



PolyU's research institute to lead the way on urban sustainability

理大研究院帶領可持續城市發展

Sustainability is one of the most pressing issues of our times. With rapidly expanding populations and ever more dense urban development, attention has shifted resolutely towards finding sustainable ways of living. PolyU pushed itself to the forefront of urban sustainability research and innovation recently with the official inauguration of the Research Institute for Sustainable Urban Development (RISUD) on 14 June.

Officiating at the inauguration ceremony were Dr Qiu Baoxing, Vice Minister, Ministry of Housing and Urban-Rural Development, PRC, Mr Wong Kam-sing, Secretary for the Environment of the Hong Kong SAR Government, Dr Andrew Chan ka-ching, Chairman of International Advisory Committee of the RISUD, Prof. Timothy W. Tong, PolyU President, and Prof. Teng Jin-guang, RISUD Director. Mr Wong took the opportunity to express the Government's commitment to developing Hong Kong into a green and sustainable city with a high quality of life. He also briefly introduced the Government's Clean Air Plan for Hong Kong, its Blueprint for Sustainable Use of Resources and outlined the Environmental Bureau's nature conservation efforts.

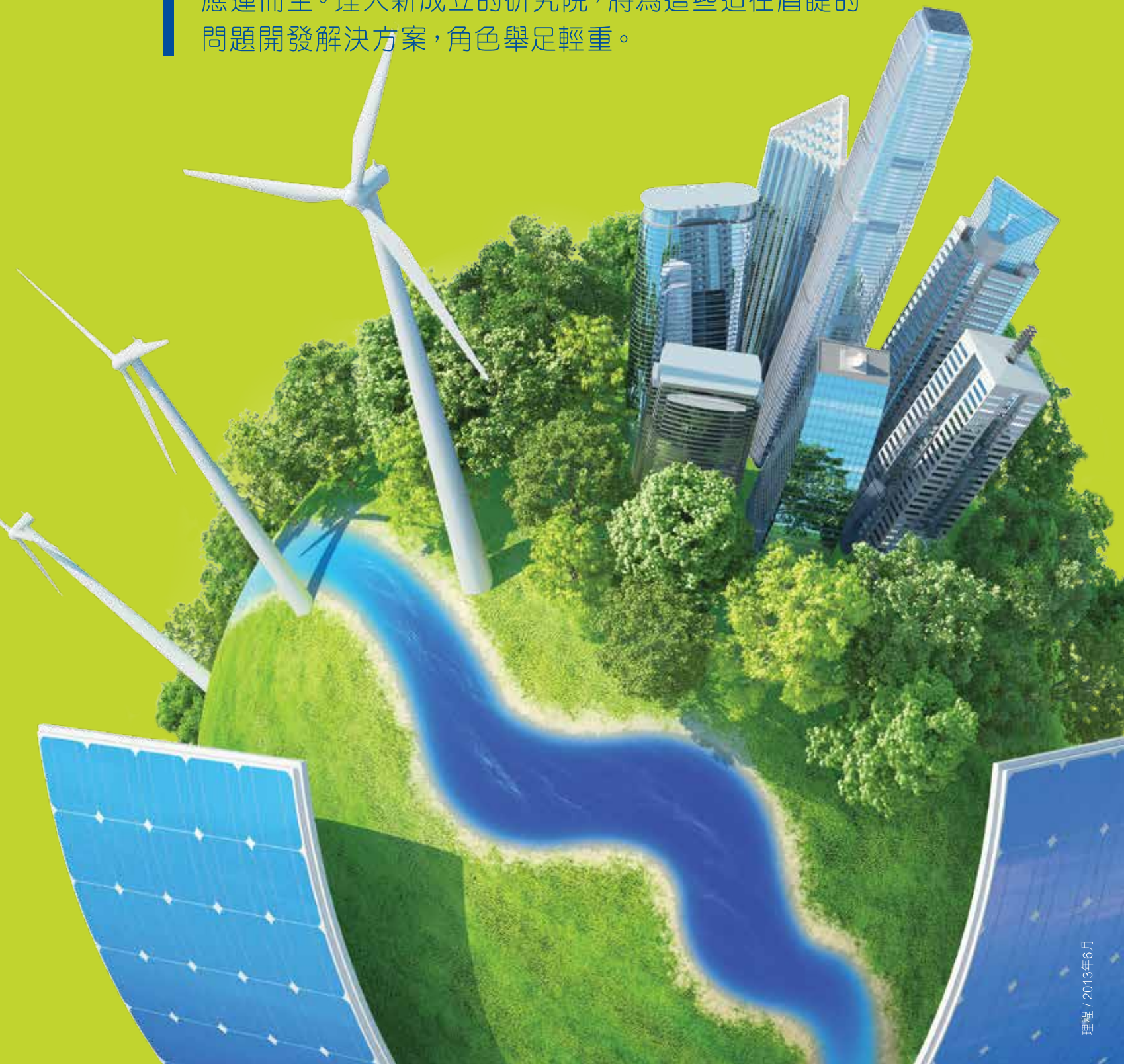
可持續發展是這個年代其中一個最迫切的議題。隨著全球人口迅速增長和城市發展越趨密集，各界都關注怎樣實踐可持續的生活方式。理大站在創新可持續發展的前沿，其可持續城市發展研究院（研究院）最近於六月十四日正式開幕。

