

# Design & Certification Systems of Green & Zero Emission Buildings

## 綠色與淨零排放建築設計和認證體系

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Living Future AP GRI Certified Sustainability Professional Certified Carbon Auditor



# Advancing Net Zero



Competition

**Advancing Net Zero** is a WorldGBC global project that aims to accelerate the uptake of net zero carbon buildings by 2050. HKGBC is one of GBCs committed to this global project.

HKGBC launched the **Climate Change Framework for Built Environment** in June 2023, serving as a tool box for managing climate risk in Hong Kong's built environment.



Conference & Webinar



Exhibition



SOUTHEAST ASIA BUILDING 16 Jun 2023

The Hong Kong Green Building Council launches Hong Kong's first "Climate Change Framework for Built Environment"



| Photo credit: Hong Kong Green Building Council.

# Climate Change Framework for Built Environment

A living document for the built environment on climate change

## Objective

A tool and platform for the industry in

- Aligning definitions, scope, target, baseline, measurement, etc.
- Shaping operating environment, adopting best practices and latest solutions, enhancing information efficiency

## Can be used for

- Reporting and disclosure
- Benchmarking
- Target setting and progress tracking
- Green financing



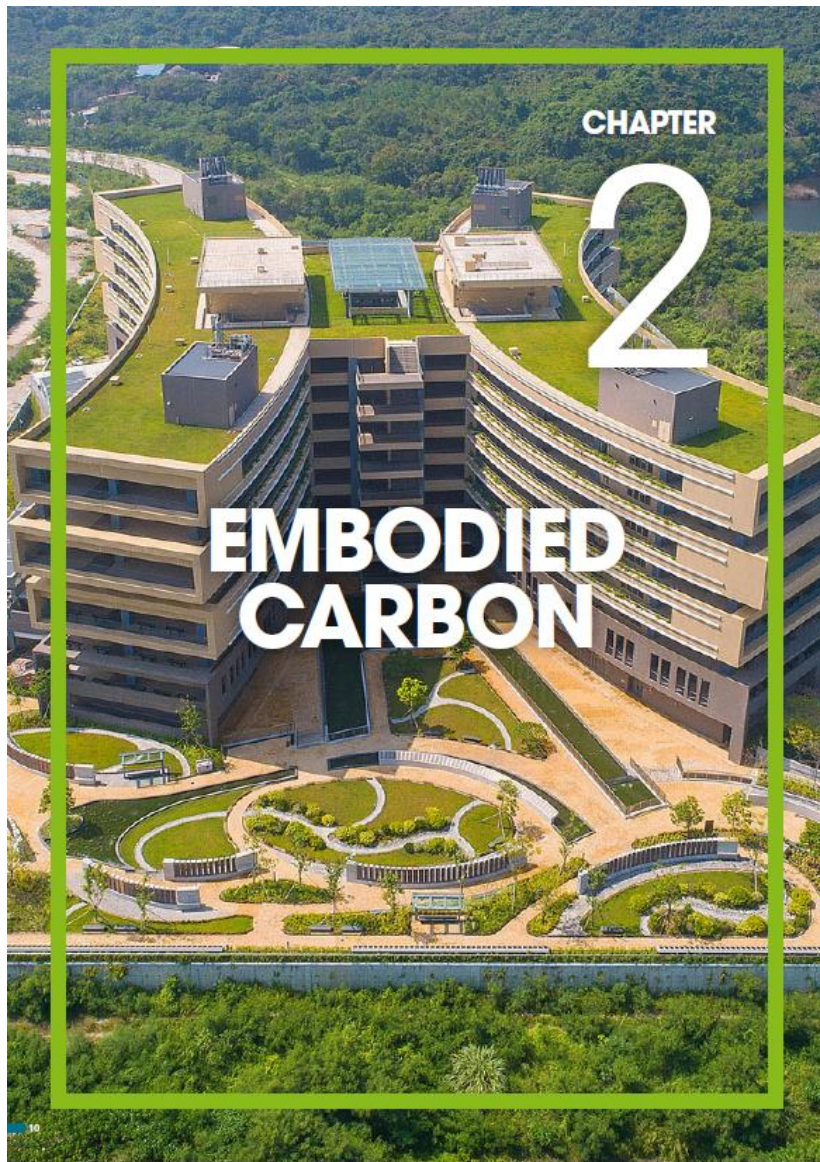
(2<sup>nd</sup> edition launched in Mar 2024)

## What's in the Framework now?

- Introduction
- Embodied Carbon
- Operational Carbon
- Climate Risk Assessment and Disclosure
- Adaptation and Resilience
- Carbon Offsets



# Embodied Carbon



## Approach 1

### Self-determined Embodied Carbon Baseline

To set up a self-determined embodied carbon baseline for a particular project, two to three design options using conventional and improved approaches should be prepared. The baseline should refer to the average values of the material embodied carbon emission factors, with a conventional design based on historical data. A consistent approach (e.g. meeting the same set of planning parameters) should be used for determining the baseline case and the alternative design cases. The following embodied carbon reduction targets are based on the baseline.

## Approach 2

### Absolute Embodied Carbon Baseline

With reference to international baselines and local example cases, this chapter establishes the following absolute embodied carbon baseline for buildings in Hong Kong. The baseline considers only superstructure, as the ground conditions could vary considerably in different locations in Hong Kong. The baseline includes A1 to A5 with the façade, but without foundation, MEP, non-structural elements and internal finishes.

# How to measure

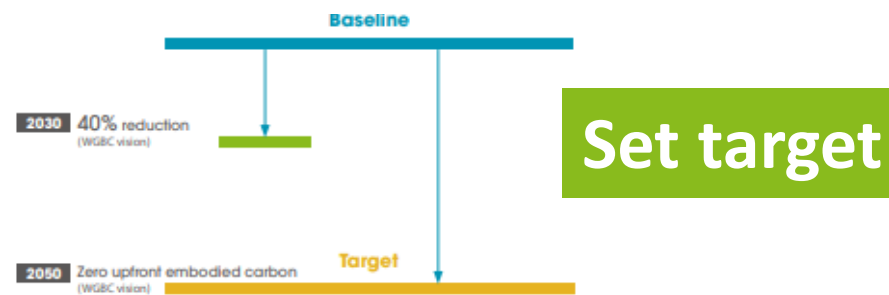
## Define baseline

Type	Explanation/ Inclusions	Baseline (kg CO <sub>2</sub> -e/m <sup>2</sup> )	20% reduction (kg CO <sub>2</sub> -e/m <sup>2</sup> )	40% reduction by 2030 (kg CO <sub>2</sub> -e/m <sup>2</sup> )	60% reduction (kg CO <sub>2</sub> -e/m <sup>2</sup> )
Non-residential	Schools, offices, complex buildings	800	640	480	320
Residential	Quarters and hostels	1,000	800	600	400
Industrial / Institutional (LL > 5 kPa)	Police stations / Fire stations, hospitals, clinical buildings	2,000	1,600	1,200	800
Others (airport, stadium, other long span > 30m)	Sport Centres	2,500	2,000	1,500	1,000

Table 3. Absolute embodied carbon baseline of different building types

### Embodied Carbon Reduction Target

According to WorldGBC's vision on embodied carbon as shown in Figure 5, the following embodied carbon reduction targets are recommended in this chapter, with reference to the baselines established either using Approach 1 or Approach 2. To meet the targets, embodied carbon reduction strategies and technologies (covered in Section 2.5) should be adopted, and carbon offset shall be considered.



