CONSTRUCTION INDUSTRY COUNCIL
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CONSTRUCTION INDUSTRY COUNCIL

CIC GREEN PRODUCT CERTIFICATION

Assessment Standard

Ready-mixed Concrete

CIC GREEN
PRODUCT CERTIFICATION

(Version 2.0)

Ready-mixed Concrete

Summary of Assessment Criteria

CORE CRITERIA

Criteria	Requirements	Verification	Point		Index
			Basic	+Bonus	
CARBON					
CFP quantification	Provide a life cycle assessment report with the carbon footprint of products (CFP) in $kgCO2_e/t$ of product, covering at least A1 to A3 and meet the requirement in Table 3.	CFP quantification report OR Environmental Product Declaration (EPD)	**50**	+10/+20 +30/+40	4.1.1
		Subtotal:	**50**	+40	

NON-CORE CRITERIA

Criteria	Requirements	Verification	Points	Index
			+Bonus	
RESOURCE				
Solid Waste Reuse	Products that achieve required utilization rate of concrete waste generated in the production process will be granted with relevant bonus points according to table below. +10 [Bonus]: 100% +5 [Bonus]: ≥ 95%	Concrete waste audit reports with supporting documents, and Waste management plan and policies	+5/+10	4.2.1
Recycled Materials	Achieve the required minimum percentage of supplementary cementitious materials (SCM) in the concrete mix. 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 aggregates in C25-35 concrete mix: 20%	Concrete mix details with supporting documents (e.g. declaration letter, purchase order, etc.)	+5	4.2.2

Criteria	Requirements	Verification	Points +Bonus	Index
ENVIRONMENT				
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.	Concrete mix details with supporting documents (e.g. declaration letter, purchase order, etc.) Green product certification of the raw material used.	+5	4.3.2
PERFORMANCE				
Advancement	Option A - Design Strength vs. Actual Strength: Actual strength of the concrete shall fulfil the requirements below: $1.15 \leq \frac{Actual\ \ Strength}{Design\ \ Strength} \leq 1.25$ Option B - Corrosion Prevention: The soluble chloride ion content should not exceed 0.2% of the total weight of the concrete.	Option A: Calculation of the ratio supported with laboratory test report(s) and mix design reports. Option B: Laboratory test report(s)	+5	4.4.1
INNOSMART				
Innovations & Additions	Adopt new practice, technology and strategy; *OR* Achieve exemplary performance	Narrative with supporting	+5	4.5.1
		Subtotal:	+15 (Maximum)	

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1. INTRODUCTION

1.1. PURPOSE

The CIC Green Product Certification Scheme (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 CIC 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 Assessment Standards (the "Standard"), which sets out the assessment criteria and their benchmarks to govern the application and award of a label under the Scheme. The comprehensive assessment evaluates the overall sustainability of construction materials and building products across multiple dimensions. These dimensions include carbon footprint, environmental impact, resource efficiency, technical performance, and the use of smart manufacturing technologies.

The Standard are divided into two main parts:

- General Requirements (Refer to General Requirements provided in separate documents). This part introduces the 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

1.2. BACKGROUND AND SCOPE

Ready-mixed concrete is one of the most widely used building materials globally, essential for construction applications. The emission hotspot for concrete manufacturing arises from cement, a crucial component in the formulation of ready-mixed concrete and is linked to substantial carbon emissions owing to the calcination process from cement production. The cement industry is responsible for approximately 7% of global anthropogenic carbon dioxide (CO_2) emissions and ranks as the third-largest industrial consumer of energy (IEA, 2018). The key opportunities for decarbonization in ready-mix concrete primarily lie in reducing the quantity of cement used and minimizing manufacturing emissions for cement. For example, the adoption of green cement with Supplementary Cementitious Materials (SCMs) is recommended.

This standard applies to ready-mixed concrete across a range of concrete grades from C20 to C80. The classification of concrete grades shall adhere to the criteria stipulated in the "Code of Practice for Structural Use of Concrete 2013 (2020 Edition)" (BD, 2020) and "General Specification for Civil Engineering Works Volume 2, 2020 Edition" (CEDD, 2020).

