

# CONSTRUCTION INDUSTRY COUNCIL

## CIC GREEN PRODUCT CERTIFICATION

### *Assessment Standard*

### *Technical Requirements*

### Precast Concrete



**CIC GREEN**  
PRODUCT CERTIFICATION

(Version 2)

**Copyright © 2026 Construction Industry Council**

All rights reserved. No part of this document may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, whether electronic or mechanical, including photocopying and recording, without the written permission of the Construction Industry Council. If there is any inconsistency or ambiguity between the English version and the Chinese version, the English version shall prevail.

**Precast Concrete**  
*Summary of Assessment Criteria*

**CORE CRITERIA**

Criteria	Requirements	Verification	Point		Index
			Basic	+Bonus	
<b>CARBON</b>					
CFP Quantification	Provide a life cycle assessment report with the carbon footprint of products (CFP), expressed as kgCO <sub>2e</sub> /m <sup>3</sup> for ready-mixed concrete (benchmark detailed in Table 4) and tCO <sub>2e</sub> /t for reinforcing bars (benchmark detailed in Table 5), covering at least A1 to A3. The overall benchmark for precast concrete product shall refer to Table 3.	CFP quantification report  OR  Environmental Product Declaration (EPD)	<b>50</b>	+10/+20/ +30/+40	4.1.1
		<b>Subtotal:</b>	<b>50</b>	+40	

## NON-CORE CRITERIA

Criteria	Requirements	Verification	Points	Index														
			+Bonus															
<b>RESOURCE</b>																		
Recycled Materials	Achieve the required minimum percentage of recycled materials in the concrete mix and reinforcing bar.	Concrete mix details  AND  Material summary with supporting documents (e.g. declaration letter, purchase order, etc.)	+5	4.2.1														
	<table border="1"> <thead> <tr> <th>Recycled Materials</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>Pulverised Fuel Ash (PFA) as SCM in concrete</td> <td>25%</td> </tr> <tr> <td>Ground Granulated Blast-furnace Slag (GGBS) as SCM in concrete</td> <td>40%</td> </tr> <tr> <td>Silica Fume (SF) as SCM in concrete</td> <td>5%</td> </tr> <tr> <td>Recycled aggregates in C20 concrete mix</td> <td>100%</td> </tr> <tr> <td>Recycled coarse aggregates in C25-35 concrete mix</td> <td>20%</td> </tr> <tr> <td>Recycled content in reinforcing bar</td> <td>20% (BOF) ; 80% (EAF)</td> </tr> </tbody> </table>				Recycled Materials	%	Pulverised Fuel Ash (PFA) as SCM in concrete	25%	Ground Granulated Blast-furnace Slag (GGBS) as SCM in concrete	40%	Silica Fume (SF) as SCM in concrete	5%	Recycled aggregates in C20 concrete mix	100%	Recycled coarse aggregates in C25-35 concrete mix	20%	Recycled content in reinforcing bar	20% (BOF) ; 80% (EAF)
	Recycled Materials				%													
	Pulverised Fuel Ash (PFA) as SCM in concrete				25%													
	Ground Granulated Blast-furnace Slag (GGBS) as SCM in concrete				40%													
	Silica Fume (SF) as SCM in concrete				5%													
	Recycled aggregates in C20 concrete mix				100%													
Recycled coarse aggregates in C25-35 concrete mix	20%																	
Recycled content in reinforcing bar	20% (BOF) ; 80% (EAF)																	
Solid Waste Reuse	Products that achieve a solid waste utilisation rate of at least 95%	Solid waste audit reports with supporting documents  AND  Waste management initiatives	+5	4.2.2														
Water Management	Option A: Water Consumption Reporting: Report both potable and non-potable water usage in the production process of the past year.	Water consumption report	+5/+10	4.2.3.1														
	Water Recycling Program: Develop and implement water recycling program during the manufacturing process.	Documentation on water recycling		4.2.3.2														
	Option B: Water Management System: Process valid certificates under ISO 14046: Water footprint Assessment	ISO Certificate		4.2.3.3														
Mould Circularity	Use recyclable material for mould production.	Declaration letter with supporting documents	+5	4.2.4														

Criteria	Requirements	Verification	Points	Index						
			+Bonus							
Energy Management	Achieve the energy consumption requirement during concrete curing:  <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Points</th> <th>Energy consumed for concrete curing</th> </tr> </thead> <tbody> <tr> <td>+10 [Bonus]</td> <td>≤ 40%</td> </tr> <tr> <td>+5 [Bonus]</td> <td>≤ 60%</td> </tr> </tbody> </table>	Points	Energy consumed for concrete curing	+10 [Bonus]	≤ 40%	+5 [Bonus]	≤ 60%	Energy consumption record with calculation  AND  Energy management plan	+5/+10	4.2.5
		Points	Energy consumed for concrete curing							
		+10 [Bonus]	≤ 40%							
		+5 [Bonus]	≤ 60%							
<b>ENVIRONMENT</b>										
Regional Materials	Meet 95% localisation degree of raw materials.	Self-prepared calculation report with supporting documents (e.g. purchase order, location map, etc.)	+5	4.3.1						
Use of Green Product	Product with the use of certified green products.	Green Product Certifications  AND  Supporting documents (e.g. declaration letter, purchase order, etc.)	+5	4.3.2						
<b>PERFORMANCE</b>										
Advancement	Compressive Strength Evaluation Indicator	Laboratory test report with calculation	+5	4.4.1.1						
	Protective Layer Thickness Deviation	Drawings, Photo record, Inspection records		4.4.1.2						
	Quality of Products			4.4.1.3						
	Product Identification Requirements			4.4.1.4						
	Voluntary Product Certification	Certification	+5	4.4.1.5						
<b>INNOSMART</b>										
Innovations & Additions	Adopt new practice, technology and strategy; <i>OR</i> Achieve exemplary performance	Narrative with supporting documents	+5	4.5.1						
		<b>Subtotal:</b>	+10 (Maximum)							