# Set target

Figure 5. WorldGBC's vision on embodied carbon reduction

# Operational Carbon

## Defining the target, baseline, units and measurement method

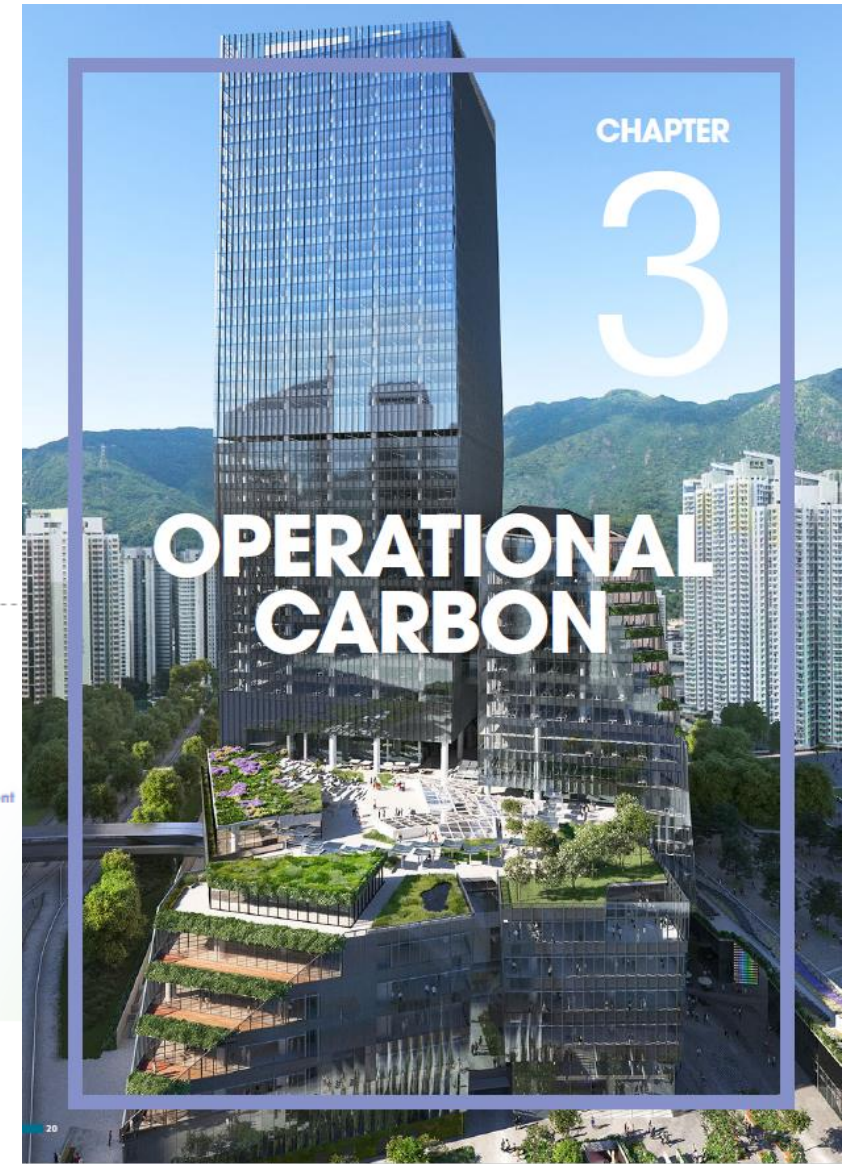
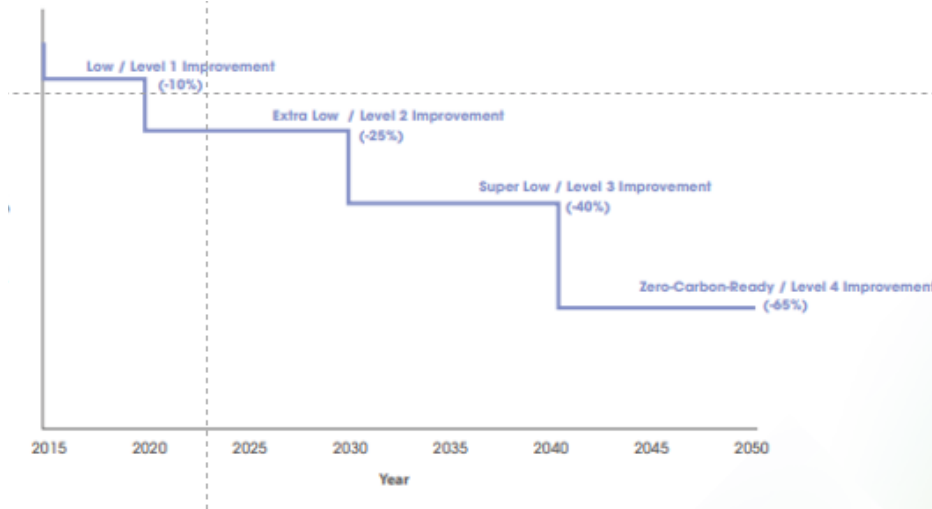
### 3.2.3 Zero-Carbon-Ready Building

Zero-carbon-ready Building is initiated by the International Energy Agency. It is defined as "highly energy efficiency and either uses renewable energy directly, or an energy supply that can be fully decarbonised".

Since decarbonising Hong Kong's electricity supply is part of the Hong Kong's Climate Action Plan 2050 and buildings in Hong Kong are connected to the supply grid, it is more appropriate and practical for Hong Kong's building sector to adopt "Zero Carbon Ready" as the target.

The energy performance indicator can be used to define how energy efficient the building is. The efficiency of a building is rated by the calculator into 4 levels namely "Low", "Extra Low", "Super Low" and "Zero-Carbon-Ready" level, or Level 1 to Level 4 Improvement. Figure 9 below indicates the EUI of the four performance levels for commercial buildings.

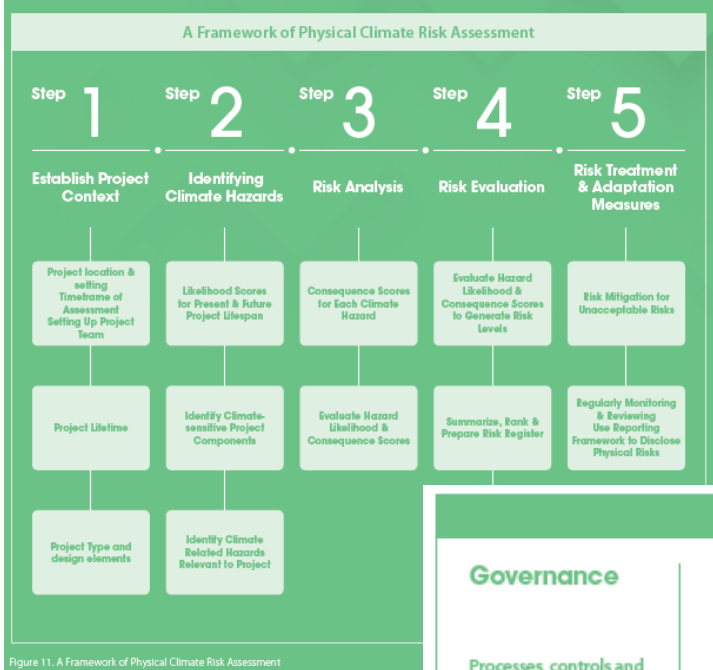
Buildings can be claimed as a Zero-Carbon-Ready building when it achieves the highest rating.



