InvestHK
The Government of the
Hong Kong Special Administrative Region
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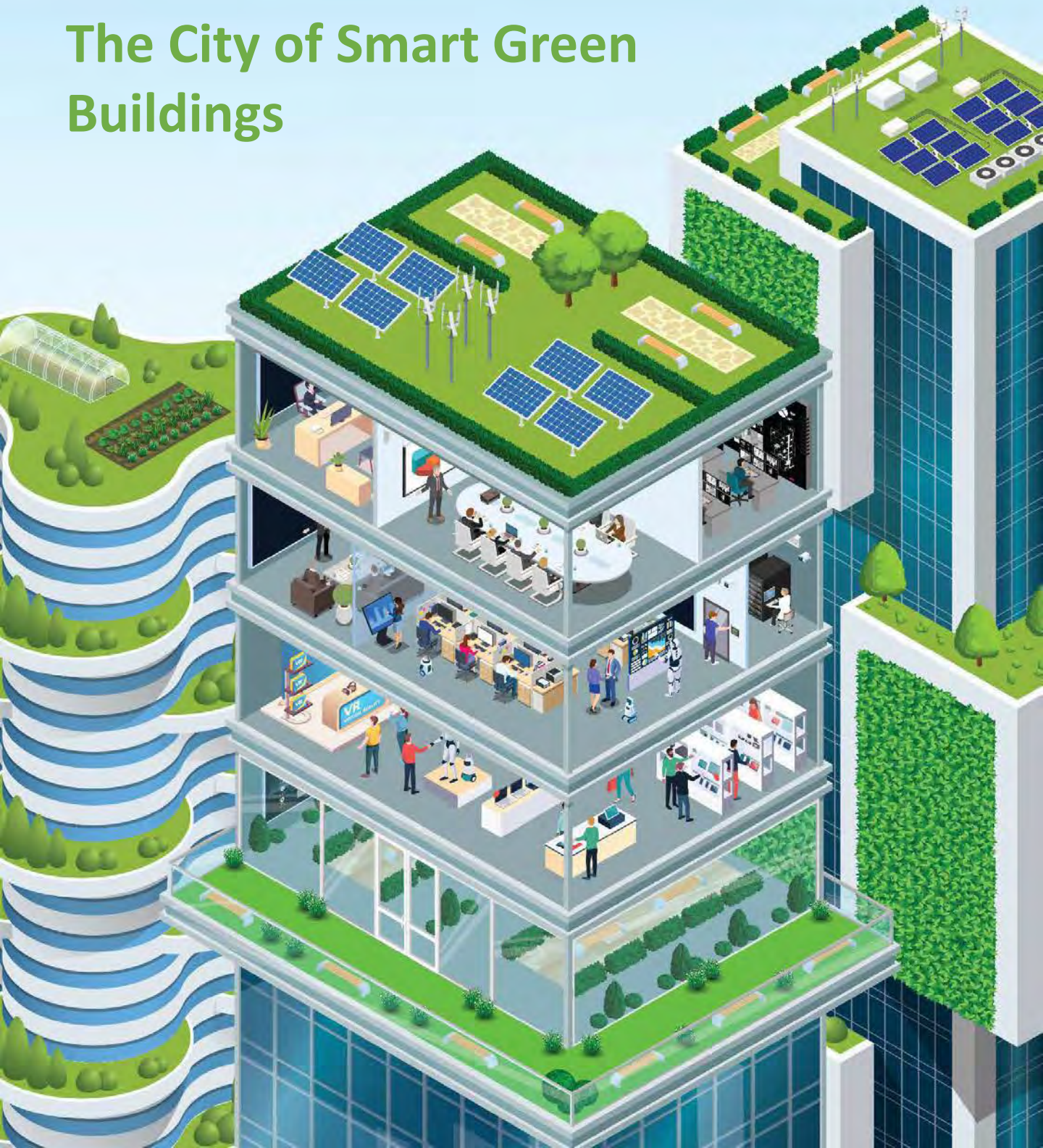
ARCADIS

Discover new ideas and business opportunities in Hong Kong -

The City of Smart Green Buildings



FOREWORD

In the wake of climate change, nations and cities are looking for solutions to address environmental issues more effectively. The built environment, which contributes to almost 40 percent of energy related carbon dioxide emissions, can become more energy-efficient to substantially reduce carbon footprint through integration of smart technologies.

Hong Kong is one of the most populated cities in the world with densely packed skyscrapers. The building sector thereby plays a crucial role in reducing the carbon emissions in Hong Kong. Facilitated by government's supportive policies and funding schemes, comprehensive building assessment and certification system and a sophisticated green finance market, the building sector in Hong Kong has quickly advanced to adopt innovations and has won various international awards in smart green buildings competitions.

Hong Kong is a living laboratory for experimenting smart building technologies. Its world-class facilities for research and development and a rich talent pool in the engineering and construction sectors are all strong catalysts for driving smart green buildings development in the city. Hong Kong not only has the privilege of accessing the enormous market in the Greater Bay Area and the rest of China, but also serves as a springboard for China's outbound investment.

Invest Hong Kong is pleased to present this analysis of Hong Kong's smart green building landscape. Jointly prepared with Arcadis, this report introduces the trends and technologies of smart green buildings and the advantages and business opportunities of developing smart green buildings in Hong Kong. It also features ten iconic projects to showcase smart and green features in the building's design, construction and operations.

We would like to express our gratitude to all professionals and industry experts who contributed their insights to this report and building a sustainable future for Hong Kong.

1 EMBRACING THE FUTURE OF SMART GREEN BUILDINGS

Source:
The Henderson, Hong Kong by Zaha Hadid Architects for Henderson Land Render by Arqui9

Hong Kong has one of the most spectacular skylines and urban landscapes in the world, thanks to the magnificent skyscrapers and the top-performing building sector of the construction industry. Recent developments have seen the sector adopt innovative technologies and place sustainability at the heart of the built asset lifecycle. Riding on our traditional strengths in building construction and unique advantages in smart technologies and sustainability, Hong Kong is poised to lead the development of smart green buildings in the Asia-Pacific region.

What can Hong Kong offer in developing smart green buildings?

Supportive Policies and Funding Schemes

Hong Kong has a wide array of policy measures and funding programmes, such as the Gross Floor Area Concession Scheme, to incentivise participation in the technological and green upgrade of buildings. *(refer to page 32)*

Mature Certification System

BEAM Plus Assessment System is Hong Kong's leading initiative offering independent assessments and certification of sustainability performance for buildings of all types and all ages. *(refer to page 36)*

Premier Green Finance Hub

Hong Kong was ranked as the number one green finance hub in the Asia-Pacific region for issuing HK$244 billion (around US$31 billion)[1] green and sustainable bonds in 2021. A diversified portfolio of sustainable financial products is available for global businesses and investors. *(refer to page 39)*

World Class Research and Development Facilities

Hong Kong has built an exceptional technological infrastructure including Hong Kong Science and Technology Park (Science Park) and Cyberport, to foster a culture of innovation and fuel the growth of building and construction technology. *(refer to page 41)*

Advanced Technologies

The building sector has invested in digital upgrade and harnessed advanced technologies such as Building Information Modelling (BIM), Internet of Things (IoT) and Artificial Intelligence (AI) throughout the building lifecycle. *(refer to page 48)*

Talented Professionals

Hong Kong has more than 10,000 Science, Technology, Engineering and Mathematics university graduates every year and attracts global professionals and specialists through the Technology Talent Admission Scheme and provides continuous vocational training to practitioners in the building sector. *(refer to page 52)*

Vibrant Ecosystem

Hong Kong's dense city landscape, vibrant real estate market and building sector provide enormous opportunities for collaborations and technology trials. The developer community and the construction industry have witnessed a burgeoning of partnerships and joint initiatives between private and public organisations. *(refer to page 55)*

[1] Exchange rate of US$1 = HK$7.8 is used in this book.

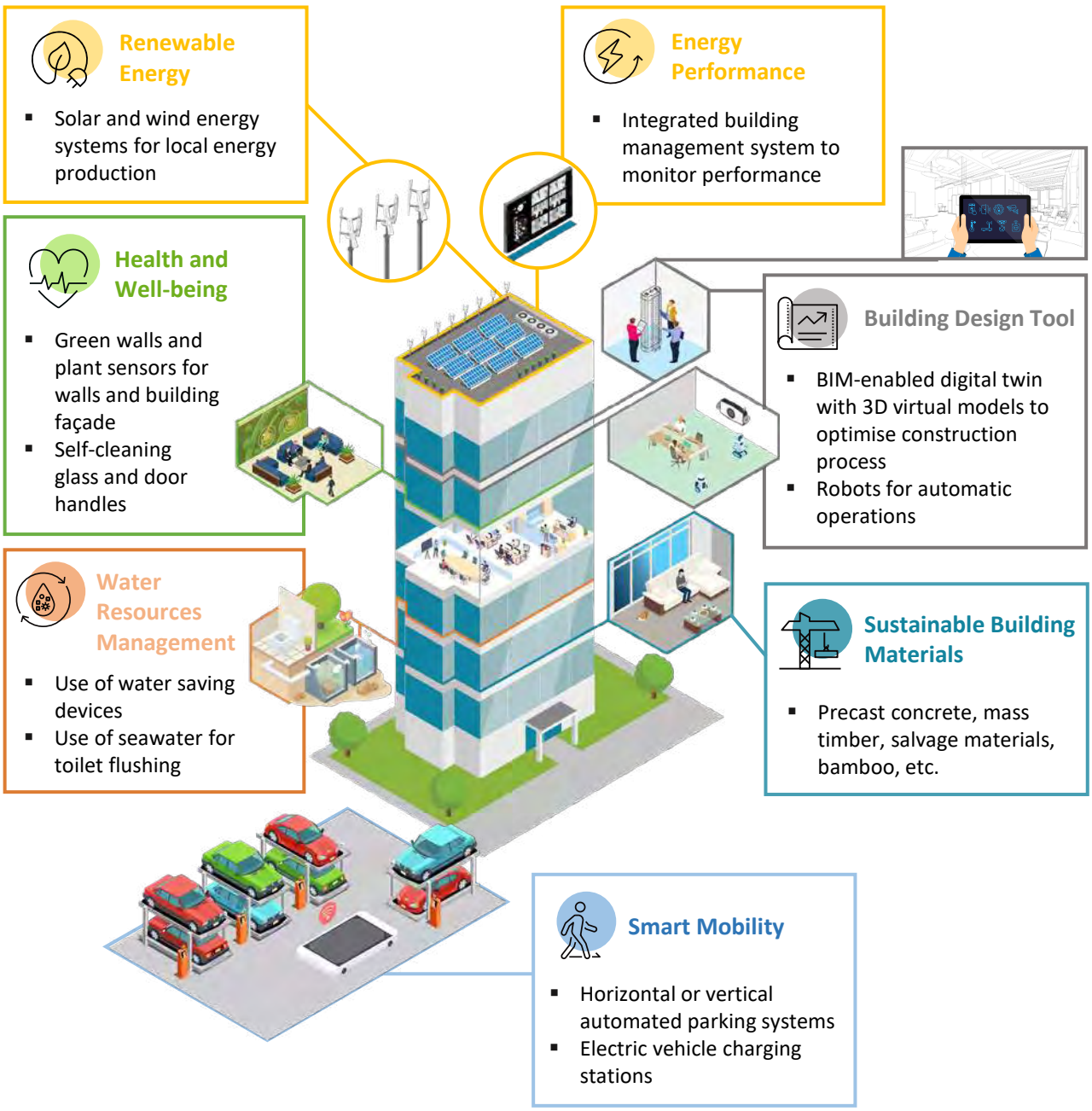
“Hong Kong is a high rise and high density international city and financial centre. The city is well placed for developing and researching smart green building technology for metropolitans. Hong Kong Green Building Council is actively working with the local building industry and green professionals to develop the next generation of low-carbon buildings and transform the energy performance of existing buildings to meet the city’s target of achieving carbon neutrality before 2050. As an international financial centre, we will make the best use of green finance to support smart green building development in the journey. We look forward to interacting and exchanging ideas with experts around the world in this exciting journey.”

Dr Tin-cheung Cheung, SBS
Chairman
Hong Kong Green Building Council

What is a Smart Green Building?

A smart green building integrates innovation and technology (I&T) throughout its lifecycle to maximise resource and operational efficiencies, enhance well-being, promote sustainability and be resilient to change[2].

The infographic below illustrates examples of smart green building technologies and features.



[2] Hong Kong Green Building Council, Hong Kong Smart Green Building Design Best Practice Guidebook, 2021

1.1 Smart Green Building is a Global Trend

Buildings are key components of a city. According to the World Bank, 56 percent of the world's population, or 4.4 billion inhabitants, live in cities, and the share is expected to rise to 80 percent by 2050[3]. As the trend of urbanisation continues, the demand for buildings will continue to rise. Modern buildings should not only serve functional and social needs but should also minimise pollution or eliminate negative impacts on the environment. Technologies such as digital twins, smart building systems and AI-powered sensors can help buildings become environmentally friendly by design and energy efficient throughout the lifecycle.

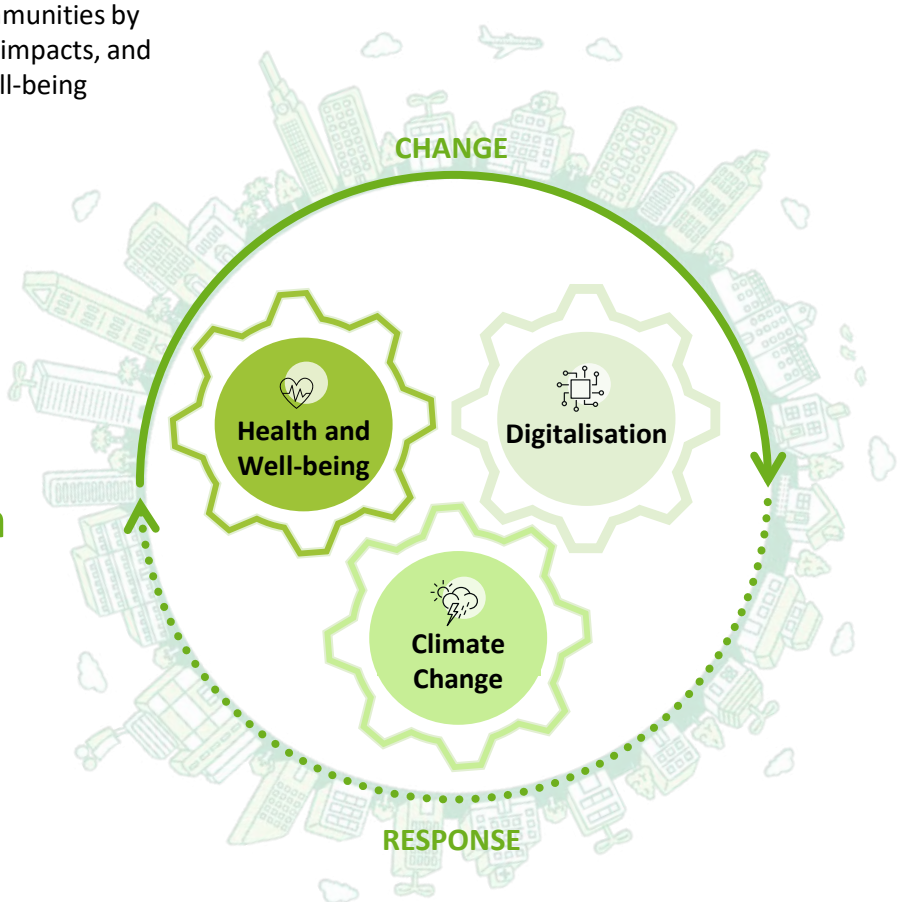
Societies around the world have realised the benefits brought by integrating sustainability initiatives with innovative technologies in buildings, which:

- Minimise impact on the environment by consuming less energy, water and other resources
- Drive economic growth by lowering construction and maintenance costs, increase property value and operating efficiency
- Create sustainable communities by bringing positive social impacts, and improve health and well-being

Smart green buildings have been gaining traction worldwide in the past decade. The rapid development has been driven by three major forces:

- Increased awareness of climate change and decarbonisation
- Embrace of digital technologies
- The pursuit of health and well-being in the post-pandemic era

Drivers of Smart Green Buildings



[3] The World Bank, Urban Development, October 2022

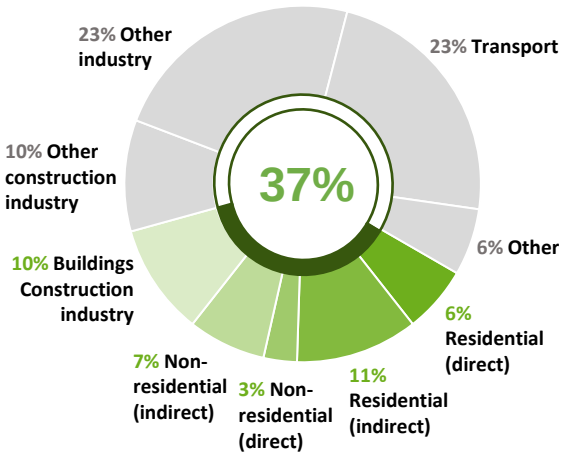
Increased Awareness of Climate Change and Decarbonisation

Climate change has wide-ranging impact on human society and our home planet. At least 85 percent of the global population has experienced extreme weather such as heat waves, tropical cyclones and drought[4]. The impact of climate change on Hong Kong has also become increasingly obvious, as it was affected by rising temperatures, heavy rainfall and mega-typhoons.

Carbon dioxide (CO^2), the primary composition of greenhouse gas that contributes to global warming, has recently reached its emission peak[5]. The global energy crisis in 2021 followed by the resurgence of coal-fired power generations has led to an escalation of carbon emissions. Hence, preventing a sharp rise of carbon emission has become an imminent problem to be resolved in many countries.

Building and construction contribute to 37 percent of global energy and energy-related CO^2 emissions[6]. Fortunately, buildings are rapidly getting greener thanks to smart technologies. They help reduce carbon emission and are playing a vital role in the fight against climate change. Smart green buildings are also more resilient than conventional buildings in mitigating climate risks. For example, greenery and porous paving can soak up the rain and alleviate impacts of flooding during storms; green roof and reflective surface can reduce temperature in a building and its surroundings.

Buildings and Construction's Share of Global Energy and Energy-Related CO^2 Emissions, 2020[6]



Remark: Direct emissions are emissions from operational emissions while indirect emissions are emissions from power generation for electricity and commercial heat. "Buildings construction industry" is the portion (estimated) of overall industry devoted to manufacturing building construction materials.

Embrace of Digital Technologies

Digital technologies have transformed the way of doing business and created a new market landscape for many industries. By adopting advanced technologies such as big data analytics, automation, IoT, AI, and machine learning, businesses have digitised their operations and become more productive and competitive.

The building sector has also joined the race to digital transformation. They have adopted technologies to boost efficiency in every stage of a building lifecycle. For instance, design consultants and construction engineers use BIM to share designs, manage version control and coordinate work processes. For building operation, AI-powered building management systems have been increasingly popular among facilities managers as they can help optimise energy consumption.

[4] Nature Climate Change, Machine-learning-based evidence and attribution mapping of 100,000 climate impact studies, October 2021
[5] International Energy Agency, Global Energy Review: CO2 Emissions in 2021, March 2022
[6] International Energy Agency, Tracking Clean Energy Progress. Adapted from Global Alliance for Buildings and Construction – 2021 Global Status Report for Buildings and Construction

These advanced technologies allow data to be shared seamlessly across various parties along the building value chain, including the project managers, designers, construction engineers and facility managers. They create transparency in the sophisticated construction and operation process, encourage collaboration between multiple parties and empower businesses to make informed decisions.

The Pursuit of Health and Well-being in the Post-pandemic Era

The COVID-19 pandemic has permanently transformed the way we interact with each other and made people more concerned about their health and wellness. Social distancing and home confinement have prompted many urban dwellers to rethink how they should use buildings for work, education and care.

Recent research suggested that living or working in smart green buildings can improve one's health and well-being[7]. For example, indoor air quality sensor, a device commonly installed in smart green buildings, can detect pollutants and monitor air condition in real time. They are connected to a building's heating, ventilation, and air-conditioning systems so that the systems can automatically adjust the settings. With better air quality, the risk of respiratory illnesses and various chronic conditions can be reduced. Biophilic designs, another smart green building feature, can offer a tranquil environment to relieve stress and boost mental well-being.

