

## Research & Innovation

### Assessing Climate Change Induced Flood Risk within the Greater Bay Area (GBA)

With funding of HK\$1.24 million under the National Natural Science Foundation of China/Research Grants Council Joint Research Scheme 2022/23, the Research Institute for Land and Space is investigating the patterns and characteristics of joint occurrences of coastal rainstorms and storm surges in order to assess flooding risks in the GBA.

About 15-28% of residential coastal areas in the GBA are expected to be flooded in 2100 due to extreme

weather events associated with climate change. This timely project thus aims to study the underlying patterns of rainstorm-storm surge joint occurrences in these coastal regions and the physical mechanisms of coastal flooding caused by compound climate and weather events in the area. A comprehensive methodology including statistical analysis, numerical simulation, and laboratory and field tests will be used. The project is expected to facilitate flood management plans in the GBA and provide useful references of urban flooding mitigation and prevention for other coastal regions.



### Partnering with Chinachem Group for a Sustainable Greater Bay Area (GBA)

Leveraging the combined strengths that PolyU has in interdisciplinary research and Chinachem Group in property and community development, a Memorandum of Understanding has been signed to drive innovative solutions for sustainable development in the GBA. Both parties will conduct three pilot research projects to explore innovative solutions and technology applications to promote carbon neutrality, an inclusive society, and a green economy.

The industry-academia collaboration will enable the development of new technologies and systems to

reduce carbon emissions and energy consumption at a next-generation data centre, exploration of new types of intergenerational housing for future Hong Kong community settlements in the GBA, and experimentation with the use of blockchain technology to promote a green economy.

Under the Memorandum, PolyU and Chinachem will also explore further opportunities for collaboration in areas such as support for start-ups and entrepreneurs, application and commercialisation of new technologies, and environmental, social, and governance strategies and measurement.

# 13 CLIMATE ACTION



### Transforming Waste Glass into Low-Carbon Construction Products

In Hong Kong, about 7% of carbon dioxide (CO<sub>2</sub>) emissions come primarily from landfill waste, of which a key solid component is glass waste, with about 200 tonnes disposed of in landfills every day. Meanwhile, its recovery rate consistently stands at lower than 20%. Waste reduction and recycling are important measures to alleviate the over-reliance on landfills for municipal solid waste disposal. With a vision that the transformation of waste glass into useful resources and high value-added products can create a significant waste management framework in Hong Kong, PolyU has been awarded an over HK\$5 million grant by the Green Tech Fund for a three-year research project on the transformation of waste glass into low-carbon construction materials.

In construction, concrete production accounts for around 8% of global anthropogenic CO<sub>2</sub> emissions. Recycling of waste glass can reduce the embodied carbon of construction materials and produce high-performance low-carbon construction products, including ultra high-performance concrete, durable self-levelling cement mortar, and high-strength pervious concrete, all of which have minimal cost and environmental impacts. The research team also aims to develop novel glass-based concrete products for pilot-scale utilisation in long-span structures, high-rise buildings, and pavements, thereby supporting the Hong Kong Government's policy of achieving carbon neutrality as well as offering practical solutions to promote glass recycling.

01

02

03

04

05

06

07

08

09

10

11

12

13

14

15

16

17



01

02

03

04

05

06

07

08

09

10

11

12

13

14

15

16

17

## Teaching & Learning

### Master's Programmes to Nurture Green Future Industry Leaders

Striving to position itself at the forefront of sustainable development with green and low-carbon transition, the University is committed to meeting the very significant market demand for sustainability-related talent. In this regard, the School of Accounting and Finance and the Department of Civil and Environmental Engineering jointly offer Hong Kong's first Master of Science in ESG and Sustainability which aims to equip future leaders with the knowledge, tools, and networks to transform the way business operates and to leverage new opportunities arising from a focus on sustainability. A range of interdisciplinary topics related to environment, society, and governance; sustainability; green finance; risk management; and corporate governance are covered in the programme to enable students to acquire knowledge about contemporary social and environmental issues such as global climate change and societal response.

