronika Buzás
STORAGE WATER HEATERS DESIGN OPTIMIZATION IN APARTMENT BUILDINGS
- 11:40 Uroš Stritih, Mastjaž Kofalt and Vincenc Butala
PCM thermal storage system for cooling and heating of buildings
- 11:50 Anna Nefedova, Bykova Iuliia, Maxim Kykolev, Sergei Kosov, Aleksandrs Zajacs and Anatolijs Borodinecs
Possibility of Thermal Storage Systems Usage During Buildings Renovation in Saint-Petersburg

10:30-12:00 Session SS 21: Ventilation & Air Distribution

Chair: Dirk Müller

Location: Musiksalen

- 10:30 Sami Lestinen, Hannu Koskela, Simo Kilpeläinen and Risto Kosonen
Air distribution and indoor climate in a multipurpose arena
- 10:40 Ahsan Iqbal, Alireza Afshari and Niels Christian Bergsøe
Post Occupancy Evaluation of 23 Newly Renovated Apartments in Copenhagen - Performance of Ventilation Systems
- 10:50 Odin Budal Søgne, Hans Martin Mathisen, Maria Justo Alonso and Guangyu Cao
Indoor Air Quality in a Zero Emission Building
- 11:00 Eri Nagashima, Takashi Kurabuchi, Yoshihiro Toriumi, Sihwan Lee, Tomoro Hori, Megumi Aibara and Atsushi Okuda
Development of a ventilation control system for a commercial kitchen
- 11:10 Essam E. Khalil, Mahmoud Amer and Mahmoud Fouad
Smoke Spread In Underground Subway Station
- 11:20 Alo Mikola, Teet-Andrus Kõiv and Kaspar Tennokese
THE PERFORMANCE OF VENTILATION IN ESTONIAN RETROFITTED APARTMENT BUILDINGS
- 11:30 Catalin Teodosiu, Viorel Ilie and Raluca Teodosiu
The impact of thermal radiation on condensation on cold surfaces of ventilated rooms
- 11:33 Alessandra De Angelis, Onorio Saro and Giovanni Cortella
INFLUENCE OF SUPPLY AIR CEILING DIFFUSERS ON SURFACE TEMPERATURE OF DISPLAY CABINET DOORS AND ON CUSTOMERS COMFORT IN FOOD STORES
- 11:36 Eftychia Spentzou, Chris R. Iddon, Matthew Grove and Malcolm J. Cook
Priority School Building Programme: An investigation into predicted occupant comfort during the heating season in naturally ventilated classrooms
- 11:39 Nga Thi Hoang, Hiroaki Tanaka and Masaya Okumiya
Study on performance evaluation of the natural ventilation system with phase change materials
- 11:42 Goo Tsusaka, Tatsuo Nobe, Mitsuhide Yasuda, Masanari Ukai, Kenichi Yasuda and Toshiki Isahaya
Comparison of Primary Energy Consumption of DHC and VRF Systems Based on Realistic Heat Loads
- 11:45 Wang Wei and Chen Jiayu
Demand-driven HVAC control in large-scale rooms based on occupancy distribution measurement with indoor positioning system
- 11:48 Anna Ramata and Andris Kreslins
Energy Efficient Ventilation for Pig Farms
- 11:51 Thijs Kruisselbrink, Juan Tang, Harry Bruggema and Wim Zeiler
Indoor Air Quality of schools a problem, but what about Day Care Centres
- 11:54 Hirano Aoi
Prediction of Cross-Ventilation Performance of Detached House Using Wind Catcher In Residential Buildings
- 11:57 Koji Shima, U Yanagi, Ryuto Shimizu, Naoki Kagi, Kenichi Azuma, Hoon Kim and Haruki Osawa
Long-term measurement on the actual condition of airborne microbe concentration in office buildings.
- 12:00 Yuina Fujii, U Yanagi, Shinsuke Kato, Hideaki Nagano, Shigeo Matsuno and Hiroshi Ida
A Study on the microbiome in Hospital Waiting room