In response to this shift in perspective on how buildings should be used, property developers and building operators have prioritised public health and well-being to create a sustainable and healthy built environment.

Hysan Development Company Limited's smart robot – Mr. SMART, monitors multiple environmental quality measurements in Lee Gardens portfolio.

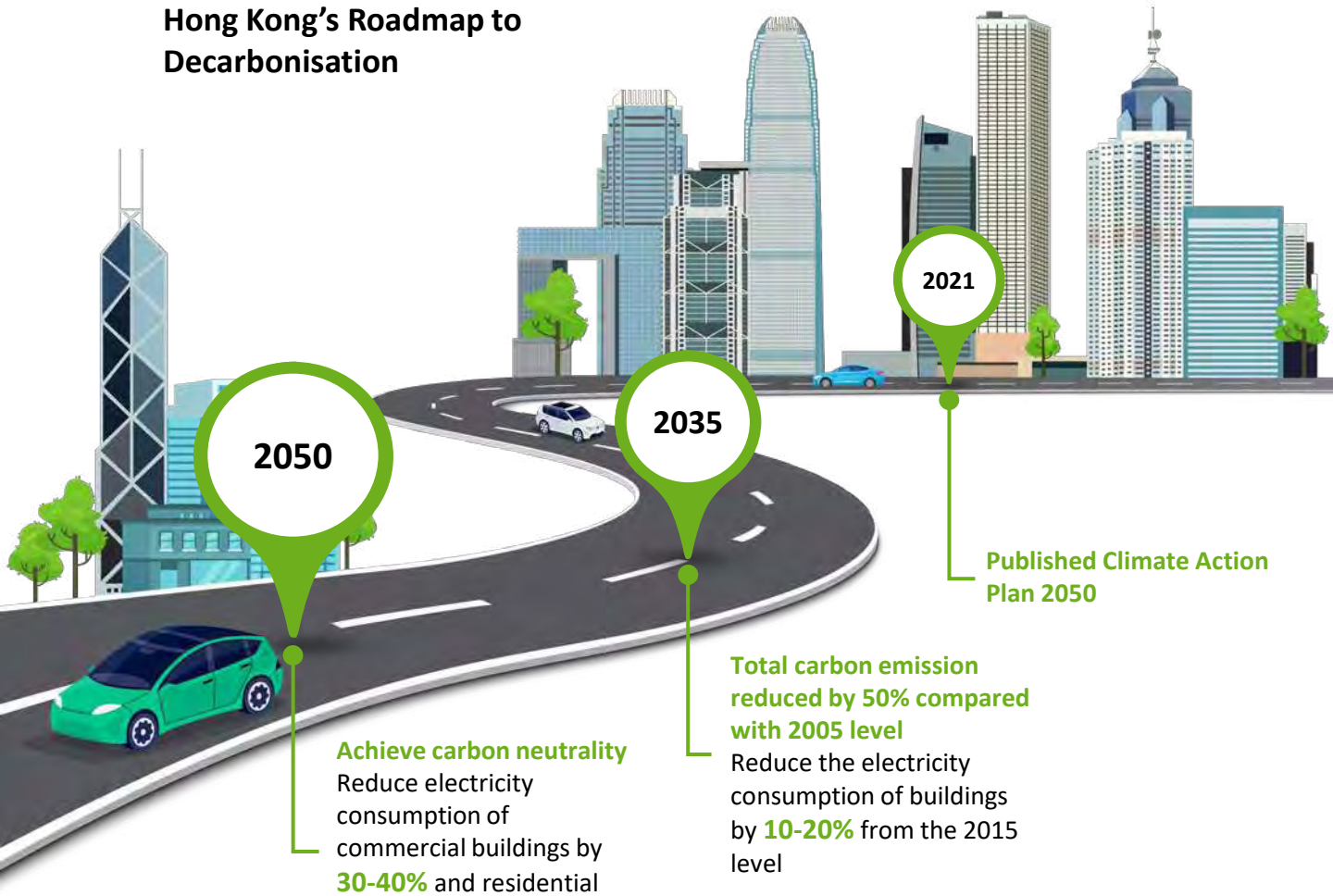
[7] Moya TA, van den Dobbelsteen A, Ottelé M, Bluyssen PM, A review of green systems within the indoor environment. Indoor and Built Environment, 2019

1.2 Ample Opportunities for Developing Smart Green Buildings in Hong Kong

As one of the most densely built cities in the world – with over 42,000 private buildings and more than 8,000 government-owned buildings in a 1,104 square kilometre area – Hong Kong has witnessed the evolution of smart green buildings[8].

The global trends – increased awareness of climate change, acceleration of digitalisation, and pursuit of health and well-being – have exerted huge influence on the city. These trends have given rise to new commitments to decarbonise Hong Kong's economy and fuelled initiatives to promote I&T development. They are also creating ample opportunities for building and construction-related businesses.

Hong Kong's Roadmap to Decarbonisation



Published Climate Action Plan 2050

Total carbon emission reduced by 50% compared with 2005 level
Reduce the electricity consumption of buildings by **10-20%** from the 2015 level

Achieve carbon neutrality
Reduce electricity consumption of commercial buildings by **30-40%** and residential buildings by **20-30%** from the 2015 level

[8] Information Services Department, 2021 Hong Kong in Brief, September 2021; Environment Bureau, Deepening Energy Saving in Existing Buildings in Hong Kong through '4ts' Partnership, June 2017

Joining Global Pledge to Cut Carbon Emissions

China is among the 195 signatories of the Paris Agreement, a legally binding international treaty on curbing climate-warming emissions and has committed to transition to a green and low-carbon economy. It is striving to peak CO^2 emissions before 2030 and achieve carbon neutrality before 2060[9].

In response to China's carbon neutrality targets, the Hong Kong Government has initiated its own targets for combating climate change and achieving carbon neutrality in the *Climate Action Plan 2050.* Energy saving and green buildings were outlined as one of the four major decarbonisation strategies in the plan. To meet carbon neutrality by 2050, the Hong Kong Government has set explicit targets to reduce electricity consumption in buildings and earmarked approximately HK$240 billion (US$31 billion) in the next 15 to 20 years to implement decarbonisation strategies and measures[10].

Buildings have been identified as a key contributor to carbon emissions, accounting for 90 percent of Hong Kong's total electricity consumption, and over 60 percent of Hong Kong's carbon emissions are attributable to generating electricity for buildings[11]. To enhance energy efficiency and conservation in both new and existing buildings, the Hong Kong Government will implement various energy saving measures, such as setting more stringent energy efficiency standards and harnessing innovative technologies.

> "The Hong Kong Government is moving with the times and the advancements in the building construction industry. We have embedded smart and green features in all of our projects and increased the use of innovative construction methods such as Modular Integrated Construction (MiC) to elevate and speed up the housing supply. We are committed to continuously improve the environmental standards in the provision of public housing and related services and strive to provide homes that are not only climate-resilient but can contribute to the goal of carbon neutrality."

Ms Winnie Ho, JP
Secretary for Housing
Housing Bureau

90%

of Hong Kong's total electricity consumption is from buildings

The Hong Kong Government has already achieved the five-year target of reducing electricity consumption in government buildings by five percent from 2015-16 to 2018-19[12]. The Chief Executive of Hong Kong has committed in the *2022 Policy Address* to improve the energy performance of government buildings and infrastructure by more than six percent by 2024-25[13].

[9] The State Council Information Office, Responding to Climate Change: China's Policies and Actions, October 2021
[10] Hong Kong Government, Government Announces Hong Kong's Climate Action Plan 2050, October 2021
[11] Hong Kong Government, Climate Change, July 2022
[12] Hong Kong Government, Hong Kong Smart City Blueprint 2.0, December 2020
[13] Hong Kong Government, The Chief Executive's 2022 Policy Address, October 2022

Government-Led Innovation and Technology Initiatives

The Hong Kong Government has unprecedentedly invested over HK$150 billion (US$19 billion) in the past five years to promote I&T development[14]. It has dedicated additional land for infrastructure development, including building landmark facilities that support cross-border I&T initiatives, providing land to universities for research and development (R&D) use and establishing research clusters. Multiple funds, including the Construction Innovation and Technology Fund, the Green Tech Fund and the Public Sector Trial Scheme, have been established to encourage R&D for smart green building development.

To increase the efficiency of city management and improve people's livelihood, the Hong Kong Government has launched the *Hong Kong Smart City Blueprint 2.0* with over 130 ground-breaking initiatives covering six smart areas (Smart Mobility, Smart Living, Smart Environment, Smart People, Smart Government and Smart Economy)[15]. The Smart Environment area focuses on how to develop green and intelligent buildings and include strategies such as promoting retro-commissioning and building-based smart technologies, and promoting building energy efficiency and conservation, which will certainly accelerate the development of smart green buildings in Hong Kong.

Additionally, the government-led initiative *Construction 2.0* has helped drive innovation and digitalisation in the construction industry and encourage collaboration with the robust I&T sector to boost productivity, efficiency, and sustainable project deliverables.

"The Urban Renewal Authority is committed to taking forward urban regeneration of old districts, beautifying the neighbourhood and integrating the old and new cityscapes, thereby improving the overall built environment and liveability of Hong Kong.

We are keen to incorporate smart and green building concepts into our new developments, revitalisation and retrofitting projects through adopting innovative information technologies, construction methods, renewal energy initiatives, and building management systems. Meanwhile, we support the Hong Kong Government's sustainable development initiatives in conjunction with our business partners and industry stakeholders to transform Hong Kong into a smart, liveable and sustainable city."

Mr Eric Poon
Executive Director
Urban Renewal Authority

[14] Hong Kong Government, Development of innovation and technology in Hong Kong, June 2022
[15] Hong Kong Government, Government releases Smart City Blueprint for Hong Kong 2.0, December 2020

Unlimited Opportunities Arising from the Innovative Construction Industry

Hong Kong provides an excellent ground for testing new building technologies and construction methods. The Hong Kong Government is pushing ahead with two mega development plans, Lantau Tomorrow Vision and the Northern Metropolis Development Strategy, to build new urban centres with future-ready infrastructure. For instance, it has indicated that the Northern Metropolis will be developed into a sustainable and carbon-neutral smart community that provides blue and green infrastructure with multiple functions and benefits[16].

> "With the upcoming Northern Metropolis Development Strategy in place, we can fast track the digitisation of the building and construction industries. The Northern Metropolis will provide an excellent opportunity for the new buildings to have wider adoption and deployment of smart technologies such as digital twin, AI, and IoT. As smart technologies are incorporated in the planning stage of the buildings, owners can easily monitor energy consumption in the operational stage and make appropriate optimisation and further enhancements."

Mr Eric Ma, GBS, JP
Chairman of Real Estate and Infrastructure Committee
Hong Kong General Chamber of Commerce

For Lantau Tomorrow Vision, it will explore the wider use of renewable energy, energy efficient design and technologies, higher greening ratio, more advanced recycling and waste management measures[17]. It can be expected that there will be a surging demand for advanced technologies and sustainable solutions in residential buildings, commercial offices, retail stores and public facilities.

	Lantau Tomorrow Vision	Northern Metropolis
Location	Reclamation near the east of Lantau Island	Border between Hong Kong and Mainland China
Total Area (hectares)	1,700	30,000
Target Supply of Residential Units	260,000 to 400,000	926,000
Target Population in 20 to 30 years	700,000 to 1,100,000	2,500,000

Hong Kong Government's development projects in the pipeline will create ample opportunities for building services, engineering consulting, architecture planning and design, surveying, and construction-related businesses in areas such as technical, management, and environment.

[16] Hong Kong Government, The Chief Executive's 2021 Policy Address, Northern Metropolis Development Strategy, 6 October 2021
[17] Development Bureau and Civil and Engineering Development Department, Lantau Tomorrow Vision Leaflet, February 2019

1.3 Smart Green Buildings are Flourishing in Hong Kong

The public's awareness of sustainability has been increasing as Hong Kong aims to be carbon neutral by 2050, which has led public and private developers to commit to making buildings smart and sustainable across all building types.

The 10 smart green building projects in the following pages showcase innovative applications of smart construction methods, sustainable building design, eco-friendly materials, as well as energy-saving technologies in Hong Kong.

Transport Department Vehicle Examination Complex

Name of Developer	**Architectural Services Department (ArchSD)**
Location	Tsing Yi
Completion Date	2021
Gross Floor Area	Around 75,000 m²
Description	A comprehensive multi-storey complex for examining various types of vehicles ranging from public transport vehicles (e.g. taxi, light bus, bus) to all types of goods vehicles (including light, medium, heavy goods vehicles, and trailers) and special purpose vehicles
Certification(s)	BEAM Plus New Buildings [v1.2] Final Platinum

Façade Fins

Optimise shading performance throughout different seasons and avoid glare from the façade to the drivers on the flyover

High-performance Window Glazing

Optimises thermal transfer, elevates energy efficiency and allows for natural daylight to enter the internal space to enhance comfort

Source: ArchSD

Smart Construction Methods

- Minimise the amount of construction waste generated through MiC and Design for Manufacture and Assembly (DfMA) methods
- Improve design and quality control using BIM and computerised simulations

Photovoltaic and Solar Hot Water Systems

Generate clean, renewable energy

618 Shanghai Street

Name of Developer	**Urban Renewal Authority (URA)**
Location	Mong Kok
Completion Date	2019
Gross Floor Area	5,223 m²
Description	A revitalisation project covering 14 street numbers, comprising 10 pre-war shophouses built in the 1920s and which have been assessed as Grade II historic buildings, as well as four post-war buildings
Certification(s)/ Award(s)	• BEAM Plus New Buildings [v1.2] Final Platinum • The Hong Kong Institute of Surveyors Best Development and Conservation Award 2021 – Grand Award in Post-occupation Category, and Sales and Leasing Category

Rainwater Recycling System

Reduces water consumption by using a zero irrigation planting system and rainwater harvesting system

Centralised Facility Management System

Enhances facility management by using IoT sensors with BIM model

E-platform for Defect and Inspection Management

Improves construction performance and cost-efficiency through data analysis

Source: URA

Energy Saving Features

Save 32% of energy consumption through using:

- Air conditioning with high coefficient of performance
- LED lighting
- Daylight sensors
- Window glazing with low shading coefficient

Construction And Demolition Recycling Strategies

Reduce construction waste at source through:

- Off-site fabrication of rebars
- Recycling of building materials
- Installation of wastewater treatment plants on construction site

InnoCell

Name of Developer	**Hong Kong Science and Technology Parks Corporation (HKSTP)**
Location	Tai Po
Completion Date	2021
Gross Floor Area	15,300 m²
Description	A smart living and co-creation space designed for I&T talents to spark collaboration within Science Park
Certification(s)/ Award(s)	• BEAM Plus New Buildings [v1.2] Final Platinum • Hong Kong Green Building Council 2021 Green Building Award – Grand Award (New Residential Building) • The World Green Building Council Asia Pacific Leadership in Green Building Awards – The Leadership in Sustainable Design and Performance Award - Residential

Energy Efficient Facilities

Reduce annual energy consumption by using 100% of certified energy efficient appliances and separate metering devices for building components

Innovative Construction Methods

Shorten the overall construction time by 40% and reduce material wastage significantly through the use of MiC

Source: HKSTP

Construction Digitalisation

Coordinates prefabrication progress using BIM and digital works supervision system

Sustainable Building Design

Provide state-of-art active and passive building design to achieve energy saving up to 56%

Smart Home Strategy

Transform user's experience and operational model and foster sustainable lifestyle by adopting home automation and smart I&T system

The Henderson

Name of Developer	**Henderson Land Development Company Limited (HLD)**
Location	Central
Completion Date	2023
Gross Floor Area	Around 43,200 m²
Description	A super Grade-A office tower that will be a showcase for health, resilience, smart technology and sustainability
Certification(s)	• BEAM Plus New Building [v1.2] Provisional Platinum • LEED Platinum Pre-certification • WELL Platinum Pre-certification • China Green Building Design Label 3-Star highest rating • China Healthy Building Design Label 3-Star highest rating • WiredScore Platinum certification • SmartScore Platinum certification

Source: The Henderson, Hong Kong by Zaha Hadid Architects for Henderson Land Render by Arqui9

Solar Responsive Ventilators

Powered by the photovoltaic on the roof, the patented ventilators adjust solar radiant heat received by the occupants at the office perimeter zone in response to the demand for their thermal comfort

Energy Saving Facilities

Reduce energy consumption by smart operating energy optimisation, and supported by highly efficient centralised chiller plant, ventilation and air condition equipment, daylight sensor, LED lighting

Sustainable Building Materials

Reduce building life cycle carbon by using low carbon and recyclable materials during construction; provide green fit-out guide to facilitate the use of low carbon materials while tenants move-in

Smart Building Operation

Enhances oversight of building operations through BIM-enabled digital twin and one-stop tenant mobile application for booking carpark spaces, event facilities and customer services

Contactless Pathway System

Minimises infection risk from building entrance to office floors

West Kowloon Cultural District

Name of Developer	**West Kowloon Cultural District Authority (WKCDA)**
Location	Yau Tsim Mong
Completion Date	2018-2019 (Art Park), 2019 (Xiqu Centre, Freespace), 2021 (M+), 2022 (Hong Kong Palace Museum)
Gross Floor Area	Around 400,000 m²
Description	A vibrant cultural quarter blending together art, education, open space, hotel, office, residential developments, retail, dining and entertainment facilities
Certification(s)	• BEAM Plus Neighbourhood (Pilot Version) Platinum • BEAM Plus New Building [v1.2] Provisional Gold (Hong Kong Palace Museum) • BEAM Plus New Building [v1.2] Final Gold (M+) • BEAM Plus New Building [v1.2] Final Gold (Xiqu Centre) • BEAM Plus New Building [v1.2] Final Gold (Freespace)

Hong Kong Palace Museum

Prevent external light from overspilling into the sky and minimise glare from light source by using lighting control and louvres for external light fitting

Art Park

Minimise flooding risk with 'Dry River' with passive water filtration function, which is formed by river bedding rocks of various sizes to mimic natural landscape features

Note: All photos are provided by WKCDA.

M+

Support by District Cooling System with energy efficient seawater cooled chillers that provide chilled water supply for M+ and other major developments within the District

Xiqu Centre

Reduce heat gain and energy consumption by installing curved metal fins on the exterior façade as shading devices

Freespace

Minimise carbon emissions from transportation by manufacturing 76% of the building materials within 800km of the construction site


FREESPACE FREESPACE FREESPACE

“Sustainability has always been a fundamental component in the development of the West Kowloon Cultural District from planning, design, construction and operation. Located in the heart of one of the most densely-populated cities in the world with a significant amount of green public open space and green infrastructures, the District is designed to be an urban oasis that brings people closer to nature and culture. Through promoting sustainability, we wish to take the lead in making the District a great place that creates positive impact for the society.”