2. DEFINITIONS & ACRONYMS

2.1. TERMS RELATING TO READY-MIXED CONCRETE PRODUCTION

Aggregates: Aggregates are granular materials used in construction. which can either be naturally sourced or recycled from old concrete. Aggregates can be divided into two categories, namely coarse aggregate which mainly retains on a 5mm test sieve, and fine aggregate which mainly pass a 5mm test sieve, in accordance with ISO 3310-2:2000 or ISO 3310-2:1999 standards. (CEDD CS3, 2016)

Cement: A hydraulic binder, i.e. a finely ground inorganic material which, when mixed with water, forms a paste which sets and hardens by means of hydration reactions and which after hardening, retains its strength and stability even under water. (BS EN 197-1:2011)

Chemical Admixtures: This class of admixtures includes those soluble chemicals that are often added to a concrete mixture for improving the concrete performance and modifying a concrete product to desired properties (Li, 2011)

Ground Granulated Blast-furnace Slag (GGBS): By-product of iron and steel making. During the production of iron and steel, fuel, ore and limestone are supplied to a blast furnace, i.e. a basic oxygen furnace or an electrical arc furnace. (Li, 2011)

Pulverized Fly Ash (PFA): By-product of a coal-based power generating plant. According to the composition, PFA can be divided into two categories namely, low calcium PFA which uses anthracite coal as the fuel for power generation and high calcium PFA which obtained by burning the lignite coal. (Li, 2011)

Silica Fume (SF):	SF is a by-product of induction arc furnace in the silicon metal and ferrosilicon alloy industries. SF is one of the most commonly used SCM materials in concrete production. The strength gain mechanisms for SF are particle packing and pozzolanic reaction. (Li, 2011)
Substitution Rate (SR):	The percentage of supplementary cementitious materials used to replace the content of cement.
Supplementary Cementitious Material (SCM):	Mineral substances that are added to concrete during mixing process. The primary source of SCMs is industrial by-products such as fly ash from power generation plants and ground granulated blast-furnace slag from the iron and steel industry. Substitution of SCMs can reduce the cement content, improve the strength of concrete products and reduce the permeability of a structure. (Kosmatka et al., 2003)

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 ready-mixed concrete product to climate change expressed as $CO2_e$ by quantifying all significant GHG emissions and removals over the ready-mixed concrete product's life cycle.

The CFP study reports submitted by Applicants will be evaluated by HKGBC for product certification purpose. 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 ready-mixed 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 ready-mixed concrete product covered under this PCR.

The functional unit is defined as $1m^3$ of the specific ready-mixed concrete product. The CFP shall be reported in $tCO2_e$.

The CFP Study shall include at least the following description of the product

- Mix composition
- Specified compressive strength

3.3. SYSTEM BOUNDARY

The PCR is developed to capture the product stage A1-A3 (Cradle-to-gate) as defined in ISO 14025:2006, 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 Ready-Mixed Concrete Manufacturing

The key unit processes of ready-mixed concrete manufacturing within the stipulated system boundary are presented in Figure 1 for CFP quantification. Ready-mixed concrete is composed essentially of portland cement, sand, coarse aggregates (e.g. gravel, crushed stone) and water. SCM, such as PFA, SF and GGBS, are added to improve the performance of a concrete product. The raw materials are often manufactured outside a concrete batching plant and transported to the plant by truck, barge or train. At most of the plants, cement is transferred pneumatically to storage silos by air blower, while the aggregates are transferred to storage bins by belt conveyer, front-end loader or bucket elevator. From the material storages, cement, aggregates and water are fed by gravity to a weigh hopper, where the raw materials are properly mixed and blended. Through the cement hydration process, the blended mixture starts to create a hard and porous substance namely, ready-mixed concrete. The ready-mixed concrete is loaded to a mixer truck and then delivered to site.

