



## **Dr. Benny K.M. CHOW**

Director of Sustainability, AEDAS (2011 – present)

Leader of the Ventilation and Health TWG, ASHRAE Hong Kong Chapter (2019 – present)

Adjunct Assistant Professor, Stanley Ho Center for Emerging Infectious Diseases, CUHK (2009 – present)

Director of Sustainability, RMJM (2008-2011)

Honorary Associate Professor, Department of Mechanical Engineering, HKU (2012 – 2016)

Part-time Lecturer, Department of Mechanical Engineering, HKU (2009-2010)

Adjunct Associate Professor, Center for Housing Innovations, CUHK (2015 - 2016)

Adjunct Associate Professor, Hong Kong Institute of Asia-Pacific Studies, CUHK (2012-2015)

Part-time Lecturer, School of Architecture, CUHK (2012-2014)

Adjunct Associate Professor, Institute of Space and Earth Information Science, CUHK (2011-2012)

Dr. Benny Chow is the Director of Sustainability at Aedas, focusing on sustainable building design, building physics, Green-BIM, and healthy building design. Dr. Chow is the Leader of the Ventilation and Health Technical Working Group (ASHRAE 170), the co-chairman of the Honor & Award Committee of ASHRAE Hong Kong Chapter.

Dr. Chow is currently appointed as the Adjunct Assistant Professor of the Faculty of Medicine at CUHK, focusing on the investigation of nosocomial infection in healthcare facilities and healthy building research. Dr. Chow was appointed as an Honorary Associate Professor in the HKU Department of Mechanical Engineering, the Adjunct Associate Professor of the CUHK Institute of the Earth and Space Information Science. Dr. Chow has a strong track record in medical sciences, including NATURE SR, HKMJ, CHEST, AJRCCM, and ERJ.

*“We shape our buildings, and afterwards our buildings shape us” - Winston Churchill*

## **A New Normal on Designing Better Places for People – Health, Well-being, and Productivity Spaces**

### **Module I - What's the Next Chapter for Sustainable Building? Developing a Business Case for Healthy, Wellbeing and Productive Workplace Environment for Home/Commercial Offices**

*(40 mins lecture & 10 mins online quiz)*

One of the key barriers to incorporating considerations of building impacts on occupants into business decisions has been confusion around what to measure and how. The study highlighted some of the research which demonstrated that green buildings could enhance health, wellbeing and productivity for their occupants. We need to understand the relationship between features of office building design and the health, wellbeing and productivity of occupants, and assesses the extent to which strategies to maximise benefits to occupants are complementary to strategies to reduce energy and resource use. The key concepts and framework of the international recognized scheme, IWBI WELL Building Standard, will be covered and discussed.

#### *Learning Objectives*

1. Why a healthy, happy workforce is a vital component of a productive, successful business in the long-term?
2. What are the key elements/considerations which affecting the design of an office impacts the health, wellbeing and productivity of its occupants?
3. What are the quantified benefits of Indoor Air Quality, Thermal Comfort, Circadian Lighting, Active Design, and Biophilia Consideration?

### **Module II – Climate Resilience – Climatic Responsive and Microclimate Design in Hong Kong**

*(40 mins lecture & 10 mins online quiz)*

The Hong Kong's Climate Action Plan 2030+ emphasizes the importance of taking into consideration urban climate in adapting to climate change. In Hong Kong's subtropical environment, comfort, health and wellbeing of people both outside and inside buildings are primary considerations in building and infrastructural design. The intense urban heat island (UHI) effect caused by our high-density development in the last forty years or so also leads to rising temperature in built-up areas and often uncomfortable urban living. Working outside buildings, heat stress has become a health and safety problem. The issue of health and comfort is increasingly a concern in the face of challenges brought about by climate change.

### Learning Objectives

1. Understand the basic microclimatic knowledge and good design practice for building and green practitioners and the general public?
2. What is the major urban microclimate design strategies and approaches in the local context of Hong Kong?
3. Review and the overseas and local case studies of sustainable building design with integrated microclimate design elements and considerations.

### Module III - Specialized Ventilation System Requirements, Standards and Field Studies for Healthcare Infection Control in Hospitals and Day Procedure Centers/Clinics in Hong Kong

(40 mins lecture & 10 mins online quiz)

The newly passed Private Healthcare Facilities Ordinance (Cap.633) provides a new regulatory regime for private healthcare facilities in Hong Kong, including private hospital, day procedure center/clinics associated with high-risk medical procedures. ASHRAE 170-2017 (Ventilation of Health Care Facilities) is the key international standard to define ventilation system design requirements that provide environmental control for comfort, asepsis, and odor in health care facilities. The presentation will cover the ventilation requirements of the healthcare medical engineering systems, the technical requirements of ASHRAE 170, and the on-site field works on the control of infectious diseases of hospitals in Hong Kong.

