

# 第八屆熱帶、亞熱帶(夏熱冬暖)地區綠色建築技術國際論壇暨 第九屆兩岸四地綠色建築技術發展論壇論文集

The 8th International Conference of Tropical and Subtropical Green Building Council Alliance &  
9th Cross-Strait Green Building Technology Development Forum Proceedings

## TRANSITION AND TRANSFORMATION OF GREEN BUILDING FOR SUSTAINABLE HUMAN HABITATS IN TROPICAL AND SUBTROPICAL REGIONS



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## Preface

According to UNDP (2015), the total urban population is expected to reach two-thirds of the world's total population by 2050. Human habitats have been deteriorating under the pressure of rapid population growth, resource consumption and climate change, and thus sustainable development has been put on the agenda and become a global initiative of great concern. Under the “Transforming our World: The 2030 Agenda for Sustainable Development”, the United Nations will “build inclusive, safe, resilient and sustainable cities and human settlements”, which has been considered as one of the future sustainable development goals. Nevertheless, building a sustainable living environment is a complicated issue that requires not only iterative advancement of green building technology, but also guidance for people to practice sustainable lifestyles.

All of the tropical and subtropical cities Including Hong Kong are now facing the environmental and ecological challenges of this climatic environment while promoting the globalization of sustainable development. Therefore, in terms of scientific research and practicality, it is of great significance in exploring the sustainability of urban human habitats in tropical and subtropical regions and their abilities to cope with natural disasters and extreme weather through development of green buildings, green communities and eco-cities.

Under the theme of “Green Building and Green Community for Sustainable and Resilient Human Habitats in Tropical and Subtropical Regions”, The 8th International Conference of Tropical and Subtropical Green Building Council Alliance & 9th Cross Strait Green Building Technology Development Forum promote the exchange of experience in the local green building industry based on the development planning of Greater Bay Area and the “Belt and Road” Initiative, pay close attention to hot topics concerning the living environment while establish interdisciplinary catalogue platform and foster industry-university collaboration so as to popularize the implementation of green buildings and application of optimizing human habitat technologies, as well as enhance the environmental awareness of urban residents.

The Conference was successfully held by China Green Building (HK) Council CGBC(HK) and Center for Housing Innovations (CHI) of the Chinese University of Hong Kong. CGBC (HK), was established on May 15, 2010, which is a learning society on building energy efficiency to promote the development of Chinese green building system. CHI, was established in Dec 1998 in Beijing, which has long been dedicated to the nation in conducting various prominent research projects, for example, the simulation of air transmitting in buildings for public hygiene concerns during SARS, China urban housing studies, China green building code development, etc. CHI engages not only in research, but also connecting the professional development and exchange on related domains in mainland China, Hong Kong, Taiwan and Macau, as well as educational careers to foster young generations in environmental simulations, sustainable planning, and green building in the Cross-Straits areas, overseas institutions and agencies. Efforts that are fully recognized by academics and industry parties home and abroad.

Under the support of more than 60 domestic and overseas green building and related professional institutions, university departments, academic groups and companies, this conference is one of the largest and most extensive green building academic events ever held in the Greater Bay Area. Meanwhile, The conference held The "Fun With The Nature exhibition" and themed activities related to green campus, which were supported and participated by principals, teachers, students and parents of primary and secondary schools in Hong Kong, including Stewards Pooi Tun Secondary School, ECF Saint Too Canaan College, Hong Kong Pooi To Primary School, Tai Po Baptist kindergarten, Firefly Conservation Foundation, to promote green environmental education, develop sustainable and sustainable life behavior, inspire young students to green living, the concept of sustainable development thinking, green concept and encourage young students physically will be implemented into life.

To facilitate the exchange of academic achievements of this conference, the received full papers and extended abstract of keynote speeches are compiled into a collection. We hope to consolidate the academic exchanges through the publication and sharing of this essay, and on this basis, inspire people to further considerate about sustainable human habitats in the future, and promote research in in tropical and subtropical regions. Meanwhile, it is hoped that more youngers will engage in the development of green buildings and sustainable living environment, thus contributing to the sustainability and resilience of urban environments in the tropical and subtropical regions.