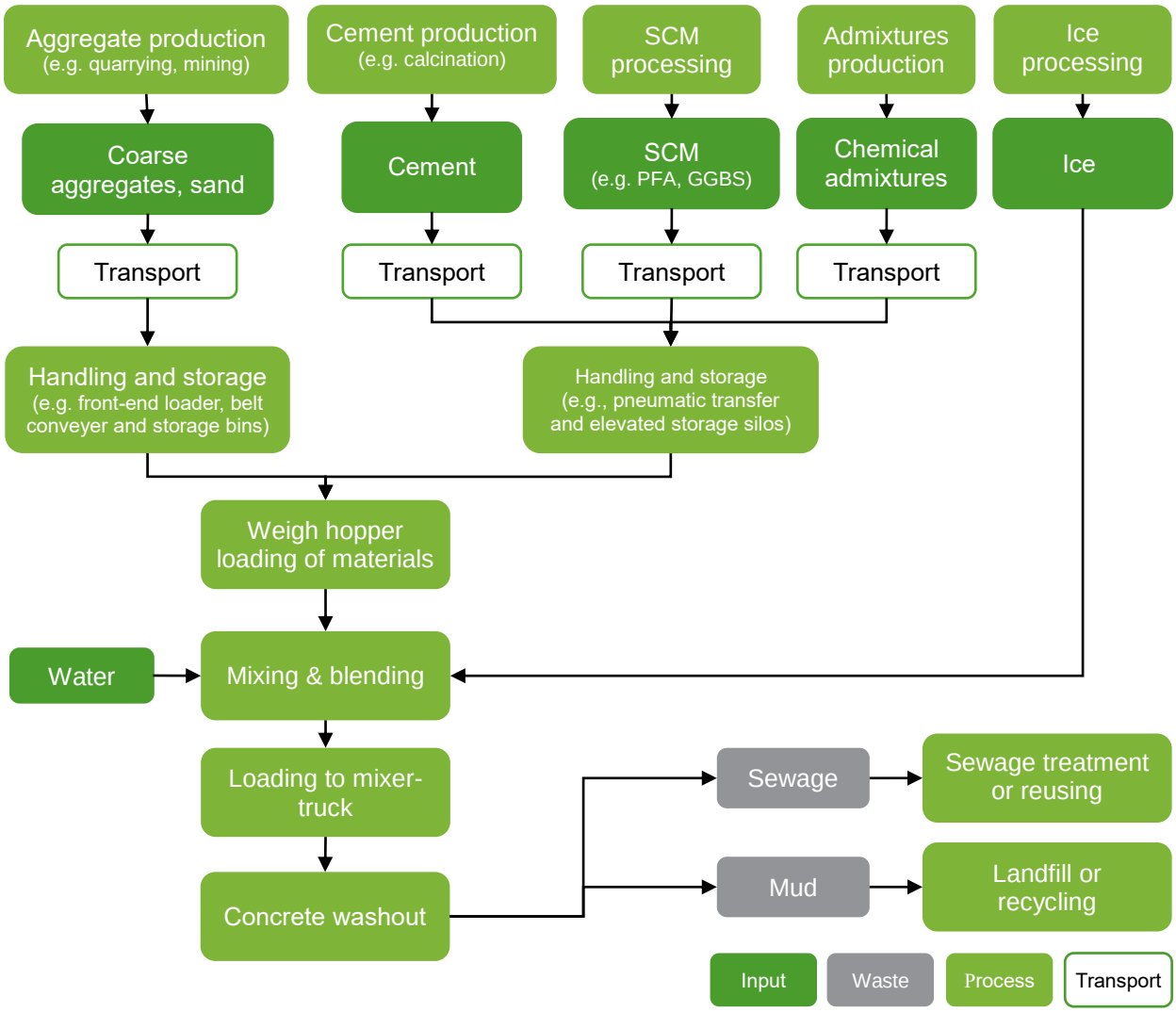

Figure 1 Process Map of Ready-mixed Concrete Manufacturing[1]

[1] The figure shows a typical concrete production process. There are some other technologies, for example the blending equipment on construction site into which the raw materials are quantified manually and fed in with a small amount.

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 cement 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 a specific ready-mixed concrete product using the CFP quantification tool (in Excel format) provided by our designated operator, HKGBC or providing an EPD report compliance with applicable standards, including ISO 14025:2006, ISO 14067:2018, ISO 21930:2017, GB/T 24067-2024 or BS EN 15804:2012+A2:2019.

The assessment of the GHG emissions generated and removed throughout the ready-mixed concrete product 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 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.