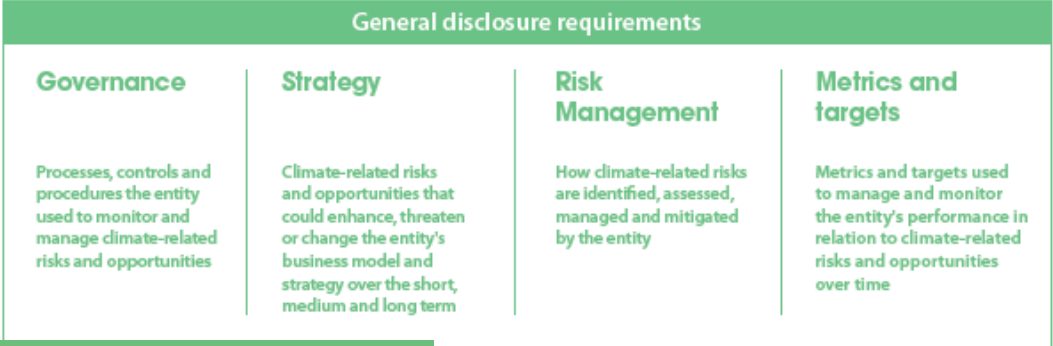
# Climate Risk Assessment & Disclosure



Address the need for robust climate risk management



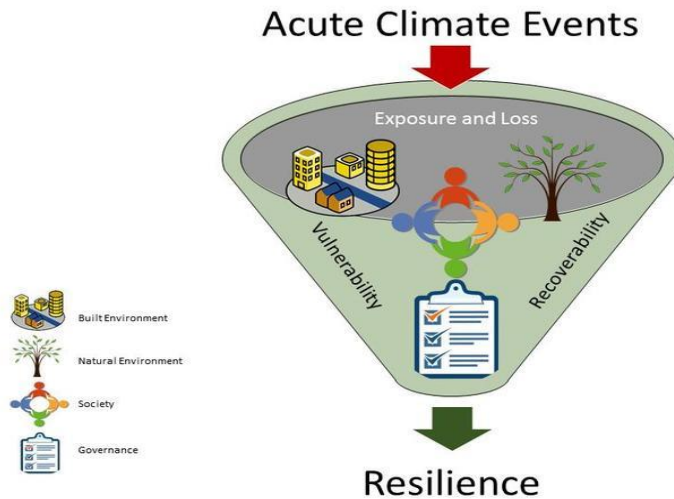
Framework for climate risk assessment




Disclosure requirements

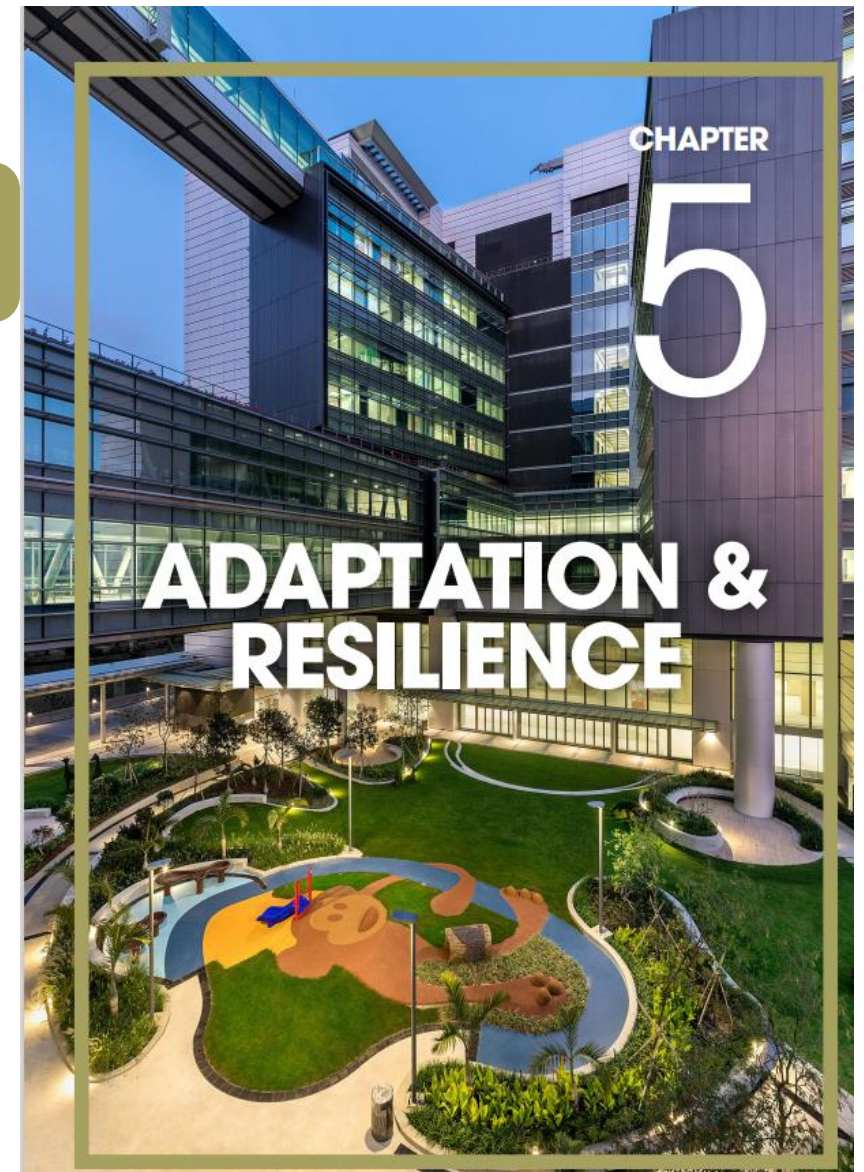
# Adaptation & Resilience

- Preparing for and responding to the impacts of climate change
- Ability to withstand, recover from, and thrive in the long term



## Approaches for HK specific climate risk

Climate change impact	Building design	Planning/external factors
<p><b>More intense storms with high speed winds and driving rain, e.g. cyclones</b></p> 	<p><b>ALL CLIMATES</b></p> <ul style="list-style-type: none"> <li>• Consider frangible architecture options.</li> <li>• Apply a "triage" approach to building design and construction and consider Design for Deconstruction (DfD).</li> <li>• Raise the house above flooding levels.</li> <li>• Use rectangular or square roofs with multiple slopes (hip roof) and sufficient gradient.</li> <li>• Build circular or geodesic-shaped houses, e.g. domes.</li> <li>• Upgrade fasteners in roof structures and in sub-floor.</li> <li>• Ensure weathertightness (sealing corners, holes, unintended entry points for wind or rain) and drainage detailing (routing water away from the building as quickly as possible through sloped drainage pipes).</li> <li>• Limit overhangs on roofs.</li> <li>• Use water-resistant materials.</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid cyclonic areas.</li> <li>• Consider orientation of building and placement of surrounding geographic features, trees and structures to capture and direct wind flow.</li> <li>• Install warning systems.</li> <li>• Promote efforts to strengthen social connectivity, community capacity, skills and networks.</li> </ul>





# Carbon Offsets for Hong Kong's Built Environment



## Provide general guidance on carbon offsets

- Climate Change Mitigation
- Emission Reduction
- Environmental Conservation
- Sustainable Development
- CSR

## Steps for establishing carbon offset plan

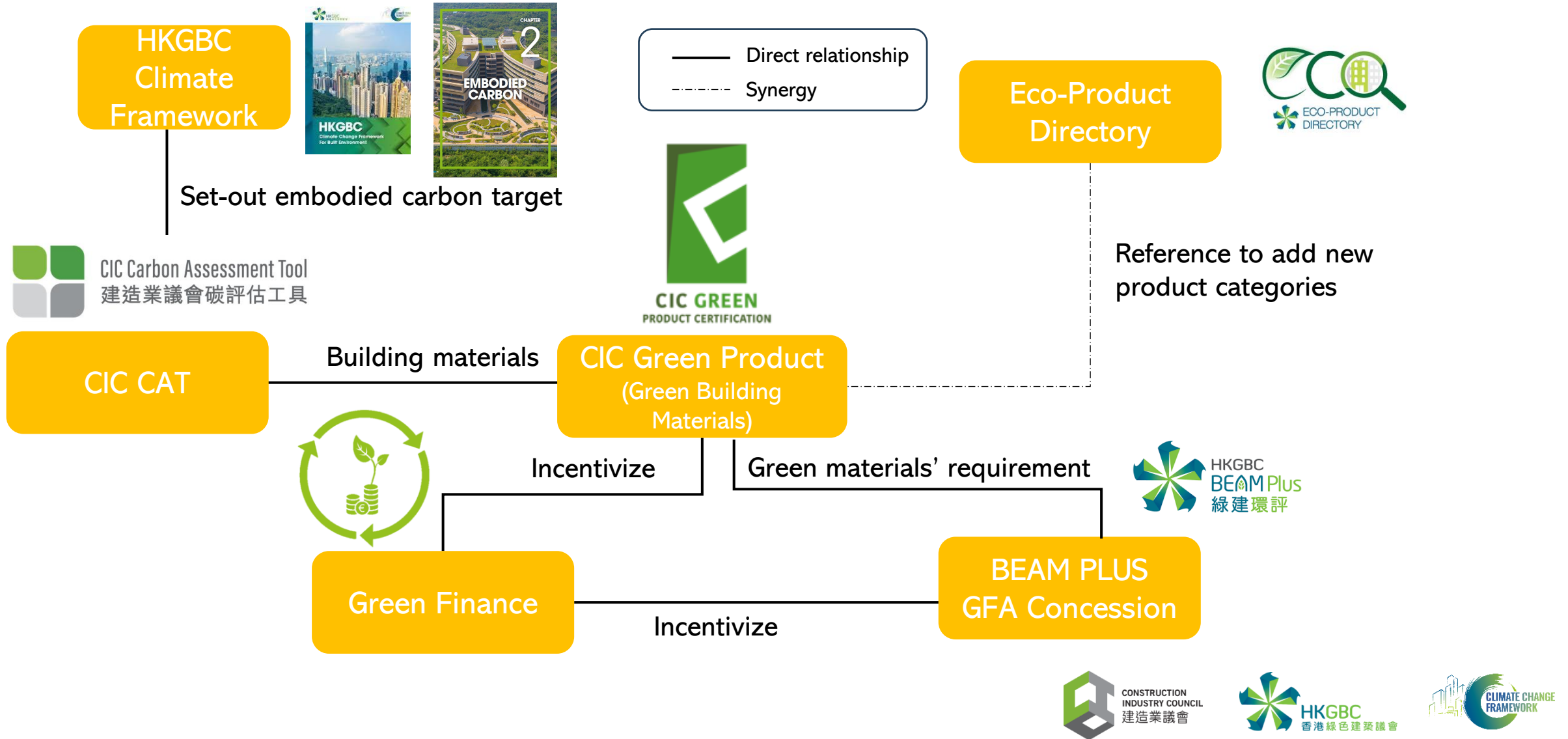


## International standards & verification schemes

- Integrity Council for the Voluntary Carbon Market (ICVCM)
- Oxford Offsetting Principles, etc.
- Verified Carbon Standard (VCS) Programme
- Golden Standard (GS), etc.