Mrs Betty Fung Ching Suk-yee, GBS
Chief Executive Officer
West Kowloon Cultural District Authority

Source: WKCDA

Central Portfolio

Name of Developer	**Hongkong Land (HKL)**
Location	Central
Completion Date	Between 1965 and 2013
Gross Floor Area	Around 450,000 m²
Description	HKL's Central Portfolio consists of 12 interconnected prime commercial buildings (including Prince's Building, Exchange Square and others), providing Grade A office and luxury retail space
Certification(s)	BEAM Plus Existing Building [v2.0] Comprehensive Scheme Final Platinum

Integrated Building Management System

Enhances efficiency and sustainability of building operation by monitoring and controlling all 12 buildings in a single centre using IoT sensors, security cameras, and AI

Solar Panels

Generate electricity using more than 700 PV panels, the largest installation of PV panels among any property developer on Hong Kong Island

Central Portfolio Buildings:

- One and Two Exchange Square
- Three Exchange Square
- The Forum
- Jardine House
- Chater House
- Alexandra House
- Prince's Building
- York House
- LANDMARK ATRIUM
- The Landmark Mandarin Oriental
- Edinburgh Tower
- Gloucester Tower

Source: HKL

AI-based Energy Optimisation

Reduces 9% of electricity consumption from the chiller

Personalised Indoor Comfort Mobile Application

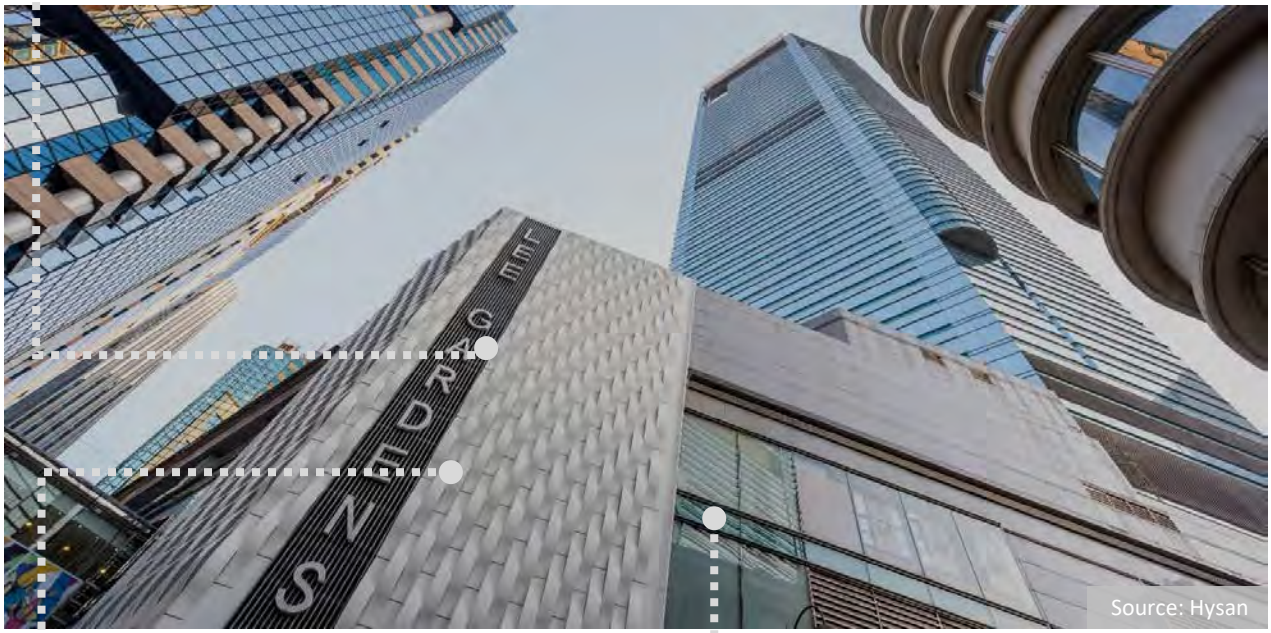
Reduces 2.5% of air conditioning consumption and 68% of temperature change service requests by allowing tenants to adjust the thermal comfort of their environment

Lee Garden One

Name of Developer	**Hysan Development Company Limited (Hysan)**
Location	Causeway Bay
Completion Date	1997
Gross Floor Area	Around 83,600 m²
Description	High-end Commercial Property with premier Grade-A offices, shopping mall and carpark with 200 parking spaces
Certification(s)	• BEAM Plus-Existing Building [v1.2] Final Platinum Certificates in 2017 and renewed to [v2.0] Final Platinum in 2022 • WELL Health & Safety Rating Certificates since 2021

Smart Building Management System

- Enables chiller plant optimisation
- Enables data consolidation from the system, identifying abnormal pattern for energy saving opportunities in retro-commissioning (RCx) and retrofitting for the centralised air-conditioning system
- Adopts smart metering with real time data analytics on metrics from temperature to voltage levels etc. to improve energy management



Source: Hysan

Green Procurement

Adopts the use of environmentally friendly "green seal" cleaning agents which reduced the emissions of volatile organics during operations and maintenance, providing a healthier indoor environment as well as reducing the need on ventilation

Water Conservation

Achieves a 75.3% annual potable water saving with the installation of water efficient devices including water efficient faucets, urinals flow controllers and dual flush water closets

Malibu

Name of Developer	**Wheelock Properties (Hong Kong) Limited (Wheelock)**
Location	Tseung Kwan O
Completion Date	2020
Gross Floor Area	130,703 m²
Description	A residential building equipped with a variety of environmentally friendly provisions to minimise the carbon footprint, enhance the well-being of end-users, and reduce operational costs
Certification(s)	BEAM Plus New Building [v1.2] Final Platinum

Climate and Epidemic-resilient Solutions

Ensure good air ventilation and access to natural lighting by conducting air ventilation analysis and natural ventilation studies during the design stage

Sustainable Building Materials

Reduce embodied carbon by using certified timber, regionally sourced materials and low volatile organic compounds materials

Source: Wheelock

Integrated Air Purification System

Enhances indoor air quality by filtering air pollutants using an ultra-violet lamp sterilisation system at lift lobbies and the clubhouse

Smart Metering

Encourages energy saving by collaborating with CLP Power Hong Kong Limited to allow residents access to their electricity consumption data

Greenery Distribution and Landscape Design

Creates an oasis for urban living by integrating greenery in more than 34% of the total site area

K11 ATELIER 11 SKIES (Part of 11 SKIES)

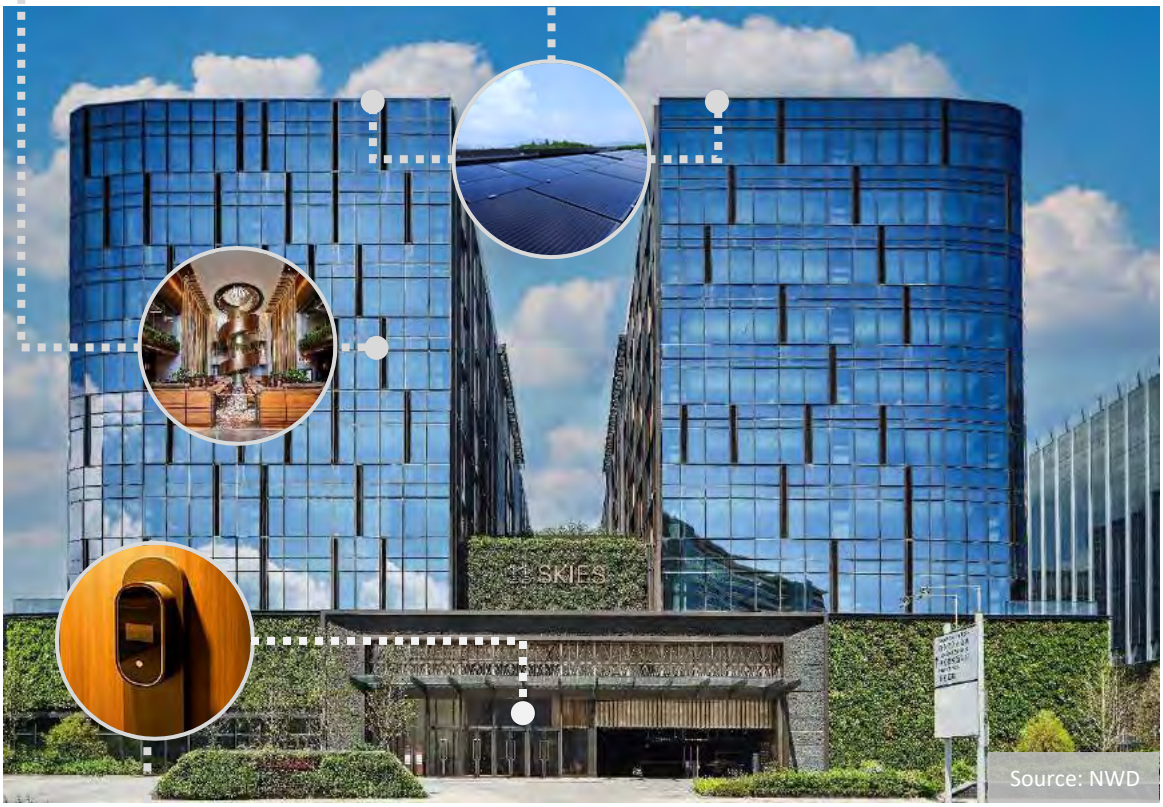
Name of Developer	**New World Development Company Limited (NWD)**
Location	SKYCITY, Hong Kong International Airport
Completion Date	By phases from 2022 to 2025
Gross Floor Area	Around 53,000 m²
Description	A mixed-use development project with three Grade-A office towers for tenants to operate cross-border business and offer services of wealth management, healthcare and wellness to both local and Greater Bay Area customers
Certification(s)*	• BEAM Plus New Buildings [v1.2] Provisional Platinum • LEED Platinum Pre-certification • WELL Building Standard Platinum Pre-certification

Indoor Air Quality Monitoring System

Design to provide hospital-grade indoor air quality by providing advanced air filters and automatically calibrating bespoke sensors using big data analytics and AI machine learning

Hybrid Solar Photovoltaic and Thermal System PVT

Aims to achieve energy savings of 177,000kWh per year by co-generating electricity and thermal energy on the rooftops



Source: NWD

AI Load Management System

Saves approximately 50% electricity use as compared to the conventional power system and simultaneously provide fast and medium electric vehicle charging

**As of 31st January 2023, the project is pursuing the final assessment/submissions of the aforementioned certifications*

One Taikoo Place

Name of Developer	**Swire Properties Limited (Swire)**
Location	Quarry Bay
Completion Date	2018
Gross Floor Area	25,162 m²
Description	A triple Grade A office tower and Hong Kong's first-ever AI enabled smart building
Certification(s)	• BEAM Plus New Buildings [v1.2] Final Platinum • WELL v1 Core & Shell Final Platinum • LEED Final Platinum

Indoor Air Quality Sensors

Monitor indoor temperature, relative humidity, carbon dioxide, particulate matter 2.5 and 10, total volatile organic compounds and ozone levels

Smart Facility Management

Optimises energy usage, detects faults and facilitates predictive maintenance by using AI and IoT to learn from operational data

Source: Swire

Smart Lighting Fixtures

Save electricity consumption with the aid of daylight and motion sensors

On-site Renewable Energy Generation

Supplies 5% of total landlord building energy through the use of solar panels and a waste-to-energy tri-generation system

Sustainable Building Materials

Reduce carbon emissions from the construction stage by using low embodied materials as the structural elements and reusing existing caisson

Source: Swire

2 HONG KONG IS A SPRINGBOARD FOR DEVELOPING SMART GREEN BUILDINGS

Hong Kong has an internationally recognised business-friendly environment for companies of all sizes. For decades, it has been one of the most attractive destinations to incorporate and promote business. In addition to well-known advantages such as low taxation and a well-established financial market, Hong Kong offers a unique combination of benefits for entrepreneurs to start or grow their smart green building businesses.

2.1 Hong Kong is an Ideal Place to do Business

Ranked as Asia's second most competitive economy in the World Competitiveness Ranking 2022, Hong Kong has demonstrated strong resilience and vitality amidst domestic and external headwinds. The six key fundamentals underpinning its competitive edges have continued to make it a top choice for international companies and entrepreneurs to do business[18].

Inherent Advantages of Hong Kong

[18] News.Gov.HK, HK ranked 5th in Competitiveness, July 2022

Low and Simple Tax System

Hong Kong has one of the world's most tax-friendly systems with only three direct taxes (profits, salaries, and property) imposed. Companies are subject to two-tier profits tax of no more than 16.5 percent, while salaries tax on individuals does not exceed 15 percent.

The Hong Kong Government also offers enhanced tax deduction for spendings on qualifying research and development (R&D) activities – 300 percent reduction for the first HK$2 million (US$256,000) spent and 200 percent reduction for further expenses[19].

Robust Intellectual Property Protection

Hong Kong's well-established legal system based on the rule of law offers strong legal protection for intellectual property (IP), covering patents, designs, copyrights, and trademarks. Hong Kong recognises several international treaties and agreements regarding IP. It is also a signatory of the World Trade Organisation Agreement on Trade-Related Aspects of Intellectual Property Rights. Therefore, its IP regime is fully compatible with international obligations and standards.

The Original Grant Patent system allows applicants to file for standard patents with a maximum term of 20 years, providing an alternative to the existing re-registration route.

In addition, Hong Kong has paved the way for implementing the Madrid Protocol. Once in effect, the Protocol will offer a convenient and cost-effective way for foreign trademark owners to register trademarks in Hong Kong. With such robust IP systems, Hong Kong encourages innovation and incentivises inventors and creators, as well as safeguards ground-breaking ideas.

Open Business Environment

Under "One Country, Two Systems", Hong Kong preserves its own currency, political, and legal systems. As a special administrative region of China that practises common law, Hong Kong is uniquely placed to conduct business to and from China and promote in and out-bound capital flow and investments.

Hong Kong also facilitates the free flow of capital, talent, goods, and information. There are no restrictions in foreign ownership or foreign direct investment. In addition to easy customs procedures, its rule-based multilateral trading system imposes no tariffs, quotas, or exceptions.

[19] Inland Revenue Department, Deduction for Research and Development Expenditure, Departmental Interpretation and Practice Notes No. 55, April 2019

International Financial Hub

As one of the world's top international finance centres, Hong Kong is a prime location for financial services and home to 200 authorised banking institutions[20]. Its financial markets operate under effective and transparent regulations that align with international standards.

Hong Kong has ranked first in initial public offering fundraising globally for four out of seven years from 2014 to 2020[21]. In 2021, the number of listed companies on the Main Board reached 2,219, with an overall market capitalisation of HK$42 trillion (over US$5 trillion)[22, 23]. The Shanghai-Hong Kong and Shenzhen-Hong Kong Stock Connects have facilitated fund flows from Mainland China to the Hong Kong capital markets. The Hong Kong Exchanges and Clearing (HKEX) has initiated new listing rules to cater for the funding needs of special purpose acquisition companies and technology firms. These mechanisms have made Hong Kong more attractive to global investors and issuers.

A Plug-in to Global Markets

Hong Kong is one of the world's most connected cities due to its location at the heart of Asia. It only takes four hours or less to get to Asia's key markets from Hong Kong via air travel, and the Hong Kong Port connects to more than 470 destinations worldwide.

Hong Kong's legal and regulatory frameworks are aligned with global standards. There are no foreign exchange controls in force in Hong Kong, and the Hong Kong dollar is freely convertible into other currencies. Firms in Hong Kong can benefit from a vast network of free trade agreements and 45 tax treaties signed between Hong Kong and other economies[24].

[20] Hong Kong Monetary Authority, Hong Kong as an International Financial Centre
[21] The Stock Exchange of Hong Kong, Listing with HKEX
[22] The Stock Exchange of Hong Kong, Fact Book 2021
[23] PwC, Hong Kong's capital markets continue to flourish 25 years after the handover, June 2022
[24] Inland Revenue Department, Comprehensive Double Taxation Agreements concluded

Gateway to the Greater Bay Area Market

Hong Kong is the most open and international city in the Guangdong-Hong Kong-Macao Greater Bay Area (GBA). For the past few decades, it has been a strategic gateway for multinational companies to enter the GBA market.

Hong Kong has developed efficient cross-boundary transportation network and facilities. Coupled with mutual market access programmes, such as Shenzhen-Hong Kong Stock Connect and mutual recognition of qualifications or examinations, the flow of talents, goods, information as well as capital between Hong Kong and GBA cities have been greatly facilitated.

Talents and companies in Hong Kong are experienced in stimulating synergies within the GBA cities. They have extensive connections to the industrial clusters in the Guangdong Province. By leveraging the manufacturing base in the Guangdong Province, businesses have built cost efficient and agile supply chains that rival their competitors. Hong Kong supports them with professional services in legal, accounting, direct investment, testing and certification. There is no better gateway to the GBA than Hong Kong due to the common language, its familiarity with Mainland practices and knowledge of international laws and regulations.

Combined with the advancing innovation and technology (I&T) development, Hong Kong can support foreign enterprises in growing their smart green building business across the GBA market. Novel technologies have further enabled synergies with the GBA. For example, cloud computing can be adopted for remote control and monitoring of operations across the border, and blockchain can be used to ensure the quality of building components.

2.2 Hong Kong is an Attractive Place for Smart Green Building Development

At the heart of Hong Kong's conducive business environment is a unique blend of core competencies that makes Hong Kong a prime location for global companies to launch smart green building business.

Supportive Policies and Funding Schemes

Hong Kong has a wide array of structured policies and comprehensive funding schemes to support companies on their smart green building businesses. These policies and funding schemes have steered the building sector towards sustainable growth and prompted building owners and managers to make proactive investments in smart and green technologies.

Building Information Modelling Mandate and Guidelines

In the public sector, the Hong Kong Government has mandated the adoption of Building Information Modelling (BIM) in capital works projects to optimise the overall design, construction, and asset management stages and increase the productivity of the construction industry.

> Capital public projects with project estimates exceeding HK$30 million (around US$4 million) are required to use BIM[25]

For the private sector, the Buildings Department (BD) has encouraged the submission of BIM as supplementary information to building plans.

As the Hong Kong Government continues to push for an industry-wide BIM adoption, design consultants and contractors will increasingly seek out BIM software and services to become BIM compliant. With better planning and collaboration, project managers can make more accurate material estimate and achieve just-in-time delivery, thus eliminating wastage and saving cost.

[25] Development Bureau, Initiative for Engagement of CIC-certified BIM Coordinators, July 2021

Gross Floor Area Concession Scheme

Since 2011, BD has provided incentives to developers to implement sustainable building design by granting up to 10 percent gross floor area (GFA) concession to new development projects which comply with the Sustainable Building Design Guidelines and attain Building Environmental Assessment Method (BEAM) Plus certifications[26]. To encourage the adoption of the Modular Integrated Construction (MiC) method, an extra 10 percent of the MiC floor area concession may also be granted[27]. The GFA concession mechanism has been an effective tool to attract developers to enter the smart green building market and upgrade their construction techniques, thereby raising the industry standards.

> "The Buildings Department is committed to promoting quality and sustainable buildings through reviewing standards and practical guidance for building professionals and contractors, and providing incentives via the gross floor area concession mechanism. The Buildings Department has been streamlining the approval process and enhancing the established mechanisms to facilitate the adoption of new technologies, innovative construction methods and green materials and products."
>
> **Ms Clarice Yu, JP**
> Director of Buildings
> Buildings Department

Building Energy Regulations and Guidance

The Hong Kong Government has enacted ordinances to mandate minimum energy efficiency requirements and provides guidance on the reduction of carbon emissions in new and existing buildings[28]. The Electrical and Mechanical Services Department (EMSD) has been promoting retro-commissioning (RCx) – a process to improve the energy performance of an existing building's equipment and systems, and help building owners reduce energy consumption, lower energy bills, and improve the indoor environment of the building[29].

As buildings have become a priority in the Hong Kong Government's effort to achieve carbon neutrality, the extent of these regulations and requirements will likely increase, thus driving up the market demand for energy efficiency solutions.

Building Energy Incentives

The Hong Kong Government provides economic incentives to encourage building owners to incorporate carbon reduction technologies and perform energy saving works in their buildings.

The following table lists the incentive schemes launched by the EMSD, Urban Renewal Authority, and the two power companies — CLP Power Hong Kong Limited and Hongkong Electric Company.