主禮嘉賓包括：中華人民共和國住房和城鄉建設部副部長仇保興博士、香港特區政府環境局局長黃錦星先生、可持續城市發展研究院國際諮詢委員會主席陳嘉正博士、理大校長唐偉章教授，以及研究院院長滕錦光教授。環境局局長黃錦星先生致辭時表示，特區政府致力把香港構建成一個綠色和宜居的可持續發展城市。他更向與會者介紹環境局於早前發表的《香港清新空氣藍圖》和《香港資源循環藍圖》，並簡介環境局在自然保育方面的工作。

Officiating guests and representatives from the Government, utilities sector, professional organization, private sector and NGO jointly unveil the vision of RISUD.
主禮嘉賓與政府、公用事業界別、專業組織、私營機構及非政府組織的代表一同揭示研究院的願景。

A newly established research institute at PolyU will play a pivotal role in shaping solutions to the looming problems of high density urban development in the Chinese mainland and beyond.

隨着中國內地和世界各地城市的高密度發展，種種問題應運而生。理大新成立的研究院，將為這些迫在眉睫的問題開發解決方案，角色舉足輕重。



In his welcoming remarks at the ceremony, Prof. Tong explained that “the establishment of the Institute aptly demonstrates the University’s dedication to making sustainable development a strategic priority.” Yet he also spared no effort in graphically illustrating the challenges ahead. “The appalling reality”, he said, “is that many people are still without access to basic services such as clean drinking water, basic sanitation, modern forms of energy, sustainable mobility and proper waste management”. That is a sobering thought. “How we manage this rapid urbanization”, he suggested, “will be the key to our survival and prosperity”.

Since January 2012, the RISUD has been playing a significant role in that process. The Institute consolidates the research strengths of the Faculty of Construction and Environment, with multidisciplinary teams advancing the frontiers of knowledge in areas such as building energy technology, regional air quality, space creation and reuse, and urban mobility. There are also plans to broaden that expertise. According to the RISUD’s Director, Prof. Teng Jin-guang, the objective is to “expand quickly to include active researchers from other departments of the University and indeed other institutions in the near future”.

Gaining a critical mass of interest in and solutions for sustainability is particularly important for China. Dr Qiu Baoxing took time out from his vice ministerial duties to pay a special visit to Hong Kong and deliver a keynote speech at the RISUD’s inauguration seminar. Speaking to a full house at the University’s Chiang Chen Studio Theatre, he suggested that in the imminent “second half” of the Chinese urbanization process, “new eco-cities and the ecological transformation of existing cities will be two major paths for city transformation”. That transformation will require “broader thinking” and “it should thoroughly adopt experiences and lessons of transformation and applicable technologies of those advanced countries”, he said. Dr Qiu hoped that Hong Kong and PolyU will play the role of technology innovator and practitioner of transformation model research and transformation demonstration.