10:30-12:00 Session SS 33: Indoor Environment

Chair: Lars Gunnarsen

Location: Europahallen

- 10:30 Hongshan Guo and Forrest Meggers
A Framework to Assess Exergetic Efficiency for Thermal Comfort
- 10:40 Lenka Proksova Zuska and Michal Kabrhel
THE HYGROTHERMAL SURVEY IN RECONSTRUCTED OFFICE BUILDING WITH CHILLED BEAMS SYSTEMS
- 10:50 Yoshihito Kurazumi, Emi Kondo, Kenta Fukagawa, Yoshiaki Yamato, Kunihito Tobita, Tomonori Sakoi, Tadahiro Tsuchikawa and Tetsumi Horikoshi
Improvement of working thermal environment for female office workers
- 11:00 Karsten Voss and Tjado Voß
Integrated design approach for improving personal summer thermal comfort in existing office buildings with suspended ceilings
- 11:10 Zhun Yu, Bin Yang, Neng Zhu and Thomas Olofsson
Energy efficient thermal comfort in temporarily occupied space – A summer case study in Tianjin
- 11:20 Yoshiaki Yamato, Yoshihito Kurazumi, Kenta Fukagawa, Kunihito Tobita and Emi Kondo
Measurements of clo value using heat flux sensors and human body
- 11:30 Steffen Petersen, Anders H. Clausen and Lasse S. Knudsen
Investigating the Ability of Prevailing Thermal Comfort Models to Predict Thermal Comfort in Homes
- 11:33 Mi-Yeon Kim, Hyung-Geun Kim and Yoon-Ji Kwon
Study on Housing Indoor Thermal Comfort Evaluation Using Measurement Around the Winter
- 11:36 Masanari Ukai, Goo Tsusaka, Shogo Kamata, Ryo Sekine and Tatsuo Nobe
Survey of Thermal Environmental Deviation in Offices
- 11:39 Sirid Bonderup, Sofie Knudsen and Lars Gunnarsen
Comparison of test methods for mould growth in buildings
- 11:42 Jamson Masih, Ashish Uzgare, Ajay Taneja and Alfred J Lawrence
Indoor/Outdoor Concentration of Particulate matter and Polycyclic Aromatic Hydrocarbons at roadside site in Agra India
- 11:45 Vu Trung Hieu Nguyen, Zhi Gao, Zhijuan Shao and Jian Zhu
A study on ozone and PM2.5 concentration levels inside and outside hotel rooms in Nanjing city, China
- 11:48 Lucia Kudiváni and Michal Krajčák
Evaluation of the indoor air quality in a library using natural CO2 as tracer gas
- 11:51 Karna Dahal and Jouni Laurikainen
Green Aspects of PCO Method – Reference to UV Turbo
- 11:54 Dana Aljadaa and Hasim Altan
Designing a High Performance Indoor Environment for a Productive Generation
- 11:57 Lorenza Pistore, Francesca Cappelletti, Andrea Gasparella and Piercarlo Romagnoni
Evaluation of the Indoor Thermal Quality in high schools buildings: strengths and limits of different assessment methods