[26] Buildings Department, Practice Notes for Authorised Persons, Registered Structural Engineers and Registered Geotechnical Engineers APP-151 Building Design to Foster a Quality and Sustainable Built Environment, August 2022
[27] Buildings Department, Joint Practice Note 8 Incentive to Promote Green and Innovative Buildings - Enhanced Facilitation Measures for Buildings Adopting Modular Integrated Construction, July 2022
[28] Building Energy Efficiency Ordinance (Building Energy Code and Energy Audit Code), Energy Efficiency (Labelling of Products) Ordinance (Mandatory Energy Efficiency Labelling Scheme), Building (Energy Efficiency) Regulation (Overall Thermal Transfer Value) and Guidelines on Design and Construction Requirements for Energy Efficiency of Residential Buildings (Residential Thermal Transfer Value)
[29] Electrical and Mechanical Services Department, Technical Guidelines on Retro-commissioning, 2018

Incentive Schemes to Promote Energy Efficiency in Buildings

Organisation(s)	Scheme	Details
Electrical and Mechanical Services Department	Energy Efficiency Registration Scheme for Buildings[30, 31]	Buildings that have obtained certificates of good building energy performance can apply for deduction under profits tax for the capital expenditure incurred ▪ 100% deduction for purchase of eligible environmental protection machinery ▪ 20% deduction for five consecutive years for eligible environmental protection installations
Urban Renewal Authority	Green Item Subsidy[32]	Provides up to HK$1,500 (close to US$200) per unit or HK$600,000 (approximately US$77,000) per owners' corporation for private residential or composite buildings of more than 30 years to encourage property owners to use certified environmentally-friendly building materials and install energy-saving facilities when carrying out building rehabilitation works in common areas
CLP Power Hong Kong Limited	Eco Building Fund[33]	Provides building owners with up to 50% in subsidies for energy-saving improvement works and 100% in subsidies for RCx works; capped at HK$500,000 (approximately US$64,000) per building
	Electrical Equipment Upgrade Scheme[34]	Offers subsidies for installation of or upgrade to energy-efficient lighting or air-conditioning for small and medium enterprises
	Energy Saving Loan Scheme[35]	Offers free energy audit service and interest-free loans up to HK$5 million (approximately US$640,000) for commercial and industrial customers to implement energy efficiency projects
Hongkong Electric Company	Smart Power Building Fund[36]	Provides a maximum of HK$500,000 (approximately US$64,000) subsidy for building owners to enhance the energy efficiency of communal building services
	Smart Power Loan Fund[37]	Provides subsidises for building owners' loan interests when they apply for bank loans to implement energy efficiency enhancement projects
CLP Power Hong Kong Limited and Hongkong Electric Company	Renewable Energy Certificates[38]	Business customers can buy Renewable Energy Certificates from the power companies to claim emission reduction benefits
	Feed-in Tariff[39]	Business customers who install or own a renewable energy system can sell clean energy to the power companies at a higher tariff rate

[30] Electrical and Mechanical Services Department, Energy Efficiency Registration Scheme For Buildings, 2018
[31] Inland Revenue Department, Tax Deduction For Environment-friendly Facilities To Be Introduced, 2008
[32] Urban Renewal Authority, Common Area Repair Works Subsidy, 2015
[33] China Light & Power, Eco Building Fund, 2021
[34] China Light & Power, Electrical Equipment Upgrade Scheme, 2021
[35] China Light & Power, Energy Audit Service And Energy Saving Loan Scheme, March 2021
[36] Hong Kong Electric, Smart Power Building Fund, 2018
[37] Hong Kong Electric, Smart Power Energy Audit, 2015
[38] China Light & Power, Buy Renewable Energy Certificates, 2021
[39] China Light & Power, Feed-in Tariff, 2021

Funding Schemes for Research and Technologies Adoption

Among the various funding schemes that support innovation, the Green Tech Fund, Construction Innovation and Technology Fund and Public Sector Trial Scheme are the most relevant to the building sector[40, 41].

Funding Schemes to Support Innovations in the Building Sector and Construction Industry

Organisation(s)	Funding Scheme	Objectives	Funding Support
Environmental Protection Department	Green Tech Fund	Support commercialisation of local R&D focusing on decarbonisation and green technologies with four features: net-zero electricity generation, energy saving and green buildings, green transport, waste reduction	Provides HK$2.5 million to HK$30 million per project (approximately US$300,000 to US$4 million)
Development Bureau and Construction Industry Council	Construction Innovation and Technology Fund	Encourage wider adoption of innovative construction methods and new technologies in the construction industry	**1.** Provides a combined funding ceiling of HK$6 million (US$770,000) per applicant for BIM and advanced construction technologies **2.** Provides maximum HK$14 million (US$1.8 million) per project for MiC **3.** Provides maximum HK$5 million (US$640,000) per project for prefabricated steel rebar
Innovation and Technology Commission	Public Sector Trial Scheme	Support production of prototypes or samples or conducting of trials in the public sector	**1.** Provides 50% of actual costs for I&T Fund projects (up to 100% if initiated by R&D Centres) **2.** Provides maximum HK$1 million (US$130,000) for incubatees and graduate tenants of Science Park or Cyberport, and technology companies conducting R&D activities in Hong Kong

As the Hong Kong Government has ramped up support for the development of smart green buildings and the upgrade of existing buildings, the demand for sustainable technologies and solutions will remain strong in Hong Kong.

[40] Development Bureau, Construction 2.0 – Time to Change, 2020
[41] Innovation and Technology Commission, Public Sector Trial Scheme, 2022

Mature Certification System

Hong Kong offers a comprehensive and mature certification system to assess the environmental performance of each stage of the building lifecycle. By providing fair and objective assessments, the system allows companies to demonstrate their commitment to sustainable development and can steer the construction industry towards more innovative and sustainable practices.

BEAM Plus Assessment System

Building Environmental Assessment Method (BEAM) Plus is the leading environmental assessment tool for buildings in Hong Kong. The BEAM scheme was established in 1996 and was upgraded to BEAM Plus in 2010 to provide a more comprehensive set of assessment. Jointly operated by the Hong Kong Green Building Council and BEAM Society Limited, BEAM Plus is a voluntary initiative applicable to both new and existing buildings.

>1,075

New and existing building projects have been assessed with BEAM Plus[42]

Its assessment criteria have evolved from being predominantly environmental to include health and wellness, decarbonisation, and digital transformation. The assessment system has been responsive to changing sustainable behaviours and has grown in scope[43].

New and existing buildings are subject to different BEAM Plus assessments, and the weighting of each assessment criteria is shown in Figures 1 and 2[44, 45, 46]. Applicants can use technologies, innovative practices or designs to score higher points under each criterion. A rating of either Platinum, Gold, Silver, Bronze or Unclassified is issued for each building.

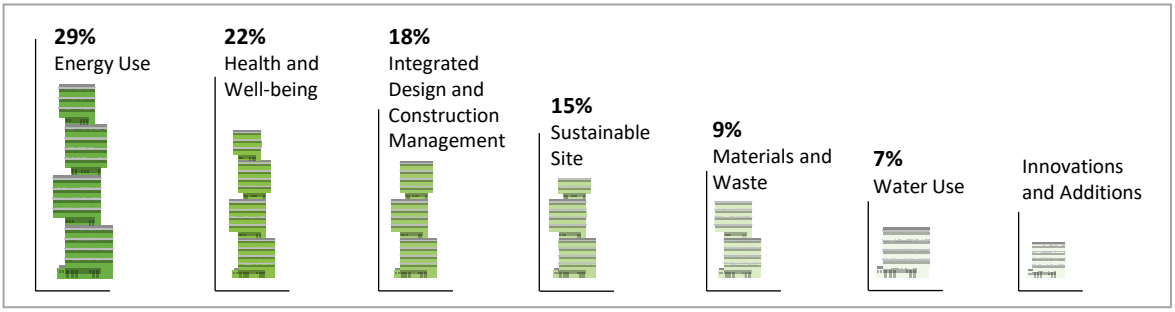


Figure 1: BEAM Plus New Building V2.0 Assessment Criteria And Weighting

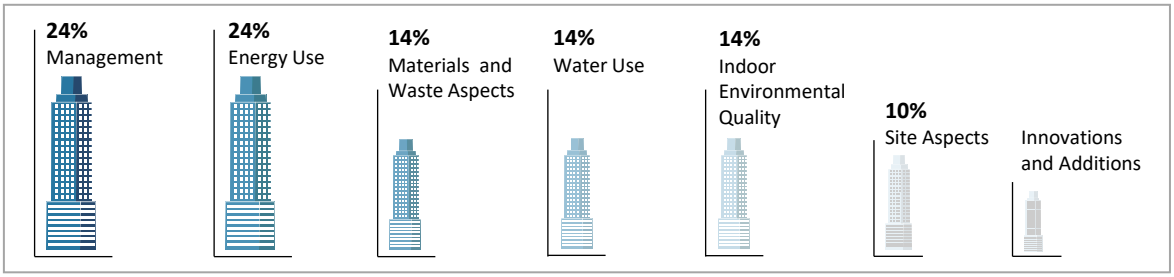
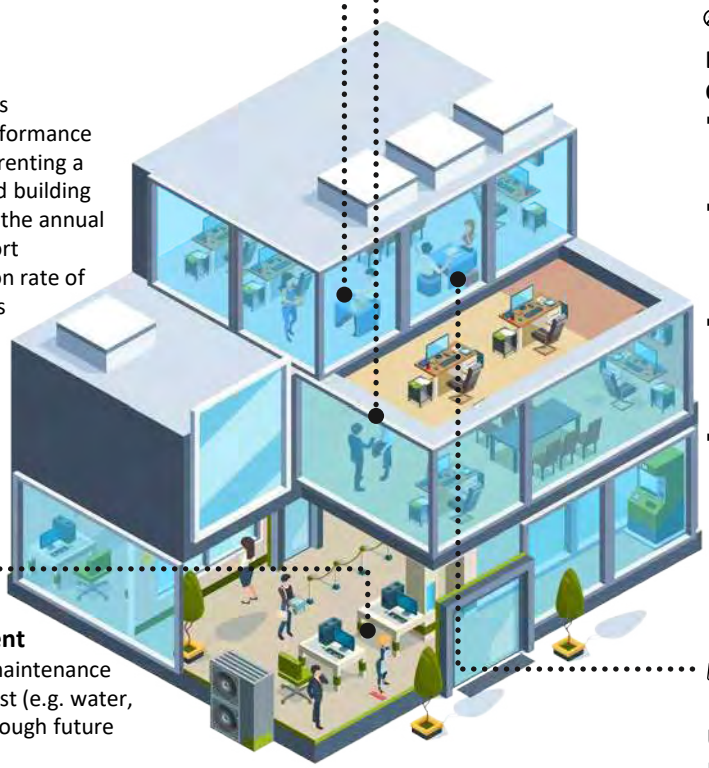


Figure 2: BEAM Plus Existing Building V2.0 Assessment Criteria And Weighting

[42] Hong Kong Green Building Council, BEAM Plus Project Directory and Statistics, 2022
[43] Hong Kong Green Building Council GBC, BEAM Plus Overview Brochure, 2019
[44] Hong Kong Green Building Council, BEAM Plus New Buildings, 2021
[45] Hong Kong Green Building Council, BEAM Plus Existing Buildings – Comprehensive Scheme, 2016
[46] Hong Kong Green Building Council, BEAM Plus Existing Buildings – Selective Scheme, 2016

Within the past five years, there has been an overall increase in the total number of BEAM Plus certifications obtained by public and private developers. As all government properties are required to achieve BEAM Plus Gold certification or above, and private developers have continued to voluntarily certify their buildings to reap the benefits.

Benefits of Green Building Certifications



Tenants

- Increase company's environmental performance and reputation by renting a BEAM Plus certified building and showcase it in the annual Sustainability Report
- Increase satisfaction rate of employees or users of the building

Developers or Building Owners

- Obtain up to 10 percent GFA concessions from the Hong Kong Government
- Increase company's environmental status and reputation in the property market
- Meet sustainability targets and publish results in the annual Sustainability Report
- Attract internationally renowned tenants, such as companies listed on Fortune Global 500, that are willing to pay a premium to rent offices

Facility Management

- Lower long-term maintenance and operational cost (e.g. water, electricity bills) through future proofing buildings
- Increase satisfaction rate of tenants or users of the building

Users

- Enhance health, well-being and productivity

"Our success in embracing sustainability strategies and innovative features in our residential and commercial projects has been well recognised by the wide array of international awards and accreditations we have received. Recently, Henderson Land (representing Hong Kong) has won the prestigious Business Leadership in Sustainability Award at the Asia Pacific Leadership in Green Building Awards 2022, organised by the World Green Building Council. At the biennial Green Building Award 2021 jointly organised by the Hong Kong Green Building Council and the Professional Green Building Council, Henderson Land achieved a total of six accolades. We will continue to lead the way for the industry and beyond by bringing even more outstanding development projects and contributing to a greener and more sustainable future for all."

Mr Edward Chan
Deputy General Manager
of Project Management
Henderson Land Development
Company Limited

Mr Johnny Yu
Advisor to Chairman
Henderson Land
Development
Company Limited

International Certification Systems Recognised in Hong Kong

Along with the BEAM Plus certification, international building certifications are well established and recognised in the local community. As the goals and assessment criteria of international certifications systems and BEAM Plus are aligned, building owners in Hong Kong can apply for triple certifications without spending additional effort in altering the building design, components, or construction practices. Local buildings without BEAM Plus certifications can also apply for subsidies under EMSD's Energy Efficiency Registration Scheme for Buildings using their international accreditations.

Building certifications serve as a channel to communicate the benefits of green buildings and demonstrate the sustainability commitments of stakeholders. They will continue to drive the growth of smart green buildings.

> "Hongkong Land has a long track record of continuously retrofitting and upgrading its Central Portfolio. Over the past 18 months, we have benefitted from a shift amongst a number of tenants who used to focus only on traditional considerations such as location and physical attributes of a building to requiring their premises be located in buildings with BEAM Plus Gold or better certifications (or equivalent). These tenants are eager to show that they are contributing to global decarbonisation efforts by partnering with landlords who are committed to meeting the highest green building certification requirements over the long-term."
>
> **Mr Mark Lam**
> Head of Investor Relations and Corporate Sustainability
> Hongkong Land Limited

International certifications include:

Building Research Establishment's Building Research Establishment Environmental Assessment Method certification

U.S. Green Building Council's Leadership in Energy and Environmental Design certification

International WELL Building Institute's WELL Building Standard

Premier Green Finance Hub

The Outline Development Plan for the GBA demonstrates the staunch support from the Central Government to develop Hong Kong into a regional green and sustainable finance hub. Leveraging the edge as an international financial centre, Hong Kong aims to accelerate the growth of green and sustainable finance to support the 2050 carbon neutrality goal.

The green and sustainable finance market of Hong Kong has been booming. The amount of green and sustainable debt issued in 2021 hit HK$445 billion (US$57 billion), which quadrupled from a year ago[47]. Of this, HK$244 billion (US$31 billion) green and sustainable bonds were arranged and issued, contributing to one-third of the total issuance in the Asia market and made Hong Kong number one in the region in 2021[48].

Government Green Bond Programme

The Government Green Bond Programme (GGBP) was launched in 2018 to spearhead the development of green bonds and debt instruments. As of July 2022, a total of approximately HK$78 billion (US$10 billion) green bonds were successfully issued[49]. The Hong Kong Government is planning to further issue approximately HK$176 billion (US$23 billion) green bonds from 2021 to 2026[50].

Proceeds from GGBP have been used to finance or re-finance green projects that fall under eligible categories. Over 50 percent of the total proceeds raised in the November 2021 issuance were allocated to green buildings[49]. In view of the growing project pipeline and positive response from global institutional investors, the Hong Kong Government raised the borrowing ceiling of the GGBP to HK$200 billion (around US$26 billion) and included more currencies, projects, and issuance channels[51].

HK$200bn
(around US$26bn)
Borrowing cap of GGBP

$ € ¥
USD-, EUR-, RMB-denominated

HK$176bn
(around US$23bn)
Issuance target from 2021-2026

More project types and issuance channels

Since the launch of GGBP, Hong Kong has witnessed a burgeoning growth of green or sustainability bond issuers and borrowers. Its portfolio of sustainable financial products have diversified and its premier status in offering one-stop financing solutions has been elevated.

Green and Sustainable Finance Grant Scheme

The three-year Green and Sustainable Finance Grant Scheme was introduced in May 2021 to provide a subsidy of up to HK$2.5 million (approximately US$320,000) to eligible bond issuers and loan borrowers, which serves to cover expenses on bond issuance and external review services[52, 53]. The scheme has made Hong Kong's fundraising platform even more attractive to green and sustainable bond issuers and loan borrowers.

[47] Hong Kong Monetary Authority, Master Insights' Fourth Finance Summit of ESG Achievement Awards Opening Speech, June 2022
[48] Hong Kong Government, Country backs HK's green finance, June 2022
[49] Hong Kong Government, Green Bond Report 2022
[50] Financial Services and the Treasury Bureau, Secretary's Blog, May 2021
[51] Hong Kong Government, Government Green Bond Programme, 2021
[52] Hong Kong Monetary Authority, Tax Concessions and Incentive Schemes, 2021
[53] Hong Kong Government, Developing Hong Kong into Green Finance Centre, February 2022

Sustainability-linked Loans

Major international and local banks in Hong Kong have launched green and sustainability-linked loans to incentivise companies to link their interest rate reductions to their sustainability performance targets. These types of loans have been gaining popularity in the real estate sector, especially among developers who use the proceeds of the loan to strengthen their green portfolio. As investment funds for smart and green technologies become more accessible, green and sustainability-linked loans are catalysing the development of smart green buildings.

Policy and Regulatory Frameworks

Financial regulators of Hong Kong have established robust policies and regulatory frameworks to improve the quality, consistency, and transparency of the green finance market. Specifically, the Hong Kong Monetary Authority and the Securities and Futures Commission have formed the Green and Sustainable Finance Cross-Agency Steering Group (the Steering Group) to take steps towards mandating climate-related disclosures and design disclosure recommendations that adhere to international best practice.

Additionally, the Steering Group is developing a green classification framework, which defines green and sustainable assets and projects with thresholds and metrics (i.e. "green taxonomy"), that is aligned with international standards. The framework can be used to assess the 'green-ness' and sustainability of companies or projects, or identify dedicated financial instruments, thus ensuring the healthy growth of Hong Kong's green and sustainable finance market.

Other public institutions have launched new initiatives to boost investors' confidence and knowledge of green and sustainable finance products in the Hong Kong market. The Stock Exchange of Hong Kong (HKEX) has mandated environmental, social and governance disclosures for listed companies and set up Asia's first multi-asset sustainable investment product platform, "STAGE". By introducing a voluntary reporting mechanism, the platform aims to enhance transparency of and access to sustainable investment products.

In October 2022, HKEX launched Core Climate, an international carbon marketplace that facilitates trading of carbon credits and instruments to support the global transition to net zero. It serves as a trusted market infrastructure and helps connect capital with climate-related financial products and opportunities, including smart green building projects.

> "Since 2018, New World Development has raised a significant HK$39 billion (US$5 billion) in sustainable finance, with a mix of green loans and bonds, sustainability-linked loans and bonds. Most recently in June 2022, we issued the world's first dual tranche social bond and green perpetual in the public market. In January 2021, our USD sustainability-linked bond was raised to support the development of our Renewable Energy Roadmap, the first of its kind in the world to be raised by a real estate developer. There continues to be tremendous potential in this space, and we will continue to actively leverage and innovate sustainable finance opportunities to further contribute to the development of sustainable finance in the region."
>
> **Mr Edward Lau**
> Chief Financial Officer
> New World Development Company Limited

World Class R&D Facilities

Hong Kong is equipped with exceptional technological infrastructure, including flagship technology campuses, R&D centres and facilities to support the growth of the I&T industry in Hong Kong.

Flagship Technology Campuses

The two flagship technology campuses in Hong Kong – Cyberport and Hong Kong Science and Technology Park (Science Park), support companies in areas such as environmental technologies, Artificial Intelligence (AI) and robotics, big data and smart cities, life and health science. All of these areas are conducive to the development of smart green buildings, which benefits from R&D facilities, infrastructure, market-led laboratories, and research centres.

> It is estimated that for every HK$1 (US$0.13) invested by HKSTP's venture fund, an external investment of HK$16 (US$2.05) is attracted[54]

"With innovation and technology as the key to strengthening sustainability and resilience of our connected world, Cyberport will continue to support start-ups engaging in smart building, construction technology, environmental technology and more, to add to the driving forces behind decarbonisation and climate actions. As a staunch champion and adopter of green solutions from homegrown start-ups, we present industry-leading ideation for smart building and ESG from Hong Kong innovators to the global stage."

Ir Eric Chan
Chief Public Mission Officer, Hong Kong Cyberport Management Company Limited

"Science Park has one of the most comprehensive infrastructures in the world to foster R&D and its commercialisation. We have built state-of-the-art facilities to help us embody the role of a demonstrator and enabler in fulfilling the city's carbon neutrality commitments. We also offer an incredible array of programmes to welcome companies, foreign or domestic, to join our ecosystem. Through co-incubation partnerships and various initiatives, we aim to equip researchers and scientists with the entrepreneurial skills needed to transform promising research into impactful action and innovation for low carbon transition."