## TABLE OF CONTENTS

<b>1. INTRODUCTION</b> .....	<b>1</b>
<b>1.1 PURPOSE</b> .....	<b>1</b>
<b>1.2 BACKGROUND AND SCOPE</b> .....	<b>2</b>
<b>2. DEFINITIONS &amp; ACRONYMS</b> .....	<b>2</b>
<b>2.1 TERMS RELATING TO PRECAST CONCRETE</b> .....	<b>2</b>
<b>2.2 TERMS RELATING TO LIFE CYCLE ASSESSMENT (LCA)</b> .....	<b>3</b>
<b>3. CFP STUDY – PRODUCT CATEGORY RULE (PCR)</b> .....	<b>3</b>
<b>3.1 GOAL</b> .....	<b>3</b>
<b>3.2 PRODUCT DESCRIPTION AND DECLARED UNIT</b> .....	<b>3</b>
<b>3.3 SYSTEM BOUNDARY</b> .....	<b>4</b>
<b>3.3.1 Overview of Process Map of Precast Concrete Manufacturing</b> .....	<b>4</b>
<b>3.3.2 Sources of GHG Emissions</b> .....	<b>5</b>
<b>3.3.3 Guidelines for Inclusion of Similar Product</b> .....	<b>9</b>
<b>4. REQUIREMENTS</b> .....	<b>10</b>
<b>4.1 CARBON</b> .....	<b>10</b>
<b>4.1.1 CFP Quantification – Core Criteria</b> .....	<b>10</b>
<b>4.2 RESOURCE</b> .....	<b>12</b>
<b>4.2.1 Recycled Materials - Non-Core Criteria</b> .....	<b>12</b>
<b>4.2.2 Solid Waste Reuse - Non-Core Criteria</b> .....	<b>13</b>
<b>4.2.3 Water Management – Non-core Criteria</b> .....	<b>14</b>
<b>4.2.4 Mould Circularity – Non-core Criteria</b> .....	<b>15</b>
<b>4.2.5 Energy Management – Non-core Criteria</b> .....	<b>15</b>
<b>4.3 ENVIRONMENT</b> .....	<b>16</b>
<b>4.3.1 Regional Materials – Non-core Criteria</b> .....	<b>16</b>
<b>4.3.2 Use of Green Products – Non-core Criteria</b> .....	<b>17</b>
<b>4.4 PERFORMANCE</b> .....	<b>17</b>
<b>4.4.1 Advancement – Non-core Criteria</b> .....	<b>17</b>
<b>4.5 INNOSMART</b> .....	<b>20</b>
<b>4.5.1 Innovations &amp; Additions – Non-core Criteria</b> .....	<b>20</b>
<b>5. SCORING</b> .....	<b>23</b>
<b>6. REFERENCES</b> .....	<b>24</b>

# 1. INTRODUCTION

## 1.1 PURPOSE

The CIC Green Product Certification (the “Scheme”) is a green product labelling scheme, owned by the Construction Industry Council (CIC) and implemented by the Hong Kong Green Building Council (HKGBC). The primary goal of the scheme is to support Hong Kong’s transition to a low-carbon economy by encouraging the adoption of environmentally friendly construction practices.

With the Green Product Certification, various stakeholders, including consumers, building professionals, construction practitioners, and policymakers, can easily and unequivocally identify environmentally preferable construction materials and building products. This certification serves as a reliable indicator of a product’s sustainability, helping to drive market demand for greener options.

To ensure the credibility and effectiveness of the certification, the CIC and the HKGBC has jointly developed this Technical Assessment Standards (the “Standard”), which sets out the assessment criteria and their benchmarks to govern the application and award of a grade under the Scheme. The comprehensive assessment evaluates the overall sustainability of construction materials and building products across multiple dimensions. These dimensions include environmental impact, resource efficiency, technical performance, and the use of smart manufacturing technologies.

The Standard is divided into two main parts:

- General Requirements (Refer to General Requirements provided in separate document). This part introduces Scheme's framework, outlines the application procedure, and details the grades.
- Technical Requirements (This document refers). This part defines the principles, requirements, and guides for quantifying and reporting the products’ carbon footprint (CFP), along with other sustainability assessment criteria and scoring standards.

This Standard neither modifies nor supersedes laws and regulations. Compliance with this Standard is not a substitute for, and does not assure, compliance with any applicable laws or regulations. Compliance with all applicable laws and regulations is a prerequisite for the manufacturing and marketing of the product.

The Scheme is owned by the Construction Industry Council (CIC), 38/F, COS Centre, 56 Tsun Yip Street, Kwun Tong, Kowloon, Hong Kong; and operated by Hong Kong Green Building Council (HKGBC), 1/F, Jockey Club Environmental Building, 77 Tat Chee Avenue, Kowloon Tong, Hong Kong, Phone: +852 3994 8888, Email: [cicgpc@hkgbc.org.hk](mailto:cicgpc@hkgbc.org.hk)

## 1.2 BACKGROUND AND SCOPE

Precast concrete is produced by casting concrete in a reusable moulds or “form” and then being cured in a controlled environment, e.g. under specific humidity, temperature and pressure, and transported to the construction site for installation. Precast concrete represents a modern industrial solution in construction, offering numerous benefits that enhance the efficiency, sustainability, and quality of building projects.

The production process for precast concrete is carried out at ground level in a controlled environment, which significantly enhance safety during fabrication by minimising the risks associated with working at height or in unpredictable outdoor conditions commonly encountered on construction sites. Additionally, the controlled conditions of a precast yard ensure superior quality control of both materials and workmanship compared to the variable environment of a construction site. This results in more consistent, reliable, and durable concrete components. Precast concrete also provides numerous other advantages, including faster project timelines, reduced labour requirements on-site, and cost efficiency. Its combination of safety, durability, and precision makes it an essential solution for creating high-quality, long-lasting structures.

The scope for this standard in commonly used precast concrete components in Hong Kong, including (i) Structural precast concrete; and (ii) Architectural precast concrete (Table 1).

*Table 1: Product Categorisation under the CIC Green Product Certification*

<b>Product Category</b>	<b>Product Sub-category</b>
i. <b>Structural precast concrete</b>	Beam, slab, column
ii. <b>Architectural precast concrete</b>	Staircase, façade

## 2. DEFINITIONS & ACRONYMS

### 2.1 TERMS RELATING TO PRECAST CONCRETE

For Terms related to Ready-mixed concrete and Reinforcing bar and structural steel please refer to the Technical Requirements under *Ready-mixed Concrete* and *Reinforcing Bar and Structural Steel*.

*Structural Precast Concrete* Refers to concrete components that are manufactured in a controlled environment using reusable moulds, then transported to construction sites for assembly. These components are designed to bear loads and are integral to the structural integrity of buildings and other infrastructures. Common examples include precast beams, columns, wall panels, floors, and staircases.

<i>Architectural Precast Concrete</i>	Precast products designed with specific standards for uniform appearance, surface details, color, and texture, often used for aesthetic purposes in buildings.
<i>Formwork</i>	Temporary or permanent mould into which concrete is poured to achieve the desired shape. In precast production, formwork can be made from various materials including wood, steel, and fiberglass.
<i>Curing</i>	The process of maintaining adequate moisture, temperature, and time to allow the concrete to achieve its desired strength and durability after casting.
<i>Moulds</i>	Moulds, also referred to as forms, are essential tools used in the construction industry to shape and define concrete products during the casting process. In the context of precast concrete, moulds are reusable structures made from various materials such as steel, plastic, rubber, or fiberglass.

## **2.2 TERMS RELATING TO LIFE CYCLE ASSESSMENT (LCA)**

For terms related to LCA please refer to General Requirements.