10:30-12:00 Session SS 7: Building Technology

Chairs: Marco Perino and Carsten Rode

Location: Radiosalen

- 10:30 Xiaoliang Wang, Huizhi Zhong, Xiangyang Rong, Bo Lei and Tao Yu
Optimal Design of Passive Solar Buildings for dormitories in China
- 10:40 Zoltán Andrásy and Rita Farkas
Combination of phase change materials with ceiling cooling panels in office environments
- 10:50 Nolwenn Hurel, Mickaël Pailha, Géraldine Garnier, Clément Belleudy and Monika Woloszyn
Three-scale airtightness study of wooden frame wall assemblies in laboratory
- 11:00 Adeline Bailly, Gaëlle Guyot and Valerie Leprince
6 YEARS of ENVELOPE AIRTIGHTNESS MEASUREMENTS PERFORMED by FRENCH CERTIFIED OPERATORS: ANALYSIS of ABOUT 65 000 TESTS
- 11:10 Radoslaw Gorzenski, Michal Szymanski and Andrzej Gorka
Multifamily buildings air tightness testing
- 11:20 Chang Sub Shin, In Sung Kang, Young Kwon Yang, Min Hee Chung and Jin Chul Park
Development of novel roof finishing materials using PCM for detached houses to mitigate urban heat island and to improve thermal condition
- 11:30 Kyriaki Foteinaki, Christina Papachristou, Ongun Berk Kazanci and Bjarne W. Olesen
Structures that include a semi-outdoor space: Part 1: Energy performance
- 11:33 Christina Papachristou, Kyriaki Foteinaki, Ongun Berk Kazanci and Bjarne W. Olesen
Structures that include a Semi-Outdoor space: Part 2: Thermal Environment
- 11:36 Ema Nemethova, Dusan Petras and Michal Krajcik
Indoor environment in a high-rise building with lightweight envelope and thermally active ceiling
- 11:39 Clelia Moraes, Priscila Watanabe, Narciso Grimaldi Gomes and Fernanda De Prince Calegher
ANALYSIS OF PROCEDURE FOR USE OF SOLAR ENERGY FOR BUILDINGS RESIDENTIAL ASSESSMENT.
- 11:42 Gaofeng Sun, Shuhong Li, Guoying Xu and Xiaosong Zhang
Experimental Study on the Dynamic Heat Transfer Characteristics of Triple-pane PCM-filled Window
- 11:45 Dave Olsthoorn and Fariborz Haghighat
Modelling of Electrically Activated Thermal Mass
- 11:48 Ricardo Gomes, Khadija Benis, Carlos Silva and Ricardo Vicente
Analysis of the effect of a rooftop greenhouse in building indoor temperature and acclimatization needs using building energy simulation
- 11:51 Hui-Jeong Kim, Sang-Woo Ham, Dong-Seob Yoon and Jae-Weon Jeong
Performance evaluation of two cross type indirect evaporative air coolers
- 11:54 Simona Michaličková and Otilia Lulkovičová
Analysis of Ideal Absorption Cycle with Support of Solar Energy and the Use of Working Solutions H₂O/LiBr and NH₃/H₂O
- 11:57 Andrei Bejan, Tiberiu Catalina and Joseph Virgone
Comparison of different PCMs impact on indoor comfort in a energy positive house

10:30-12:00 Session WS 19: Building automation and control systems: continuous operational energy use optimization (REHVA & eu.bac Task Force)

Organiser: REHVA - eu.bac joint Task Force on Building Automation and Control Systems (BAC)

Presenters:

Organisers/moderators: Andrei Litiu and Peter Hug - **eu.bac**

Speakers:

- Bonnie Brook - **eu.bac**
- Stefano Corgnati - **REHVA**
- Simona D'Oca - **REHVA**
- Valentina Fabi - **REHVA**
- Roland Ullmann - **eu.bac**

Scope:

The aim of the workshop is to interactively discuss about the before mentioned issues and what practical tools can be used to overcome them and ensure building automation and control systems deliver their multiple benefits promises. The workshop will include the presentation of several certified building(s).

Location: Bondestuen

10:30-12:00 Session WS 20: How to improve the quality of the works and compliance of Energy Performance Certificates? (QUALICHeCK)

Organiser: QUALICHeCK

Presenter:

Chairperson: Peter Wouters

Scope:

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?

Location: Harlekinsalen

10:30-12:00 Session WS 25: Total Concept method for major reduction of energy use in non residential buildings (EU H2020 Total Concept)

Organiser: EU Horizon 2020

Speakers:

Introduction to Intelligent Energy Europe project the "Total Concept" (Alireza Afshari)

Main steps of the Total Concept method implementation (Mari-Liis Maripuu)

The economic principles of the Total Concept method (Åsa Wahlström)

The Total Concept method implementation in the Nordic countries- outcomes and lessons learned (Mads Mysen)

Short description:

In order to reach the 20-20-20 EU-targets it will be essential to increase the ambitions by the building owner's to carry out major energy refurbishment projects in the non-residential building sector. In existing non-residential buildings energy savings can often be achieved by improving the building envelope and the performance of HVAC systems and other energy requiring installations. In addition, changes in user behavior can be effective - without loss of comfort. However, if the measures are to be carried out in practice then they would have to comply with the property owner's or client's terms and conditions for long-term investments. Total Concept offers a method and a economic tool that can provide the information required by establishing a platform for decisions on investments in energy-saving measures. The method applies a refined systematic approach to the work with energy issues in buildings, with the aim of achieving maximum energy savings in a cost efficient way and to motivate building owners to take a step further and make decisions on larger investments. A European cooperative venture has been established, involving Sweden, Norway, Finland, Estonia and Denmark, to further develop the method and to test the concept in the various national contexts. The aim is to establish a reliable market driver for major renovation projects that can lead to considerable energy savings in the building sector. Since the non-technical barriers influencing the renovation rates can be somewhat similar also in other European countries, it will be possible to transfer the method also to other countries. The workshop covers the identified main non-technical barriers in the renovation market in northern European countries and how the Total Concept method could be a solution to overcome these barriers. The results of Total Concept method implementation in the Nordic countries are presented and possibilities for increasing the number of larger energy renovations of non-residential buildings will be discussed.

Location: Latinerstuen

10:30-12:00 Session WS 29: Occupant Behaviour (IEA EBC Annex 66)

Organiser: IEA EBC Annex 66: "Definition and Simulation of Occupant Behavior in Buildings" www.annex66.org

Speakers:

Andreas Wagner (KIT, Germany): Experimental approaches for collecting occupant behavior data in the field and in the lab

Ardeshir Mahdavi (TU Vienna, Austria): New modeling approaches and quality assessment for occupant behavior models

Rune Andersen (DTU, Denmark): Application of occupant behavior models in building energy performance simulation for improved design and operation of buildings

Short description:

Occupancy behavior in buildings is of growing importance for building design as well as for building operation and performance optimization, as it turned out to be one of the leading influences on energy consumption in buildings. Occupancy behaviors are either random, or purpose-driven (e.g. entering/leaving a room, consuming domestic hot water, using an appliance) or comfort-related (e.g. adjusting a thermostat, opening a window for ventilation, closing blinds). They change the indoor environment in terms of temperature, humidity, illuminance levels, air quality etc. which influences total energy consumption of a building. As building services systems and their controls are becoming more complex and sophisticated, occupants are often not aware of the relation between their actions and their influence on energy consumption.

The challenges to model and predict occupancy behavior in buildings are: (a) occupancy behavior is stochastic and complex in nature; (b) monitoring occupancy behavior relies on various sensors with relatively high costs; and (c) privacy issues make data collection difficult. Hence, there is a lack of consistent data from real-life building operation and therefore state-of-the-art models used in the planning practice simplify user-related actions and mostly underestimate their impacts. There is a strong need for improved and more accurate approaches of modeling occupant behavior as well as for integrating these models into building simulation programs in order to support planners and building managers during the design phase and building operation.

This issue has been raised in the IEA Annex 66 *Definition and Simulation of Occupant Behavior in Building* and researchers contribute to different tasks and activities in this context since the beginning of 2014. The workshop will introduce into three major areas of the Annex work in order to open discussions between researchers and practitioners about the necessity and the best strategy to implement occupant behavior in building design and operation.

Location: Laugstuen

10:30-12:00 Session WS 31: Advanced airflow distribution methods for reduction exposure to indoor pollution (Scanvac)

Organiser: SCANVAC

Presenters:

Chair: Guangyu Cao

Speakers:

Prof. Guangyu Cao, NTNU, Norway

Prof. Arsen Melikov, DTU, Denmark

Prof. Risto Kosonen

Prof. Peter Nielsen

Scope:

The main objective of this workshop is to discuss various methods to improve indoor air distribution to prevent the occupants from exposure to various indoor pollutants.