# Synergy mapping on current instruments

## Governance: Built Environment Green Labelling Eco-System in Hong Kong



# CIC Green Product Certification (CICGPC)



The scheme was formally launched in **Nov 2019**

- **Owned by The Construction Industry Council (CIC)**
- **Operated by and the Hong Kong Green Building Council (HKGBC)**

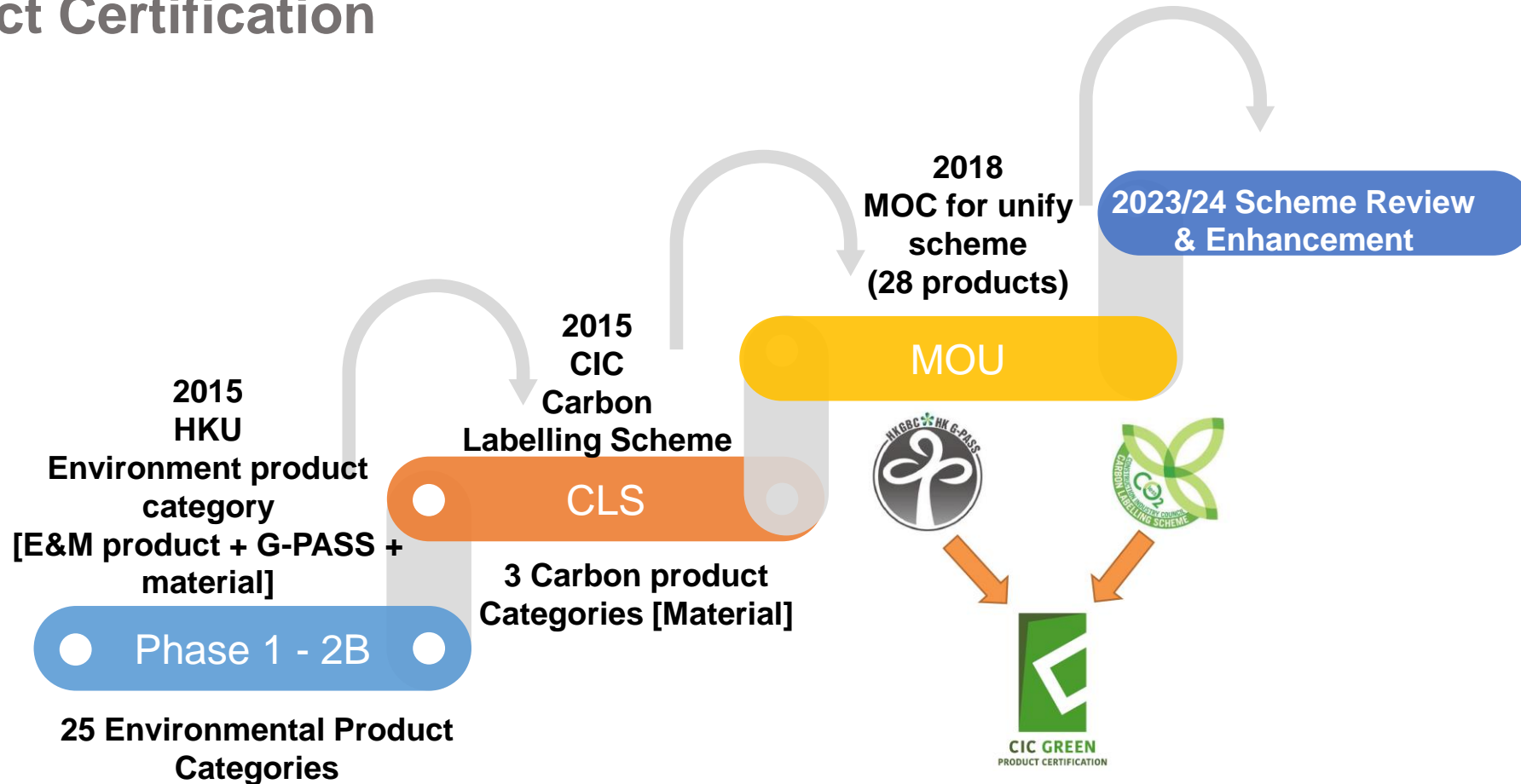
Aims to help consumers, building professionals and policy makers identify environmentally preferable building materials and products with good environmental performance