## **3. CFP STUDY – PRODUCT CATEGORY RULE (PCR)**

### **3.1 GOAL**

The goal of carrying out a CFP study is to calculate the potential contribution of a specific precast concrete to climate change expressed as CO<sub>2e</sub> by quantifying all significant GHG emissions and removals over the precast concrete product's life cycle.

The CFP study reports submitted by Applicants will be evaluated by Validation and Verification Body. This is facilitated by identical CFP quantification and communication requirements under the same product category as stipulated in Annex C of ISO 14067:2018.

This section sets the PCR of precast concrete products for CFP quantification and reporting under the Scheme following the four phases of life cycle assessment (LCA), i.e. goal and scope, LCI, LCIA, and life cycle interpretation. Applicants should refer to the principles and methodology detailed in ISO 14067:2018 and WBCSD (2011) for CFP quantification and reporting.

### **3.2 PRODUCT DESCRIPTION AND DECLARED UNIT**

The CFP study should be conducted on a per-product basis. Refer to Section 1.2 for the description of precast concrete covered under this PCR. The CFP study for precast concrete should include the following information regarding ready-mixed concrete, reinforcing bars and the manufacturing process of precast concrete.

For ready-mixed concrete, the functional unit is defined as 1m<sup>3</sup> of the specific product. The CFP shall be reported in kgCO<sub>2e</sub>. The CFP study should, at a minimum, include a detailed description of the mix composition and the specified compressive strength of the ready-mixed concrete.

For reinforcing bar, the functional unit is defined as 1 tonne of the reinforcing bar. The CFP shall be reported in tCO<sub>2e</sub>. The CFP study must include, at a minimum, a description of the product's production method (e.g., BF-BOF, scrap-based EAF, DRI-EAF, etc.) along with technical data and properties such as steel grade, yield strength, and tensile strength.

For the manufacturing process of precast concrete, the CFP Study shall include description of the product, the manufacturer and the production method.

### 3.3 SYSTEM BOUNDARY

This PCR is developed to capture the product stage A1-A3 (Cradle-to-gate) as defined in ISO 14067:2018, ISO 21930:2017, GB/T 24067-2024 or BS EN 15804:2012+A2:2019.

#### 3.3.1 *Overview of Process Map of Precast Concrete Manufacturing*

The precast concrete manufacturing process begins with the delivery and handling of essential raw materials, such as reinforcing bars, cement, aggregates, cementitious materials, and admixtures etc. Upon arrival, these materials are inspected to ensure compliance with quality standards and are stored under appropriate conditions. For a detailed guidance on the production processes associated with these raw materials, Applicants should refer Technical Requirements under *Ready-mixed Concrete* and *Reinforcing Bar and Structural Steel*.

Reusable moulds are prepared for casting by cleaning and inspecting them to eliminate defects. The raw materials are mixed in a concrete mixer to achieve a uniform consistency, before being poured into the prepared moulds, where reinforcing bars are positioned in accordance with the design specification.

Once cast, the components undergo a curing process in a controlled environment to ensure optimal strength and durability. Quality control measures, including compressive strength test and dimensional accuracy checks, are implemented throughout the process to ensure compliance with established standards. After curing, the components are carefully demoulded, inspected for defects, and subjected to any necessary finishing operations, such as surface treatments or coatings.

The final precast components are then stored in designated storage areas prior transportation to construction sites. To enhance operational efficiency, manufacturers should prioritise effective management of water, energy, and other inputs during production. Additionally, waste handling and disposal must be implemented to minimise environmental impact.

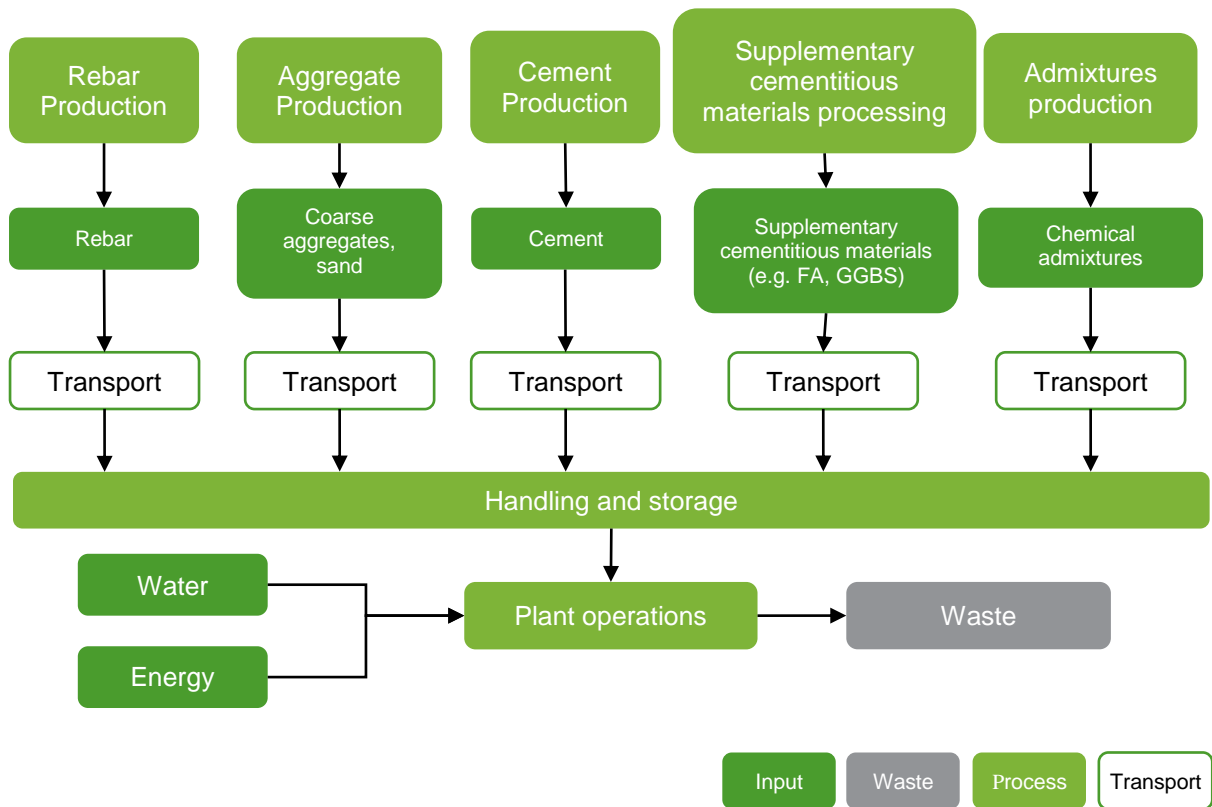


Figure 1 Process Map of Precast Concrete Manufacturing.

3.3.2 Sources of GHG Emissions

The qualitative and quantitative data for inclusion in the life cycle inventory shall be collected for all unit processes that are included in the predefined system boundary and process map. The assessment and reporting of GHG emissions and removals of precast concrete are divided into direct emissions and indirect emissions.