唐偉章教授致歡迎辭時指出，研究院的成立，說明了大學視「可持續發展」為優先策略的決心。然而，他亦不忘提出面前的挑戰。他說：「現實中令人震驚的是，許多人仍然欠缺基本生活所需，例如清潔的食水、基本的衛生設施、現代化的能源、可持續發展的流動性，以及適當的廢物處理。」這話發人深省。他表示：「生存和繁榮的關鍵在於我們如何應付高速城市化的發展。」

自二零一二年一月起，研究院一直在這過程中擔當重要的角色。研究院匯聚建設及環境學院的科研優勢，組成跨學科團隊拓展知識前沿，重點領域包括：建築物節能技術、區域空氣質素、空間開拓與再用、以及城市流動性等，並計劃逐步擴闊其專業範疇。研究院院長滕錦光教授表示：「我們的目標是在不久的將來，讓大學其他學系、甚至其他院校或機構的優秀科研人員加入，使研究院人才更加鼎盛。」

對中國而言，參考可持續發展的各種處理方案尤其重要。仇保興博士抽空專程來港於研究院開幕後的研討會中發表主題演講，理大蔣震劇院全場座無虛席。他指出，中國當前正處於城鎮化中後期，城市的轉型迫在眉睫，生態新城和既有城市生態化改造是轉型的兩大主要方向。城市轉型需要更廣闊的思路，需要充分吸收先行國家城市轉型的經驗教訓和適用技術。他期望香港和理大在轉型模式研究和轉型示範方面有著技術創新者和示範者的作用。



(Photo on top) Prof. Khalid M. Mosalam
(上方相片) Khalid M. Mosalam 教授

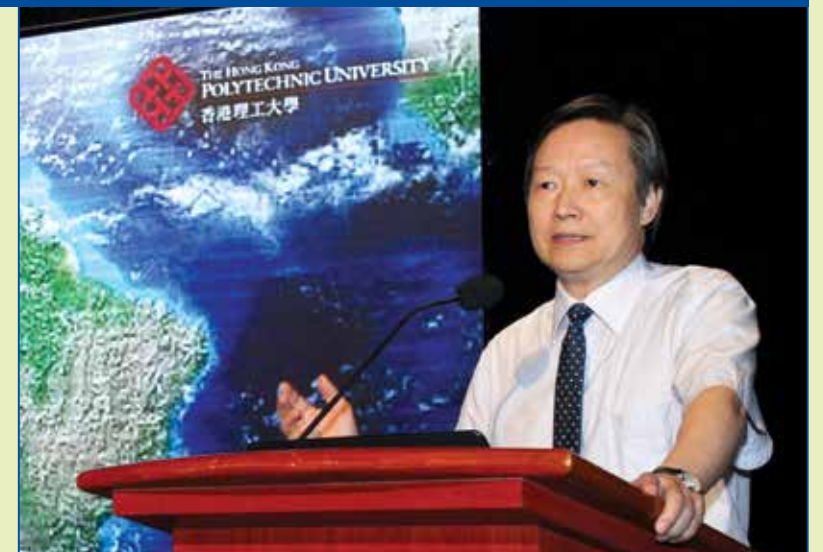


Prof. Guy Brasseur
Guy Brasseur 教授

Also giving keynote speeches at the seminar were Prof. Khalid M. Mosalam from the Department of Civil and Environmental Engineering at the University of California Berkeley, who discussed building efficiency and sustainability in the tropics, and Prof. Guy Brasseur, Director of the Climate Service Center in Germany. Speaking on the links between air quality and climate, Prof. Brasseur considered the struggle for sustainability from an international perspective. He made the stark observation that during the last 50 years, “economic activity has increased ten-fold, and the connectivity of the human enterprise has risen dramatically through globalization of economies and flow of people, information, products and diseases”. This has led to “rapid changes in biogeochemical cycles, hydrological processes and landscape dynamics”, he said, all of which must be addressed urgently.

The RISUD’s capacity to attract scholars from around the world was again on display the following day in a series of international workshops that covered building energy efficiency, the lifecycle performance of concrete structures, sustainable urban renewal in high-density cities, regional air quality – linking science to policy and sustainable waste management – recycling of waste. A key element of all the discussion was a keen understanding that active and innovative social engagement would be necessary to address the substantial challenges ahead.