**An independent and voluntary environmental labelling scheme**



# CICGPC's Journey

## Advancing Sustainability in Construction and Green Product Certification



Remarks: (G-PASS) is Green Product Accreditation and Standards



# Overview for CICGPC in 2024

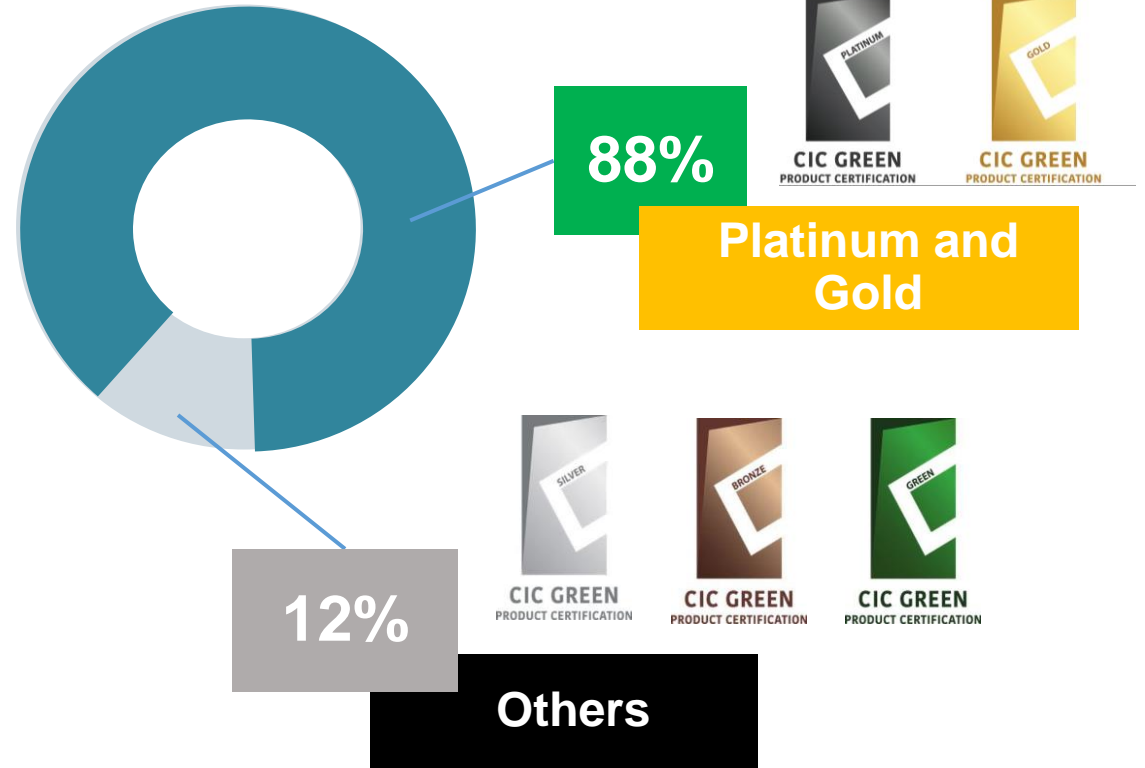
**28**  
Material  
Categories

**1000+**  
Certified  
Products

**> 90**  
Green  
Suppliers

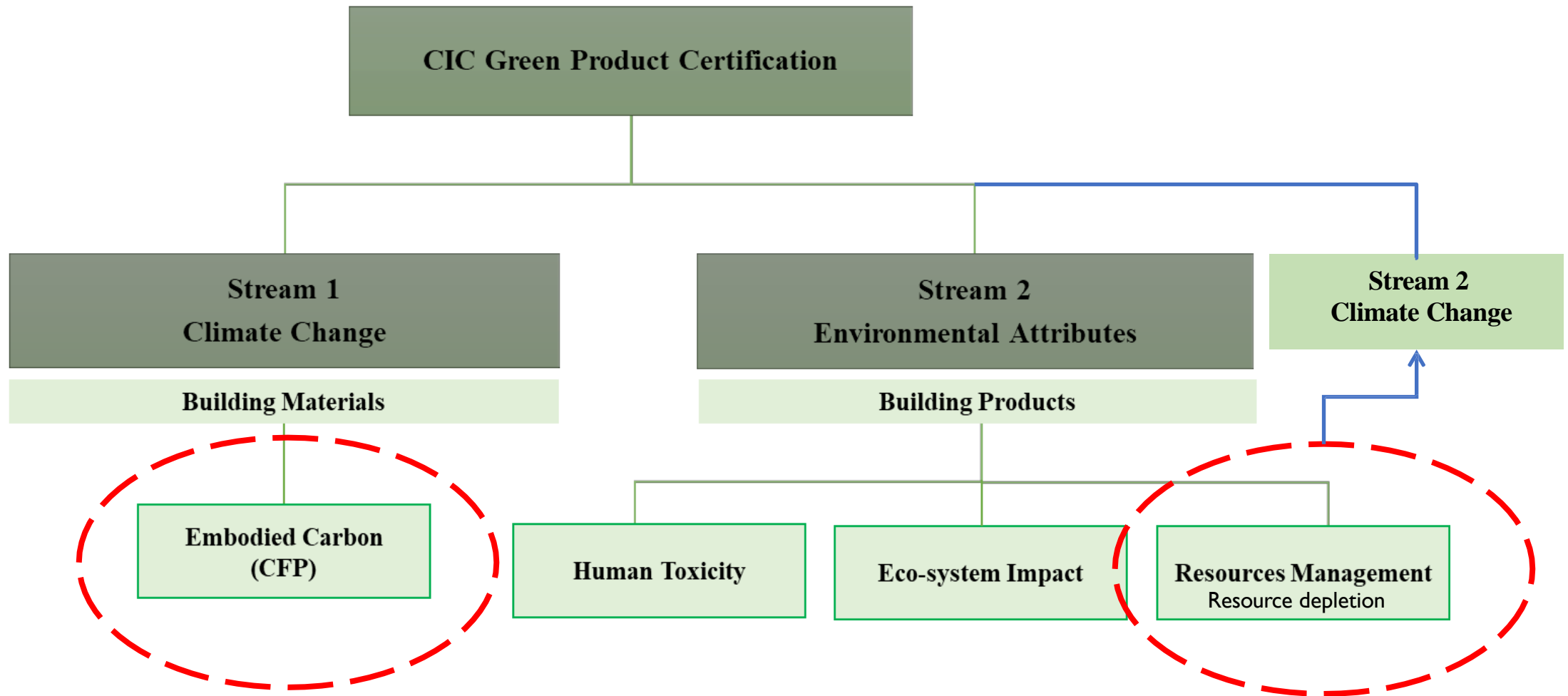
**6&7**  
Credits attained  
under BEAM Plus  
NB V2.0 & EB V2.0

## Distribution of Certified Product Ratings



# CIC Green Product Certification (CICGPC)

## Certification Criteria under the Scheme



# CIC Green Product Certification (CICGPC)

Assessment Criteria are developed throughout Product Life Cycle

## Raw Materials

Extraction efficiency?

Recycle materials?

Raw Material Extraction,  
Transportation & Manufacturing:  
[carbon footprint A1 to A3]

## Manufacturing

Energy intensive?  
Water consumption?

## Packaging

Recyclable package?  
Environmental friendly  
design?

## Construction & Distribution

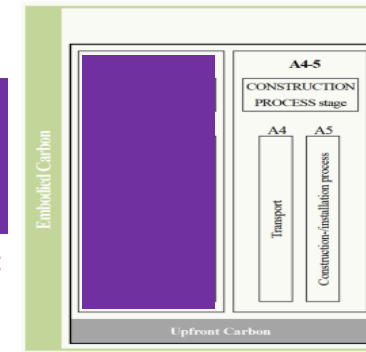
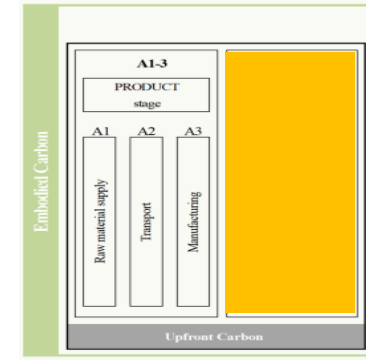
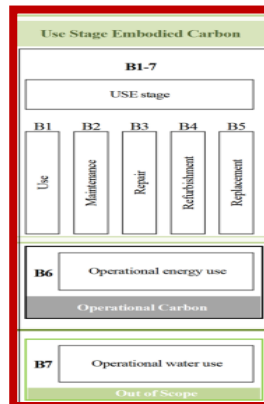
Distribution & On-site construction :  
[carbon footprint A4 to A5]

## Disposal

Recyclable?  
Recycling programme?

## Usage

Durability?  
Toxicity?  
Hazardous substances?  
Energy efficiency?



# Existing Categories and Products in CICGPC

## 28 Categories in the Green Product list in one Basket

- Carbon Footprint  
(Construction Material,  
covered >80% of embodied  
carbon of building)



Cement



Ready-mixed Concrete



Structural Steel and Reinforcing Bar

- Resource depletion, Environmental & Health (**Architectural & Interior**);
- Energy & Water Efficiency & Performance (**MEP**)



Extruded Aluminium Product



Glazing



Panel Board



Ceramic Tile



Plant-based Fibre Composite



Furniture



Stone  
(Natural /  
Artificial)



Wall Covering



Paint & Coating



Adhesive & Sealant



Chiller



LED Lighting



CFL



Electronic Ballast



Cable & Wire



Block for  
Internal Partition



Pavement Block



Synthetic Carpet



Thermal  
Insulation



VRF Split Type  
System



Cooling Tower



Air-handling Unit  
(AHU)



Fan Coil Unit (FCU)



Water Pump



Sanitary Ware –  
Ceramic Product



# Governance: Hierarchy

## Driven forces from top to bottom



- Policy making
- Financial incentives
- Sustainable Goals



- Green Building Certification Regulations
- ESG evaluation target



- Environmental Credentials
- Marketing image



- Awareness of health and environment impact

### Government

Mandatory regulations about sustainable targets or financial incentives top-down is a critical measurement to adopt green product or materials.

### Developer

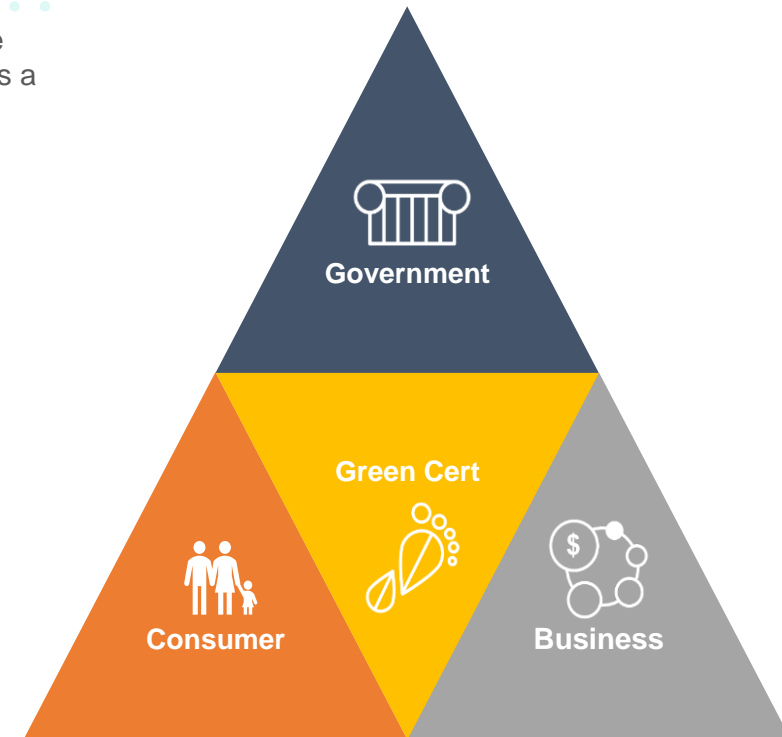
Building developers are the main target client of green product supplier. The grooming trend of green building are driven the developer to choose more sustainable materials

### Supplier

Certified green product can show a measurement and guarantees of product performance, also communicating and marketing the environmental credential

### Consumer

More health and environment-friendly purchasing choice.