Mr Barry Kwong
Director of Sustainability Hong Kong Science and Technology Parks Corporation

[54] Mr Raymond Wong, Head of Investment of Hong Kong Science and Technology Parks Corporation

Cyberport[55]

Established in 2004, Cyberport is a government-owned flagship campus for I&T and entrepreneurship that holistically supports entrepreneurs from stages of start-up nurturing, seed funding, product commercialisation to business expansion and investment matching.

Provides a gross floor area of **119,000** square metres with offices, co-working spaces, data services platform, a shopping arcade and a hotel

Over **180** Incubatees have expanded to global and Mainland China markets; one-fourth of founders of onsite companies came from **24** regions/countries

Gathers over **1,900** start-ups and technology companies, among which over **770** companies engage in Smart Living/Smart City technological innovation including smart building, property management, smart home, construction technology, green technology and smart retail

Source: Cyberport

For the existing infrastructure, eco-initiatives including the installation of solar panels, replacing old chillers with advanced variable-speed chillers, expanding electric vehicle charging capacity on campus, have contributed to building a more eco-friendly environment.

Until November 2022 –

- Over **HK$35.4 billion** (US$4.5 billion) funds raised by Cyberport start-ups;
- Cyberport Macro Fund investments and co-investments reached **HK$1.7 billion** (US$218 million);
- Cyberport Investors Network drove **HK$1.7 billion** (US$218 million) investment for start-ups up

[55] Cyberport, About Cyberport, 2022

Cyberport Expansion Project

The Cyberport Phase 5 expansion incorporates various smart green construction technologies including those from community start-ups.

Excellent Platform for Start-ups

The Cyberport campus, waterfront park and expansion project can allow start-ups to demonstrate effectiveness of their technological offerings while realising environmental, social, and governance (ESG) considerations in their daily operation.

Bridging Connections

Cyberport strives to build connections between start-ups specialising in construction technology, smart building, environmental technology, etc. with enterprise and institutions to drive decarbonisation.

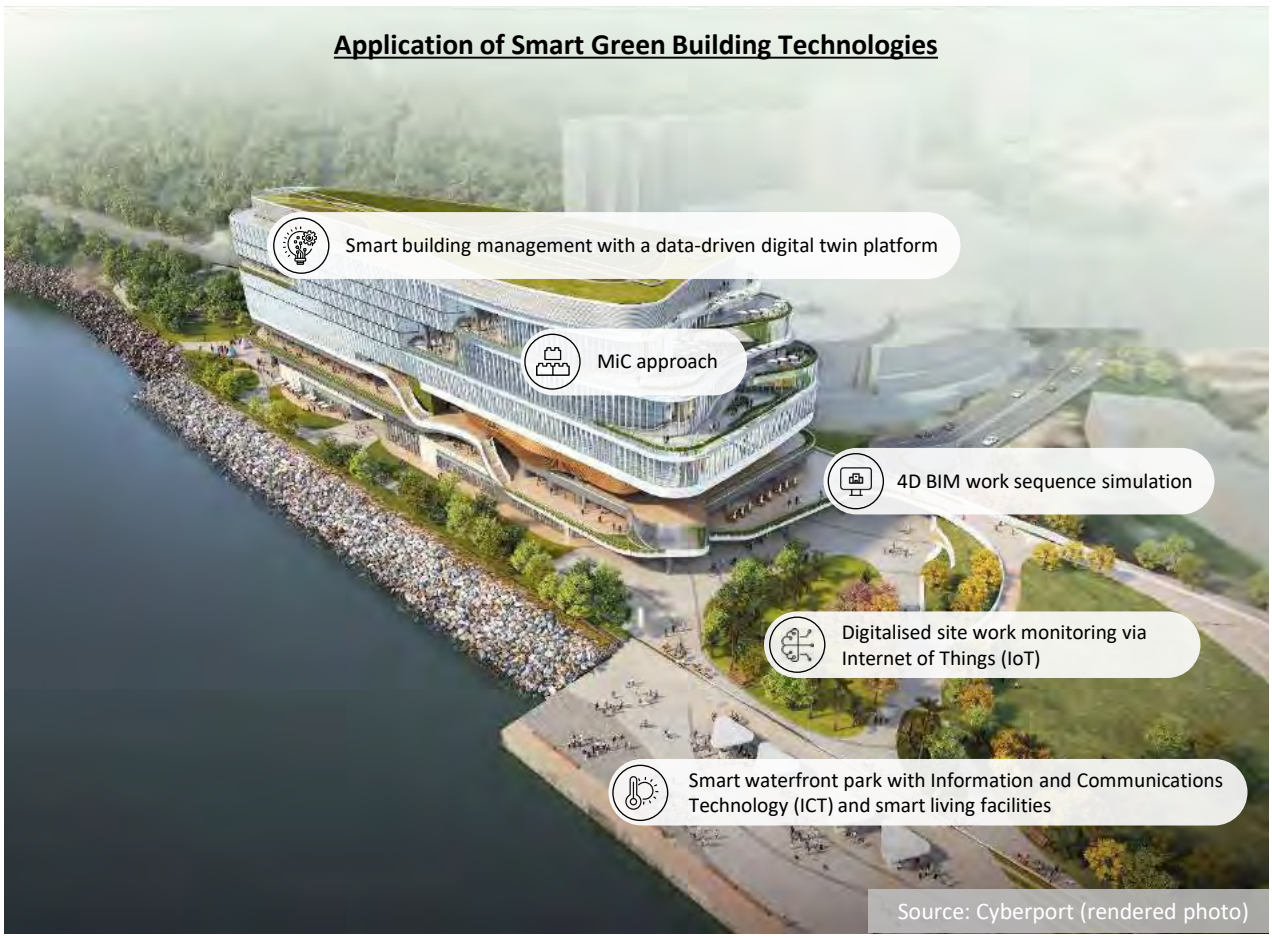
Additional Facilities

More co-working and public spaces, demonstration platforms, data service infrastructure, multi-function conference facilities and ancillary amenities will be provided to help start-ups develop and trial-run cutting-edge digital technology solutions.

Smart Way for Natural Harmony

The waterfront park will be elevated into a smart park equipped with ICT technology, smart living facilities and greenery for the public to share the natural environment.

Application of Smart Green Building Technologies



Source: Cyberport (rendered photo)

Science Park[56, 57]

Established in 2001 as a public corporation, HKSTP operates one of Hong Kong's largest R&D base and offers infrastructural facilities, incubation and acceleration programmes as well as other services to foster research, and I&T development.

23 well-equipped buildings providing **400,000** square metres of R&D facilities, laboratories and offices

Over **1,100** I&T companies from over **20** countries and regions

Manages **three** INNOPARKS with key infrastructures such as Data Technology Hub, Advanced Manufacturing Centre and Microelectronics Centre, which drive re-industrialisation and commercialisation of R&D results

Developing the **1.2**-million-square-metre Hong Kong-Shenzhen Innovation and Technology Park at the Lok Ma Chau Loop that focuses on six R&D areas, i.e. healthcare technologies, big data and AI, robotics, new material, microelectronics and financial technology

Focuses on healthtech, AI and robotics, financial technology and smart city technologies

[56] HKSTP, Our Impact, 2022
[57] HKSTP, Instructure, 2022

Over **900** graduates from incubation programmes with **80%** of graduated incubates still in business

Over HK$80 billion (approximately US$10 billion) raised by Science Park companies since FY18/19

Data Technology Hub[58]

- Established in 2021, Tseung Kwan O INNOPARK
- Provides 27,017 square metres of data-centric working spaces and supporting facilities for ICT companies
- Located adjacent to landing stations of major submarine cable systems, and the advanced data centres in Hong Kong
- Provides the ideal environment to enable big data analytics, machine learning, AI, and deep learning

Advanced Manufacturing Centre[59]

- Established in 2022, Tseung Kwan O INNOPARK
- Provides 108,580 square metres of state-of-the-art advanced manufacturing facilities
- Supports smart industries – electronics and optical equipment, robot-electronics and power devices for smart city applications and sensor fabrication, semiconductor advanced packaging to embark on high value-added and customised production

Microelectronics Centre[60]

- Expected in operation in 2024, Yuen Long INNOPARK
- Provides over 38,580 square metres of cleanrooms and special facilities to support the development and pilot production of new generation micro-electronics products, such as sensors, semiconductors, and integrated microelectronics
- Located near the Shenzhen Bay Port and Lok Ma Chau Control Point – ideal for companies engaging in cross-border business

[58] HKSTP, Data Technology Hub, 2022
[59] HKSTP, Advanced Manufacturing Centre, 2022
[60] Hong Kong Government, Development of innovation and technology and advanced industries, May 2022

I&T Research Centres

The Hong Kong Government's Innovation and Technology Commission has funded five R&D centres –

1. Automotive Platforms and Application Systems R&D Centre (APAS)
2. Hong Kong Applied Science and Technology Research Institute (ASTRI)
3. Hong Kong Research Institute of Textiles and Apparel (HKRITA)
4. Logistics and Supply Chain MultiTech R&D Centre (LSCM)
5. Nano and Advanced Materials Institute (NAMI)

These centres aim at driving applied R&D, promoting technology transfer and commercialisation of R&D results. They provide fully equipped laboratories and shared facilities to steer collaboration with local and international companies, universities and institutions on R&D projects. In particular, ASTRI, LSCM and NAMI have made remarkable achievements in areas related to buildings and green technologies.

R&D Centre	Focus Areas	Examples of R&D Results
ASTRI	• Smart city • Intelligent manufacturing • Health technologies • Application specific integrated circuits	**Digital direct current circuit breaker:** Direct current is used instead of alternating current to minimise the number of power conversion stages and reduce the amount of energy usage and power loss in a building[61]
NAMI	• Construction • Electronics • Energy • Environmental • Healthcare	**High strength lightweight concrete:** Lower density concrete with thermal insulation to save material consumption, transportation efforts, save energy consumption and enhance indoor environment quality[62]
LSCM	• Infrastructure information technology system • IoT and radio-frequency identification technology • Location-based service technology • Logistics and supply chain analytics and applications • Supply chain security	**Smart construction quality management system:** Vision-based system that combines construction site surveillance videos with deep learning to detect site quality deviations and defects[63]

[61] ASTRI, DC Building Power Protection by Digital DC Circuit Breaker
[62] NAMI, High Strength Lightweight Concrete
[63] LSCM, Pi: A Smart Construction Quality Management System

Hong Kong Productivity Council (HKPC)[64]

HKPC provides comprehensive innovative solutions and facilities for industries and companies in Hong Kong and collaborates with local industries and enterprises and world-class R&D institutes on product creation, technology transfer and commercialisation. It provides a wide range of services in environmental analysis and innovative product testing through its accredited Green Living Laboratory and technology centres. HKPC has supported the construction industry in its pursuit of process optimisation and advanced manufacturing technologies.

Construction Industry Council (CIC)[65]

The CIC acts as a communication channel between the construction industry of Hong Kong and the Hong Kong Government. It is empowered to formulate codes of conduct, facilitate the adoption of construction standards, administer registration and rating schemes, promote good practices and compile performance indicators. In addition to conducting research on the construction industry and innovative technologies, the CIC has also set up a Research and Technology Development Fund that provides up to 100 percent financial support for research projects on BIM, construction procurement and project management, construction productivity, construction safety and green construction.

"NAMI provides the building industry with licensed technologies, world-class R&D facilities and a platform to showcase novel applications or ideas in areas covering construction materials and environmental technology. Companies can use NAMI's award-winning nanotechnologies in their own applications or co-develop pioneering technology with NAMI for usage in their products. NAMI not only assists companies in securing government funding for research projects as well as for public trials, but it also provides support to companies seeking to establish production lines and marketing their products in Hong Kong."

Dr Ivan Sham
Chief Commercial Officer
Nano and Advanced Materials Institute Limited

[64] HKPC, About Us – Background
[65] CIC, Corporate Profile

Advanced Technologies

The building and construction sectors in Hong Kong have accelerated the adoption of new and innovative technologies, spearheading the I&T development in the GBA and in the Asia-Pacific region. With a variety of building types and sizes available, Hong Kong is the ideal environment for stakeholders in the building sector to develop and test technologies throughout the building lifecycle.

The building lifecycle mainly consists of four key stages –

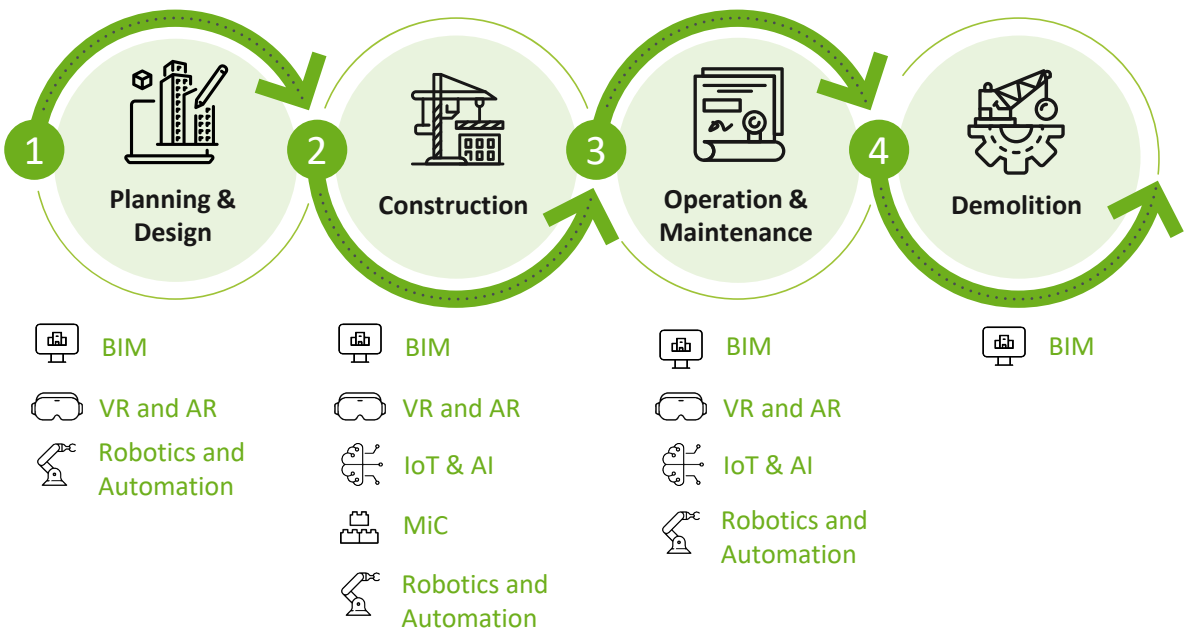
1. Planning and Design
2. Construction
3. Operation and Maintenance
4. Demolition

Advanced technologies such as BIM, virtual reality (VR) and augmented reality (AR), robotics and automation, MiC, IoT, and AI can be deployed along these stages and achieve remarkable outcomes.

> “Major players in the Hong Kong construction industry have been actively adopting innovative construction technologies to reduce construction time and boost productivity, quality and safety. Yau Lee Construction Company, for example, has invested substantially to develop patented construction technologies and build a vertically integrated supply chain, so as to achieve synergy and create competitive advantage. With building projects growing in size and complexity, Hong Kong provides excellent catalyst for construction firms to experiment and localise top notch technologies from overseas.”

Ir Dr Conrad Wong
Vice Chairman
Yau Lee Holdings Limited

Advanced technologies can be applied along the building lifecycle



Technology	Application in the Building Lifecycle	Recent Use Case(s) in Hong Kong
Building Information Modelling	BIM is the holistic process of creating and managing information of a building. It enables architecture, engineering and construction industry practitioners to manage information in all stages of the building lifecycle. The BIM software allows multiple parties to collaborate on the same data model in real-time, enables thorough design reviews and identifies potential clashes, thus reducing construction material waste and overall energy footprint. The data collected can also be connected with facility management systems to create 3D visualisations and enable real-time monitoring and remote control of building facilities.	BIM has been adopted in Hong Kong for more than 10 years. Recent notable building projects that utilised BIM include the West Kowloon Cultural District's Xiqu Centre, the Transport Department's Vehicle Examination Complex, Hong Kong Airport Authority's Three Runway System, Urban Renewal Authority's 618 Shanghai Street.

"Advanced technologies such as BIM, MiC, IoT, AI, blockchain, and robotics have been increasingly adopted in the building construction lifecycle. In response to climate risks derived from climate change, Hong Kong has pioneered the use of technologies and sophisticated construction techniques to build and retrofit buildings that are sustainable and climate resilient. The high construction quality and industry standard have made Hong Kong a proud showcase to other markets."

Ms Rosana Wong
Vice President
Smart City Consortium

Technology	Application in the Building Lifecycle	Recent Use Case(s) in Hong Kong
Virtual and Augmented Reality 	VR is commonly used in conjunction with wearables for construction site training. Moreover, AR can be integrated with BIM models for spatial walkthroughs and give a realistic idea of what each component of the building will look like in the future. Using a smartphone or tablet, users can see and interact with the virtual model, thus spotting errors easily and make appropriate changes. These technologies can also overlay key information onto a space while conducting building maintenance and inspection works, helping to streamline operations and automate repair processes.	Leighton Asia, an international contractor in Hong Kong, developed an AR App to visualise the interior design of buildings as compared with the construction progress[66]. Contractors for the Drainage Services Department and Electrical and Mechanical Services Department also deployed similar AR technologies for the Relocation of Shatin Sewage Treatment Plant to Caverns and the construction of Trade Industry Tower respectively[67].
Robotics and Automation 	Robotics and drones can automate time-consuming and repetitive tasks in each stage of the building lifecycle. For example, robots can be used to perform dangerous tasks on-site, automate the fabrication of modular building components off-site, track project progress and automate reporting documentation. After the construction stage, robots can be used to perform property management tasks such as cleaning and monitoring the overall building environment.	Hysan Development Company Limited, a property developer in Hong Kong, has implemented a smart robot, Mr. SMART, for its properties in the Lee Gardens. It serves as a reliable guide to visitors of the properties and monitors environmental quality measurements such as air quality, thermal comfort level, water leakage and smoke detection[68].

[66] Leighton Asia, Bringing Project to live with Augmented Reality, 2022
[67] Construction Innovation and Technology Application Centre, Augmented Reality (AR) for the Construction Site
[68] Hysan, Driving Change Together, Sustainability Report, 2021

Technology	Application in the Building Lifecycle	Recent Use Case(s) in Hong Kong
Modular Integrated Construction	MiC, a part of Design for Manufacture and Assembly (DfMA) design approach, is an innovative construction method that assembles parts to create modules (e.g., reinforced concrete, steel frame, and hybrid) in a factory environment which are then transported to the construction site for installation. The use of MiC shortens the construction time by about 30 percent and reduces dust and noise pollution on the construction site.	Well-known projects using MiC in Hong Kong include Science Parks' InnoCell, Architectural Services Department's (ArchSD) Married Quarters for the Fire Services Department and Penny's Bay quarantine camps. Other notable planned or under construction projects include Chinachem Group's residential development in Cheung Sha Wan, ArchSD's Chinese Medicine Hospital in Tseung Kwan O, University of Hong Kong's residential development in Pok Fu Lam, Housing Authority's public housing in Tung Chung and City University of Hong Kong's student hostel in Ma On Shan.
Internet of Things and Artificial Intelligence	IoT is a network of physical objects that are embedded with sensors and software for connecting and exchanging data. With the combined use of IoT and AI, facility management tasks such as controlling building temperature, electricity consumption, water usage, and maintenance can be adjusted according to learned user preferences and historical trends.	Hong Kong property developers, such as Hongkong Land and Swire Properties Limited (Swire), have developed centralised intelligent building management platforms through the installation of real-time IoT sensors, security cameras and the use of AI algorithms.

"Hong Kong has been a pioneer in utilising some of the top-notch technologies for its buildings. Innovative technologies such as IoT, BIM, digital twin, intelligent facility management systems, smart lighting systems and others have been successfully embedded in new and existing buildings. Hong Kong's high density allows technology researchers to explore, test and evaluate new deployment in the most cost-effective way. Based on the feedback from users, they can fine-tune the technologies and deploy them to a wider market."

Dr Benny Chow
Director of Sustainability
Aedas

Talented Professionals

Hong Kong was ranked first place in the World Talent Ranking 2021 in the Asia-Pacific region[69]. The city's professional expertise, contributed by the large pool of architects and engineers and the prosperous property market, has been recognised in many aspects of building and construction. In the global race for talent, Hong Kong offers competitive visa schemes to attract talents with valuable skills, knowledge and experience from around the world.