As Ms Marjorie Yang Mun-tak, PolyU Council Chairman, put it in her video message to the inauguration ceremony, “innovation is not just about developing new technology but also finding new ways to solve problems”. “With this Institute, we can capitalize on the multidisciplinary expertise of PolyU to create sustainable solutions to problems generated by high-density urban development,” she said.



“ I hope that Hong Kong and PolyU will play the role of technology innovator and practitioner of transformation model research and transformation demonstration. 我希望香港和理大在轉型模式研究和轉型示範方面有著技術創新者和示範者的作用。 ”

Dr Qiu Baoxing, Vice Minister, Ministry of Housing and Urban-Rural Development, PRC
中華人民共和國住房和城鄉建設部副部長仇保興博士

研討會上，加州大學柏克萊分校土木及環境工程學系 Khalid M. Mosalam 教授亦主持主題演講，討論在熱帶地區建築的能效和可持續性。此外，德國氣候服務中心 (Climate Service Center) 總監 Guy Brasseur 教授更講述空氣質量和氣候之間的關聯，並從全球角度審視可持續發展。他指出，在過去的五十年間，經濟活動激增了十倍，而經濟全球化和人口、資訊、產品和疾病的流動，令人與人之間的聯繫大增。這導致生物地球化學循環、水文過程與地理景觀的急劇變化，這些問題都必須急切正視。

研究院在成立典禮翌日舉辦了一系列工作坊，備受學者的關注，討論範圍涵蓋大廈能源效益、混凝土結構的生命周期性能、高密度城市的可持續市區更新、區域空氣質素——科技與政策，以及可持續廢物管理——循環再造廢物等議題。工作坊的共同討論重點是大家都意識到必須集合社會各界的創意和積極參與，才能解決面前重大的挑戰。

理大校董會主席楊敏德女士透過錄像於研究院成立典禮上表示：「創新並不限於開發新科技，也指運用新思維解決問題。研究院可匯聚理大跨領域的專家，研發可持續的方案，處理高密度城市發展所引致的問題。」

Meeting the challenges of sustainability

Although vital to the future of humanity, sustainability will by no means be easy to achieve. According to the Study on Sustainable Development for the 21st Century, which was commissioned by the Hong Kong Government in 1997, sustainable development “balances social, economic, environmental and resource needs, both for present and future generations, simultaneously achieving a vibrant economy, social progress and a high quality environment, locally, nationally, and internationally through the efforts of the community and the Government”. Yet, the capacity to achieve sustainability is often challenged by population expansion.

As Prof. Alexander Wai Ping-kong, PolyU Vice President (Research Development), stated, “the Asia-Pacific region currently has an urban population of 1.4 billion, which is expected to increase to 2 billion in the next seven years”. This will place extraordinary pressure on city space, infrastructure and quality of life. In China alone over the next 25 years, an estimated 300 million rural dwellers will become urban residents. The scale of this process is unprecedented in human history, and the challenge is how to achieve it in a sustainable manner so that the natural environment is well protected and the built environment functions in an efficient manner in terms of energy and resources.

With massive urbanization programmes underway in the Chinese mainland, many mainland cities are developing according to Hong Kong’s high-density urban development model. High-density development and high-rise buildings are becoming much more common, along with the problems they bring, such as air pollution, heat island effects and solid waste management. Researchers in Hong Kong have extensive experience in dealing with these sorts of issues, which makes PolyU and the RISUD uniquely suited to overcoming the challenges of sustainability.



“The Government is committed to developing Hong Kong into a green and sustainable city with a high quality of life.