**Direct vs. Indirect Emissions**

The direct emissions stem from sources that are owned or controlled by the material supplier. The indirect emissions originate from sources that are controlled by third parties, but they are nonetheless related to the activities of the material supplier.

WBCSD (2013b)

The GHG assessment framework is developed based on the ISO 14067:2018 “Greenhouse gases - Carbon footprint of products - Requirements and guidelines for quantification”. The Applicant is required to quantify and report the carbon footprint of major materials (i.e. ready mixed concrete and reinforcing bar) used for specific precast concrete product using the CFP quantification tool (in Excel format) provided under the Scheme or providing an EPD report compliance with applicable standards, including ISO 14025:2006, ISO 14067:2018, ISO 21930:2017, BS EN 15804:2012, GB/T 24025-2009 or GB/T 24067-2024.

The assessment of the GHG emissions generated and removed throughout the precast concrete production processes shall be made based on an attributional approach, i.e. by assessing the carbon contents associated with inputs and outputs of a specific process. For instance, the GHG emissions of by-product gases, either for internal or external use,

should first be subtracted within the process boundary. Subsequently, the GHG emitted from the fuel combustion and chemical reduction owing to the use of the by-product gas associated with the assessed product should be assessed and reported in the subsequent processes.

### **3.3.2.1 Direct Emissions**

The sources of direct GHG emissions include combustion of fuels.

#### **i) Combustion of Fuels**

GHG emitted from combustion of fuels is reported separately, by the following application types, to provide flexibility in the aggregation of emissions:

- Raw material preparation (e.g., bought raw materials, handling and storage)
- On-site transportation
- Equipment
- Room heating / cooling
- On-site power generation

Carbon in fuels is assumed to be fully oxidized. The resulting overestimation of emissions will usually be small and can be neglected in the CFP assessment. The fuels used in precast concrete production are categorized into conventional, alternative and biomass fuels for carbon footprint quantification and reporting. If the electrical power is generated by third parties where the activities are not owned or controlled by the material manufacturers and suppliers, it should be referred to the “external electricity production” under indirect emissions.

The sources of direct GHG emissions related to ready-mixed concrete and reinforcing bars such as alternative fossil fuel and biomass fossil fuels, please refer to Technical Requirements under *Ready-mixed Concrete* and *Reinforcing Bar and Structural Steel*.

### **3.3.2.2 Indirect Emissions**

Key indirect GHG emissions arising from the production of precast concrete include: i) external production of electricity consumed by precast concrete manufacturers; ii) production of bought raw materials, energy commodities; iii) off-site transportation; and iv) land use change.

#### **i) External Electricity Production**

When a supplier of grid electricity can deliver a specific electricity product with specific life cycle data and guarantee that the electricity sale and the associated GHG emissions are not double counted, life cycle data for that electricity product shall be used. When the supplier of electricity does not provide specific GHG data for the specific electricity product, the GHG emissions associated with the national grid where the life cycle stage occurs shall be used. Where a country does not have a national grid but has several unconnected grids or several countries share a common grid, GHG emissions associated with the relevant grid from which the electricity is obtained shall be used. If specific life cycle data on a process within

the electricity supply system are difficult to access, data from recognised databases may be used.

The GHG emissions shall include: the emissions arising from the generation of electricity, e.g. combustion of fuels, and generation of electricity lost in transmission and distribution in the grid; upstream GHG emissions (e.g. the mining and transport of fuel to the electricity generator or the growing and processing of biomass for use as a fuel); and downstream GHG emissions (e.g. the treatment of waste arising from the operation of nuclear electricity generators or treatment of ashes from coal fired electricity plants).

## **ii) Production of Bought Raw Materials and Energy Commodities**

GHG emissions and removals associated with both concrete and reinforcing bar production are calculated by multiplying the consumption of raw materials by their respective embodied carbon emission factors from the Inventory of Carbon and Energy (ICE) database, as provided in the CFP quantification tool. For concrete, this involves materials like cement and aggregates, while for reinforcing bar, it includes materials such as limestone, dolomite, iron ore, coke, and lime. Primary emission factors should be used if available, and details on selecting data sources can be found in the "Data Requirement" section. This approach ensures a comprehensive assessment of the carbon footprint for both concrete and steel products.

GHG emissions from the mining and production of energy ware such as coal, natural gas, oil, petcoke, etc. used in the manufacturing process should also be accounted for under the indirect emissions. Applicants should apply the emission factor provided by region specific databases or well recognised sources (e.g. Ecoinvent, China Energy Statistical Yearbook, Japan CFP database, etc.).

## **iii) Off-site Transportation of Raw Materials to Manufacturing Plant**

Applicants are required to specify the mode of transportation (e.g. road, rail, water or aircraft), type of activity data, vehicle type, distance travelled, fuel used, etc. to measure the GHG emissions associated with off-site transportation of raw materials to the manufacturing plant (see Figure 2). When transportation is outside Hong Kong or the fuel consumption of non-road transport is not known, the fuel / distance-based approach is applicable to the case. The transport emissions associated with the cement product can be measured by adopting the WRI's protocol, namely "GHG Emissions from Transport or Mobile Sources"<sup>1</sup> (version 2.7, 2024) or equivalent resources if deemed appropriate. The fuel-based approach only applies to the case when the transportation happens within Hong Kong and the fuel consumption data are known. The fuel-based emission factors can be obtained from the EPD and EMSD guideline, namely "Guidelines to Account for and Report on Greenhouse Gas Emissions and Removals for Buildings (Commercial, Residential or Institutional Purposes) in Hong Kong" (2010 Edition).

---

<sup>1</sup> The tool is accessible at: <https://ghgprotocol.org/calculation-tools-and-guidance>

Fuel consumption data can also be estimated based on the energy consumption indicators as provided by EMSD Energy Consumption Indicator<sup>2</sup>.

