



# Decarbonising the built environment in Hong Kong

How can Hong Kong reach its decarbonisation goals?

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# Contents

Glossary .....	1
Introduction .....	3
Decarbonisation challenges .....	3
Vision of a decarbonised built environment .....	5
Current and planned policy measures for decarbonisation .....	7
Current policy measures .....	7
Planned policy measures .....	8
Gap analysis .....	9
Recommendations .....	11
Conclusions .....	13

# Glossary

Term	Definition
Building life cycle	<p>The BS/EN 15978 standard divides the building life cycle into four stages:</p> <ul style="list-style-type: none"> <li>• Stage A: Product and construction process</li> <li>• Stage B: Use</li> <li>• Stage C: End of life</li> <li>• Stage D: Benefits and loads beyond the system boundary.</li> </ul> <p>Each stage is further divided into modules.</p>
Carbon emissions	<p>Although carbon dioxide is only one among a number of greenhouse gases, the term ‘carbon emissions’ is used throughout this paper as a proxy for human-produced greenhouse gases.</p>
Carbon intensity	<p>The quantity of carbon emissions associated with an activity or product, often compared to its alternatives. For example, travelling by car is more carbon-intensive than travelling by train.</p>
Embodied carbon	<p>The total greenhouse gas emissions and removals associated with materials and construction processes throughout the whole life cycle of a building.*</p>
Greenhouse gases (GHGs)	<p>Constituents of the atmosphere, both natural and anthropogenic (human-created), that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth’s surface, the atmosphere and clouds.</p>
Life cycle assessment (LCA)	<p>An assessment of the environmental impact of a product or service.</p>
Net zero whole-life carbon building	<p>A building where the sum total of all building-related greenhouse gas emissions over a building’s life cycle, both operational and embodied, is minimised; meets local carbon, energy and water targets; and, with residual offsets, equals zero.*</p>

Term	Definition
Net zero carbon operational energy building	<p>A building where:</p> <ul style="list-style-type: none"> <li>• no fossil fuels are used</li> <li>• all energy use has been minimised</li> <li>• it meets the local energy use target</li> <li>• all energy used is generated on or off site using renewables that demonstrate additionality (they are newly built for this purpose), and</li> <li>• any residual direct or indirect emissions from energy generation and distribution are offset (see <i>Offset carbon emissions</i>).*</li> </ul>
Offset carbon emissions	Reduced or avoided emissions meant to compensate for an equivalent quantity of emissions occurring elsewhere.
Operational carbon	The GHG emissions arising from all energy and water consumed by an asset in use, over its life cycle.*
Whole life carbon emissions	The sum total of all building-related greenhouse emissions, both operational and embodied, over the life cycle of a building, including its decommission. Overall whole life carbon building performance includes separately reporting the potential benefit from future energy recovery, reuse and recycling.*

\* Definitions adapted from RICS' [Whole life carbon assessment for the built environment](#), 2nd edition, 2023.



# Introduction

Hong Kong's building sector plays a significant role in the city's economic development, however, it also accounts for a substantial share of greenhouse gas emissions. According to [Hong Kong's Climate Action Plan 2050](#), buildings account for around 90% of electricity consumption and more than 60% of carbon emissions. In response to global climate change concerns and the need to reduce carbon emissions, Hong Kong has embarked on a journey towards decarbonisation. This paper explores the current status of decarbonisation efforts in Hong Kong's building sector, highlighting progress made, the upcoming challenges and outlining solutions.

## Decarbonisation challenges

Hong Kong's building sector has made commendable progress in its journey towards decarbonisation with initiatives focusing on green building practices, renewable energy adoption, energy efficiency measures and carbon reporting. However, several challenges, such as ageing building stock, high land prices, regulatory frameworks and public awareness must be addressed to achieve meaningful and lasting change.

### Ageing building stock

One of the biggest challenges in the decarbonisation process is the ageing building stock in Hong Kong. According to The Hong Kong University of Science and Technology's report [Aging buildings problem needs to be addressed aggressively](#), over 9,000 buildings are over 50 years old, with this estimated to rise to around 14,000 by 2030. Many older buildings were not constructed with energy efficient designs and technologies.

Retrofitting these structures can be costly and logistically challenging, thus discouraging property owners from investing in decarbonisation measures.

## High land prices

The high cost of land in Hong Kong puts pressure on developers to maximise their floor area, often resulting in dense and energy-intensive buildings. Achieving sustainable development while balancing economic considerations remains a critical challenge.