### Learning Objectives:

1. What are the technical requirements of ASHRAE 170 and the specialized ventilation systems required by the healthcare premises under the Code of Practices, Private Healthcare Facilities Ordinance (Cap.633)?
2. How to ensure negative pressure airflow to prevent airborne contaminants, bacteria, and viruses from escaping the isolation room?
3. How to monitor indoor air quality and particulate counts, and how to alert building operators when needed?

### Selected SCI Publications (Citations 696, h-index 12, i10-index 13)

- 1) Chan, Matthew T. V., **Benny K. M. Chow**, Leo Chu, and David S. C. Hui. 2013. "Mask Ventilation and Dispersion of Exhaled Air." *American Journal of Respiratory and Critical Care Medicine* 187 (7) (April): e12–e14. doi:10.1164/rccm.201201-0137IM. (Impact Factor: **17.452**)
- 2) Hui DS, **Chow BK**, Lo T, et al. Exhaled air dispersion during high-flow nasal cannula therapy versus CPAP via different masks. *European Respiratory Journal*, **2019**;53(4):1802339. doi:10.1183/13993003.02339-2018 (Impact Factor: **12.242**)
- 3) 1. Chan MTV, Chow BK, Lo T, et al. Exhaled air dispersion during bag-mask ventilation and sputum suctioning - Implications for infection control. *Nature Scientific Report*. **2018**;8(1):198. doi:10.1038/s41598-017-18614-1 (Impact Factor: **3.998**)
- 4) Hui, D. S., **B. K. Chow**, S. S. Ng, L. C. Y. Chu, S. D. Hall, T. Gin, J. J. Y. Sung, and M. T. V. Chan. 2009. "Exhaled Air Dispersion Distances During Noninvasive Ventilation via Different Respirator Face Masks." *Chest* 136 (4) (May): 998–1005. doi:10.1378/chest.09-0434. (Impact Factor: **9.657**)
- 5) 1. Hui DS, **Chow BK**, Lo T, et al. Exhaled Air Dispersion During Noninvasive Ventilation via Helmets and a Total Facemask. *CHEST Journal*. 2015;147(5):1336. doi:10.1378/chest.14-1934 (Impact Factor: **9.657**)
- 6) Hui, D. S., **B. K. Chow**, L. C. Y. Chu, S. S. Ng, S. D. Hall, T. Gin, and M. T. V. Chan. 2009. "Exhaled Air and Aerosolized Droplet Dispersion During Application of a Jet Nebulizer." *Chest* 135 (3) (March): 648–654. doi:10.1378/chest.08-1998. (Impact Factor: **9.657**)
- 7) Hui, D. S., S. D. Hall, M. T.V. Chan, **B. K. Chow**, S. S. Ng, T. Gin, and J. J.Y. Sung. 2007. "Exhaled Air Dispersion During Oxygen Delivery Via a Simple Oxygen Mask." *Chest* 132 (2) (August): 540–546. doi:10.1378/chest.07-0636. (Impact Factor: **9.657**)
- 8) Hui, D. S., S. D. Hall, M. T. V. Chan, **B Chow**, Jin Yeu Tsou, Gavin M. Joynt, Colin Sullivan, and JJY Sung. 2006. "Noninvasive Positive-Pressure Ventilation: An Experimental Model to Assess Air and Particle Dispersion." *Chest* 130 (3) (September): 730–740. doi:10.1378/chest.130.3.730. (Impact Factor: **9.657**)
- 9) Hui, David S., **Benny K. Chow**, Leo Chu, Susanna S. Ng, Sik-To Lai, Tony Gin, and Matthew T.V. Chan. 2011. "Exhaled Air Dispersion and Removal Is Influenced by Isolation Room Size and Ventilation Settings During Oxygen Delivery via Nasal Cannula." *Respirology* 16 (6) (August): 1005–1013. doi:10.1111/j.1440-1843.2011.01995.x. (Impact Factor: **4.756**)
- 10) Hui, David S., **Benny K. Chow**, L Chu, SS. Ng, N Lee, T Gin, and MTV. Chan. 2012. "Exhaled Air Dispersion During Coughing with and Without Wearing a Surgical or N95 Mask." Edited by Ravi Jhaveri. *PLoS ONE* 7 (12) (December 5): e50845. doi:10.1371/journal.pone.0050845. (Impact Factor: **2.776**)