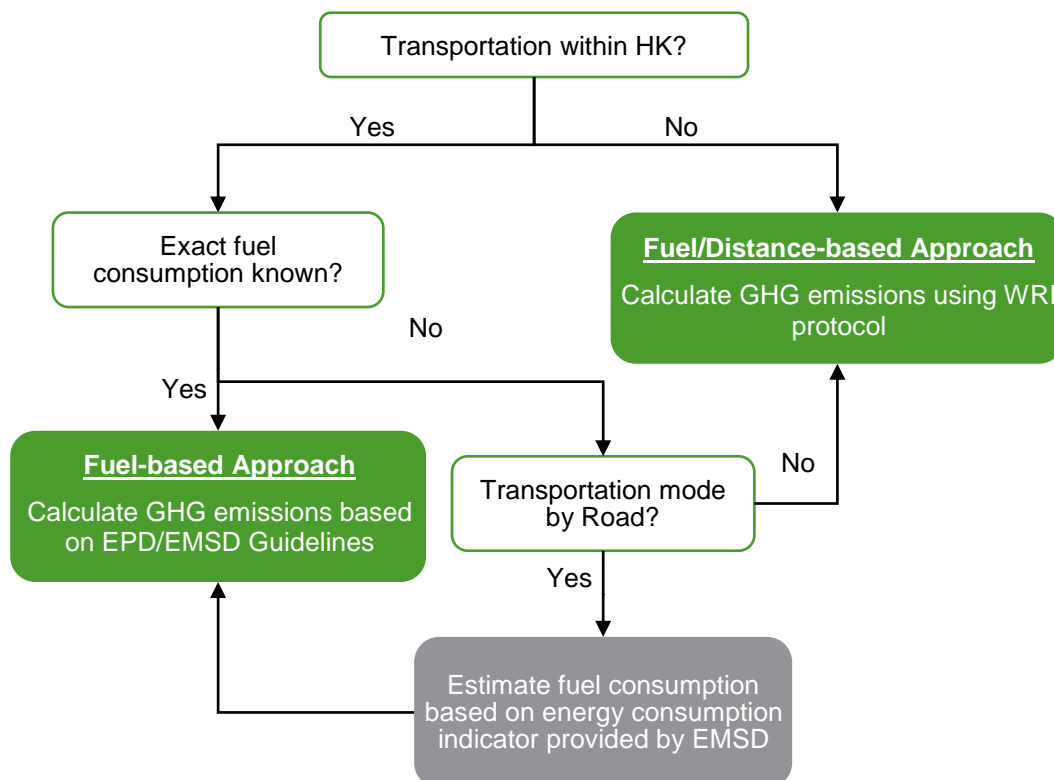


Figure 2 Method Selection for Off-Site Transportation Emission Calculation

#### iv) Land Use Change

The GHG emissions and removals occurring as a result of direct land use change shall be assessed in accordance with internationally recognised methods such as the IPCC Guidelines for National Greenhouse Gas Inventories and included in the CFP. If plant-specific data are applied, they shall be transparently documented in the CFP study report. If a national approach is used, the data shall be based on a verified study, a peer reviewed study or similar scientific evidence and shall be documented in the CFP study report. Indirect land use change can be ignored in CFP studies under the CIC Green Product Certification.

<sup>2</sup> The indicators are accessible at: <https://ecib.emsd.gov.hk/index.php/en/online-benchmarking-tools/transport-sector>

*Table 2: Parameters and Data Sources for Calculating the Carbon Footprint of Precast concrete Products*

<b>Emission components</b>	<b>Parameters</b>	<b>Units</b>	<b>Sources of parameters</b>	
<b>Direct Emissions</b>	<b>Fuels Combustion</b>	Quarrying / Mining raw materials	t	Fuel Consumption: measure at plant level
		On-site transportation	GJ/t fuel	Emission factors: IPCC defaults or measured
		Equipment	tCO <sub>2</sub> e/GJ fuel	
		Room Heating & Cooling	fuel	
		On-site power generation		
<b>Indirect Emissions</b>	<b>External electricity production</b>	Power bought from external grid	GWh	Measured at plant level
		Emission factor	tCO <sub>2</sub> e/GWh	Applicant-specific value or country grid factor
	<b>Production of bought raw materials and energy commodities</b>	Net raw materials and energy commodities purchased	t	Measured at plant level
		Emission factor	tCO <sub>2</sub> e/t	Default factor / Input
	<b>Off-site transportation</b>	Mode of transportation Type of activity data Vehicle type Distance travelled Fuel consumed		Measured using WRI protocol/EPD /EMSD guidelines
		<b>Land use change</b>	Emission factor	Measured in accordance with IPCC Guidelines

### 3.3.3 Guidelines for Inclusion of Similar Product

Similar products manufactured at one or multiple locations owned by the same manufacturer that fall under the same Product Category Rule, may be incorporated under in a single group product same certification, contingent upon the core manufacturing processed being fundamentally the same.

Additionally, when preparing the application, the applicant must ensure the following:

- The products must be for the same type of component. For example, slabs and beams cannot be combined in the same application.
- The material used, including ready mixed concrete and reinforcing bar & structural steel in the precast concrete must share identical physical and mechanical properties, such as compressive strength of ready-mixed concrete, yield strength and tensile strength for reinforcing bar.
- The manufacturing process for precast concrete need to be consistent across all products included.

- All products included in the same group product certification must meet the same benchmark level under Carbon Label. The variation in CFP among all products shall be within 10%.

Once the Applicant chooses to apply through the group certification, the data reporting for the grouped products shall follow either one of the below approaches.

- **Weighted Average Calculation:** The average must be weighted according to the production volumes of the included products, if applicable. This means that products with higher production volumes will have a greater influence on the overall average, providing a more accurate representation of environmental performance.
- **Worst-Case Reporting:** If a single value is selected for each impact category across all products, the reported value should reflect the worst performance within the range of variation.

## 4. REQUIREMENTS

All submissions and documentations shall be endorsed by the Chief Executive Officer or other authorised persons of the Applicant to demonstrate conformance to the assessment criteria. All certification, laboratory reports, and documentation must be valid during the assessment process and labelling period. The date of issue of all laboratory reports and documentation shall be within 5 years from the first application submission date.

If the certification expires during the labelling period or upon renewal, the applicant is required to provide an updated and valid certification. Failure to resubmit the required certification will result in the revocation of CIC Green Product Certificate without compensation.

The chemical tests should be conducted by either a third party or the manufacturer, providing that they have obtained ISO 17025 certification or relevant national accreditations, such as HOKLAS or CNAS.

### 4.1 CARBON

#### 4.1.1 CFP Quantification – Core Criteria

*The Applicant is required to achieve 50 Basic Points under this section. Additionally, the Applicant can achieve maximum 40 Bonus Points under this section.*

##### Requirements

The Applicant shall provide a life cycle assessment report for quantification and reporting of the carbon footprint of products (CFP), following the guidance addressed in the General Requirements and detailed system boundary and GHG emissions related to the raw material used (i.e. ready mixed concrete and reinforcing bar) listed in Section 3. The CFP study report should be prepared in accordance with ISO 14067:2018 or GB/T 24067-2024.

OR

The Applicant shall provide the CFP value of the raw material used (i.e. ready mixed concrete and reinforcing bar) from a product-level EPD certified in accordance with ISO 14025:2006, ISO 14067:2018, BS EN 15804:2012, ISO 21930:2017, GB/T 24025-2009 or GB/T 24067-2024.

Points will be awarded according to the certification level of the raw material used, as listed in Table 3. The certification level of the raw material used is defined according to Table 4 for ready-mixed concrete and Table 5 for reinforcing bars.