## Regulatory frameworks

While the Hong Kong government has introduced various initiatives and regulations to promote decarbonisation, there is a need for more stringent regulations and incentives. The development of comprehensive sustainability standards and stricter enforcement of green building practices could accelerate progress.

## Public awareness

Public awareness and buy-in for decarbonisation efforts are essential. Many Hong Kong residents remain unaware of the environmental impact of the real estate sector and the benefits of sustainable living. Educational campaigns and community engagement are necessary to drive behavioural change.

To meet its decarbonisation goals, Hong Kong needs a concerted effort from government, developers, property owners and the public. Collaboration and innovation in sustainable building practices, energy efficient technologies and renewable energy sources will be essential to transform the real estate sector into a sustainable and low-carbon industry, contributing to a greener and more resilient future for the city.

# Vision of a decarbonised built environment

The building sector has a pivotal role to play in shaping a sustainable future. [Hong Kong's Climate Action Plan 2050](#) commits to achieve net zero carbon emissions for all new government buildings by 2030 and for all new buildings by 2050. To imagine a decarbonised built environment in Hong Kong's future, a holistic approach should be taken that addresses construction practices, building design, energy sources and community engagement. This section explores the strategies needed to transform buildings and the industry.

## Green building practices

Widespread adoption of green building practices is a key element to a decarbonised built environment. All new construction projects should aim for certification under a robust green building standard like BEAM Plus or equivalent. To achieve such certifications, innovative techniques should be adopted such as vertical gardens, cool roofs and rainwater harvesting systems. The integration of natural elements into urban design could enhance both energy efficiency and the quality of life in the city.

## Energy efficient design

Energy efficient buildings should be the norm rather than the exception. In an ideal decarbonised future, technologies such as smart building management systems, efficient HVAC (heating, ventilation, and air conditioning) systems and advanced insulation materials would be standard features. Retrofitting existing buildings should be incentivised, allowing older buildings to benefit from the latest energy-saving innovations.

## Renewable energy integration

To truly decarbonise buildings, there must be a shift toward renewable energy sources. Solar panels, wind turbines and other renewable energy systems should be integrated into building design and urban landscapes. Introducing innovative solutions, such as building integrated photovoltaics (BIPV) and urban wind farms, should contribute to meeting Hong Kong's energy needs while reducing dependence on fossil fuels.

## Sustainable materials and waste reduction

Using sustainable materials that minimise environmental impact should be prioritised in Hong Kong's future building sector. Reclaimed, recycled and locally-sourced materials should be favoured to reduce carbon emissions associated with transportation and the manufacture of new products. Waste reduction strategies, together with the reuse and recycling of

construction materials, should be enforced, contributing to the establishment of a circular economy. Prefabrication or the use of Modular Integrated Construction (MiC) would ideally be adopted in Hong Kong to significantly reduce the carbon footprint in the construction process.

## Resilient and inclusive communities

A decarbonised future should also focus on creating resilient and inclusive communities. Buildings should be designed with climate adaptation in mind, incorporating features such as green spaces, community gardens and elevated structures to mitigate the risks of flooding and extreme weather events. Furthermore, affordable housing options and green spaces should be integrated into all neighbourhoods to ensure equitable access to sustainable living.

## Community engagement and education

Public awareness campaigns, workshops and educational programmes can inform residents about the benefits of sustainable living and the role they can play in reducing carbon emissions. Collaboration between government, industry stakeholders and communities is crucial for achieving meaningful change.

## Government leadership and regulation

Government leadership is pivotal in steering the building sector towards decarbonisation. Stricter regulations, incentives and penalties should be enforced to encourage compliance with green building standards and energy efficiency measures. Moreover, public projects should serve as exemplars of sustainability, setting high standards for private developers to follow.

The desired decarbonised future of Hong Kong's buildings is one where sustainable practices are integrated seamlessly into the urban environment. Achieving this requires collaboration, innovation and commitment from all stakeholders. Hong Kong's building sector has the potential to not only reduce its carbon footprint but also become a model of sustainability for cities worldwide, ensuring a healthier and more sustainable future for all its residents.



# Current and planned policy measures for decarbonisation

As a densely populated metropolis, Hong Kong faces significant challenges in reducing carbon emissions from its building stock. The building sector is a driver of economic growth but also a major contributor to greenhouse gas emissions. To address this, the Hong Kong government has implemented several policy measures and has ambitious plans for future initiatives to accelerate decarbonisation. This section addresses existing policies and upcoming strategies aimed at achieving a sustainable and low carbon built environment in Hong Kong.