Location: Columbinesalen

13:30-15:00 Session SS 15: Energy Flexibility & Storage

Chairs: Fariborz Haghighat and Jérôme Le Dréau

Location: Det Lille Teater

- 13:30 Danhong Wang, Kristina Orehounig and Jan Carmeliet
Dynamic building energy demand modelling at urban scale for the case of Switzerland
- 13:40 Wim Zeiler, Timilehin Labeodan, Kennedy Aduda and Gert Boxem
Building's Energy Flexibility towards neighborhood level for Smart grid support
- 13:50 Paul Beagon, Joe Warren, Donal Finn and James O'Donnell
Next Generation Building and District Metrics to Enable Energy Systems Integration
- 14:00 Behrang Talebi and Fariborz Haghighat
A Procedure to Predict the Energy Demand Profile of District System
- 14:10 Borui Cui, Cheng Fan and Fu Xiao
Development of A Scheme for Assessment of Demand Response Potential Using Distributed Sensor Networks for Residential Flat
- 14:20 Mads Kronborg Agesen, Arne Skou and Keld Lotzfeldt Pedersen
Controller Prototyping and Validation for Photo-Voltaic Comfort Cooling Plant
- 14:30 Trond Thorgeir Harsem, Robert Martinez and Janne Grindheim
EFFICIENT INTERACTION BETWEEN ENERGY DEMAND, SURPLUS HEAT/COOL AND THERMAL STORAGE
- 14:40 Hamidreza Heidar Esfehiani, Martin Kriegel and Hatef Madani
Load Balancing Potential of Ground Source Heat Pump System Coupled with Thermal Energy Storage: A Case Study for Berlin

13:30-15:00 Session SS 2: Building Retrofit

Location: Europahallen

- 13:30 Salvador Acha and Nilay Shah
Re-commissioning Energy Conservation Measures in Supermarkets: An UK Case Study
- 13:40 Åke Blomsterberg and Rikard Nilsson
RENOVATION OF A MULTI-FAMILY BUILDING IN SWEDEN – ANALYSES OF ENERGY SAVINGS, LCC, LCA AND CO-BENEFITS
- 13:50 Fabien Coydon, Sebastian Herkel and Hans-Martin Henning
Retrofit of multi-family homes with central heat recovery ventilation, learnings from three case studies
- 14:00 Piotr Narowski and Maciej Mijakowski
Different ventilation strategy implementation for achieving nZEB standard of school building
- 14:10 Roberto Ruiz Flores, Matteo D'antoni and Vincent Lemort
Energy reduction in public building stock: assessing the impact of control strategy over expected energy savings and indoor comfort level
- 14:20 Laure Itard and Dasa Majcen
Actual energy savings of thermal renovation in the dwelling stock: the results of a large scale study in the Netherlands
- 14:30 Faidra Filippidou, Nico Nieboer and Laure Itard
Actual Energy Savings of Renovated Dwellings: the case of Amsterdam
- 14:40 Lamia Berrah, Catherine Buhé, Vincent Clivillé, Anna Risch and Monika Woloszyn
Energy efficiency renovations in residential building: What are the key variables in the decision-making? Evidence from France

13:30-15:00 Session SS 20: Ventilation & Air Distribution

Chair: Hilde Breesch

Location: Radiosalen

- 13:30 Sophie Yuan, Andreas Athienitis, Yuxiang Chen, Jiwu Rao and Charalampos Vallianos
An experimental and simulation study of night cooling in a building with hybrid ventilation
- 13:40 Haolia Rahman, Hojong Hwang and Hwataik Han
Hybrid ventilation control strategies to reduce energy consumption in a small office building
- 13:50 Adam O' Donovan, Paul D. O'Sullivan and Michael D. Murphy
A field study on the thermal comfort performance of a ventilative cooling system in a retrofitted low energy building
- 14:00 Wenhui Ji, Per Heiselberg, Houhua Wang, Yue Hu and Zili Zhang
Experimental Assessment of Mechanical Night Ventilation on Inner Wall Surfaces
- 14:10 Erik P.M. Bouwens, Marcel G.L.C. Loomans, Jan L.M. Hensen and Jos J.N. Lichtenberg
Ventilative Cooling Potential in Low-Energy Dwellings – The HoTT Case Study
- 14:20 Theofanis Psomas, Per Heiselberg, Karsten Duer and Eirik Bjørn
CONTROL STRATEGIES FOR VENTILATIVE COOLING OF OVERHEATED HOUSES.
- 14:30 Thiago Santos, Nick Hopper and Maria Kolokotroni
Performance in practice of a ventilation system with thermal storage in a computer seminar room
- 14:40 Peter Holzer, Theofanis Psomas and Paul Osullivan
International Ventilation Cooling Application Database
- 14:50 Mariya Bivolarova, Lauris Rezgals, Arsen Melikov and Zhecho Bolashikov
Exposure reduction to human bio-effluents using seat-integrated localized ventilation in quiescent indoor environment