*Table 3: Benchmark for Precast Concrete Products under the CIC Green Product Certification*

Points	Certification Level	
	Ready-mixed Concrete	Reinforcing Bar
50 Basic +40 Bonus	A	A
50 Basic + 30 Bonus	B or above	B or above
50 Basic + 20 Bonus	C or above	C or above
50 Basic + 10 Bonus	D or above	D or above
50 Basic	E or above	E or above

*Table 4: Benchmark for ready-mixed concrete under the CIC Green Product Certification  
(The values shall be rounded to the nearest integer)*

Certification Level	CFP (kgCO <sub>2e</sub> /m <sup>3</sup> )								
	C20	C30	C35	C40	C45	C50	C60	C70	C80
A	≤206	≤227	≤248	≤268	≤286	≤303	≤339	≤375	≤375
B	207-229	228-252	249-275	269-299	287-319	304-338	340-378	376-419	376-419
C	230-253	253-279	276-305	300-330	320-352	339-374	379-418	420-463	420-463
D	254-277	280-306	306-335	331-363	353-386	375-410	419-458	464-507	464-507
E	≥278	≥307	≥336	≥364	≥387	≥411	≥459	≥508	≥508

*Table 5: Benchmark for Reinforcing Bar under the CIC Green Product Certification  
(The values shall be rounded to two decimal places)*

Certification Level	CFP (tCO <sub>2e</sub> /t of product)
A	≤1.01
B	1.02-1.97
C	1.98-2.16
D	2.17-2.43

E	2.44-2.77
---	-----------

Verification

- CFP quantification report in accordance with ISO 14067:2018, GB/T 24067-2024 OR
- Product-level Environmental Product Declaration (EPD) in accordance with ISO 14025:2006, ISO 14067:2018, ISO 21930:2017, GB/T 24067-2024, GB/T 24025-2009 or BS EN 15804:2012.

**4.2 RESOURCE**

**4.2.1 Recycled Materials - Non-Core Criteria**

*The Applicant can achieve maximum 5 Bonus Points under this section.*

Requirements

5 Bonus Points will be awarded for the products that adopt required recycled materials in either ready-mixed concrete or reinforcing bars during the production process of precast concrete products. The eligible recycled contents are listed in Table 6.

*Table 6: Eligible SCM and recycled contents*

Eligible SCM and Recycled Contents	Required Percentage
Pulverised Fuel Ash (PFA) as SCM in concrete mix	25%
Ground Granulated Blast-furnace Slag (GGBS) as SCM in concrete mix	40%
Silica Fume (SF) as SCM in concrete mix	5%
Recycled aggregates in C20 concrete mix	100%
Recycled aggregates in C25-35 concrete mix	20%
Recycled contents in reinforcing bar	20% (BOF); 80% (EAF)

Verification

To obtain the points under this criterion, the following documents shall be provided for verification:

- Concrete mix details with source of raw materials, quantity used, and mass percentage; and
- Material summary with detailed breakdown of the raw materials used by weight, and specifying the proportion of recycled materials; and
- Relevant supporting documentation such as declaration letter to verify the use of recycled materials in the production process, purchase order / delivery notes for raw materials purchased, etc.

#### 4.2.2 Solid Waste Reuse - Non-Core Criteria

*The Applicant can achieve maximum 5 Bonus Points under this section.*

##### Requirements

Manufacturers that achieve a solid waste utilisation rate of at least 95% will receive 5 bonus points. Comprehensive utilisation of solid waste includes both recycling and reuse by the manufacturer itself, as well as recycling and utilisation by qualified third-party organizations. The utilisation rate of solid waste is defined as the mass percentage of solid waste generated during the production of steel and steel components that is effectively utilised. The solid waste utilisation rate is calculated using the formula:

$$R = \frac{M_r}{M_p} \times 100\%$$

where:

$R$  = Utilisation rate of solid waste generated during the production process.

$M_r$  = The mass of solid waste diverted from landfill during the statistical period, measured in kilograms (kg).

$M_p$  = The mass of solid waste generated during the statistical period, measured in kilograms (kg).

The definition of common solid waste is listed in Table 7. The utilisation rate of solid waste generated during the production process should be calculated over a statistical period of 12 months. If the manufacturer has not been in operation for 12 months, the period can be appropriately shortened but should not be less than 6 months.

*Table 7: Types of Solid Waste*

Common Solid Waste	Description
Returned Concrete	Cement and aggregates wasted due to spillage, over-ordering, or improper handling during the batching process.
Cured Concrete Waste	Leftover concrete from mixing or casting processes that cannot be reused directly in structural elements.
Excess Raw Materials	Excess concrete or rebar and off-cuts from the production of precast concrete components
Scrap Steel	Pre-consumer scraps such as steel offcuts, defective products, and overproduction, and post-consumer scraps.

##### Verification

To obtain the points under this criterion, the following documents shall be provided for verification:

- Solid waste audit reports with the types and quantities of solid waste generated and diverted from landfill during production, and calculation of utilization rate over the statistical period; and
- Descriptions that outline the waste management initiatives / policies within the organisation; and
- Relevant supporting documentation such as declaration letter, trip ticket, delivery note for recycling solid waste.

#### **4.2.3 Water Management – Non-core Criteria**

*The Applicant can achieve maximum 10 Bonus Points under this section.*

*The Applicants can select one of the options below and comply with any or all the requirements under that option to achieve associated points.*

##### **Option A:**

#### **4.2.3.1 Water Consumption Reporting – Non-core Criteria**

##### Requirements

5 Bonus Points for reporting both potable and non-potable water usage in the production process of the past year.

##### Verification

Water consumption report, support by water usage data acquired from water meter, water sub-meter, water bill or other equivalent documents.

#### **4.2.3.2 Water Recycling Program – Non-core Criteria**

##### Requirements

5 Bonus Points for developing and implementing water recycling program during the manufacturing process.

##### Verification

Documentation demonstrating the implementation of water recycling program, support by drawings, water usage data acquired from water sub-meter or other equivalent documents.

##### **Option B:**

#### **4.2.3.3 Water Management System – Non-core Criteria**

##### Requirements

10 Bonus Points for possessing valid certificates under ISO 14046: Environmental management – Water footprint – Principles, requirements and guidelines.

ISO 14046 is a framework for assessing the water footprint of products, processes, and organizations. It provides principles, requirements, and guidelines for conducting and

reporting water footprint assessments. It helps organizations evaluate and improve their water management practices.

Verification

A valid ISO 14046 Certificate issued by accredited certification bodies.

**4.2.4 Mould Circularity – Non-core Criteria**

*The Applicant can achieve maximum 5 Bonus Points under this section.*

Requirements

5 points for adopting recyclable materials in the moulds production. This ensures that the moulds can be effectively recycled at the end of life.

Verification

To obtain the points under this criterion, following documents shall be provided for verification:

- A declaration letter stating the material used for mould production, supported by documents including but not limited to material summary with purchase order / delivery notes, photo record or other equivalent information.

**4.2.5 Energy Management – Non-core Criteria**

*The Applicant can achieve maximum 10 Bonus Points under this section.*

Requirements

Points are awarded for demonstration of the compliance of percentage of energy consumed for concrete curing process, as listed in Table 8. The manufacturer should enhance the production under effective energy management policies, procedures, programmes to achieve low energy consumption during the concrete curing process.