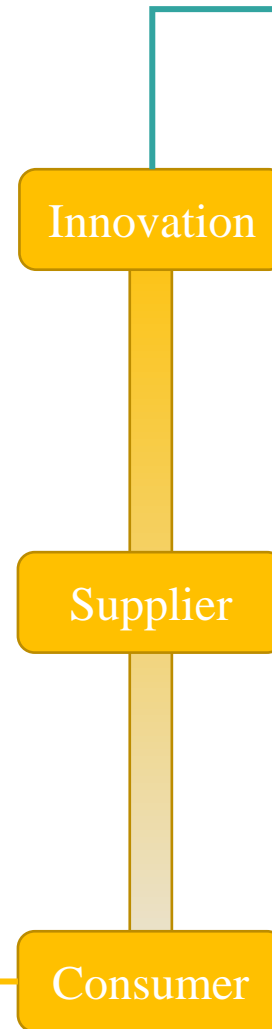
# Financial Incentive



## Urban Renewal Authority

- Green Item Subsidy (GIS)

- Beginning from 1 July 2015, owners who apply for the Common Area Repair Works Subsidy under the Integrated Building Maintenance Assistance Scheme (IBMAS) can have the chance to get the new **Green Item Subsidy (up to \$1,500 per unit; up to \$600,000 per Owners' Corporation)** on top of the subsidy for general repair works (**up to \$3,000 per unit; up to \$1,200,000 per Owners' Corporation**).
- URA encourages owners to source such “green” products which are generally recognized by the industry, for the purpose of applying and assessment under Green Item Subsidy. **The Green Product Accreditation and Standards (HK G-PASS) launched by the Hong Kong Green Building Council (HKGBC) is one of such standards for reference.**



## HKSAR

- Green Tech Fund

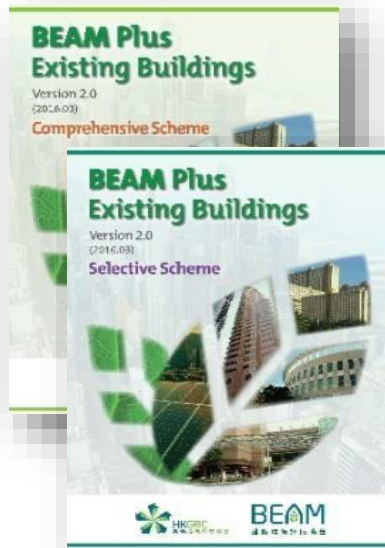
- (GTF) was established in 2020 to provide better and more focused funding support to research and development projects which can help Hong Kong decarbonize and enhance environmental protection. **A total of \$400 million has been allocated to the GTF.**
- Each project may last up to five years, with funding up to **\$30 million**

## Hong Kong Bank

- Green Financing Incentive Scheme

- provide businesses with financial support to capture sustainable opportunities while transitioning to a low-carbon economy.
- Competitive loan interest rates

# BEAM Plus Assessment Tools



## BEAM Plus EB V2.0

EB V2.0:

Up to 2 Bonus credits for using CIC certified green products and HKGBC eco-product directory (minimum usage rate from 5%)



## BEAM Plus NB V2.0

NB V2.0 :

Up to 2 normal +2 Bonus credits for using CIC certified green products and HKGBC eco-product directory (minimum usage rate from 5%)

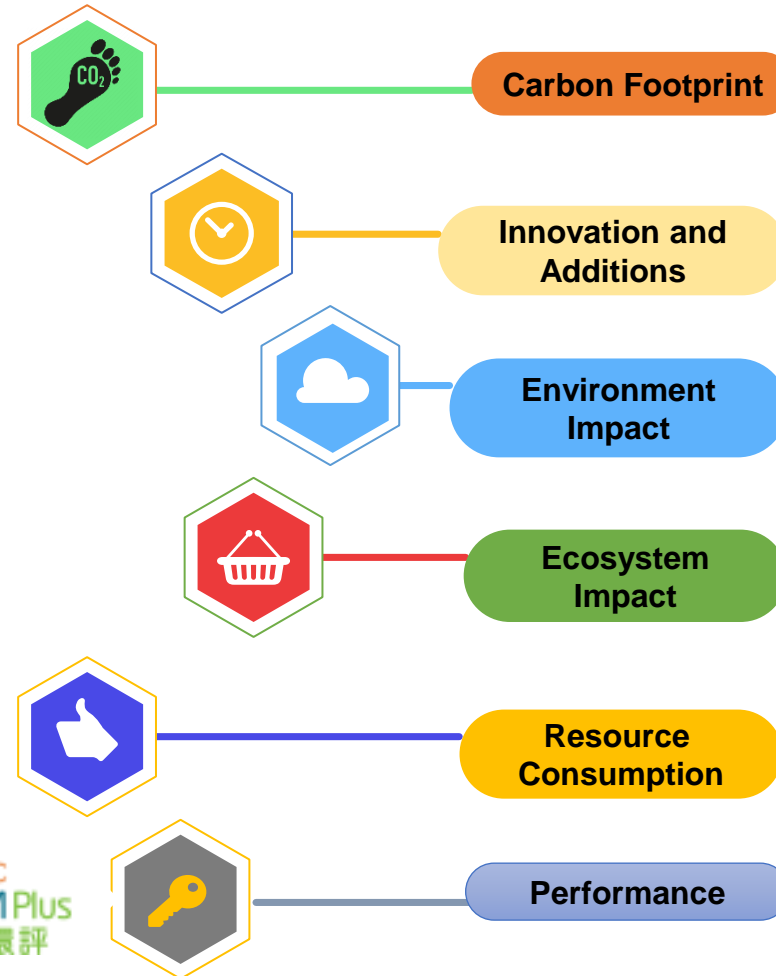


# BEAM Plus Incentive

## Seeking Wider Recognition of CICGPC's Assessment Results in BEAM Plus

Higher Submission and Achievement chances

- Evaluate the potential credits bonus that can be obtained in the proposed new categories through the BEAM Plus system (NB v2.0).
- Driving force for Project owner on the adoption of Green Certified products into projects during the Green Procurement process.
- In addition to the “Use of Green Products” category under NB (MWA9), the new CCIGPC assessment system offers additional bonus credits from various aspects.



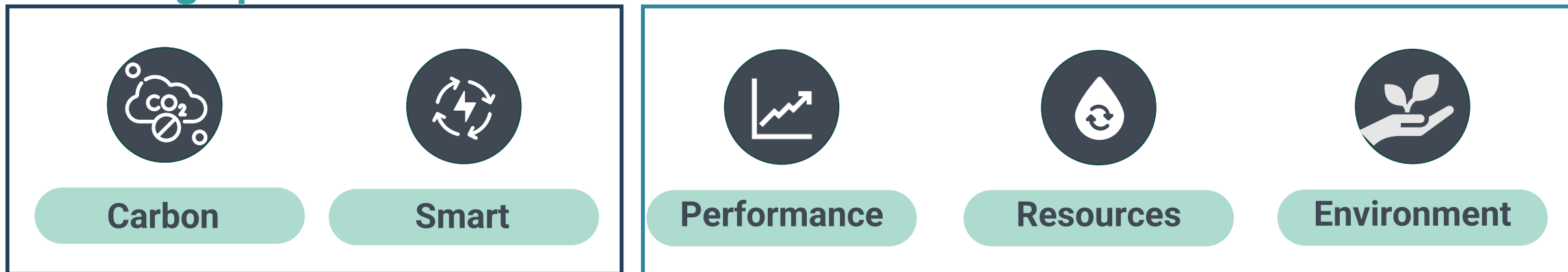
### Assessment Requirements

- Manufacturing raw materials, energy & water usage (A1-A3)
- Operation energy & water usage (B6 & B7), Renewable energy
- Usability (e.g. facilitate carbon, resources & living optimization)
- Use of Industrial IoT/A.I.
- TVOC/Heavy metal
- Hazardous / Toxicity/Bacteria
- Contamination/ODP / GWP
- Biodiversity
- Ecosystem
- Recycle / circularity content
- Material Reduction (in process / on-site)
- Circularity
- Characteristics of the product could increase the building energy saving or resource usage.