Conventional Fuels

Conventional fuels are fossil fuels including, e.g. coal, petroleum coke, fuel oil and natural gas. The preferred approach is to calculate CO_{2e} from conventional fuels (the same applies to alternative fuels), based on fuel consumption, lower heating values, and matching CO_{2e} emission factors. Fuel consumption and lower heating values of fuels should be regularly measured at the plant level. It is important to note that the applied heating value always has to match the status of the fuel, especially with respect to the correct moisture content during its weighing (raw coal or dried coal).

Default emission factors per GJ lower heating value are extracted from IPCC (2006 and 2019) and listed in the CFP quantification tool. Manufacturers are encouraged to use the plant or country specific emission factors if reliable data is available. The emission factor of fuels shall be based on the total carbon content. Direct calculation of emissions based on fuel consumption (in tonnes) and fuel carbon content (in percent) is acceptable on condition that the material variations in the composition of fuel, and especially its water content, are adequately accounted for.

Alternative Fuels

A variety of alternative fuels are increasingly used which are typically derived from wastes and therefore, without this application, the waste would have to be disposed of in some other forms, usually by landfilling or incineration. Alternative fuels include fossil fuel-based fractions, such as waste oil and plastics, and biomass fractions, such as waste wood and sewage sludge. They serve as a substitute for conventional fossil fuels, and IPCC 2006 guidelines for national GHG inventories require the following:

- The amount of GHG taken up in biomass and the equivalent amount of GHG emissions from the biomass at the point of complete oxidation result in zero net GHG emissions when biomass carbon is not converted into methane, non-methane volatile organic compounds or other precursor gases.

- GHG emissions from fossil fuel-derived wastes (also called alternative fossil fuels), in contrast, is not a priori climate neutral. Direct GHG emissions from the combustion of fossil alternative fuels shall, therefore, be calculated and included in the total of direct emissions.

- GHG emissions from mixed fuels with biomass and fossil fraction (e.g. pre-treated industrial and/or domestic wastes), a split between the fossil and non-fossil fraction of the fuel should be established and the emission factors applied to the appropriate fractions.

- CO2e emission factors shall be specified at the plant level where practical. In the absence of any plant or company specific data, manufacturers shall use the default emission factors provided in the CFP quantification tool in accordance with the IPCC.

Emissions from Refrigerants

Some concrete batching plants use refrigerants to produce ice for providing extra water content and controlling temperature of concrete. However, applicants are not required t o
quantify their CO_2 emissions related to the use of refrigerants, because consumption of ice and the induced emissions are insignificant. However, applicants should be prepared to demonstrate that their ice processing has no significant impact on their overall CO_2

3.3.2.2.Indirect Emissions

Key indirect GHG emissions arising from the production of ready-mixed concrete products include: (i) external production of electricity consumed by concrete manufacturers; (ii) production of bought raw materials and energy commodities; (iii) off-site transportation of raw materials to manufacturing plant; 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); 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 the use of raw materials such as cement, fine aggregates, coarse aggregates, etc. in the production of the concrete product shall be calculated by multiplying the consumption of those raw materials by the embodied carbon emission factors adopted from the Inventory of Carbon and Energy (ICE) provided in the CFP quantification tool. Primary emission factors should be used if data are available. Please refer to “Data Requirement” for details about the selection of data sources.

GHG emissions from the mining and production of energy commodities such as coal, natural gas, oil, petcoke, etc. used in the concrete manufacturing process should also be accounted for under the indirect emissions. Applicants should apply

the emission factor provided by region specific databases or well recognized 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 **Error! Reference source not found.**). When t ransportation 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 and WBCSD's protocol, namely "GHG Emissions from Transport or Mobile Sources[2]" (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). Fuel consumption data can also be estimated based on the energy consumption indicators as provided by EMSD Energy Consumption Indicator.