World-class Universities

Five Universities in Hong Kong are in the **top 100 universities** of the World University Rankings 2023[70]

香港大學 THE UNIVERSITY OF HONG KONG

香港中文大學 The Chinese University of Hong Kong

THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

香港科技大學 THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

CityU 香港城市大學 City University of Hong Kong

Quality Graduates

10,128 Science, Technology, Engineering, Mathematics graduates in 2020/21 academic year[71]

5% More graduates from the previous academic year

Technology Talent Admission Scheme (TechTAS)

251

Approved applications (2017 – July 2021)[72]

TechTAS provides a fast-track arrangement for companies to engage overseas and Mainland China talents to conduct R&D works in areas including AI, data analytics, material science, robotics, green technology and IoT. The Hong Kong Government announced enhancements for TechTAS in October 2022[73]:

(1) Extension of quota validity period

(2) Lifting local employment requirement

Top Talent Pass Scheme

2-year pass will be given to top talents to explore opportunities in Hong Kong. These talents mainly include:

(1) High earners with annual salary of HK$2.5 million (approximately US$320,000) or above and

(2) Graduates from top 100 universities with three years of work experience over the past five years[74]

[69] International Institute for Management Development, Hong Kong SAR Rankings, 2022
[70] Times Higher Education, World University Rankings 2023, October 2022
[71] UGC, Graduates of UGC-funded Programmes by University, Level of Study, Mode of Study and Academic Programme Category, 2020/21 (from Hong Kong University Grants Committee)
[72] The Government of Hong Kong, Attracting talents to come to Hong Kong, 2021
[73] The Government of Hong Kong, Policy Address: Attracting talents, enterprises to boost competitiveness, October 2022
[74] The Government of Hong Kong, The Chief Executive's 2022 Policy Address, Trawl for Talents, October 2022

Architecture, Engineering and Construction Professional

The construction industry and the building sector of Hong Kong are renowned for rapid construction of quality high-rise buildings and the adoption of specialised construction techniques, such as design-and-build methods. Its architects are experts in high-rise, slope, and high-density designs and designing with space constraints. Engineers and surveyors have also accumulated project management experience and technical expertise from a wide range of projects. These professionals have been driving the development of smart green buildings.

Professional associations provide continuing education through comprehensive training and informational sessions on the latest research, trends, and resources. The Vocational Training Council, CIC, and Hong Kong Institute of Construction offer ordinary and accredited courses on BIM, MiC, and DfMA for professionals looking to build on their existing skills and learn about the latest design and construction approaches.

Professional members in Hong Kong[75]

>4,700 members	香港建築師學會 The Hong Kong Institute of Architects
>30,000 members	HKIE THE HONG KONG INSTITUTION OF ENGINEERS 香港工程師學會
>10,500 members	THE HONG KONG INSTITUTE OF SURVEYORS 香港測量師學會
545	CIC CERTIFIED BIM MANAGER 建造業議會認可建築信息模擬經理
541	CIC CERTIFIED BIM COORDINATOR 建造業議會認可建築信息模擬協調員
3,238 BEAM Professionals	BEAM Pro
838 BEAM Affiliates	BEAM Affiliate

> Hong Kong has great technical expertise in constructing buildings, not only can our professionals build at a fast pace, but they also excel at planning, managing their time, meeting targets, and providing quality work, which in turn helps businesses to obtain return on investments quickly. We also provide in-depth and comprehensive training programmes to continuously upskill our engineers and professionals in the construction field on topics such as BIM and the latest trends in climate change.

Mr Kai-hong Wan
Regional Director – Hong Kong
Institution of Civil Engineers

[75] The Hong Kong Institute of Architects; The Hong Kong Institution of Engineers; The Hong Kong Institute of Surveyors; CIC; Hong Kong Green Building Council

Sustainability Professional

Sustainability professionals in Hong Kong comprises energy, water efficiency, and waste management analysts, environmental consultants, sustainability advisers, energy and carbon auditors, certifiers, and quality controllers. These talents have acquired sustainability concepts and skills in green technologies through post-graduate training programmes from local institutions. They excel in making technical and economic comparisons between conventional and green solutions as well as between different green solutions.

Innovation and Technology Talent

Currently, Science Park houses over 18,000 professionals from I&T companies and 12,000 R&D practitioners[76]. Its incubation programme and InnoAcademy continue to nurture start-ups in areas such as building products, construction materials, energy equipment and services, utilities, and construction and engineering.

In the academic year of 2020/21, Hong Kong had 10,128 university graduates in the fields of Science, Technology, Engineering, Mathematics (STEM)[77]. The Hong Kong Government launched the STEM Internship Scheme to provide allowance for undergraduates and postgraduates taking eligible STEM programmes to enrol in short-term I&T-related internships. The Chief Executive announced in the *2022 Policy Address* that the Scheme would be expanded to students studying STEM programmes at Greater Bay Area campuses established by designated local universities, as well as in other local and non-local universities[78].

Skilled Labour

In addition to professionals, skilled labour, including electricians, technicians, installers/maintainers, plumbers, and craftspeople, are also vital to the success of developing smart green buildings. The skilled labour in Hong Kong have vast experience in constructing, installing, and maintaining building systems and parts at a fast pace. The Hong Kong Government has also allocated HK$1 billion (US$128 million) to the CIC to increase the number of training centres and courses to upskill construction workers[79].

Hong Kong's vibrant building and construction industry provides an excellent launching pad for talents of all sorts and continues to attract professionals from all over the world. This talented workforce will take a leading role in maintaining Hong Kong's position at the top of developing smart green buildings.

[76] Hong Kong Science and Technology Park, Our Impact, 2021
[77] UGC, Graduates of UGC-funded Programmes by University, Level of Study, Mode of Study and Academic Programme Category, 2020/21 (from Hong Kong University Grants Committee)
[78] STEM Internship Scheme, Innovation and Technology Commission
[79] Financial Secretary, The 2022-23 Budget, February 2022

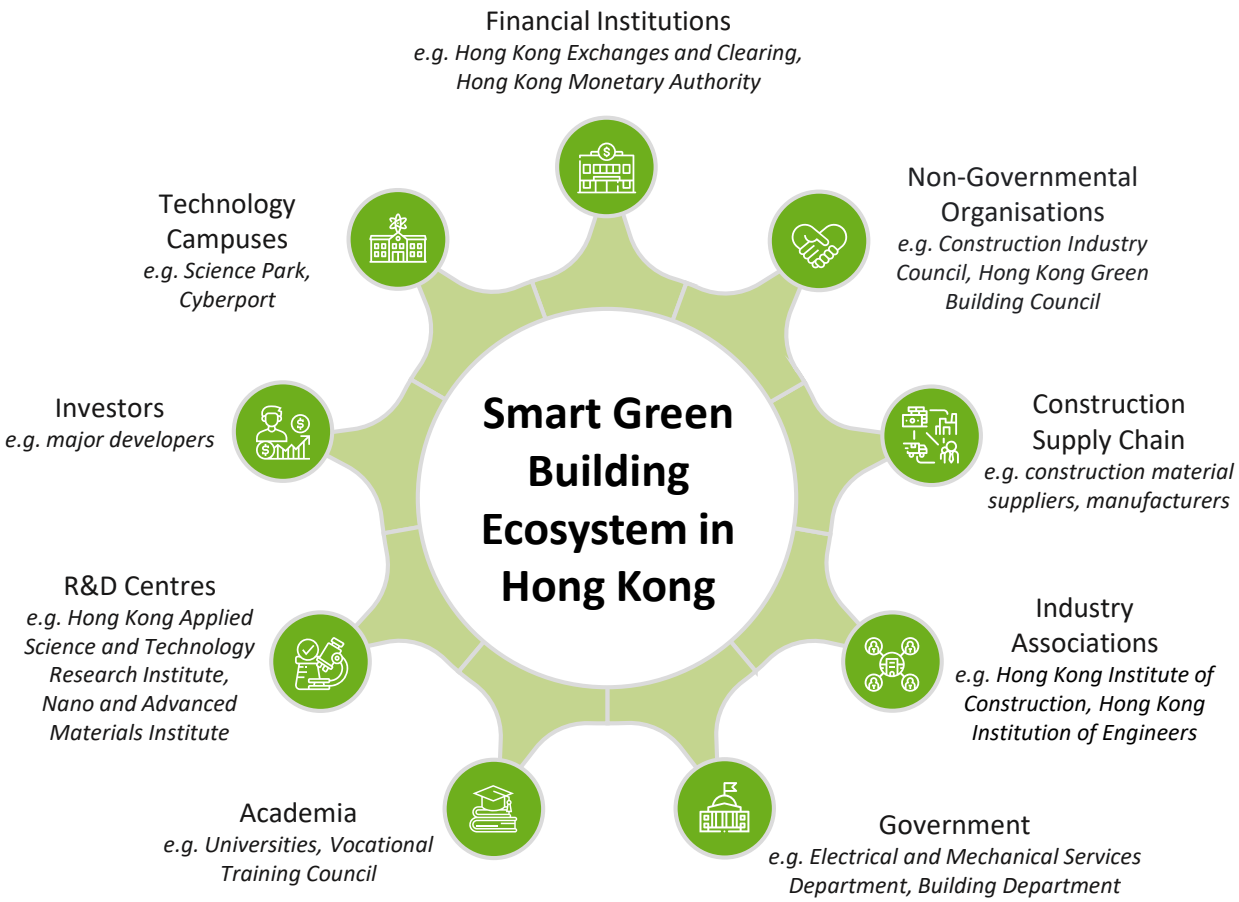
Vibrant Ecosystem

Hong Kong provides a fertile ground for innovation as ecosystem players of smart green buildings, including the government, industry associations, technology campuses, R&D centres, property developers, construction companies, non-profit organisations and universities, can interact in a close-knit and dynamic atmosphere where they can create dialogue and stimulate creativity.

The Innovation Hub@HK website launched by the Innovation and Technology Commission in August 2022 has showcased more than 360 R&D outcomes of the collaboration between local universities and research centres[80]. These R&D outcomes have helped foster I&T development in Hong Kong.

> "Hysan has been proactively seeking innovative ideas to drive sustainability. Our partnership with the Hong Kong Science & Technology Parks to launch the Community Lab aims to nurture up-and-coming start-ups, connecting them with resources and business networks. We offer a solid foundation to enable them to test-drive their business cases. Within the authentic setting, the tech ventures can better understand the needs of the market and make improvements. They can properly apply and commercialise their products to increase their competitiveness."

Mr Ricky Lui
Executive Director and Chief Operating Officer
Hysan Development Company Limited



[80] Hong Kong Government, Innovation and Technology Commission launches Innovation Hub@HK website, August 2022

The following examples highlight the successful collaboration between ecosystem players engaging in smart green building activities:

Win-win Opportunity

The Community Lab, established by Hysan and HKSTP in May 2022, aims to build a solid foundation for the I&T ecosystem to manifest start-up potential and business opportunities and empower the Smart City Blueprint of Hong Kong[81]. As the backbone of The Community Lab, the Last-mile Testing Programme provides an unparalleled testing ground for tech ventures to test-drive their Proof-of-Concepts ("PoC") concepts in an authentic and complex community environment, along with the domain knowledge in real estate provided by Hysan's mentors.

Accelerator for Construction Technology

The CIC has partnered with Science Park to create Hong Kong's first construction technology focused innovation acceleration programme – ConTech Accelerator, which focusses on construction safety, sustainability and productivity[82]. The programme aims to create a unique platform to drive the best practice of ConTech trials and adoption across a range of different scenarios in sites and premises.

Testing Ground for New Technologies

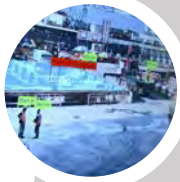
New World Development Company (NWD)'s Impact Kommons, Asia's first accelerator based on the United Nations Sustainable Development Goals, recruits local and international start-ups to solve social and environmental problems arising in Hong Kong[83].

It connects start-ups to industry leaders and provides mentorship and strategic development support, professional referrals, business-to-business collaboration and funding opportunities. The start-ups can pilot their solutions at NWD's properties and seek to scale their solutions through integrations and investments.

[81] HKSTPC, Hysan Development Joins Hands With HKSTP to Unveil the Future of Business with Launch of the Community Lab, May 2022
[82] CIC and HKSTPC, The Construction Industry Council and HKSTP Launch ConTech Accelerator with 20 Leading Construction Stakeholders to Spark Sector-wide Innovation and Technology Adoption, July 2022
[83] The official website of Impact Kommons, 2022

Idea Generation Events

In 2021, the Hong Kong Green Building Council and Swire held the Advancing Net Zero Ideas Competition for local and international stakeholders to generate realistic ideas and solutions based on data from Swire's two office properties[84]. The ideas were categorised as either for future or for existing buildings and addressed the themes of zero carbon and ultra-energy efficiency, embodied carbon, and health and sustainability. The partnership allowed both parties to grow their knowledge on how buildings can become net zero and provided an opportunity for companies to showcase their creativity to the building sector.



Solving Real-life Challenges

Nexplore, powered by Leighton Asia, collaborates with some of the world's leading research institutes to build innovative solutions not only for Leighton Asia, but also for the construction industry. It has partnered with ASTRI for its R&D capabilities and accessibilities to fundings to solve real-life challenges on construction site. Some of the solutions are trialled at Leighton Asia's projects to accelerate its digital delivery capability.

"The dynamic interaction between players in the technology ecosystem, coupled with high construction output, has made Hong Kong an ideal platform to examine the latest trends and to experiment technologies that can transform the digital landscape of the construction industry. Having tapped resources from the ecosystem and the network of Leighton Asia as well as our wider group, Nexplore, our innovation and development arm in Science Park, has been collaborating with local R&D institutes to build tailor-made technologies that improve the sustainability of the industry."

Mr Francesco Tizzani
Group Manager of Digital Construction
Leighton Asia

A burgeoning and collaborative ecosystem is already present in the smart green building domain. Companies interested in the smart green building market can easily tap into this ecosystem and collaborate with other players to realise their strategic goals, whether to find new sales channels for existing products or services, to identify the right partners to strengthen their core competence, to expand into adjacent markets, or to launch new ventures.

[84] Hong Kong Green Building Council, The Hong Kong Green Building Council Announces the Winners of the "Advancing Net Zero" Ideas Competition for Building Solutions to Address Climate Change, December 2021

3 LEVERAGING HONG KONG'S STRATEGIC POSITION

3.1 Opportunities in the Greater Bay Area

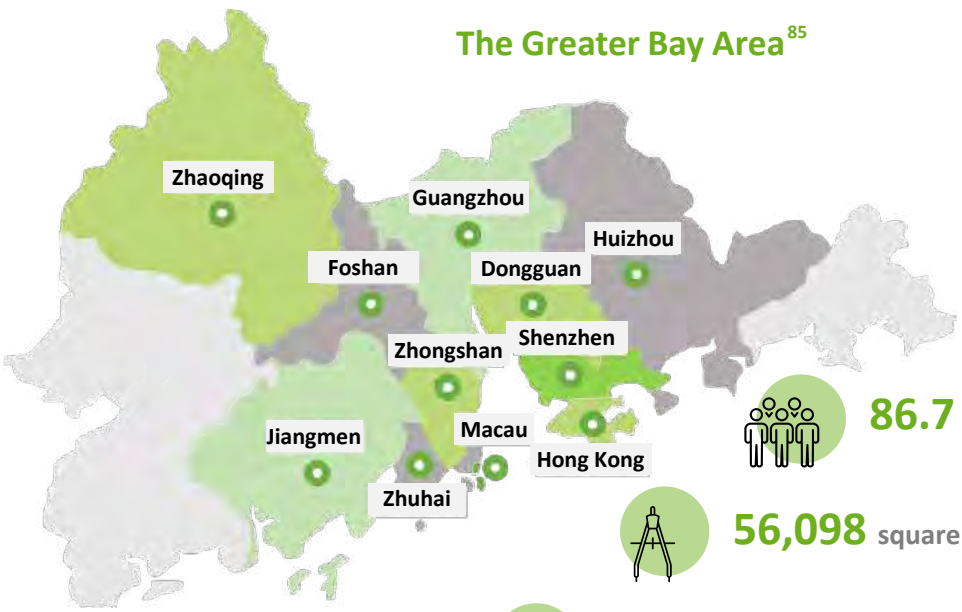
Favourable Social Economic Conditions

The Guangdong-Hong Kong-Macao Greater Bay Area (GBA) is a combination of the most prosperous cities located in the southern parts of China. Specifically, it comprises the two Special Administrative Regions of Hong Kong and Macao, and the nine municipalities of Guangdong Province – Guangzhou, Shenzhen, Zhuhai, Foshan, Huizhou, Dongguan, Zhongshan, Jiangmen, and Zhaoqing.

The GBA is China's master plan to build an integrated economic and business hub that rivals bay areas around San Francisco, New York and Tokyo. China's Central Government promulgated *the GBA Outline Development Plan* in February 2019 and set out five strategic goals for the GBA, including becoming a globally influential international innovation and technology hub and a showcase for in-depth cooperation between Mainland China, Hong Kong, and Macao.

To build a "one-hour living circle" in the GBA, cross-boundary transportation networks and facilities were developed, including the 55-kilometre-long Hong Kong-Zhuhai-Macao Bridge and the astonishing 142-kilometre Guangzhou-Shenzhen-Hong Kong Express Rail.

The Greater Bay Area[85]



86.7 million people

56,098 square kilometres

HK$15.3 trillion (close to US$2 trillion) GDP in 2021

- Account for 11% of national gross domestic product
- Exceed the gross domestic product of South Korea, Spain and Australia

[85] Hong Kong Trade Development Council, Statistics of the Guangdong-Hong Kong-Macao Greater Bay Area, 2021

Guangdong Province – A Hot Spot for Foreign Investment

Guangdong Province, which covers the nine municipalities of the GBA, has a population of 127 million[86]. It is the most populous province in Mainland China, with abundant supply of young migrants and relatively well-educated manpower[87].

Among the nine municipalities, Shenzhen and Guangzhou are the two powerhouses and China's tier-1 cities. Shenzhen has become an epicentre for technology, manufacturing and finance, while Guangzhou is the political, economic, technology, education, and cultural centre for the South China region.

Other cities in Guangdong Province have served as the manufacturing heartland for the region, other Mainland China cities and the world. Companies can find diversified industrial clusters consisting of networked suppliers, component manufacturers and distributors in the province. They can leverage them to build efficient and cost-effective manufacturing supply chains.

The People's Government of Guangdong Province has made substantial investments in research and development (R&D) to nurture high-tech and high value-added industries in the past decade. Investors can leverage each city's unique strengths and find unprecedented business opportunities in sectors such as innovation and technology (I&T), financial services, environmental protection, and sustainable development.

Joint I&T Initiatives with Shenzhen

The GBA Outline Development Plan demonstrates a strong backing from the Central Government to develop Hong Kong into an international I&T hub[88]. It will create a lot of synergies with the Hong Kong Government's Northern Metropolis Development Strategy, which aims to produce additional land for I&T use in the northern part of Hong Kong and southern part of Shenzhen. The planned Shenzhen-Hong Kong I&T Co-operation Zone will provide approximately 540 hectares of land and pool together talents and strengths of both Hong Kong and Shenzhen, driving the GBA to become an international I&T hub[89].

> "Hong Kong should go beyond as just a contact point for the GBA. We should extend our collaboration with cities in the GBA to have co-vision, co-creation and co-realisation. Co-vision means painting a common picture of a desired future and seeking buy-in from stakeholders; co-creation refers to the application of I&T and having the ideas and systems patented; and co-realisation means bringing an idea from concept to market and scaling up. Hong Kong can take the role of the initiator, facilitator and active partner for these three "co" and create an innovative "blue ocean" using smart green buildings and related systems."

Professor Elvis Au, BBS
Adjunct Professor
Department of Geography and Department of Urban Planning and Design, The University of Hong Kong

[86] Guangdong Bureau of Statistics, Statistical Yearbook of Guangdong 2022, October 2022
[87] China Statistics Press, China Population Census Yearbook 2020, 2020
[88] BrandHK, Hong Kong's Role in the National 14th Five-Year Plan, October 2021
[89] Hong Kong Government, Shenzhen-Hong Kong Innovation and Technology Co-operation Zone, July 2022

The Hong Kong Science and Technology Parks Corporation (HKSTP) has already set up a branch in Shenzhen, boasting an area of 31,000 square metres and provide offices, laboratories, conference rooms and other amenities. The branch helps international start-ups secure capital, attract talents, and provides support in sourcing and establishing manufacturing supply chains so that they can gain a foothold in the entire GBA. HKSTP also works with Hong Kong universities that have campuses in the GBA to establish incubator networks at those campuses[90].