# Linkage between CICGPC and BEAM Plus Certification

Setting up a common set of criteria for each label



## BEAM Plus Incentive



Direct + Possible Credits

# Linkage between CICGPC and BEAM Plus Certification

## From BEAM Plus New Building V2.0

## Assessment Area

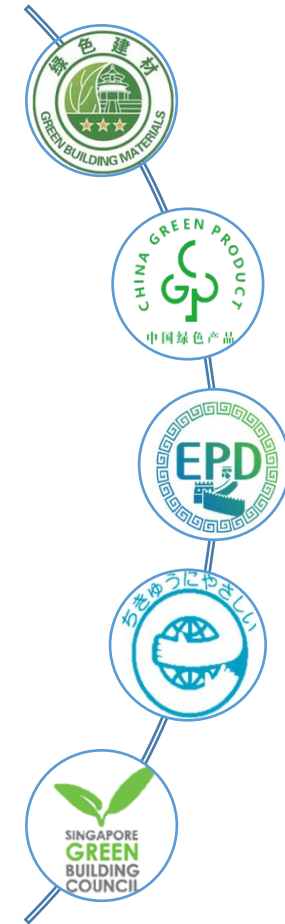
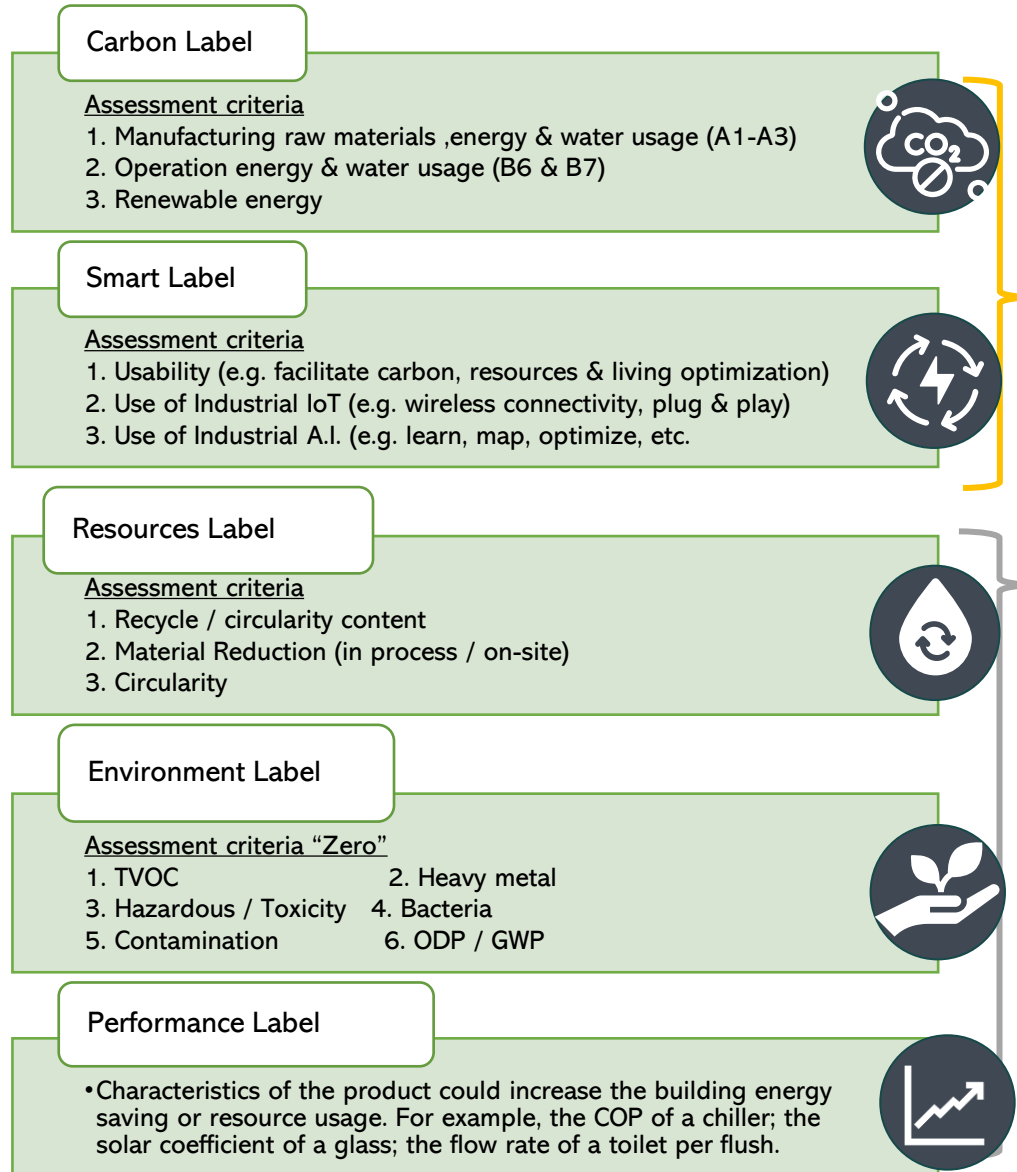
## Referenced Standard

### Direct credits

### Possible Credit

MW 9a
MW 9aB

EU 5a
EU05b
EU05bB
MW10
HWB05
IDCM13B
WU 2
WU 6
WU 7
HWB08a
HWB08aB
HWB08b
HWB10a
HWB10b
EU06a
EU06b



# Incentives for Green Building: Maximizing Impact Through CICGPC Integration

## BEAM Plus

Driving Force for the Project owner on the adoption of green certified products into project during the green procurement process.

## Enhancing Competitive

The rating standard of CICGPC is designed to align with the China Green Product Label System, facilitating suppliers' entry into the mainland market.

## Carbon Disclosure

Suppliers who disclose product carbon information gain a competitive edge by showcasing their commitment to sustainability. This can differentiate their products in the market, attract environmentally conscious customers, and potentially lead to increased sales and market share.

## Green Finance

The borrower's performance against these targets is measured periodically, and if the targets are met, the loan terms may be adjusted, resulting in potential financial incentives such as reduced interest rates or extended loan tenures.

Encourage and incentivize borrowers to improve their sustainability performance over time.

# “General” Product Category for all other green products & materials

**Compulsory**  
(50 points)

Nil

**Selective**  
(5 out of 10 points)



Carbon

- Conduct carbon audit for carbon footprint of products/materials & submit result
- Disclose carbon footprint reduction method



Resources

- Submit product/material information for disclosure of recycle & reusable substrates
- Submit energy management plan for the product production process



Performance

- Conduct energy audit for assessing energy efficiency products & submit result
- Disclose energy & water performance indicator



Smart

- Disclose the data utilization, data visualization, data management and data processing features of the product
- Innovation method for optimising system/equipment performance or minimising resources / carbon footprint



Environment

- Submit material safety data sheet for disclosure of toxic & harmful/health & safety substrates
- Submit solid & water waste management plan for the production process