特區政府致力把香港構建成一個綠色和宜居的可持續發展城市。”

Mr Wong Kam-sing, Secretary for the Environment
環境局局長黃錦星先生

迎接可持續發展的挑戰

雖然可持續發展對人類未來至關重要，但絕非容易實現。根據香港政府於一九九七年委託顧問進行的《香港二十一世紀可持續發展》研究，在香港推行「可持續發展」，意指在社會大眾和政府群策群力下，均衡滿足現今一代和子孫後代在社會、經濟和資源方面的需要，從而令香港在本地、國家及國際層面上，同時達致經濟繁榮、社會進步及環境優美。然而，人口膨脹往往是實現可持續發展要面對的挑戰。

正如理大副校長（科研發展）衛炳江教授指出，亞太區城市現有人口十四億，預計七年後將增至二十億。這將對城市空間、基礎設施和生活質素帶來非常沉重的壓力。單單就中國內地來說，在未來二十五年間，估計將約有三億農村人口變為城市居民。人數之多，規模之大，人類歷史上前所未見。面對這些挑戰，當務之急就是研究怎樣以可持續的方式實現城市化，在妥善保育自然環境之餘，居住環境亦能有效地節約能源和資源。

As Prof. Teng Jin-guang put it, PolyU naturally “sees as its obligation the sustainable development of Hong Kong as well as other high-density cities in the Chinese mainland and other parts of the world through its research and knowledge transfer activities”. More specifically, he commented that with Hong Kong serving as a testing ground “for the studies of technologies and systems that are indispensable for high-density urban development, we have great confidence that the RISUD will succeed in its mission with the support of both industry and the community.”

在城市化的洪流中，很多中國內地城市均借鑒香港的高密度城市發展模式，高密度發展及高樓大廈比比皆是，空氣污染、熱島效應、固體廢物管理等問題亦隨之而生。香港的科研人員在處理這些問題上經驗豐富，這正是理大與研究院為可持續發展提供解決方案的優勢所在。

滕錦光教授稱：「理大堅信有責任通過科研和知識轉移來幫助香港、中國內地城市及世界各地城市以可持續的方式發展。」具體而言，他認為香港本身就是一個實驗室，最適宜驗證實現高密度城市發展所需的技術和策略。若能得到業界和社會的支持，他深信研究院必能達成使命。

Guests from different sectors witness the establishment of the RISUD.

各界嘉賓見證可持續城市發展研究院的成立。



Building on a successful track record

Stated a little more specifically, the RISUD has three roles. Primarily, it is working on sustainable solutions to the problems generated by high-density urban development. Institute members are also engaged in transferring knowledge through specialist consultancies and continuing professional training. In this they have a good deal of expertise and experience, previously having developed energy-saving strategies for the International Commerce Centre and helping to turn waste glass and construction waste into a new type of brick known as the Eco-block, which is now used in projects throughout Hong Kong. Since the establishment of the RISUD, the Construction Safety Research Group, led by Prof. Albert Chan, has seen its findings and recommendations adopted in the Construction Industry Council's Guidelines on Site Safety Measures for Working in Hot Weather, released in April 2013.

A further role is to create significant positive impact on government policies and societal culture for sustainable urban development through services to professional and government organizations. This is achieved through organizing international conferences and workshops, such as the Sustainable Urban Development Forum held in Shenzhen on 20 April 2013, offering short training courses for local professionals and delivering seminars to disseminate research findings. The Institute is also cooperating with the Faculty of Construction and Environment in organizing the Summer School for Outstanding Postgraduate and Senior Undergraduate Students, which will be held in early August 2013. The intention is to attract students from leading universities around the world so they can learn about PolyU's cutting edge urban-development research, amongst other activities, and consider the University as an ideal home for their future studies.

Supporting the RISUD's three roles is a multidisciplinary approach to research, drawing in expertise from areas such as environmental science, geo-science, urban planning,

engineering, information technology, the health sciences and the social sciences. Researchers are organized into the divisions of Urban Planning and Management, coordinated by Prof. Geoffrey Q.P. Shen, Urban Infrastructure, led by Institute Director, Prof. Teng Jin-guang, Urban Environment, coordinated by Prof. Wang Tao, Digital Technology in Urban Development, overseen by Prof. Ding Xiao-li, and Building Energy and Environmental Performance, with Prof. Yang Hong-xing as coordinator. These five divisions house 26 research groups, covering areas ranging from sustainable land use to the urban micro-environment, each of which is led by an internationally renowned scholar in the field.

