

22nd Region XIII CRC Seminar

Emerging Technologies in HVAC

AUGUST 23, 2019

9AM TO 12PM

Sunway Resort Hotel & Spa

Distinguish Lecturer : Dr. Chandra Sekhar

Guest Speaker : Mr. Vincent Tse

CRC Package – Refer to CRC Program

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AGENDA

Time	ITEM
0830 - 0850	Registration
0850 - 0900	Opening Remark
0900 - 0950	Topic 1 - Emerging HVAC technologies for energy efficient healthy buildings in hot and humid climates Part 1
0950 - 1040	Topic 2 - Emerging HVAC technologies for energy efficient healthy buildings in hot and humid climates Part 2
1040- 1055	Coffee/Tea Break
1055 - 1145	Topic 3 - Tall Buildings HVAC design and Integration challenges—with case studies sharing
1145- 1200	Q&A
1200-1205	Appreciation Ceremony
1205	End

Topic 1 & 2: Emerging HVAC technologies for energy efficient healthy buildings in hot and humid climates

In recent times, clear associations are being established between ventilation rates, Indoor Air Quality (IAQ) and the productivity of workforce in various types of buildings, most significant of which is the commercial and office building sector. It is also an established fact that HVAC systems do consume a significant proportion of national energy budget in any country irrespective of whether the HVAC design is “Cooling Driven” or “Heating Driven”. Hence, the notion of Energy Efficient Healthy Buildings is gaining popularity worldwide in the context of sustainable design and it is even more challenging in hot and humid climates that have all-year air-conditioning demand in the form of energy intensive cooling and dehumidification. It is quite apparent that Climate Change effects are only going to make the HVAC designer’s job even more challenging in the future. Whilst SOURCE CONTROL is commonly advocated as the fundamental approach to eliminating or containing the contaminant levels inside the building, a more practical and often necessary approach is likely to be EXPOSURE CONTROL. Thus, ventilation plays an important role in providing a quality built environment. Two considerations are highlighted in order to achieve “good” indoor air quality (IAQ) and energy efficiency – the enhanced dehumidifying performance of cooling coils and the effectiveness of air distribution strategies. The concept of decoupling “ventilation air” from “supply air” is fast emerging as an ideal solution to combat thermal comfort and indoor air quality (IAQ) issues in a sustainable manner.

This talk will highlight some of the current and future technologies for air-conditioning and air-distribution that can collectively contribute to the design of energy efficient healthy buildings. The air-conditioning technologies reviewed include the Low Face Velocity-High Coolant Velocity (LFV-HCV) system; outside air pre-treatment system; single coil twin fan (SCTF) system employing a compartmented cooling coil; desiccant dehumidification system and heat pipe. The air-distribution systems reviewed include SCTF system with independent “ventilation” and “thermal cooling” on zone-based demand; personalized ventilation system coupled with secondary ambient air distribution system and dedicated outdoor air system (DOAS) coupled with chilled beams or radiant chilled ceiling.

Topic 3: Tall Buildings HVAC design and Integration challenges—with case studies sharing

Malaysia was the world leader in super tall buildings in 1999 when the iconic Petronas Twin Towers were completed. In coming years, there will be even a few more new and super tall towers being built in the heart of KL City, and many more in the rest of the world.

The presentation will be focus on the basic principles of super tall buildings design, and the importance of design integration amongst Architectural, Structural, Elevators, HVAC, electrical and mechanical systems. Case studies on design challenges in tall buildings will also be shared in the presentation.



Speaker 1 # Dr. Chandra Sekhar, Ph.D.

Dr. Chandra Sekhar is currently a Professor and Programme Director (M.Sc – Building Performance and Sustainability) and Co-Director (Centre for Integrated Building Energy and Sustainability in the Tropics) in the Department of Building at the National University of Singapore (NUS). He is also a Founding Director of Enhanced Air Quality Pte Ltd., a NUS Spin-off Company incorporated in June 2004, arising out of his research in the fields of indoor air quality (IAQ) and Energy. He has been an IAQ consultant in Singapore since 1993.

He holds BE (Mechanical Engineering) from the University of Rajasthan (Malaviya National Institute of Technology), India and PhD (Mechanical Engineering) from the University of Adelaide, Australia, in the area of energy efficient cooling and dehumidification systems. In 1992, he joined NUS as a faculty and has since been teaching and conducting research in the areas of thermal comfort, ventilation and indoor air quality, energy efficient HVAC systems, building energy analysis/management and integrated building design/operation and has published about 250 papers in these areas in several international journals and conferences.