13:30-15:00 Session SS 26: Building Performance

Chairs: Jaap Hogeling and Jørgen Rose

Location: Hal Øst

- 13:30 Neşe Ganiç Sağlam, A. Zerrin Yılmaz, Gözde Gali, Touraj Ashrafian Bonab and Alpay Akgüç
REFERENCE BUILDING ESTABLISHMENT PROCEDURE FOR THE RESIDENTIAL BUILDINGS IN TURKEY
- 13:40 Martin Thalfeldt, Jarek Kurnitski, Jonas Gräslund, Per Kempe and Jeroen Verwer
Relevance of renewable energy ratio in describing nearly zero energy buildings
- 13:50 Livio Mazzarella
Near zero, zero and plus energy buildings: revised definitions
- 14:00 Mile Siljak
BUILDING – ENERGY – EFFICIENCY – CONFUSION – MISCONCEPTION – REALITY
- 14:10 Alexandros Kostopoulos, Eleni Agiatzidou, Lara Lopez and Ana Juan Ferrer
Revisiting Business Models within Cloud Market
- 14:20 Wolf Bracke, Marc Delghust, Jelle Laverge and Arnold Janssens
Building energy performance rating: impact of the reference characteristics in the notional building approach
- 14:30 Roman Lechner and Saqib Javed
Life-Cycle Cost-Optimized Cooling Systems for European Office Buildings
- 14:40 Balaji Kalluri, Sekhar Kondepudi, Andreas Kamilaris, Kwok Wai Tham and Harn Wei Kua
Classifying Office Plug Load Appliance Events in the context of NILM using Time-series Data Mining
- 14:50 Yoshihisa Momoi, Georgia Ntosti, Stavros Moiragias, Zhecho Bolashikov and Arsen Melikov
Thermal Environment of Textile Based Ventilation Combined with Chilled Ceiling

13:30-15:00 Session SS 34: Commissioning, Control & Energy Management

Chairs: Alireza Afshari and Andreas Wagner

Location: Musiksalen

- 13:30 Jimmy Vesterberg
Utilizing a regression approach for troubleshooting energy performance of Swedish multifamily buildings
- 13:40 Sarah Noye and David Fisk
Reducing the Performance Gap By Design For Commissioning
- 13:50 Arie Taal and Laure Itard
Automatic Fault Detection Diagnosis and Correction of Energy Monitoring Systems
- Adeline Bailly and Sylvain Berthault
- 14:00 RELIABILITY of VENTILATION SYSTEM INSPECTION for DWELLINGS: COMPARISONS of MEASUREMENTS and CONTROLS PROTOCOLS TESTED DURING ON-SITE CAMPAIGN of the PROMEVENT PROJECT
- 14:10 Ando Andriamamonjy, Ralf Klein and Dirk Saelens
Practical approach of an open hybrid Fault Detection and Diagnosis (FDD) method. Application to the HVAC system of a Near-Zero Energy university building.
- 14:20 Alexandra Tallet, Khansa M. M. Merghani and Christian Inard
Air handling unit faults impact on thermal comfort, energy consumption and indoor air quality in an office building
- 14:30 Frigyes Kocsis, Zoltan Magyar and Istvan Barotfi
The benchmark analysis of office premises – potential energy saving opportunities in offices with 2nd generation and 3rd generation of energy management systems
- 14:40 Jan Dirk Schagen, Arie Taal, Laure Itard and Laure Itard
Bayesian Belief Networks and Expert Systems for supporting model based sensor fault detection analysis of smart building systems.
- 14:50 Young Jin Kim, Ki Uhn Ahn and Cheol Soo Park
Data Filtering and Fault Detection of VAV System using Wavelet Transform and Machine Learning Model

13:30-15:00 Session TS 10: High IEQ and energy-efficient ventilation in renovated school buildings (EU IEE Renew-School)