As Hong Kong strengthens its links with GBA cities, the regional I&T ecosystem will become more resourceful and vibrant.

Opportunities in China's Green Building Boom

The Central Government has been dedicated to promoting green and sustainable transformation. In 2020, President Xi Jinping announced that China would aim for its emissions to peak before 2030 and reach carbon neutrality before 2060. The promotion of green buildings is crucial for China, given that emissions from buildings made up a significant portion of the country's emission profile, accounting for 51 percent of China's overall emissions in 2019[91].

In 2020, 77 percent of China's new urban construction was classified as green buildings under China's Three-Star Green Building Evaluation Standard[92, 93]. The Ministry of Housing and Urban-Rural Development and the National Development and Reform Commission issued an action plan in mid-2022, instructing to construct all new urban buildings in line with green building standards by 2025[94]. It also stipulated that at least 30 percent of new buildings needs to attain star ratings by the year. One-star rating is the minimum requirement for all government-funded community buildings or large-scale public buildings. This requirement has set off a massive boom in the construction of star-rated green buildings.

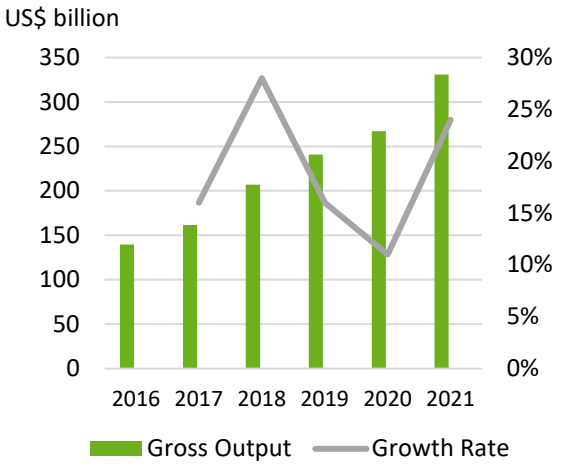
China's Three-Star Green Building Evaluation Standard

The action plan also called for higher energy-saving standards in buildings and aimed to raise buildings' utilisation of renewable energy from 6 percent in 2020 to 8 percent by 2025. Moreover, the plan projected that electricity would account for more than 65 percent of buildings' whole-life energy consumption by 2030, making the case for abating carbon emissions during operation.

[90] Hong Kong Government, Developing Hong Kong into International Innovation and Technology Hub, February 2022
[91] China Association of Building Energy Efficiency, Chinese Buildings' Energy Consumption and Carbon Emissions Research Report (2021), December 2021
[92] The State Council of The People's Republic of China, Responding to Climate Change: China's Policies and Actions, October 2021.
[93] The Three-Star Green Building Evaluation Standard share quite a lot of similarities with the LEED rating system by the U.S. Green Building Council.
[94] The State Council of The People's Republic of China, Ministry of Housing and Urban-Rural Development: Notice of the General Office of the National Development and Reform Commission on Issuing the Implementation Plan of Carbon Peak in the Field of Housing and Urban-Rural Development, June 2022

China's bid to slash carbon emissions will give sustainable buildings a boost over the next few years. Guangdong Province, one of Mainland China's economic growth engines, has recorded consecutive growth in its construction output over the past few years.

Gross Output Value and Growth Rate of Construction Industry in Guangdong[95]



As the province takes on a smarter, more sustainable and resilient development direction, it will present tremendous business opportunities in building design, materials, solutions and equipment.

Hong Kong and GBA cities have already deepened collaboration in infrastructure planning, standard-setting, and carbon emissions data sharing, boosting their potential to lead the movement in smart green building in the Asia-Pacific region.

"It's our commitment to embed sustainability considerations into our business and operations. We set out to incorporate green features and energy efficiency measures in the planning, design, construction and operation of our railway network and properties. As a builder and operator of a reliable, efficient and environmentally friendly transportation system, we play a part in transiting Hong Kong to a carbon neutral city by 2050 as well as reducing the carbon footprints at our operations in Mainland China and overseas to achieve the common goal of decarbonization. We believe the future offers ample opportunities in the course of green building development and collaborations."

Mr Carl Devlin
Capital Works Director
MTR Corporation Limited

Green areas integrated across the city of Shenzhen in the Greater Bay Area

[95] Production of construction enterprises, Guangdong Statistic Bureau, 2016 – 2021

3.2 Leveraging the Advantages of Hong Kong

Hong Kong opens doors for companies looking to seize the tremendous business opportunities arising from smart green buildings in the GBA and the rest of China.

Living Laboratory for New Technologies

Hong Kong's high-rise buildings and urban density provide ideal grounds to test the market potential of new technologies

A Fundraising Platform to Support Building Projects

As an international financial centre, Hong Kong has become an important platform for green and sustainable investment and financing

Gateway to Enter the Mainland China Market

Hong Kong serves as a gateway for foreign enterprises and investors to venture into the GBA market

A Stepping-stone for Outbound Investment

Hong Kong provides an international stage for GBA companies to showcase and export their smart green building products and services

"Hong Kong has always been a bridge between the East and the West. Leveraging its unique advantages including talent pool, robust regulatory framework, open market, and close business relationship and proximity with Mainland China, Hong Kong is acting as a gateway to and from China. In the space of property market, property developers like Wheelock Properties, have been investing in developing world class buildings through the adoption of advanced technologies. Since 2012, we have set BEAM Plus gold standard as our residential and commercial building standard. We have also leveraged green finance as a key to a sustainable future. It demonstrates that Hong Kong is best placed to provide an investment and collaboration platform for overseas and Mainland companies in the property sector."

Mr Ricky Wong
Managing Director
Wheelock Properties (Hong Kong) Limited

Living Laboratory for New Technologies

Due to a shortage of buildable land, Hong Kong is one of the densest cities in the world in terms of population as well as building density. It is facing increasing urban challenges such as ageing buildings, traffic congestion, shortage of buildable land in urban areas, and high energy consumption. All these attributes make it an ideal test ground for smart building solutions. R&D technologists can propose solutions to building asset owners to address pain points and pilot proof of concept. If their innovative ideas can succeed in Hong Kong, they can make it work in other cities.

While it takes decades to build a building in many developed economies, building projects are on a fast-track in Hong Kong. Due to tight schedules, space restrictions, and high land costs, the demands for productivity in the construction industry are extremely high. Developers and contractors have made concerted efforts to optimise construction processes by integrating technological applications. Innovators engaging in the building business can witness their best ideas progressed from ideation to realisation, all within a relatively short period of time. Hong Kong can provide an excellent proving ground for them to test market potential and get instant feedback on their products or services, before considering rolling out to a larger market.

Hong Kong provides abundant resources to support enterprises in commercialising and localising their R&D results. The two flagship I&T campuses and five R&D centres offer a variety of programmes for start-ups, covering all crucial aspects from validating ideas and marketing to finding the right investors and matching with some of the largest conglomerates in Hong Kong.

Enterprises can enjoy additional tax deduction for expenditure incurred on domestic R&D:

Tier	Tax Deduction
The first HK$2 million (around US$256,000) spent on a qualifying R&D activity	300%
Remaining amount of R&D expenditure (no limit)	200%

Moreover, given Hong Kong's proximity to the manufacturing hub in the GBA, enterprises can gain ready access to the advanced manufacturing base in the city cluster for prototyping and scaling up. They can make use of the comparative advantages of the GBA cities to build up a comprehensive industry chain, including strengthening R&D capabilities, commercialising R&D results, widening distribution and marketing.

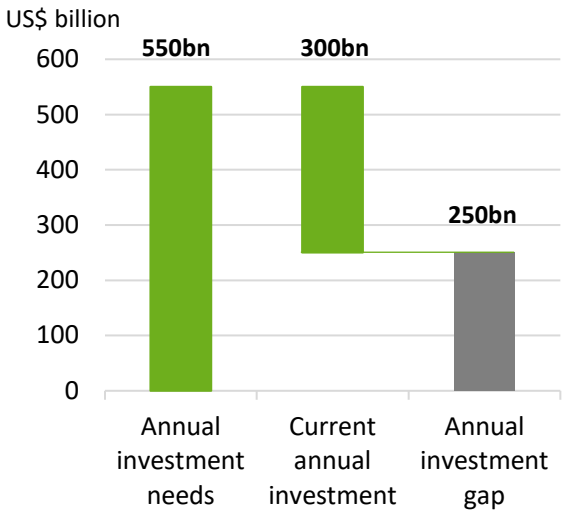
"What makes Hong Kong unique is that it can act as the ideal test bed for novel technology in a condensed space. Hong Kong, with our incredibly modern skyscrapers and historically rich districts, is the best location for the adoption of innovative climate change solutions. Based on our experience at Hong Kong Science and Technology Parks, we have seen many foreign start-ups choose Hong Kong as their landing pad to gain a strong foothold in Asia. There is no doubt that if a start-up is successful in launching their product in Hong Kong, they will be able to make breakthroughs in other countries in no time."

Mr Tony Ho
Chief Project Development Officer, Hong Kong Science and Technology Parks Corporation

A Fundraising Platform to Support Building Projects

As entrepreneurs respond to the Hong Kong Government's green initiatives, they will require more capital to acquire solutions such as alternative energy and green technology solutions and undergo technology enhancements.

Estimated Investment Gap to Achieve China's Carbon Neutrality Targets in 2060[96]



Hong Kong, renowned for its capabilities to facilitate efficient capital formation and allocation, plays an instrumental role in bridging China's investment demand and channelling global capital flows. Under the mutual access mechanism between the two financial markets, Stock Connect was launched to gave Mainland and international investors direct access to each other's market. The scheme has repeatedly hit new trading volume records since inception and its scope will expand to include more eligible stocks[97]. Hong Kong is also the principal market for offshore renminbi, handling over 70 percent of the world's offshore renminbi transactions[98].

The Central Government has in recent years placed more emphasis on green financing. There will be higher 'green' requirements on financing channels, investment products, and different types of financial services. Hong Kong is in a unique position to capture related opportunities from the Mainland China, given its world-class business infrastructure, high degree of internationalisation, established engagement with nearby regions and countries, as well as sound regulatory environment. The city also maintains a pipeline of green finance professionals, ranging from investors to traders. Most importantly, it has a track record in issuing green financial instruments successfully at market prices.

The launch of the Government Green Bond Programme demonstrated Hong Kong's technical capabilities and commitment to build a pre-eminent green bond market. The green bond issuances have met strong demand from a diversified group of investors, signalling the investor community's confidence in the Hong Kong market[99].

In 2021, the Shenzhen Municipal Government issued offshore renminbi municipal government bonds including green bonds in Hong Kong. This first offshore renminbi bond issuance by a municipal government is a significant step to further open the financial market in Mainland China. It also paved the way for a closer collaboration and market integration between Hong Kong and Shenzhen in the GBA cluster and would encourage more Mainland entities to follow suit[100].

[96] Estimation by By China's National Centre for Climate Change Strategy, Financial Services and the Treasury Bureau, May 2021
[97] Hong Kong Stock Exchange, Celebrating 7th Anniversary of Stock Connect, November 2021
[98] Hong Kong Monetary Authority, Dominant Gateway to China, July 2022
[99] South China Morning Post, Hong Kong's First Retail Green Bond Sells Out with US$4.2 Billion in Orders, Auguring Well for City's Role as Funding Hub for Climate-Friendly Projects, May 2022
[100] Hong Kong Government, Developing Hong Kong into Green Finance Centre, February 2022

Gateway to Enter the Mainland China Market

There is no better base to venture into Mainland China's market than Hong Kong. Not only is Hong Kong one of the Mainland's principal trading partners, but it also originates and intermediates about two-thirds of China's inward foreign direct investments and outward direct investments[101].

The Closer Economic Partnership Arrangement (CEPA) signed between the Mainland and Hong Kong opens huge markets for Hong Kong's goods and services. The latest CEPA amendment allows surveyors who have obtained professional qualifications in Hong Kong to directly register for practising and providing property valuation services in some GBA cities[102].

Hong Kong professionals from the construction and related engineering service sectors can also register and practise in the entire Mainland through mutual recognition of qualifications and examinations.

With geographical and cultural proximity to the Mainland, Hong Kong offers a familiar environment to foreign investors for preparing their entry into China. By setting up presence in Hong Kong, foreign enterprises can gradually adapt to the business environment in Mainland China. They can also tap into the local talent pool that has accumulated solid experience in dealing with Mainland businesses and the varied city landscape across the country. Talents in Hong Kong possess the flexibility and business know-how to grasp the changing market conditions in China. Therefore, Hong Kong can equip foreign enterprises with the ability to mitigate risks and uncertainties in the onshore market.

Companies with a presence in Hong Kong will attain additional credentials and a competitive edge over companies without presence in Hong Kong, especially in the GBA city cluster. More affluent cities in China are generally welcoming of smart green buildings, as there is greater awareness of green building certification. Developers are thus more likely to develop new smart green buildings in those places. In tier-2 or tier-3 cities, opportunities mainly stem from retrofitting existing buildings with green features. Whether it is retrofitting or integrating green designs to existing buildings, Hong Kong can guide foreign investors in creating tailored strategies for every location.

> "There are many opportunities for building professionals to provide relevant expertise to drive the evolution of smart green buildings in the GBA. The opportunities range from commercial and residential building developments to exhibition centres, advanced manufacturing plants and recreational facilities. The professional communities in Hong Kong can join hands to exchange ideas on green designs, construction methods, successful projects as well as collaborate in the R&D of new smart and green technologies."

Ir Dr Derek Pang, JP
Chief Executive Officer Asia Allied Infrastructure Holdings Ltd.,
Fellow, the Chartered Institute of Building

[101] Hong Kong Financial Services Development Council, Hong Kong: A Leading Financial Hub of Offshore RMB, April 2020
[102] Trade and Industry Department, Mainland and Hong Kong Closer Economic Partnership Arrangement (CEPA), November 2019

A Stepping-stone for Outbound Investment

Hong Kong serves as a stepping-stone for Mainland enterprises looking to reach out to the global market and accelerate integration with the world economy. Many Chinese enterprises have already set up an offshore base in Hong Kong to make good use of its global connection and financial services. More importantly, operating in Hong Kong can help enterprises in Mainland China adopt modern and globalised management systems, as well as international rules and industry practises.

Companies from Mainland China can tap a high calibre Hong Kong talents who are trilingual, have international exposure, and understand global practises and industrial norms. Hong Kong can prepare these companies for overseas expansion.

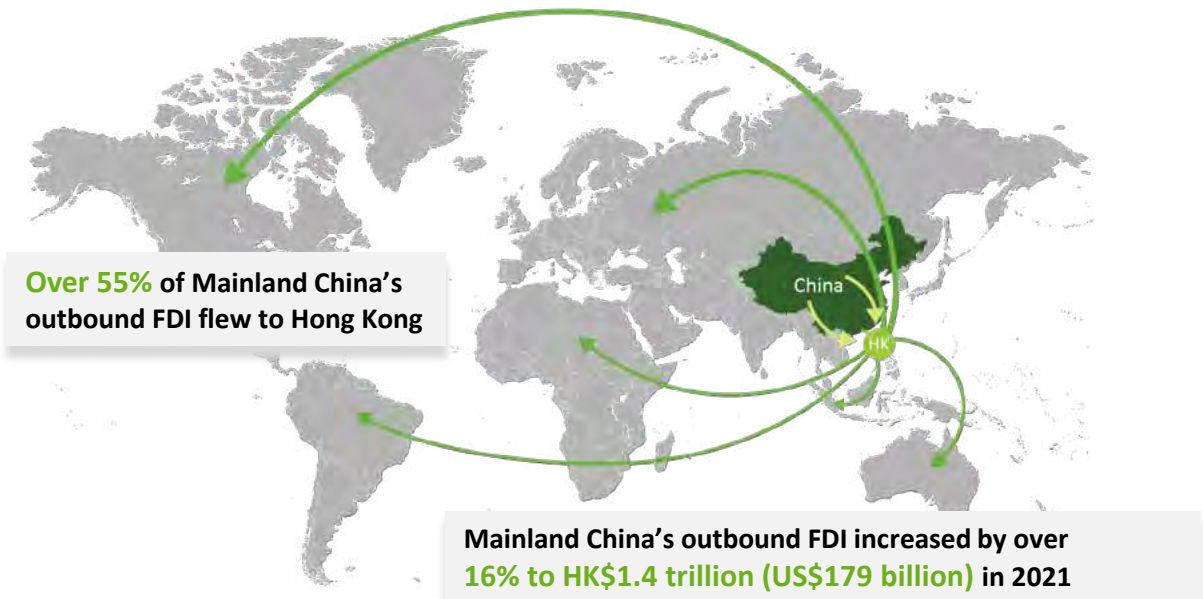
Companies from Mainland China can find many professional service providers in Hong Kong that can support the global expansion of their smart green building business. Law firms, accounting firms, and insurance companies in Hong Kong provide the most sought-after overseas connections as well as diverse and high-quality services, such as accurate risk assessments, due diligence checks, and business intelligence. These services are necessary when making decisions on mergers and acquisitions or overseas project bidding.

Also, Hong Kong has a robust accreditation system and international reputation for product quality testing and certification. Suppliers of building materials and equipment can use independent third-party testing and inspection services in Hong Kong to obtain world-recognised green product certifications or labels and build consumer confidence.

Companies in Mainland China can also easily raise and manage funds using Hong Kong's mature financial system and infrastructure. They can transfer funds freely and enjoy competitive financing costs to support their overseas growth plans.

Due to its high degree of internationalisation and reputable global standing, Hong Kong has been an indispensable base for Mainland companies looking to venture overseas.

China's Outbound Foreign Direct Investment (FDI)[103]



[103] 2021 Statistical Bulletin of China's Outward Foreign Direct Investment, Ministry of Commerce, September 2022

4 SUCCESS STORIES

Source: HKL

Schneider Electric

Schneider Electric's purpose is to empower all to make the most of our energy and resources, bridging progress and sustainability for all

By integrating world-leading process and energy technologies, end-point to cloud connecting products, controls, software and services across the entire building lifecycle, Schneider Electric enables integrated technology management for homes, buildings, data centres, infrastructure and industrial businesses.

Hong Kong is a Significant Hub

Originating in France, Schneider Electric set foot in Hong Kong nearly 50 years ago and established Hong Kong as one of its four global hubs. What attracted Schneider Electric to build and continue its business in Hong Kong over the years was due to Hong Kong's economic freedom and stability, proximity to Mainland China, strong infrastructure in telecommunications and utility, strengths as a traditional financial hub, and ability to reach international cities. The talent available in Hong Kong is also known for their work ethics, quality work and ability to work efficiently.

Cloud-based energy management platform, enabled by Internet-of-Things technologies, increases operational excellence and maximises energy efficiency across multi-site property portfolio.

Grasping the Eco-trend

As the impact of climate change becomes more conspicuous, massive opportunities have become available across the whole building lifecycle and for the construction industry.

> The building landscape in Hong Kong has shifted to create two new markets – digitising new buildings and retrofitting existing buildings – which have allowed Schneider Electric to sync their vision for buildings of the future with their digital solutions and software for each stage of the building lifecycle, from design and build to operate and maintain.

With the push for sustainable development from developers, new types of projects have emerged for Schneider Electric, including retrofitting existing buildings to enhance energy efficiency and collecting building data, as well as managing buildings through a centralised cloud-based energy management platform to save energy costs and reduce energy consumption.

The drive from ecosystem partners in Hong Kong has contributed to Schneider Electric's strong foothold in the real estate market, with prominent Hong Kong developers such as Swire Properties Limited, Link Real Estate Investment Trust and Nan Fung Group. Schneider Electric has witnessed a boom in its energy management sustainability business in Hong Kong over the last few years. This has also led the company to leverage these experiences and apply them across the border to Mainland China.