### **Relevant Presentation Track Records (in the last 3 years)**

- 1) Dr. Benny CHOW (2019). "Ventilation and Infection Control in Healthcare Facilities", Seminar on Healthcare Engineering Systems of Day Procedure Centres (DPC), organized by Department of Health & EMSD, HKSAR (11/29/2019).
- 2) Dr. Benny CHOW (2019). "Experimental study on specialized ventilation system of airborne infection isolation room", Seminar on Healthcare Engineering Systems of Private Hospitals, organized by Department of Health & EMSD, HKSAR (2/21/2019).
- 3) Dr. Benny CHOW (2019). "Specialized Ventilation System Requirements, Standards and Field Studies for Healthcare Infection Control in Hong Kong", Joint Comprehensive Certificate Course on HVAC & R System in Buildings 2019, organized by HKIE-BSD, CIBSE-HKB, BSOMES, ASHRAE-HKC & ACRA (10/29/2019).
- 4) Dr. Benny CHOW (2019). "The Challenges of Retro-Commissioning for Existing Building - System Health Check, Diagnostics, Re-tuning and Retrofitting", Thermal Energy Storage & LEED, Next Generation Refrigerant – R32 Performance, Refrigerant Selection for Next-Gen Chillers, The Challenges of Retro-Commissioning, organized by ASHRAE Macao Chapter & ASHRAE Hong Kong Chapter (6/14/2019).
- 5) Dr. Benny CHOW (2019). "The Science of Designing Future Smart & Sustainable Buildings", The Connected Cities Conference 2019, organized by KPMG, CLP, JOS, Siemens, Smart City Consortium (1/24/2019).
- 6) Dr. Benny CHOW (2018). "The Latest International Perspectives on the Key Design Features of Green/Smart School and its Positive Impact on Students' Learning Environment", 智慧城市專題研習計劃, organized by Education Bureau, HKSAR (2/5/2018).
- 7) Dr. Benny CHOW (2018). "A Business Case Study on the Utilization of Green BIM and Machine Learning Platform to Support Building Performance Simulations and Architectural Design Decision", Guest Lecture, organized by THEi (3/9/2018).
- 8) Dr. Benny CHOW (2018). "What's the Next Chapter for Better Green Building? Developing a Business Case for Healthy, Wellbeing and Productive Workplace Environment", Environmental Forum on Green and Healthy Buildings, organized by HKGBC & The Open University of Hong Kong (3/26/2018).
- 9) Dr. Benny CHOW (2018). "The Latest International Perspectives on the Key Design Features of Green/Smart School and its Positive Impact on Students' Learning Environment", Guest Lecture (Green Buildings), organized by Open University of Hong Kong (4/9/2018).
- 10) Dr. Benny CHOW (2018). "The Rise of Green BIM, Machine Learning and AI-Powered Algorithm in Modeling the Urban Microclimate on Supporting the Smart Green Resilient City Development Goals – A Business Cast Study", "Further Step beyond Green to Ecological City", organized by HKIE - Building Services Division (4/27/2018).
- 11) Dr. Benny CHOW (2018). "A Study of Target Settings and Categorization on Building Energy Use to Mitigate the Adverse Impacts of Climate Change", Energy Talk Series, organized by University of Macau (5/2/2018).
- 12) Dr. Benny CHOW (2018). "Combating Infectious Disease Through Design Engineering – The Design of Isolation Ward for Reducing Airborne Infection in Common Clinical Settings", Joint Chapters Half-day Technical Seminar on High Performance Healthcare HVAC System, organized by ASHRAE Hong Kong Chapter & ASHRAE Macao Chapter (5/17/2018).
- 13) Dr. Benny CHOW (2018). "Urban Microclimate Design in Hong Kong", HKIS Working Group on Green Building, organized by The Hong Kong Institute of Surveyors (5/25/2018).
- 14) Dr. Benny CHOW (2018). "BIM Integration of Integrative Design and Construction Management – A Roadmap of BEAM Plus Upgrade", BIM & Smart Construction Series, organized by Hong Kong Productivity Council (8/30/2018).
- 15) Dr. Benny CHOW (2018). "The Design of Healthy Green Buildings – a perspective on demand-side requirements", "Envolve & Involve" Series, organized by USGBC North Asia (12/13/2018).