*Table 8: Points allocation for energy consumption in concrete curing*

Points	Energy consumed for concrete curing
10 Bonus	≤ 40%
5 Bonus	≤ 60%

The calculation of energy consumption for concrete curing is defined according to the formula:

$$S = \frac{E_e}{E_t} \times 100\%$$

where:

S = Percentage of energy consumed for concrete curing process per product line.

$E_e$  = Energy consumed for concrete curing process during the statistical period per product line.

$E_t$  = Total energy consumed for precast concrete products per product line during the statistical period.

The data should be calculated over a statistical period of 12 months. If the manufacturer has not been in operation for 12 months, the period can be appropriately shortened but should not be less than 6 months.

#### Verification

To obtain the points under this criterion, following documents shall be provided for verification:

- Provide records of energy consumption and demonstrate the percentage of energy consumed for the concrete curing process, through readings from sub-meter or fuel purchase record
- Descriptions outlines energy-saving measures implemented within the manufacturer.

### **4.3 ENVIRONMENT**

#### **4.3.1 Regional Materials – Non-core Criteria**

*The Applicant can achieve maximum 5 Bonus Points under this section.*

#### Requirements

Products that achieve a 95% localisation degree of raw materials will be granted 5 bonus points. The localisation degree of raw materials is calculated based on the percentage of materials transported within certain distances with appropriate transportation methods.

The calculation focuses on the primary raw materials, according to formula below.

$$T = \frac{M_{gt}}{M_t} \times 100\%$$

where:

$T$  = The localisation degree of raw materials.

$M_{gt}$  = The total quantity of primary raw materials used during the statistical period, transported to the manufacturer, within 800km radius by road transportation; within a 1,600km radius by rail transportation; or within a 4,000km radius by sea transportation, excluding water, measured in tons (t). The distance is measured by the direct distance, not by actual travel distance.

$M_t$  = The total amount of raw materials used during the statistical period, excluding water, measured in tons (t).

A statistical period of 12 months should be used. If the manufacturer has not been in operation for 12 months, the period can be appropriately shortened but should not be less than 6 months.

Verification

To obtain the points under this criterion, the following documents shall be provided for verification:

- A self-prepared calculation report with relevant supporting, including but not limit to, purchase order forms showing the quantity of raw materials used, a map showing the origin for each raw material, the location of the plant, and the transportation methods

**4.3.2 Use of Green Products – Non-core Criteria**

*The Applicant can achieve maximum 5 Bonus Points under this section*

Requirements

5 Bonus Points for product that demonstrates the use of certified green products.

To promote the use of environmentally friendly products that have a minimal ecological impact, Applicants are encouraged to use raw materials that are certified as green products.

Verification

To obtain the points under this criterion, the following documents shall be provided for verification:

- Green Product Certification of the raw materials from its suppliers; and
- Relevant supporting documentation such as declaration letter to verify the use of green products in the production process, purchase order / delivery notes for raw materials purchased, etc.

**4.4 PERFORMANCE**

**4.4.1 Advancement – Non-core Criteria**

*The Applicant can achieve maximum 10 Bonus Points under this section.*

Requirements

Points are awarded according to table below.

*Table 9: Points allocation for product performance*

Points	Requirements
5 Bonus	Fulfil all the following requirements <ul style="list-style-type: none"> <li>• Compressive Strength Evaluation Indicator (<i>Section 4.4.1.1</i>)</li> </ul>

	<ul style="list-style-type: none"> <li>• Protective Layer Thickness Deviation (<i>Section 4.4.1.2</i>)</li> <li>• Quality of Products (<i>Section 4.4.1.3</i>)</li> <li>• Product Identification Requirements (<i>Section 4.4.1.4</i>)</li> </ul>
5 Bonus	Fulfil the requirements on Voluntary Product Certification ( <i>Section 4.4.1.5</i> )

#### 4.4.1.1 Compressive Strength Evaluation Indicator

The product shall achieve a compressive strength evaluation indicator (U) of  $\geq 1.4$  for six consecutive batches.

The mechanical performance evaluation indicators for products are calculated based on GB/T 50107 using the formula:

$$U = \frac{m_{f_{cu}} - \lambda_1 \times S_{f_{cu}}}{1.4 f_{cu,k}}$$

where:

U = Single inspection batch product compressive strength evaluation indicator.

$m_{f_{cu}}$  = Average compressive strength of concrete cubes in the same inspection batch, accurate to 0.1N/mm<sup>2</sup>.

$\lambda_1$  = Qualification evaluation coefficient, selected according to Table 10.

$S_{f_{cu}}$  = Standard deviation of the compressive strength of concrete cubes in the same inspection batch, accurate to 0.1N/mm<sup>2</sup>. If the calculated standard deviation of the inspection batch is less than 2.5N/mm<sup>2</sup>, take 2.5N/mm<sup>2</sup>.

$f_{cu,k}$  = Standard value of concrete cube compressive strength, accurate to 0.1N/mm<sup>2</sup>.

Table 10: Qualification evaluation coefficient

Nos. of products in one batch	10-14	15-19	$\geq 20$
$\lambda_1$	1.15	1.05	0.95

#### Verification

To obtain the points under this criterion, the following documents shall be provided for verification:

- Concrete cube test reports with actual comprehensive strength conducted by a laboratory accredited under HOKLAS, in accordance with the testing methods specified in CS1:2010; and
- Calculate of single inspection batch product compressive strength evaluation indicator.

#### ***4.4.1.2 Protective Layer Thickness Deviation***

The thickness of the concrete cover to reinforcement shall not be less than 25 mm.

The product must maintain a concrete cover thickness within a tolerance of  $\pm 5$  mm from the specified value.

The product shall follow the requirements outlined in the Code of Practice for Fire Safety in Buildings and the Code of Practice for Precast Concrete Construction.

##### Verification

To obtain the points under this criterion, the following documents shall be provided

- Inspection records of the precast concrete (including photo record).

#### ***4.4.1.3 Quality of Products***

Product appearance has general defects but is treated to meet standards.

##### Verification

To obtain the points under this criterion, the following documents shall be provided for verification:

- Inspection records of the precast concrete, including photographic documentation.

#### ***4.4.1.4 Product Identification Requirements***

The identification content should include at least the component number, location, qualified status, installation direction, and functional identification of embedded parts.

##### Verification

To obtain the points under this criterion, the following documents shall be provided for verification:

- Photographic records demonstrating permanent markings or labels that include all necessary information, such as component number, location, qualified status, installation direction, and functional identification of any embedded parts.

#### ***4.4.1.5 Voluntary Product Certification***

##### Requirements

Products that have obtained voluntary product certification from recognized certification organizations, regarding the performance and quality of the product, such as Product Conformity Certification Schemes (PCCS).