Powering Buildings of the Future

Schneider Electric believes that the buildings of the future are sustainable, resilient, hyper-efficient and people-centric, making a net-zero future possible. Currently, the engineering and construction industry is also adopting more digital technologies in the construction phase so that buildings can become more energy efficient upon construction completion. To expand its capabilities in building lifecycle digitisation, Schneider Electric has recently acquired construction software provider RIB Software SE. The acquisition not only enables digital solutions for greater efficiency and sustainability in the construction market, but also allows Schneider Electric to tap into RIB's valuable research and development (R&D) resources and talent.

Looking Ahead

With the changing landscape of the building and construction market in Hong Kong towards sustainability, Schneider Electric will continue to enlarge their footprint in the sector, turning their vision to be the digital partner for sustainability and efficiency into a reality.

> "Climate change has had more importance in recent years and Hong Kong customers are keen to reduce their carbon emissions for efficiency and sustainability. This creates a sense of urgency and a demand for digital solutions and technologies that can reduce energy consumption. Over the years, Hong Kong has brought many opportunities to Schneider Electric and continues to fulfil its vision in creating buildings of the future in an all digital, all electric world."
>
> **Mr Jonathan Chiu**
> Hong Kong President
> Schneider Electric

Buildings of the future are sustainable, resilient, hyper-efficient and people-centric, making a net-zero future possible.

Sycra Technologies Limited

Sycra provides one-stop smart lighting solutions, including internet of things (IoT) platform, smart sensors, lighting controllers and lights, as well as a building automation software

What Makes Hong Kong so Attractive

Sycra Technologies Limited (Sycra) was attracted to Hong Kong's strategic location and excellent connectivity. The city offers easy access to the production base in Mainland China and is at the forefront of technological innovations in the Guangdong-Hong Kong-Macao Greater Bay Area (GBA). Also, the Hong Kong Government has put in place a series of supporting policies to assist small and medium-sisi technology companies. Its goal to become a world class smart city has triggered a higher demand for smart products and management systems that complies with the latest net zero carbon emission and carbon neutrality strategies and targets.

Easy Access To R&D Funding

Since its establishment in Hong Kong, Sycra has obtained close to HK$2 million (approximately US$256,000) in funding to conduct R&D activities from the Partnership Research Programme of the Innovation and Technology Fund, Innovation and Technology Commission.

Asher Sun, Chief Executive Officer of Sycra, said, "Access to funding is crucial to small and medium-sized enterprises as they need to invest in R&D to keep up with unexpected challenges and competitors." R&D is necessary for accelerating innovation and sustaining relevance, and it requires funding.

Sycra also participated in the Incubation Technology Programme of Hong Kong Science and Technology Park (Science Park). Through the programme, Sycra received funding to develop its precision spectrum control technology for enhancing human-centric lighting in workspaces. This patented technology allows for the extension of Sycra lamp's life expectancy beyond a normal LED lamp, reducing waste and thus makes it a sustainable product.

The programme also connected Sycra to a wide network of mentors and professionals from the technology and business communities. It helped build Sycra's engineering team, which was instrumental in developing the patented precision spectrum control technology. Through Science Park's network, Sycra was able to identify new customers and valuable partners.

Science Park

“Hong Kong is very supportive of technology companies like ourselves. The latest Government initiatives on smart city have boosted the demand for what Sycra has been striving to create in the past few years. The Incu-Tech Programme of Science Park has provided many resources for us, including financial aid, premises, training, technical assistance and promotion support. It has truly been one of the best opportunities we were offered to grow as a technology brand.”

Mr Asher Sun
Chief Executive Officer
Sycra Technologies Limited

Autodesk Far East Limited

Autodesk provides Building Information Modelling (BIM) software products and services for architecture, engineering and the construction industry

Autodesk is a renowned American software brand that offers design and drafting software applications like AutoCAD and other solutions for several industries, including architecture, engineering, and construction (AEC); product design and manufacturing; and media and entertainment. It established a Hong Kong base in 1992 and has sustainable growth of business since then, as the AEC business has remained vibrant over the past three decades.

Hong Kong is Making Clear Progress in Technology Upgrade

The AEC industry in Hong Kong has changed rapidly with the acceleration of digital transformation, such as integrating BIM with the latest technologies including IoT sensors, simulators, Artificial Intelligence, extended reality, and predictive analytics. Traditional construction processes have become more digitalised with the adoption of new technologies. Initiatives by the Hong Kong Government and the industry, including the *Hong Kong Smart City Blueprint*, *Construction 2.0*, and the mandatory use of BIM in public works projects, have boosted the demand for innovative solutions and contributed to the growth of Autodesk's Hong Kong business.

The Hong Kong Government's **Construction Innovation and Technology Fund (CITF)** subsidises construction businesses in their adoption of technologies, including BIM software subscription and BIM training courses. CITF has greatly relieved the financial burden of small- and medium-sized construction companies when undergoing digital upgrade and upskilling their staff. Autodesk is glad to see that its products have been listed under CITF's pre-approved list, a recognition of their proven effectiveness to boost productivity, uplift quality, or enhance environmental performance. Autodesk has seen growth in its client pool for both public and private projects.

CITF 建造業創科基金

The AEC industry in Hong Kong has reached a consensus to march ahead in the journey of digitalisation by connecting processes and data, as well as automating workflows. Autodesk has continued to make breakthroughs in software design and functions so that data can be shared more seamlessly and provide better insights for decision-making. It also strives to improve its customer services to suit the special needs of local clients. For example, more resources are invested in developing local plug-ins for automating processes to facilitate adoption of BIM in building and construction industries.

Stakeholder Engagement is the Key

In addition, the company has actively engaged ecosystem partners, including the Construction Industry Council, developers, universities, and professional associations through events and activities. For example, it has formed the Autodesk Industry Advisory Board, a non-profit interest group, to facilitate cross-border exchange and experience sharing among its BIM users in Hong Kong, Macau, and Mainland China. It regularly hosts conferences to connect with industry experts and organises the annual Hong Kong BIM Awards to showcase and celebrate innovative approaches to projects.

BIM is the New Frontier of Architecture

Autodesk believes that sustainability has become an essential component in the evolution of construction technologies. Hong Kong is on the right trend to step up from focusing on the financial and time scheduling data of BIM dimensions to creating sustainable and environmentally conscious designs and buildings.

> “As Hong Kong develops itself as a smart city with massive infrastructure and land developments planned, reducing carbon emission and energy consumption in new and existing buildings will create a demand for new technologies. This allows Autodesk to help transform the planning and construction process to become more efficient, sustainable, and safer.”

Dr Wendy Lee
Regional Manager
Hong Kong and Macau
Autodesk Far East Limited

Autodesk Civil 3D® design software empowers civil engineers to realise tomorrow’s infrastructure

Traxon Technologies Limited

Traxon offers lighting and control systems and intelligent lighting solutions

Traxon Technologies Limited (Traxon), a global leader in architectural lighting solutions, offers a one-stop service to clients by partnering with lighting designers, architects, contractors, and system integrators to develop lighting solutions from concept and design to testing and commissioning. Traxon saw an opportunity in the fast-growing China market for architectural LED lighting and made the decision to move its headquarters from Germany to Hong Kong in 1997, two years after the company was founded.

The Strategic Role of Hong Kong

Traxon saw Hong Kong as a strategic pivot to enter the Mainland China market. As a renowned international lighting designer hub, Hong Kong provides a well-established talent pool on innovative lighting technology.

> Moving to Hong Kong allowed Traxon to better understand the latest trends and market conditions in Mainland China and tighten cooperation with contract manufacturers in Guangdong and Zhejiang Provinces, thus achieving speed to market.

In addition to overseeing global management and operations, the Hong Kong headquarter plays a critical role in creating an agile supply chain and mobilising corporate-wide resources.

As Hong Kong has the same time zone as many of the major cities in Asia, it is in excellent position to communicate with the suppliers in China and coordinate production and delivery. Its teams in Hong Kong are not only bilingual, but they understand both international practices and local preferences. On one hand, they can translate clients' requirements to the design and engineering teams in Germany and the United States; on the other, they can bring state-of-the-art technologies and innovation from overseas to clients in Hong Kong and Mainland China.

Customised Media Tube Lighting

Growing our Lighting Community

In the past 10 years, building requirements have evolved from being functional and cost-effective to having increased focus on sustainability and energy efficiency. There has been growing demand for LED technology, LED control systems as well as optimised and dynamic lighting solutions to reduce energy consumption. Traxon has leveraged the cohesive business communities and connectivity of Hong Kong to forge partnership with more than 40 overseas and local companies in the lighting supply chain. They have joined hands to explore greener lighting products that use less cables and offer higher precision.

Beautifying Hong Kong's Harbour

Recently, Traxon developed the iconic lighting façade for the M+ Museum in the West Kowloon Cultural District in Hong Kong. As a cultural landmark, M+ Museum turns into an evolving digital exhibition platform after dark through the use of LED lights and fully integrated building control systems. The museum can be viewed from various angles, distances, and lighting conditions, adding visual aesthetics and dimension to Hong Kong's Victoria Harbour. To balance the desire for beauty and the pursuit of sustainability, Traxon has worked closely with the site owner to create a customised solution that shifts the hue and dims the LED lights according to the weather and day light. The solution not only ensures comfortable viewing, but also lowers overall light pollution and energy consumption.

Investing in the GBA

Traxon's success in Hong Kong has become a key factor in its penetration into the GBA and Mainland China market. Appreciating the synergetic development between cities in the GBA, Traxon plans to elevate its technological capabilities by establishing a new R&D centre in the Lok Ma Chau Loop, a zone bordering Shenzhen and Hong Kong. The R&D centre will strive to improve lighting materials so that they can be lighter, more sustainable, and of better quality.

> "Our Hong Kong headquarters serves as the corporate brain that orchestrates our supply chain and global resources. Our continued success in the city and the GBA has allowed us to realise our mission to inspire the world with beautiful and sustainable lighting solutions, and to transform creative visions into unforgettable lighting experiences."

Mr Jack Chong
Chief Executive Officer,
Traxon Technologies Limited

Exterior display of M+ in the West Kowloon Cultural District in Hong Kong

EPAM Systems, Inc.

EPAM provides digital transformation and product engineering services

EPAM Systems, Inc. (NYSE:EPAM), headquartered in the United States and listed on the New York Stock Exchange, specialises in digital transformation and product engineering services. It made the strategic decision to set up its regional headquarters in Hong Kong in 2013 as the first entry point into the Asia Pacific region.

Since EPAM's establishment in Hong Kong, its regional business footprint has grown by nearly 600 percent in less than 10 years and expanded to multiple industries.

EPAM has ranked four times as the top IT services company on Fortune's 100 Fastest Growing Companies list.

EPAM was attracted by Hong Kong's diversity, strategic location and business environment. The company saw Hong Kong as an internationally oriented city that welcomed foreign companies and innovations and stood to become an international technology hub. Sandy Zhang, Delivery Head of EPAM in Hong Kong, said, "Hong Kong has all the things we need."

> Hong Kong is a perfect location for setting up regional headquarters. Its close proximity to Mainland China allowed EPAM to manage delivery centres in Shenzhen, Suzhou, and Chengdu.

Its staff in Hong Kong collaborate closely with their colleagues in Mainland China and serve to introduce global expertise and technologies to their local clients.

Another unique strength of Hong Kong is its multi-national workforce and well-rounded technical skillsets, which helped EPAM grow and solidify its offerings as a key end-to-end technology service provider in the region. Its more than 1,000 engineers, consultants and designers in Hong Kong and Mainland China come from diverse backgrounds and offer complementary knowledge as well as technical know-how to serve clients with multiple needs.

"We have taken gradual but progressive steps to expand into a multinational IT services provider. Establishing our first Asia-Pacific office in Hong Kong 10 years ago was certainly one of the most critical decisions we have made. The city not only provided us with a strategic gateway into the Greater China region, but it has also supplied us with a global workforce and variety of skillsets no other Asian cities could have offered. Recently, we have seen some significant changes in the building technology landscape which brings enormous business opportunities to companies like EPAM."

Ms Sandy Zhang
Delivery Head
EPAM Systems, Inc.

Intelligent Automation for Buildings

EPAM has witnessed the transformation of building technologies globally, which was driven by smart technology, data-backed ecosystems and an increased awareness of sustainability.

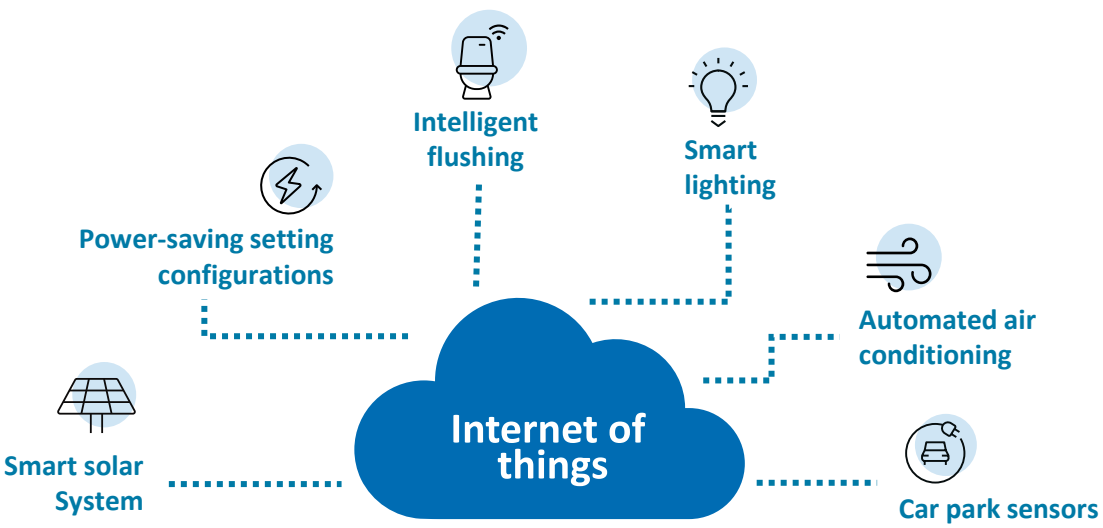
One of the most requested information technology services is intelligent automation (IA). From planning and design to facilities management, companies can use data-backed IA to schedule tasks, create precision modelling, predict faults and automate notifications. Compared to conventional methods, IA can significantly improve the accuracy, efficiency and effectiveness of operation processes.

EPAM has observed an increasing demand for the wider adoption of IoT in buildings in metropolises like Hong Kong. IA and a unified system can help facility managers monitor the operational efficiency of their buildings by harnessing the data collected from the network of sensors.

Digitalisation to Enhance Experience

Zhang shared that the real estate sector has accelerated the pace of digitalisation and her company is capitalising on opportunities emerging from this trend. Her team has recently developed a one-stop property management portal for a leading property developer in Hong Kong. The portal digitalises tendering, tenancy management and contractor management processes, automating repetitive tasks and facilitating communications between the landlord and tenants. By collaborating with multiple departments and stakeholders in the process, EPAM designed the portal in a way that suits their needs and usage habits. The portal has successfully enhanced user experience and satisfaction of the tenants. It has also become a key milestone in the client's digital transformation roadmap.

Sensors and Automation Enabled by IoT



“Leveraging advanced technologies to promote smart green buildings is not only to enhance operational efficiencies but also to achieve a healthy, sustainable and high quality of living environment. Technologies such as IoT, AI/big data, new materials, renewable energy, BIM, MIC etc. are increasingly adopted to improve sustainable building design and reduce environmental impacts throughout the entire building life cycle from design and construction to operation and maintenance.

Riding on its strong reputation for construction of high-rise buildings and adoption of globally recognised green certification standards, as well as a wealth of expertise in architecture, engineering and construction services, Hong Kong’s high-rise building model can be a reference for the building designs in other cities. Hong Kong is outstanding in terms of integration and application of technologies and know-how. Backed by world-class R&D infrastructure, favourable government policies and incentives, friendly business environment with a simple and low tax regime, and ease to access capital, Hong Kong presents tremendous opportunities for overseas and Mainland companies to set up businesses in Hong Kong to provide eco-friendly solutions to accelerate smart green building development.”

Mr Andy Wong
Head of Innovation and Technology
Invest Hong Kong

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Professor Elvis Au, BBS
Adjunct Professor
Department of Geography and Department of Urban Planning and Design, The University of Hong Kong

Mr Edward Chan
Deputy General Manager of Project Management
Henderson Land Development Company Limited

Ir Eric Chan
Chief Public Mission Officer
Hong Kong Cyberport Management Company Limited

Mr Hau-wai Cheung, SBS
Chairman (2018-2022)
Hong Kong Green Building Council

Dr Tin-cheung Cheung, SBS
Chairman
Hong Kong Green Building Council

Mr Jonathan Chiu
Hong Kong President
Schneider Electric

Mr Jack Chong
Chief Executive Officer
Traxon Technologies Limited

Dr Benny Chow
Director of Sustainability
Aedas

Mr Carl Devlin
Capital Works Director
MTR Corporation Limited

Mrs Betty Fung Ching Suk-yee, GBS
Chief Executive Officer
West Kowloon Cultural District Authority

Ms Margaret Ho
Manager of Industry Development
Environment and Sustainability Department
Construction Industry Council

Mr Tony Ho
Chief Project Development Officer
Hong Kong Science and Technology Parks Corporation

Ms Winnie Ho, JP
Secretary for Housing
Housing Bureau

Ir Chi-keung Hon, GBS, JP
Chief Executive and Secretary
Hong Kong Institution of Engineers

Ir Raymond Kwok
MEP & Innovation Lead
Swire Properties

Mr Barry Kwong
Director of Sustainability
Hong Kong Science and Technology Parks Corporation

Mr Mark Lam
Head of Investor Relations and Corporate Sustainability
Hongkong Land Limited

Mr Edward Lau
Chief Financial Officer
New World Development Company Limited

Ms Ivy Lee
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Director of Sustainability
Leigh & Orange Architects

Mr Patrick Lee
Convenor – Smart City Working Group
Hong Kong General Chamber of Commerce

Dr Peter Lee
Former Chief Technology Officer
Nano and Advanced Materials Institute

Dr Wendy Lee
Regional Manager
Hong Kong and Macau
Autodesk Far East Limited

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ABOUT INVEST HONG KONG

Invest Hong Kong is the Hong Kong Special Administrative Region Government's department for attracting foreign direct investment. Our goal is to help overseas and Mainland companies to set up and develop their businesses in Hong Kong. For those foreign companies that are already established here, we extend our services to help them expand in our city.

Visit our website:

All of our services are free, confidential and tailored to clients' needs. Our comprehensive range of services includes:

Latest information on Hong Kong's business environment:

- Sector-specific advice and opportunities
- Business incorporation procedures
- Tax and business regulations
- Cost-of-business models
- Employment legislation
- Immigration requirements
- Business networking opportunities

Introduction to business contacts:

- Lawyers, accountants, human resource specialists, consultancies, designers, interior specialists and real estate companies

Arranging visit programmes:

- Meetings with service providers, professional associations and government officials and departments

Business support facilitation:

- Support and assistance with business licences, visa applications, trademark registration, IP and trade regulations
- Marketing and public relations services during the launch and expansion of your company
- Advice on living and working in Hong Kong — housing, healthcare, schooling and networking

Invest Hong Kong has offices in major cities around the world and industry experts across a range of business sectors. Contact us for free advice on setting up in Hong Kong or for details on how we can support your expansion in our city.

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ABOUT ARCADIS HONG KONG

Arcadis Hong Kong has a long history of leading expertise in providing Construction Cost and Project management capabilities that ensure our clients' projects are delivered with a competitive advantage, exceed project requirements and deliver sustainable outcomes. Our Cost Management heritage is particularly strong in Greater China having set-up our first office in Hong Kong back in 1949. We entered the Mainland China market in 1984, introducing modern Cost Management techniques to its newly evolving construction market. Our initial commissions were from Hong Kong and foreign developers investing in China, however since then our client base has grown to include state-owned enterprises and local developers.

Visit our website:

We are committed to further extending our professional expertise to include new areas like whole-life costing, and supporting the growing number of clients who are looking for high quality solutions as they embark on projects in other parts of the world. Furthermore, we have aligned our operating models to facilitate innovation, ease knowledge transfer and enable the sharing of best practices. We work to ensure clients have access to our best resources and delivering the most appropriate solutions.

Our Core Services

- Cost and Commercial Management
- Project and Programme Management
- Business Advisory
- Environment and Water Management

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