In addition, the Department of Applied Biology and Chemical Technology hosts the City's first master's programme — Master of Science in Sustainable Technology for Carbon Neutrality. The programme offers students the latest scientific, technological, and managerial knowledge which they can apply to address current and emerging environmental issues and concerns, thereby helping to enable corporations achieve zero emissions. Through systematic and cross-disciplinary hands-on training on tackling challenging and dynamic global issues related to carbon auditing, green financing, carbon management, and sustainable energy, students are upskilled to propose innovative and multifaceted solutions to meet the increasing local and national demand for qualified professionals in the fields of carbon neutrality, energy transition and low-carbon energy conversion systems.

### Subject: Global Climate Change and Society Response

Focusing on the current state of science and debates on global climate change, students examine underlying scientific, economic, and ecological issues, and ways in which institutions have been engaged in negotiating an international response. The subject, hosted by the Department of Civil and Environmental Engineering, enables students to develop a critical mind for identifying an integrated approach to analysing climate change and developing coherent relevant policies. Through this experience, as well as developing creative and critical thinking and an ability to work independently, students are prepared to help promote policy based on solid science knowledge.



1<sup>st</sup> Carbon-Strategic Catalysis International Conference

## Outreach & Engagement

### Scholarly Discussions on Pathways to Carbon Neutrality

Funded by the National Natural Science Foundation of China and the Beijing-Hong Kong Academic Exchange Centre, PolyU held a two-day Academic Symposium on Carbon Neutral and Smart and Healthy City, gathering more than 30 renowned scientists from 15 universities in Hong Kong and Mainland China to share research findings and establish future directions and collaborations.

Focusing on five research topics – “Carbon Neutrality and Sustainable Development”, “Low Carbon Land and Urban Development”, “Key Technologies for Smart and Energy-Flexible Buildings in High Density Cities towards Carbon Neutrality”, “Towards Future Smart Cities”, and “Carbon Neutral Construction Materials” – researchers discussed strategies for reducing carbon emissions and accelerating the transformation of energy systems towards developing a smart and zero-carbon healthy city. In order to support the

national “dual carbon goals”, they also sought to identify innovative technological measures on energy system transformation, energy conservation, reduction of industrial energy consumption and emission, and carbon capture.

Meanwhile, the Research Centre for Carbon-Strategic Catalysis and the Research and Innovation Office hosted the three-day 1<sup>st</sup> Carbon-Strategic Catalysis International Conference with **more than 350 participants**. During the event, internationally renowned scholars shared their research, and strategic, conceptual, and technical insights on carbon neutrality, while frontier scientists engaged in discussion on advanced research, promoting interdisciplinary collaborations and innovations.

## Governance & Operations

### Campus Carbon Neutrality Roadmap, Accountability, and Research

With the object of achieving campus carbon neutrality by 2045 and demonstrating the University’s commitment to sustainability and environmental stewardship, PolyU has established the Campus Carbon Neutrality Committee.

The Committee is tasked with strategic planning, and the development, implementation, monitoring, and reviewing of the University’s carbon neutrality roadmap and relevant action plans. It will also take into consideration PolyU’s short and medium term targets for 2028 and 2033, designed to ensure effective campus development plans that are five years ahead of the Government’s target.

In addition, the Carbon Neutrality Funding Scheme has been set up to support sustainability-related research projects that leverage PolyU expertise and transform the campus into a testbed for technologies and solutions that could ultimately reduce carbon emissions and improve living standards. Innovative projects include AI-empowered digital twins for smart building energy management; an ammonia-powered hydrogen fuel cell charging station; a smart mini-grid system for renewable energy conversion, storage and utilisation; a 3D-printed biochar for outdoor facility design; and a blockchain-enabled building information modelling platform for a student hostel in Kowloon Tong.

Direct and indirect carbon emission per capita (tonnes CO<sub>2</sub>e)

Reduced **>30%**  
(compared to the peak level in 2014/15)



01

02

03

04

05

06

07

08

09

10

11

12

13

14

15

16

17