The 13th Asia Pacific Conference on the Built Environment

Next Gen Technology

to make green building sustainable

19-20 November 2015, Crowne Plaza Kowloon East Hotel, Hong Kong

CONFERENCE BOOKLET

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Conference Programme

Day 1 • 19th November 2015 (Thursday)

08:00	Registration		
09:00	Welcome Address Dr Philip YU – Conference Chair		
09:05	Opening Ceremony Guest of Honor – Mr K S WONG, JP, Secretary for Environment		
09:15	Keynote Speech: Building Energy Quotient - ASHRAE's Building Energy Labeling Program Mr David UNDERWOOD – ASHRAE Society President		
09:30 - 10:40	1st Session: Architecture and Building Materials Chair: Dr OW Chee Sheng, APCBE Steering Committee		
	Green Roof Design for Sustainable Performance – Getting it Right	Mr Mark Andrew RICHARDSON	Hong Kong
	Investigation on Assessment Methods of Low Carbon Public Buildings in Beijing	Dr GAO Caifeng	Mainland China
	New Technology and Approaches to Significantly Cut Lab & Commercial Building Energy Use	Mr Gordon P SHARP	USA
	Study of Embodied Energy and Carbon for Indoor Living Walls	Dr Sam C M HUI	Hong Kong
	1st Session Q&A		
	Poster Presentation Briefing (HVAC&R Technology) - Theoretical Study of the Effect of the Evaporator Superheating on the Performances of Air Conditioner in Malaysia - Design of Radial Turbo-Expanders for Small Organic Rankine Cycle System - A Liquid Desiccant and Dew Point Evaporative Cooling Based 100% Outdoor Air System: Design and Analysis - Empirical Models for Liquid Desiccant and Evaporative Cooling-assisted 100% Outdoor Air System Simulation - Solar Powered Absorption Chiller Water System - Theoretical Investigation on Low GWP Refrigerant Replacement for Chiller Applications	Mr NG Wen Bin Prof Ari Darmawan PASEK Mr HAM Sang Woo Mr KIM Min Hwi Mr Matthew NGAN Mr LIU Tao	Malaysia Indonesia South Korea South Korea Singapore Mainland China
	Coffee Break / Exhibition / Poster Session		
11:10 - 12:15	2nd Session: Design and Commissioning for High Performance Chair: Ir K T CHEUK, HKIE BS Division		
	Analysis on a Case Study of Energy Reduction through HVAC Commissioning of a New Building	Dr KIM Young Ki	South Korea
	Primary Energy Saving of a Liquid Desiccant and Evaporative Cooling-assisted 100% Outdoor Air System with Fuel Cell in Heating Season Operation	Ms JO Su Young	South Korea
	Development of Efficient and Cleaner Charcoal Stoves for Cooking Applications in a Rural Residential Dwelling	Mr Hans Felix R. BOSSHARD	Philippines
	Performance Enhancement of Single Stage Air Source Heat Pump Utilizing Vapor Injection Design	Prof LUO Win Jet	Taiwan
	Occupant-participatory Approach to Enhance Thermal Comfort	Dr Abraham LAM	Hong Kong
	2nd Session Q&A		
	Luncheon / Exhibition		
14:00	Keynote Speech: Improving Performance: Our Buildings and Infrastructure Mr John FIELD – CIBSE President Elect		
14:10 - 15:20	3rd Session: HVAC Technology and Refrigerant Chair: Prof J L NIU, HK PolyU BSE Department		
	Next Generation for HCFCs and High GWP HFCs	Mr Steve KUJAK	USA
	Effects of Temperature and Pressure on Quenching Distances of Difluoromethane (R32) and Ammonia (R717)	Dr Kenji TAKIZAWA	Japan
	Phase Change Materials Development from Salt Hydrate to Application as Secondary Refrigerant in Air Conditioning System	Mr Muhammad IRSYAD	Indonesia
	Development of Low-GWP Alternative Refrigerants	Ms Mai HASHIMOTO	Japan
	3rd Session Q&A		
	Poster presentation briefing (HVAC&R System Applications) - District Cooling in an Educational Hub in Malaysia - A Preliminary Evaluation for Retrofit Feasibility of HVAC System of an Office Building - Energy Efficient Approach by Utilizing Heat Pump Water Heating System in a University Campus - Integrated Sustainability Approach for Commercial Office Development – Case Study of Redevelopment High Rise Projects in HK - Evolution on FCU Drives - Analysis of Cooling Load Calculations for Underfloor Air Distribution Systems	Dr KHOO Chun Yong Dr LIN Hung Wen Prof WANG Fujen Mr LEUNG Wai Ho Mr Calvin TANG Ms ZHOU Yichun	Malaysia Taiwan Taiwan Hong Kong Hong Kong Hong Kong
	Coffee Break / Exhibition / Poster Session		
15:50 - 16:55	4th Session: Indoor Environment and Safety Chair: Dr C S WONG, ASHRAE HK Chapter		
	Numerical Study on Ventilation System for Smoke Control Inside a Multipurpose Hall	Dr Azli ABD RAZAK	Malaysia
	Computational Fluid Dynamics Studies on the Effectiveness of Sidewall Sprinklers to Suppress the Fire at the Undercarriage of Mass Rapid Transit Train	Dr George XU	Singapore
	Introduction of a New Measuring Method for Unified Glare Rating for BEAM Plus using High Dynamic Range Photography	Prof CHUNG Tse Ming	Hong Kong
	Indoor Microbial Growth Prediction Using Coupled Computational Fluid Dynamics and Microbial Growth Models	Mr Majeed Olaide OLADOKUN	Hong Kong
	Establishment of Baseline Data of the Indoor Air Quality of Offices in Metro Manila	Mr Efren DELA CRUZ	Philippines
	4th Session Q&A		
	Announcement		
17:00	Day 1 Programme adjourn		
18:30	Banquet cum International Nite		