## Current policy measures

### Green building certification (BEAM Plus)

The Building Environmental Assessment Method (BEAM) Plus is Hong Kong's flagship policy for promoting sustainability in construction. This voluntary green building certification encourages developers to adopt sustainable practices. It assesses various aspects of sustainability, including energy efficiency, site selection, indoor environmental quality and materials use. Many developers voluntarily seek BEAM Plus certification to demonstrate the green attributes of their projects.

### Mandatory building energy codes

Hong Kong has established mandatory building energy codes to improve energy efficiency in new and existing buildings. These codes set energy performance standards that must be met by materials, equipment and building services. Regular energy audits and retrofits are required for existing buildings to ensure ongoing energy efficiency improvements.

### Mandatory energy efficiency labelling scheme

This scheme covers major appliances including air conditioners, refrigerators, washing machines and compact fluorescent lamps. It provides energy efficiency labels to inform consumers and encourage the use of energy efficient appliances.

### Retrofit programmes

To reduce energy consumption in older buildings, the government offers a tax discount for building owners to retrofit existing buildings with energy efficient technologies.

## Planned policy measures

### Net zero carbon buildings

Hong Kong is setting ambitious targets to achieve net zero carbon emissions for new publicly-owned buildings by 2030 and for all new buildings by 2050, as established in [Hong Kong's Climate Action Plan 2050](#). This will require stricter energy efficiency standards, increased adoption of renewable energy sources and a focus on sustainable building materials.

### Climate resilience and adaptation strategies

The government is developing strategies and guidelines to enhance building resilience against climate change impacts such as flooding and extreme weather events. These measures include improved drainage systems, elevated building designs and resilient infrastructure planning.

### Enhanced enforcement and regulation

Stricter enforcement for green building standards and energy efficiency requirements are being discussed. This includes imposing more stringent penalties for non-compliance and enhancing auditing and monitoring of construction projects.

### Carbon reporting

[HKEX](#) is holding a consultation on enhancing the climate-related disclosure guidance under their ESG framework, which proposes to mandate all issuers to make climate-related disclosures in their ESG reports. This policy will enhance transparency and accountability by measuring and managing carbon emissions in the commercial sector.



# Gap analysis

Hong Kong is facing the dual challenge of continuous rapid urbanisation and the urgent need to reduce carbon emissions. To address these challenges, the Hong Kong government has introduced several policy measures while also planning additional initiatives. The following analysis aims to identify the disparities between existing and planned measures, and the desired future highlighting areas that require attention to achieve a decarbonised built environment.

Current policies primarily focus on green building certification (BEAM Plus), mandatory energy codes and energy efficiency labelling. While these policies encourage sustainable construction practices and energy efficiency, they mainly target new developments and do not comprehensively address existing buildings.

Planned measures, such as net zero carbon new buildings and retrofit programmes, show a shift towards a broader scope by addressing existing building stock and aiming for net zero carbon emissions. However, the transition from policy to implementation remains a challenge.

## Lack of renewable energy integration from new to old buildings

Current policies lack a specific focus on the integration of renewable energy sources into existing buildings, while planned measures emphasise the adoption of renewable energy in new developments. A clear roadmap for retrofitting existing buildings with renewable energy technologies is lacking.

## Undefined climate resilience and adaptation

While planned measures include strategies for building resilience against climate change impacts, the details of these strategies, such as funding allocation and specific guidelines, are not well defined. A comprehensive approach to climate resilience, including measures for both new and existing buildings, is necessary. Public awareness and engagement in resilience planning should also be increased.

## Community engagement and education

Both current and planned policies need to enhance community engagement and education efforts. Raising awareness among building owners, developers and residents is essential for successful decarbonisation. A coordinated and sustained effort to educate and engage the public is required to drive behavioural change and ensure widespread adoption of sustainable practices.

## Government leadership and regulation

The success of planned measures depends on effective enforcement and regulation. Stricter penalties for non-compliance and enhanced monitoring are essential. While plans exist to strengthen enforcement, their implementation and effectiveness remain to be seen.

Hong Kong's transition to a sustainable and low-carbon built environment is a complex challenge. While the current policy measures have laid a foundation for sustainability, the planned measures show a shift towards a more comprehensive approach, including existing buildings and a net zero carbon target. However, several gaps exist such as the integration of renewable energy in retrofitting buildings, detailed climate resilience strategies and robust community engagement efforts. Addressing these gaps will require concerted efforts from the government, industry stakeholders and the public. Clear roadmaps, funding allocation and coordination between different agencies and departments are essential to bridge these gaps effectively.