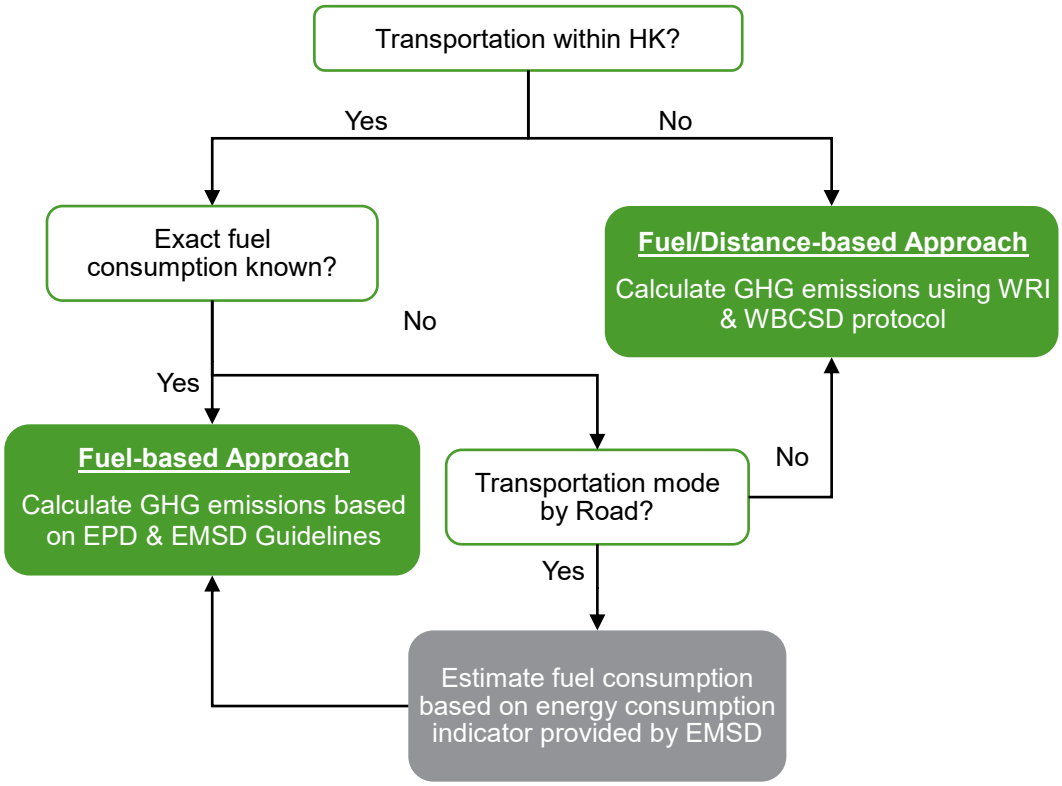

Figure 2 Method Selection for Off-Site Transporation Emission Calculation

[2] The tool is accessible at: https://ghgprotocol.org/calculation-tools-and-guidance

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.

Table 1: Parameters and Data Sources for Calculating the Carbon Footprint of Ready-mixed Concrete Products

Emission components		Parameters	Units	Sources of parameters
Direct Emissions	***Fuels Combustion***			
	Conventional fuels	Fuel consumption Lower heating value Emission factor	t GJ/t fuel tCO_2e/GJ fuel	Measured at plant level Measured at plant level IPCC defaults, or measured
	Alternative fossil fuels	Fuel consumption Lower heating value Emission factor	t GJ/t fuel tCO_2e/GJ fuel	Measured at plant level Measured at plant level IPCC defaults, or measured
	Biomass fossil fuels	Fuel consumption Lower heating value Emission factor	t GJ/t fuel tCO_2e/GJ fuel	Measured at plant level Measured at plant level Default = 0 kg CO_2e
Indirect Emissions	**External electricity production**	Power bought from external grid Emission factor	GWh tCO_2e/GWh	Measured at plant level Applicant-specific value or country grid factor
	Production of bought raw materials and energy commodities	Net raw materials and energy commodities purchased Emission factor	t tCO_2e/t	Measured at plant level Default factor / Input
	Off-site transportation of raw materials to manufacturing plant	Mode of transportation Type of activity data Vehicle type Distance travelled Fuel consumed Emission factor	Measured using WRI & WBCSD protocol / EPD & EMSD Guidelines	
	Land use change	Emission factor	Measured in accordance with IPCC Guidelines	

3.3.3. Guidelines for Inclusion of Similar Products

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

To be qualified under group certification, the products shall comply with the following:

- All products must exhibit the same specified compressive strength
- All products must meet the same benchmark level under Carbon Label

Applicants can select the type of group certificates that best suits their requirements. The available options and the criteria for grouping products or plants are outlined in Table 2. The flowchart in Figure 3 demonstrates the process of selecting different certificates.