The international dimension is further enhanced by the RISUD's inclusion in a research network of centres of excellence for sustainable urban development. Other members include the Center for Sustainable Cities at the University of Southern California, Los Angeles, the China-Australia Centre for Sustainable Urban Development at the University of South Australia and Tianjin University, and centres at the Delft University of Technology, Fudan University, the South China University of Technology, the University of California at Berkeley, the University of Leeds, the University of Pennsylvania and the University of Texas.

Helping to lead China and the world to sustainable development will be a task measured in generations, and it will not be achieved alone. As Prof. Timothy W. Tong noted, "no single government, institution or individual, however, can attain this alone because the challenges require a global and collective commitment to overcome". Yet the RISUD is already pushing back the frontiers of knowledge, ensuring that PolyU will be instrumental in the move towards urban sustainability. Let's build the future together.

建基於成功往績

基本上，研究院有三項使命。首要是針對高密度城市發展所衍生的問題，研發可持續的解決方案。第二，研究院的學者透過專家顧問服務及專業培訓，促進知識轉移。他們在這方面具專業知識和經驗，例如為環球貿易廣場開發節能策略，以及利用回收的玻璃及建築廢料，研製成新型環保再造磚，現時更應用在多個香港的項目中。研究院成立之後，在陳炳泉教授的領導下，其建築安全研究小組的研究結果及建議，更被建造業議會採納於二零一三年四月出版的《在酷熱天氣下工作的工地安全指引》內。

第三項使命是為專業組織及政府機構提供服務，透過政府政策及社會文化推動可持續城市發展。通過舉辦國際會議和研討會，例如二零一三年四月二十日在深圳舉行的可持續城市發展論壇、為本地專業人士提供短期培訓課程，以及透過研討會公佈研究成果，達致這使命。研究院亦將聯同建設及環境學院在二零一三年八月初舉辦專為優秀研究生和高年級本科生而設的暑期課程，目的是吸引來自世界各地著名大學的學生，讓他們了解理大的尖端城市發展研究。暑期課程亦包括其他活動，有助他們考慮日後入讀理大。

研究院必須匯集環境科學、地質科學、城市規劃、工程學、資訊科技、醫療科學及社會科學等界別菁英的力量，進行跨學科研究，才能達致其使命。科研人員分佈於研究院轄下分部：城市規劃及管理分部（由沈岐平教授統籌）、城市基建分部（由研究院院長滕錦光教授統籌）、城市環境分部（由王韜教授統籌）、城市發展與數碼技術分部（由丁曉利教授統籌），以及建築能源及環境分部（由楊洪興教授統籌）。這五個分部統籌共二十六個研究小組，由在其專長領域聲譽卓著的資深學者擔任組長。

此外，研究院更加盟可持續城市發展卓越中心的研究網絡，以進一步加強其國際視野。其他網絡成員包括：美國洛杉磯南加州大學的可持續發展城市中心、南澳大學和天津大學合辦的中澳城市環境與可持續發展研究中心、代爾夫特理工大學、復旦大學、華南理工大學、加州大學柏克萊分校、利茲大學、賓夕凡尼亞大學和德克薩斯大學。

帶領中國和世界走向可持續發展是一項跨越未來世代的重任，不可能單憑一己之力實現。唐偉章教授指出：「沒有一個政府、機構或個人能獨自達致這目標，而是需要全球集體去承擔這責任，共同克服面前種種挑戰。」可持續城市發展研究院將竭盡所能，開拓知識領域，讓理大在可持續發展的路途起著領導作用，攜手創建未來。◆

Research outputs and application:

科研成果及應用：

1. System optimization and development of optimal strategies for International Commerce Centre, with annual energy savings
優化環球貿易廣場的建築系統和控制策略，實現全年節能
2. Structural performance monitoring of the 632-metre Shanghai Tower
上海中心（632米高）的結構性能監測
3. Vibration control tests for high-speed trains using smart dampers
智能減震器測試高鐵的震動情況
4. Building-integrated photovoltaic experimental system developed by PolyU
理大研發的建築一體化光伏實驗系統
5. Outdoor test facility of building-integrated photovoltaic
建築一體化光伏系統室外測試設施
6. Path covered with Eco-blocks
以環保再造磚鋪設的公園小徑
7. Regenerable Nanosorbents
可循環納米污水淨化物料