Location: Laugstuen

- 13:30 Armin Knotzer
Examples of high performing school renovations applying prefabricated wooden elements in Austria
- 13:40 Pawel Wargocki, Christian A. Hviid and Agata Skupien
Do new and renovated schools and kindergartens secure sufficiently high indoor environmental quality?
- 13:50 Francesca Romana d'Ambrosio Alfano, Boris Igor Palella, Alessandra Ranesi and Giuseppe Riccio
IEQ Evaluation in Schools: some Considerations about the Parameters PMV may be influenced by
- 14:00 Yacine Allab, Andrea Kindinis, Francesco Causone, Anita Tatti, Sophie Simonet and Annie-Claude Bayeul-Laine
Ventilation rates and thermal comfort assessment in a naturally ventilated classroom
- 14:10 Christian A. Hviid and Steffen Petersen
An Methodology for Quality Control and Draught Assessment of Room Ventilation Supply Using Laser Light Sheets
- 14:20 Maciej Mijakowski and Piotr Narowski
Indoor climate and energy standard of school buildings with different ventilation strategy
- 14:30 Lorenzo Pagliano, Roberto Armani, Andrea Sangalli, Francesco Causone and Marco Pietrobon
Analysis of ventilation strategies for the nearly zero energy retrofit of a kindergarten

13:30-15:00 Session TS 4: High integration of renewable sources in community energy supply utilising low exergy systems (IEA EBC Annex 64)

Organiser: IEA EBC Annex 64: "Optimised Performance of Community Energy Supply Systems with Exergy Principles – LowEx Communities"

www.annex64.org

Short description:

Communities are characterised by a wide range of heating and cooling energy demands. This energy is mainly provided by the combustion of fossil fuels, which is responsible for greenhouse gas (GHG) emissions. While much has already been achieved, there are still large potentials in providing heating and cooling energy with lower or without CO₂ emissions. At the community level, different renewable sources are available that do not involve combustion processes. These energies are often characterised by high fluctuations and different exergy levels or ‘qualities’: e.g. electricity (high-exergy) from photovoltaics or low temperature (low-exergy) heat from solar energy or waste heat. Low energy qualities are of particular interest, because they can supply most heating and cooling demands very efficiently. Exergy calculation still is a major challenge nevertheless. To identify potential savings and synergies holistic analysis of energy flows is necessary. The application of exergy principles is especially important, allowing the detection of different available energy quality levels and the identification of optimal contribution to an efficient supply. From this, appropriate strategies and technologies with great potential for the use of low-valued energy sources (LowEx) and a high share of renewable energies for heating and cooling of entire cities can be derived. In the framework of the EBC project ‘Annex 64: LowEx Communities’ advanced technologies will be adapted and further developed to realise the identified potentials. An additional task is to develop and test appropriate business models for the implementation on energy systems based on low exergy principles.

Presentations:

- 1) Optimising Community Energy Supply with Exergy Principles. Dietrich Schmidt, Fraunhofer IBP/GER.
- 2) Addressing different approaches for evaluating Low-Exergy Communities. Sabine Jansen, DTU/NL and Forrest Meggers, Princeton/USA,
- 3) Energy and exergy analyses of Bjerringbro low-temperature district heating area. Klaus Lund Nielsen, DTU/DK.
- 4) Renewable Low-Temperature District Heating of a New Housing Area in Kassel, Germany – A Case Study of IEA. Janybek Orozaliev, University of Kassel/GER
- 5) Assessment and methods for optimised community supply based on exergy principles. Ivo Martinac, KTH – The Royal Institute of Technology / SWE
- 6) Methodology for the assessment of temperature reduction potentials in district heating networks by demand side measures and cascading solutions. Ralf-Roman Schmidt, Austrian Institute of Technology / AT
- 7) Simulation and exergetic analysis of renewable multi-generation units for a building group. Anna Kallert, Fraunhofer IBP/GER

Location: Latinerstuen

13:30-15:00 Session TS 9: Sustainable Energy for Data Centres (EU RenewIT, GENiC and DOLFIN)