Table 2: Types of Certificates and Related Requirements Available for Ready-mixed Concrete

Certification Type	Definition	Criteria
Single Product, Single Plant / Single Product, Multi Plant	A group of ready-mixed concrete produced at a single plant or several (or all) of the plants of one manufacturer.	- The mix design should be identical and consistent, including the proportions of cementitious materials, SCM, aggregates, water, and chemical admixtures - The allowable tolerance of mix variation in the manufacturing process shall not exceed 5% - The variation in CFP among all the grouped products shall be within 10%.
Multi-Product, Single Plant / Multi-Product, Multi-Plant	A group of ready-mixed concrete produced at a single plant or several (or all) of the plants of one manufacturer.	- The mix design should include the same types of raw materials, including cementitious materials, SCM, aggregates, water, and chemical admixtures - The variation in CFP among all the grouped products shall be within 10%.

Once the Applicant choose 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.

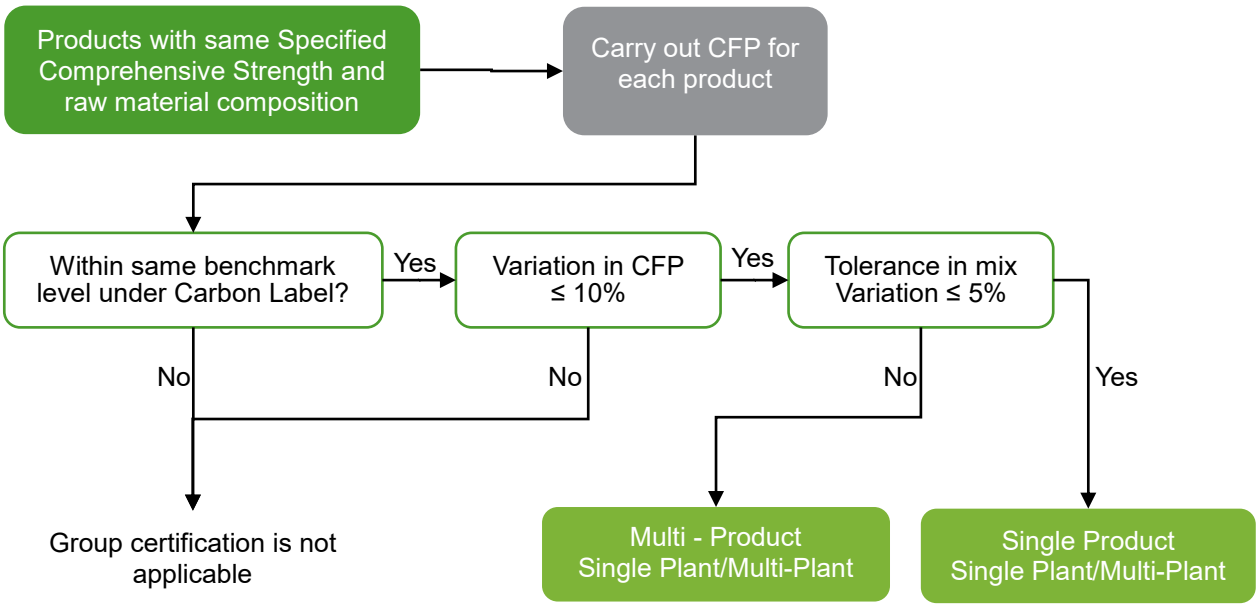

Figure 3 Process of selecting different certificates.

3.4. PROVISIONAL CERTIFICATION

Upon the request of Applicants, a provisional certificate of CIC Green Product Certification (the "Provisional Certificate") might be issued by HKGBC before an official Certificate of CIC Green Product Certification is awarded under special circumstances. To apply for a Provisional Certificate, Applicants should follow the application process as stated in General Requirements with a letter that states the special circumstances.

The special circumstances are defined as below.

i) In cases where new design mixes that do not have a green product certificate is requested for a project's interim period.

ii) In case where a new concrete batching plant has been established with production data less than 1 year

The Provisional Certificate can be applied with at least one month of production data. The validation period of Provisional Certificate is limited to six months. Applicant must apply for the official Certificate of CIC Green Product by submitting a re-assessment of the CFP within the valid Provisional Certificate period. The CFP re-assessment can be carried out through either Carbon Auditing Route or EPD Route, as stated in General Requirements.