# Recommendations

Hong Kong's built environment must achieve net zero carbon emissions to reach the city's target of carbon neutrality by 2050. The industry must be more responsible for its developments and operations and there is significant scope for improvement in this regard.

The recommendations presented in this section are extracted from RICS' [Hong Kong Policy Address Recommendation Paper 2022](#), which provided the Hong Kong government with insights on various topics in the built environment.

## Green standards for all buildings

- The Hong Kong government can lead by example and further encourage sustainability in the private sector. RICS recommends implementing regulatory requirements, which specify a defined rating, for all government buildings in Hong Kong.
- Hong Kong developers should be incentivised to adopt higher green building standards for government land sales and should be required to undergo a final assessment for a specific rating.
- Many private developers have incorporated sustainable design and energy efficient features into their projects to take advantage of gross floor area (GFA) concessions, a government scheme that awards additional floor area when specific prerequisites are met. RICS recommends that appropriate rating requirements be incorporated into the GFA concessions regime to further stimulate the adoption of green building practices in Hong Kong.
- For general building plan submissions that do not seek GFA concessions, there is currently no building control mechanism in place to enforce levels of carbon performance. In Singapore, the *Building Control (Environmental Sustainability) Regulations* require a minimum environmental sustainability standard for new buildings and existing buildings undergoing significant retrofitting, subject to specific size criteria. Compliance is assessed based on the submission of carbon footprint calculations for all building materials or a carbon footprint report. Failure to meet these standards results in the rejection of building plans. RICS recommends similar requirements be imposed in Hong Kong through building controls for both new and existing buildings undergoing major retrofitting, potentially expediting the approval process if certain sustainability criteria are met.
- More stringent guidelines and requirements should be implemented to accelerate the reduction of carbon emissions in existing buildings, including the introduction of more frequent reporting. Additionally, the government could gradually expand the scope of the ordinance to include non-commercial properties in its efforts to promote energy efficiency.

## Adopting international standards

- When considering the carbon footprint of buildings, it is essential to account for the embodied carbon emissions from a building's inception to its eventual decommissioning. RICS recommends that the Hong Kong government develop and enforce a standardised method of assessment and reporting for measuring the life cycle carbon emissions of buildings. The Hong Kong government should collaborate with professional organisations and ensure alignment with established international standards and other frameworks, such as the [International Cost Management Standard](#) (ICMS 3) and RICS' [Whole life carbon assessment for the built environment](#). The implementation of a standardised common assessment tool and reporting standard will ensure more effective management of carbon emissions in the built environment.

## Mandatory carbon database

- There is a global push for environmental transparency and an increased awareness of corporate carbon responsibility. It is, therefore, imperative for private developers and building owners to provide more comprehensive and high-quality data. RICS recommends that the Hong Kong government introduce mandatory annual carbon reporting for all buildings, including both embodied and operational carbon, to a centralised carbon database. This initiative should start with listed companies and gradually encompass private enterprises.
- Companies may also explore the possibility of offsetting their emissions through Hong Kong's potential carbon market. The Hong Kong International Carbon Market Council is actively exploring opportunities for carbon trading in the region.

## Imposing sustainability requirements for landlords and tenants

- In Hong Kong, numerous developers offer a range of green certifications for their buildings, however, there is a noticeable lack of accountability among developers to maintain these certifications once they expire. Additionally, the ongoing performance of buildings is not comprehensively monitored. RICS recommends that the Hong Kong government review and strengthen the minimum energy efficiency compliance requirement under the [Building Energy Efficiency Ordinance \(Cap 610\)](#).
- RICS also recommends that all new leases signed by the Hong Kong government are green leases. The establishment of a local green lease standard form will facilitate the adoption and implementation of green leases by private sectors.

# Conclusions

Decarbonising Hong Kong's built environment is an urgent necessity for mitigating climate change and creating a sustainable future. The recommendations outlined in this paper, together with Hong Kong's existing and planned measures, provide a comprehensive set of tools for achieving this goal.

The success of these recommendations depends on the collaboration of government, industry stakeholders and the community. Public awareness and engagement are critical to drive behavioural change and support decarbonisation efforts. By implementing these recommendations, Hong Kong can transition towards a greener, more sustainable and resilient built environment, while significantly reducing its carbon emissions.



## Delivering confidence

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