Conference Programme

Day 2 • 20th November 2015 (Friday)

08:30	Registration		
09:00	Keynote Speech: Exploring E&M Service Solutions for Sustainable Green Buildings Ir TAI Tak Him – Deputy Director of Electrical and Mechanical Services Department		
09:15 - 10:35	5th Session: Renewable Energy and Energy Efficiency Chair: Mr Edward TSUI, ASHRAE Region XIII		
	Drivers for Green – BEC & MEELS "Next Gen Technology to make Green Building Sustainable"		Mr CHIU Chun Ting Hong Kong
	Energy Efficiency Strategies for ASEAN Region		Mr LEONG Siew Meng Malaysia
	A Systematic and Quantitative Approach for Photovoltaic Panel Glare Analysis		Mr WU Yunrong Hong Kong
	Building Integration of Photo-Voltaic: The Future of Sustainable Building		Mr Tjerk REIJENGA Netherlands
	Study on Optimal Operation of a Solar Assisted Ground Source Heat Pump System for Office Heating		Dr LI Huai Mainland China
	5th Session Q&A		
	Poster presentation briefing (Environmental Assessment and System Evaluation) - District Energy Systems (DES) Analysis during LEED Energy Simulation: a Case Study - A Numerical Model for the Investigation of Pollutant Dispersion and Thermal Environment in Underground Carparks - Use of Sustainable Building Environmental Model (SBEM) in Hong Kong Air-conditioned Buildings - Comparison of Energy Performance in Dedicated Outdoor Air System (DOAS) and Desiccant-enhanced Evaporative Air Conditioner (DEVAP) - Primary Energy Saving and CO2 Emission Reduction in a DEVap Air-conditioning System with Fuel Cell - Implementation of an Energy Model using Inverse Simulation Procedure with Building Energy Simulation Tools	Dr KIM Young Ki Dr PAN Dong Mei Dr MUI Kwok Wai Ms KIM Hui Jeong Ms DONG Hye Won Dr LIN Hung Wen	South Korea Hong Kong Hong Kong South Korea South Korea Taiwan
	Coffee Break / Exhibition / Poster Session		
11:05 - 12:10	6th Session: Simulation and Optimization for Sustainability Chair: Mr C M CHUNG, CIBSE HK Branch		
	Optimal Duct Layout using Topology Optimization		Mr Mark Christian MANUEL Taiwan
	Annual Operating Energy Consumption in a DOAS with FCU and a Liquid Desiccant and Evaporative Cooling-assisted 100% Outdoor Air System		Mr YOON Dong Seob South Korea
	Energy Performance of a Desiccant-Enhanced Evaporative (DEVap) System		Mr LEE Sung Joon South Korea
	Analysis and Improvement of Sulfurization Processing Plant Ventilation Simulation Engineering		Prof KUAN Yean Der Taiwan
	BIM Implementation in MEP Design and Energy Saving Measures in HVAC System for Museum Project		Mr TANG Ka Wing, Gavin Hong Kong
	6th Session Q&A		
	Closing Speech Mr C M CHUNG – Chair of CIBSE HK Branch		
12:15	Luncheon		
14:00	Conference Close		

About the Conference

Asia Pacific Conference on the Built Environment (APCBE) is a biennial event of ASHRAE Region XIII and it was first launched back in 1991. In response to the growing technology, the Conference scope has been expanded from HVAC&R to cover various aspects related to the built environment. This international conference provides an excellent platform for researchers and practitioners to share ideas, best practice, new technologies and future prospects.