Prof. TSOU Jin Yeu  
January 2019 at Hong Kong

# 序 言

到 2050 年，世界城鎮人口總數預計將達到世界總人口的三分之二（聯合國開發計劃署，2015）。隨著人居環境在人口快速增長和資源消耗及全球氣候變遷所造成的壓力下不斷惡化，推行可持續發展已被不斷提上議程並成為備受關注的全球性倡議。聯合國在《改變我們的世界——2030 年可持續發展議程》中，將“建設包容、安全、有抵禦災害能力和可持續的城市和人類住區”確定為未來可持續發展目標之一。然而建設可持續人居環境是一個複雜的問題，不僅需要綠色建築技術的迭代進步，也需要培育和引導居民踐行綠色生活方式。正因為這樣的複雜性，我們對於可持續人居環境的探索將是一個漫長的過程，需要前赴後繼地努力，需要通過跨學科交叉協作來實現。

香港及相關熱帶及亞熱帶城市和地區，在可持續發展全球化的同時，還面臨著此氣候條件下的獨特環境及生態挑戰。通過綠色建築、綠色社區及生態城市等手段探索提升熱帶及亞熱帶地區城市人居環境的可持續性及應對自然災害和極端天氣的自我修復能力，對於本氣候區內的國家和地區社會經濟的發展具有非常重要的科研及現實意義。

“第八屆熱帶、亞熱帶（夏熱冬暖）地區綠色建築技術國際學術論壇暨第九屆兩岸四地綠色建築技術發展論壇”在此背景下應運而生。本次大會以“綠色建築與綠色社區作為構建熱帶及亞熱帶地區可持續和韌性人居環境的手段”為主題，旨在搭建國際化的交流平台促進熱帶及亞熱帶氣候背景下的國家、地區和城市間綠色建築、綠色生活領域的科研成果交流、實踐經驗分享及政策法規研討；深入探討綠色建築、綠色社區等作為提升城市宜居性的方法在日趨快速且複雜的城市化進程中所面臨的機遇與挑戰；同時響應“一帶一路”倡議，推動粵港澳大灣區各省、市、地區的人居環境協同發展，凝聚粵港澳大灣區及熱帶、亞熱帶地區綠色建築及相關領域的學會、協會、科研機構、大專院校以及產業界等，共同致力於普及綠色建築的實施和人居環境優化技術的應用，以及提升城市居民的環境保護意識。

本次大會由中國綠色建築與節能（香港）委員會及中國城市住宅研究中心聯合主辦。中國綠色建築與節能（香港）委員會（以下簡稱“香港綠委會”），於 2010 年 5 月 15 日成立，是中國綠色建築與節能專業委員會在香港的地方分會，是研究適合中國國情的綠色建築與建築節能的理論與技術集成系統、協助政府推動綠色建築發展的學術團體。中國城市住宅研究中心（以下簡稱“中心”）在中國大陸建設部科學技術委員會（現住房和城鄉建設部科學技術委員會，以下稱住建部科技委）的支持之下，於 1998 年 12 月在北京成立，設於香港中文大學，旨在通過設計與技術的結合以促成高素質和可負擔的中、高密度城市住宅，並提升未來中國城市住宅的住居舒適性與效能。香港綠委會及中心自成立以來，在中國大陸住建部及相關機構的支持與協作之下，就環境模擬、可持續規劃、綠色建築等主題，在海峽兩岸展開了大量科研、學術交流和教育活動，獲學術界和業界的高度評價。

承蒙人居環境相關領域產官學研各界的支持，本次大會取得圓滿成功，成為在粵港澳大灣區舉辦的規模最大且具有深遠影響力的一次綠色建築專業活動。共有超過 60 個單位對大會的舉辦給予了大力協助，使得本次大會的參會群體覆蓋了整個粵港澳大灣區的主要綠色建築專業學會、協會以及教育科研機構；眾多資深學者、業界專家以及政府官員於大會齊聚一堂，集思廣益，從多個角度探討可持續人居建設的重要議題；同時在香港神託會培敦中學校、聖道迦南書院、大埔浸信會公立學校、香港培道小學、大埔浸信會幼稚園、港螢火蟲保育基金會等學校和機構的支持下，成功舉辦了香港首次 Fun With The Nature 展覽以及綠色校園主題活動，推行環保教育和可持續理念，將綠色生活的思維灌輸給青少年一代。

為促進本次大會學術成果的交流，現將本次大會收錄之論文全文及主題演講摘要編纂成集。願通過本論文集的發佈及分享，鞏固本次大會取得的學術交流成果，並在此基礎上启发各界人士對於未來可持續人居的進一步思考，促進熱帶及亞熱帶地區人居環境領域的研究與實踐取得更大的進步。與此同時，希望砥礪更多的青年學子投身到綠色建築及可持續人居環境建設的工作中來，貢獻於熱帶及亞熱帶地區城市與社區環境的可持續性及韌性的提升。

鄒經宇 教授  
2019 年正月 於 香港

**The 8<sup>th</sup> International Conference of Tropical and Subtropical Green Building Council Alliance &  
9<sup>th</sup> Cross-Strait Green Building Technology Development Forum  
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