Prof. Sekhar is an Associate Editor of ASHRAE Science and Technology for the Built Environment (STBE) [formerly HVAC&R Research] journal, Regional Editor (South East Asia) Indoor and Built Environment and an editorial board member of Energy and Buildings, Building and Environment, International Journal of Ventilation and International Journal of Sustainable Built Environment. He is a regular reviewer of articles for several international journals, such as, ASHRAE STBE and Transactions; Indoor Air; Energy and Buildings; Building and Environment; Energy; International Journal of Ventilation & Indoor and Built Environment. He is a co-inventor and holds 3 US and other patents in the area of energy efficient air-conditioning system with zonal ventilation control for enhanced indoor air quality. He is actively involved in the development of local IAQ, ventilation and energy standards in Singapore and received the SPRING Singapore Merit Award 2012 in recognition for his contributions towards Quality and Standards in Singapore. He is a member of the International Scientific Committee of the Healthy Buildings, Indoor Air, ROOMVENT, CLIMA and IAQVEC series of conferences. He was the Chair of the Steering Committee for ASHRAE IAQ2010 conference in Kuala Lumpur in 2010 and continues to be on the steering committee of subsequent ASHRAE IAQ conferences (Vancouver, 2013 and Alexandria, USA, 2016).

Prof Sekhar is a Fellow of ASHRAE and the International Society for Indoor Air Quality and Climate (ISIAQ). He has been an ASHRAE Distinguished Lecturer since 2006 and is regularly invited as a DL speaker around the world. He is a recipient of the Environmental Health Award (2014), Exceptional Service Award (2013) and the Distinguished Service Award (2010) from ASHRAE. He is a co-recipient of The Enterprise Challenge award of the Prime Minister's Office, Singapore in 2004 and ASEAN Energy Award in 2011. He is also a member of the Institution of Engineers, Australia (CPEng, IEAust). He currently serves as a Director-At-Large for the Society and is also a member of SSPC 62.1, SGPC 10, TC 2.1 and TC 4.3. He is a past Chair of the Environmental Health Committee (EHC, 2012-2013) and was a member of the IEQ-Global Alliance Ad Hoc Committee (2013-2017), EHC (2006-2012 & 2016-2018). He has also served the ASHRAE Singapore Chapter in various capacities, including as its President during 2010-2011 and as a BOG member



Speaker 2 # Vincent Tse

Vincent Tse is Managing Director of WSP, Building MEP China Region. He graduated with MSc Deg. In Building Services Engineering (University of Manchester) at 1978.

Over 40 years of design experience in MEP and Vertical Transportation Systems (VTS), Vincent's major focus is in building central core optimization, floor efficiency, sustainable and green design of super tall buildings. Vincent has been partnering with many renowned architects, structural engineers, building

specialists and developers in the design of various tall building throughout China/Asia/Europe. He is recognized for his expertise in MEP and VTS engineering, and is known in the industry for designing iconic and super/mega tall buildings.

Vincent has undertaken the design of over 50 buildings with soaring heights of over 250 meters; 20 of which stands over 400 meters tall. Namely:- the 632-meter Shanghai Tower, 636-meter Wuhan Greenland Centre and the 555-meter Lotte World Tower at Seoul (as Owner's Engineer), the 648-meter Wuhan CTF Center, the 608-meter Tianjin Goldin Finance 117 Tower, the 530-meter CTF Centers in Tianjin and Guangzhou, the 528-meter Beijing Z15 Citic Headquarters, the Singapore Marina Bay Sands resort hotel complex and the 700-meter KLCC new Mega Tower as the MEP and VTS consulting engineer.

Vincent has also been an active participant with ASHRAE. He has served ASHRAE as Vice President, Director of the Board, Distinguished Lecturer, Chair of ASHRAE Region 13 (Far East Region) and the Chair of Hong Kong Chapter.

Vincent was also an award - winner of the CIBSE Gold Medal in 2013, Hong Kong Polytechnic University Outstanding Alumni in 2005, ASHRAE Exceptional Services Award in 2015 and Distinguished Services Award in 2003. He is also Fellow of ASHRAE, CIBSE, IMechE, IHEEM, HKIE and Trustee Board Member of CTBUH.