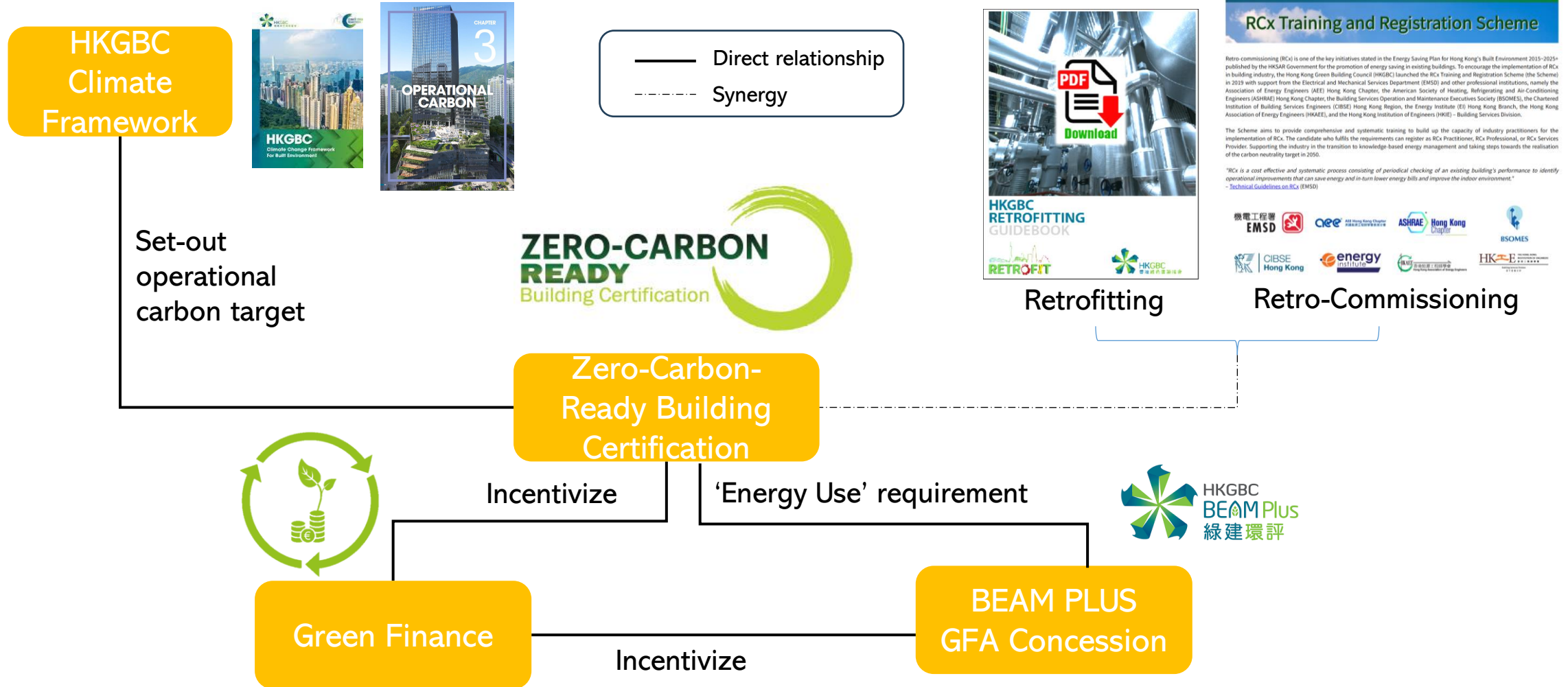
50 points





# Synergy mapping on current instruments

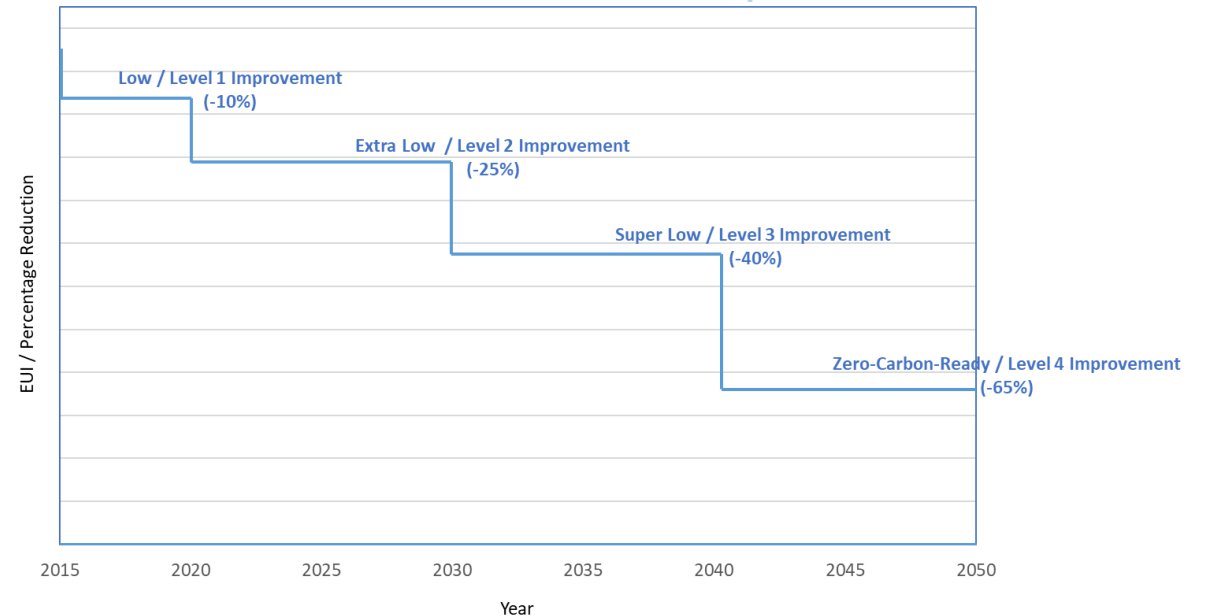
## Governance: Zero Carbon Ready Building in Hong Kong



# Zero-Carbon-Ready Building Certification



Suggested Trajectory for Commercial Building to Achieve to the Zero-Carbon-Ready Rating in 2050



## 1. Energy Performance Certificate

Building will be awarded a certification according to the rating of building energy efficiency

## 2. Target Setting Certificate

Building will be awarded a certification if a target to meet zero-carbon-ready building requirement is set

## 3. Progress Certificate

Building will be awarded a certification at the year when the reduction target is achieved

- Route 1: EUI
- Low
  - Extra Low
  - Super Low
  - Zero-Carbon-Ready
- Route 2: Percentage (%) Reduction
- Level 1 Improvement
  - Level 2 Improvement
  - Level 3 Improvement
  - Level 4 Improvement

Year	Rating
2020	Low
2030	Extra Low
2040	Super Low
2050	Zero-Carbon-Ready



# Zero-Carbon-Ready Building Certification



## The Certificate

### Energy Performance Certificate

For buildings using EUI as performance indicator:

Low, Extra Low, Super Low and Zero-Carbon-Ready

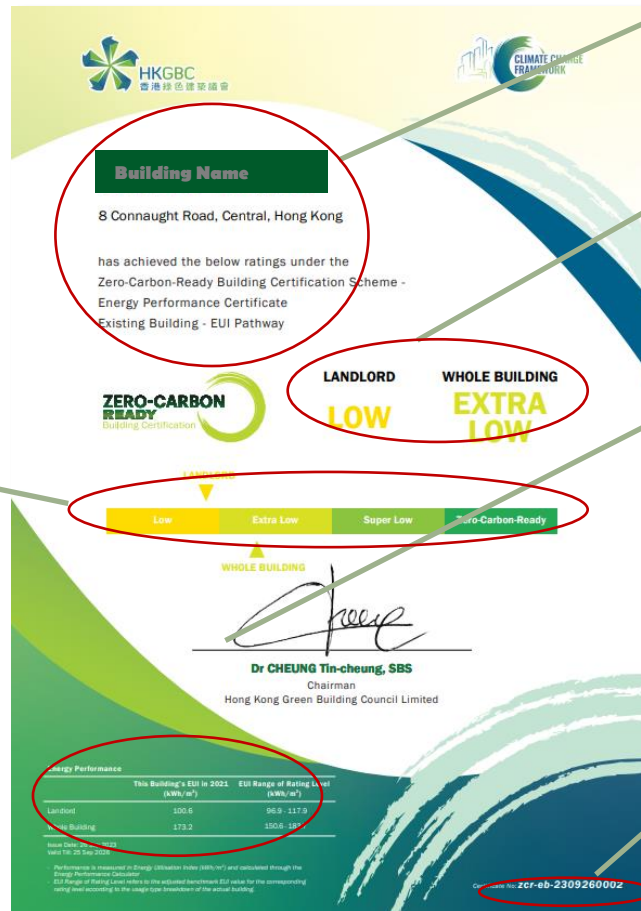
For buildings using % reduction as performance indicator:

Level 1 – 4 Improvement

### Target Setting Certificate

Assessed building performance indexes

Target level / year



Building information, assessment method and certification type

Ratings of landlord and whole building

EUI or % reduction of the building, range of ratings, etc.

Certificate no.

# Zero-Carbon-Ready Building Certification



## Energy Assessor - ZCRB

- To be engaged by an applicant to assess the building performance for application of certification.
- Pre-qualification – should be Registered Energy Assessor under the Buildings Energy Efficiency Ordinance and has taken a training course and passed an examination organised by HKGBC.
- Duty – to provide detailed and independent assessment and verification of the building's energy systems based on building data and information.



# Zero-Carbon-Ready Building Certification



*Since first launch in September 2023*

**>12 building owners participated**

**>70 certificates issued**

*Recognised by*

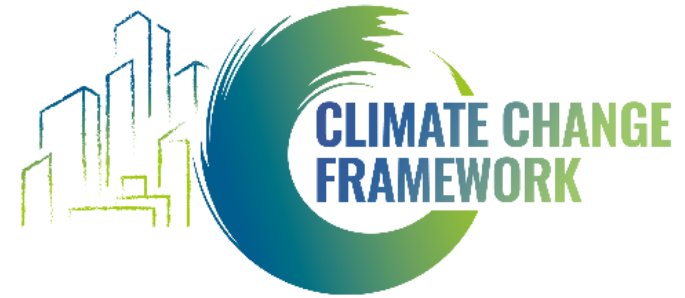


G R E S B



HKMA





Thank you!