Location: Gæstesalen

- 13:30 Lara Lopez, Enric Pages, Dhanaraja Kasinathan, Jacinta Townley, Dirk Pesch and Susan Rea
Optimizing energy efficiency for next-gen data centres
Verena Rudolf, Thorsten Urbaneck, Nirendra Lal Shrestha, Noah Pflugradt, Bernd Platzer, Jaume Salom, Angel Carrera, Mieke Timmerman, Eduard Oró, Albert Garcia, Òscar
- 13:40 Càmara and Hans Trapman
Simulation of on-site generation CHP systems for large-scale data centre
- 13:50 Gino Carrozzo, Tommaso Zini, Gianluca Insolubile, Theodore Zahariadis and Artemis Voulkidis
An Energy Consumption Optimization Platform For Green Data Centres
- 14:00 Vojtech Zavrel, J. Ignacio Torrens and Jan L.M. Hensen
Simulation based-assessment of Thermal aware computation of a bespoke data centre
Albert Garcia Prat, Eduard Oró, Jaume Salom, Massimiliano Manca, Daniela Isidori, Angel Carrera, Òscar Càmara, Mieke Timmerman, Andrew Donoghue, Noah Pflugradt,
- 14:10 Thorsten Urbaneck and Nirendra Lal Shrestha
Online tool to evaluate the implementation of energy efficiency strategies and renewable energy into data centre portfolio
- 14:20 Eduard Oró, Albert Garcia and Jaume Salom
Numerical analysis for potential heat reuse in liquid cooled data centres

13:30-15:00 Session WS 21: Coupling HVAC + Refrigeration + Lighting systems in shopping centres: technology solutions and modelling approach (IIF-IIR and EURAC)

Organisers:

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

Scope:

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.

Location: Bondestuen

13:30-15:00 Session WS 22: Agenda for Ventilation and Air Infiltration 2020 and beyond: knowledge gaps, research priorities and the need for innovation (AIVC)

Organiser: AIVC

Presenters:

Pawel Wargocki and Peter Wouters

Background:

The primary objective of the Air Infiltration and Ventilation Centre (AIVC) formed by the IEA (International Energy Agency) Energy in Buildings and Community (EBC) Programme in 1979 is to provide reference information on research and development in the fields of air infiltration and ventilation, which are key aspects to achieve healthy and comfortable highly energy efficient buildings. This Annex has produced a number of landmark reports and guides in addition to organising events such as the annual AIVC conference, and many more specialized workshops and webinars. Since 2011, the AIVC's activities are structured around projects integrating activities such as webinars and workshops and produce position papers, technical papers, technical reports, etc. The full list of existing projects is available on the AIVC website, <http://www.aivc.org/resources/collection-publications/aivc-projects>.

Scope:

This workshop will attempt to look into the future needs concerning ventilation and air infiltration, including comfort and health and considering all building types and climates.

Location: Harlekinsalen

13:30-15:00 Session WS 24: Energy refurbishments (REHVA Task Force)

Presenters:

Discussion Moderator: Branislav Todorović, ENB Editor at Large

Chairs and Speakers: Marija S.Todorović, Sergio Vega, Ioan Silviu Dobosi, Tim Jonathan, Birol Kilkis

Scope:

Workshop will address holistic deep – Renewable Energy Sources (RES) integrated refurbishment of existing buildings to the level of energy efficiency and renewable energy sources (RES) integration that can lead cost-effectively to Zero CO₂ emission and smart Energy+ (E+) buildings and settlements. Presented will be cutting-edge and emerging technologies seeking more density RES integrated buildings solutions, developing modelling predictive control based Smart Grids as integration of buildings at district level, taking in account standardization, different barriers, weather extremes including catastrophic events and building's resilience relevant features. Technical solutions of houses energy supply systems, energy efficiency and energy balances, as well as HVAC system design creativity, related approaches to the loads and energy demands minimization, harmonization of passive and active indoor environment control, innovations and sustainability taking in account life cycle and embodied energy will be presented of the most challenging projects including some of the Solar Decathlon Europe edition (encompassing Big data collected by an innovative measuring/monitoring Transdisciplinary Synergetic Modelling and Monitoring System and Program – TSMS, and TSMP).

Location: Columbinesalen