##### Verification

To obtain the points under this criterion, the following documents shall be provided for verification:

- A copy of the valid product certification certificate.

### **4.5 INNOSMART**

#### ***4.5.1 Innovations & Additions – Non-core Criteria***

##### Requirements

5 Bonus Points will be granted for manufacturers demonstrating innovation in sustainable production practices.

Examples of incorporating various smart technologies to improve efficiency, reduce energy consumption, and optimise performance are listed in Table 11.

*Table 11: Example of innovative and smart technologies.*

<b>Examples</b>	<b>Description</b>
Decarbonisation Strategies	<ul style="list-style-type: none"> <li>Investigate the use of carbon capture and storage (CCS) technologies to capture and sequester the CO<sub>2</sub> emissions generated during the cement production process.</li> <li>Implement the use of low-carbon transportation fuels, such as biofuels or electric vehicles, for the concrete delivery fleet.</li> </ul>
Environmental Impact Reduction	<ul style="list-style-type: none"> <li>Integrating GPS technology into delivery truck routing can significantly reduce fuel consumption and emissions by optimising routes based on real-time traffic conditions and delivery locations.</li> <li>GPS data can be combined with telematics to monitor truck performance and driving behaviour. This allows for targeted training to improve fuel efficiency and reduce emissions from the concrete delivery fleet.</li> </ul>
Digitalisation and Data-Driven Optimization	<ul style="list-style-type: none"> <li>Develop a comprehensive digital platform that integrates all aspects of the concrete production and delivery process, enabling data-driven decision-making and optimisation.</li> <li>Implement advanced analytics and machine learning algorithms to optimize the concrete mix design, production parameters, and delivery logistics based on real-time data.</li> </ul>
Health and Safety Enhancements	<ul style="list-style-type: none"> <li>Integrate wearable sensors and Internet of Things (IoT) devices to monitor the health and safety of workers in the concrete production facility and during delivery.</li> <li>Develop real-time hazard detection and warning systems to identify and mitigate potential risks, such as equipment malfunctions or environmental hazards.</li> </ul>
Quality Assurance	<ul style="list-style-type: none"> <li>Products marked with a spray code or having a chip implanted for traceability.</li> <li>RFID (Radio Frequency Identification) technology enhances efficiency and traceability in the precast concrete industry by enabling real-time tracking of components throughout their lifecycle. By embedding RFID tags, manufacturers streamline inventory management, improve quality control, and maintain detailed records of each product's history, ensuring compliance with industry standards and enhancing operational accountability.</li> </ul>

Verification

To obtain the points under this criterion, the following documents shall be provided for verification:

- A written report with a maximum length of 1,000 words. The report should clearly outline the proposed solution, objectives, and evaluation methods used to meet the criteria established by Smart Technologies; and
- Attachments that provide evidence of implementation, along with relevant technical specifications that support the claims made in the report.

## 5. SCORING

The points for meeting each criterion stated in this Standard are summarized below.

*Table 12: Points to be awarded under the assessment criteria of this Standard*

Label	Evaluation criteria	Points		Related Beam Plus Credits
		Basic	+Bonus	
Carbon	CFP Quantification [CORE]	<b>50</b>	+10/+20/ +30/+40	MW 10
Resource	Recycled Materials	-	+5	MW 6
	Solid Waste Reuse	-	+5	
	Water Management	-	+5/+10	
	Mould Circularity	-	+5	
	Energy Management	-	+5/+10	
Environment	Regional Materials	-	+5	MW 8
	Use of Green Products	-	+5	MW 9
Performance	Advancement	-	+5/+10	
InnoSmart	Innovations & Additions	-	+5	IA
<b>Total: (Maximum possible:100)</b>		<b>50</b>	<b>+50</b>	

Applicants must demonstrate that they have achieved the basic points under the CORE criteria. Applicants may apply for up to TWO assessment criteria beyond the Carbon Label, allowing for a maximum of 10 bonus points. These bonus points can be earned from any assessment criteria under the Resource, Environment, Performance, and InnoSmart Labels.

Related BEAM Plus Credits refer to these relevant credits under BEAM Plus New Buildings Version 2.0, as listed below.

- MW 6: Recycled Materials
- MW 8: Regional Materials
- MW 9: Use of Green Products
- MW 10: Life Cycle Assessment
- Innovations and Additions

## 6. REFERENCES

ACI (2007) *ACI education bulletin E1-07: aggregates for concrete*. Committee E-701 (Materials for Concrete Construction), American Concrete Institute, U.S.A.

BS EN 197-1 (2011) *Composition, Specification and Conformity Criteria for Common Cements*.

Buildings Department (2013) *Code of Practice for Structural Use of Concrete*. Buildings Department, Hong Kong.

EPD (2013) *Product Category Rules for Unreinforced Concrete, Version 1.0, The International EPD® System*.

Flower, D.J.M. and Sanjayan, J.G. (2007) Green House Gas Emissions due to Concrete Manufacture, *International Journal of Life Cycle Assessment*, 12(5), 282-288.

GB/T 24067-2024 *Greenhouse gases : Product carbon footprint Quantification requirements and guidelines*.

ISO 14025 (2006) *Environmental Labels and Declarations – Type III Environmental Declarations – Principles and Procedures*.

ISO 14040 (2020) *Environmental Management – Life Cycle Assessment – Principles and Framework*.

ISO 14044 (2020) *Environmental Management – Life Cycle Assessment – Requirements and Guidelines*.

ISO 14064-1 (2018) *Greenhouse Gases – Part 1: Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals*.

ISO 14067 (2018) *Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification and Communication*.

IPCC (2023) : *synthesis report*. Intergovernmental Panel on Climate Change, Cambridge University Press. Geneva, Switzerland.

IPCC (2006) *Guidelines for National Greenhouse Gas Inventories*. National Greenhouse Gas Inventories Programme, Intergovernmental Panel on Climate Change.

Kosmatka, S.H., Kerkhoff, B., Panarese, W.C. (2003) *Design and Control of Concrete Mixtures, fourteenth ed*. Portland Cement Association. Illinois, U.S.A.

Li, Z.J. (2011) *Advanced Concrete Technology, first ed*. John Wiley & Sons. New Jersey, U.S.A.

WBCSD (2013) *Greenhouse Gas Protocol*, World Business Council for Sustainable Development. Accessed on 3 Oct. 2013 from <http://www.ghgprotocol.org>

Worrell, E., Price, L. Martin, N., Hendriks, C. Media, L. O. Carbon Dioxide Emissions from the Global Cement Industry. *Annu. Rev, Energy Environ.* 2001, 26, 303-329.

United Nations (2020) *The Doha Amendment to the Kyoto Protocol*. New York: United Nations.

T/CECS 10047-2019 Green Building Materials Assessment- Ready-mixed Concrete

The Norwegian EPD Foundation (2012), NPCR 20, Product-Category Rules (PCR) for preparing an environmental declaration (EPD) for Product Group Precast Concrete Products