The Conference theme of the 13th Asia Pacific Conference on the Built Environment “Next Gen Technology to make green building sustainable” is not simply about the hi-tech products available today but the future technology being developed for more sustainable built environment, including design approach, system controls, construction management, commissioning, facility operation & maintenance, etc. It is intended to bring together international speakers to meet and discuss the advanced technologies with mindful of our next generation.

Organizing Institutions

ASHRAE Hong Kong Chapter
The Chartered Institution of Building Services Engineers Hong Kong Branch
The Hong Kong Institution of Engineers - Building Services Division

Organizing University

The Hong Kong Polytechnic University - Department of Building Services Engineering

Supported by

ASHRAE Indonesia Chapter
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ASHRAE Thailand Chapter
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International Advisory Panel

American experts	Robert K. WATSON	Founding Chairman of LEED
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British experts	Richard H. ROOLEY	ASHRAE President 2003-04
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	HU Yie-Zu Robert	ASHRAE Director & Regional Chair 2007-10
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	YANG Xudong	Editor-in-Chief, Building Simulation Journal
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	Kwang-Woo KIM	President, AIK 2004-06
Malaysian experts	OW Chee Sheng	ASHRAE Director & Regional Chair 2004-07
Singaporean experts	WONG Yew Wah	ASHRAE Director & Regional Chair 2001-04

Steering Committee

Chairman	OW Chee Sheng	Malaysia
Members	Bill WANG	Taiwan
	Chirdpun VITOORAPORN	Thailand
	David EDENBURN	Singapore
	Michael SUNG	Hong Kong

Organizing Committee

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Vice-Chairman	Alan LAM (ASHRAE-HK Chapter)
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	Franky SHUM, Hyvan WONG, MY CHAN, Vincent MA (CIBSE-HK Branch)
	Brian CHENG, Edwin LAU, KT CHEUK, Sally LEUNG, YN AU YEUNG (HKIE-BS Division)

Contents

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NEXT GEN TECHNOLOGY

to make Green Building Sustainable

Speaker

Prof CHUNG Tse Ming
Hong Kong

Introduction of a New Measuring Method for Unified Glare Rating for BEAM Plus using High Dynamic Range Photography

Authors

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Abstract

Interior lighting quality is a concern in BEAM Plus. Its credit requirement can partially be fulfilled if the limiting Unified Glare Rating (UGR) in normally occupied areas is achieved. Currently, the practical application of the UGR formula is advised to be making use of computer software. However, the information of an existing interior electric lighting installation is usually insufficient to develop a simulation model for the UGR calculation. Recently, High dynamic range (HDR) photography has been proved acceptable to obtain reliable luminance across a scene. Its capability for evaluating discomfort glare by directly measuring the background and luminaire luminances is of high potential. This study compares the UGR values of five indoor lighting installations obtained from DIALux simulations and field measurements using HDR respectively photography with 67 subjective discomfort responses via questionnaire surveys. It was found that in the UGR range of 16 and 25, the values obtained from HDR photography are closer to those obtained from the survey participants than those obtained from DIALux. The results verified that HDR photography could reflect subjective sensation of discomfort glare caused by electric lighting in an indoor space more accurately than what the software shows. A new UGR measuring method using HDR photography for evaluating discomfort glare is introduced to demonstrate compliance with the BEAM Plus assessment criteria.

Speaker

Mr Majeed Olaide OLADOKUN
Hong Kong

Indoor Microbial Growth Prediction Using Coupled Computational Fluid Dynamics and Microbial Growth Models

Authors

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Abstract

This study investigates, using in-situ and numerical simulation experiments, airflow and hygrothermal distribution in a mechanically ventilated academic research facility with known cases of microbial proliferations. Microclimate parameters were obtained from in-situ experiments and used as boundary conditions and validation of the numerical experiments with a commercial CFD analysis tool using the standard k–ε model. The findings revealed good agreements with less than 10% deviations between the measured and simulated results. Subsequent upon successful validation, the model was used to investigate hygrothermal and airflow profile within the shelves holding stored components in the facility. The predicted in-shelf hygrothermal profile were superimposed on mould growth limiting curve earlier documented in the literature. Results revealed the growth of xerophilic species in most parts of the shelves. The mould growth prediction correlates with the microbial investigation in the case studied room reported by the authors elsewhere. Satisfactory prediction of mould growth in the room successfully proved that the CFD simulation can be used to investigate the conditions that lead to microbial growth in an indoor environment.