4. REQUIREMENTS

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

Manufacturers shall provide a life cycle assessment report to quantify and report the carbon footprint of products (CFP) following the guidance stated in the General Requirements and detailed methodology documented in Section 3. A CFP study report should be prepared conforming ISO 14067:2018.

OR

The Applicant shall provide the product's CFP value from a product-level EPD certified in accordance with ISO 14025:2006, ISO 14067:2018, ISO 21930:2017, GB/T 24067-2024 or BS EN 15804:2012. The EPD shall demonstrate the GHG emissions covering the system boundary specified in Section 3.

The benchmark for ready-mixed concrete products is listed in Table 3 below.

Table 3: Benchmark for Ready-mixed Concrete

	CFP ($kgCO_2e/m^3$)								
Concrete Grade	**C20**	**C30**	**C35**	**C40**	**C45**	**C50**	**C60**	**C70**	**C80**
50 Point + 40 Bonus	<206	<227	<248	<268	<286	<303	<303	<375	<375
50 Point + 30 Bonus	207-229	227-252	248-275	268-299	286-319	303-338	303-378	375-419	375-419
50 Point + 20 Bonus	230-253	253-279	276-305	300-330	320-352	339-374	379-418	420-463	420-463
50 Point + 10 Bonus	254-277	280-306	306-335	331-363	353-386	375-410	419-458	464-507	464-507
50 Point	>277	>306	>335	>363	>386	>410	>458	>507	>507

Verification

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

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

4.2. RESOURCE

4.2.1. Solid Waste Reuse – Non-core Criteria

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

Requirements

Manufacturers that achieve required utilization rate of concrete waste generated in the production process will be granted relevant bonus points according to table below. 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.

Table 4 Requirements of solid waste reuse

Points	Utilization Rate
10 Bonus	100%
5 Bonus	⩾ 95%

The utilization rate is calculated as formula below.

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

where:

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

M_r = Amount of concrete waste diverted from landfill during the statistical period, measured in kilograms (kg).

M_p = Total amount of concrete waste generated during the statistical period, measured in kilograms (kg).

The definition of common concrete waste is listed in Table 5. The utilisation rate of concrete 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 5: Types of Concrete Waste

Common Concrete Waste	Definition
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 and off-cuts from the production of precast concrete components

Verification

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

- Detailed concrete waste audit reports with the types and quantities of concrete waste generated and diverted from landfill during production, and calculation of utilization rate over the statistical period; and
- Waste management initiatives / policies outlining concrete waste management practices within the organisation; and
- Relevant supporting documentation such as trip ticket, delivery note for recycling concrete waste.

4.2.2. Recycled Materials – Non-core Criteria

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

Requirements

Products containing required percentage of SCM or recycled contents in concrete mix will be awarded with 5 bonus points. Eligible SCM and recycled contents are listed as below.

Table 6: Eligible SCM and Recycled Contents

Eligible SCM and Recycled Contents	Required Percentage
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 aggregates in C25-35 concrete mix	20%

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
- Relevant supporting documentation such as declaration letter to verify the use of recycled materials in the production process, purchase order / delivery note for raw materials purchased, etc.

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 amount of main raw materials used during the statistical period that were transported over a distance within 800km radius of the HKSAR 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)

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 Product – 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:

- Concrete mix details with source of raw materials, quantity used, and mass percentage, and
- Green Product Certification of the raw materials from its suppliers, and
- Relevant supporting documentation such as declaration letter to verify the use of recycled materials in the production process, purchase order / delivery note for raw materials purchased, etc.

4.4. PERFORMANCE

4.4.1. Advancement – Non-core Criteria

The Applicant can achieve maximum 5 Bonus Points under this section, *by fulfilling either one of the options below*.

Option A: Design Strength vs. Actual Strength

Requirements

To ensure the consistent quality of readily mixed concrete, the ratio between the 28 days actual strength and the design strength of the concrete shall fulfil the requirements below:

$$1.15 \leq \frac{Actual\ \ Strength}{Design\ \ Strength} \leq 1.25$$

Verification

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

- Calculation of the ratio of actual compressive strength and designed compressive strength

- 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
- Concrete mix design reports with designed concrete strength.

Option B: Corrosion Prevention

Requirements

By controlling chloride levels, the durability and longevity of the structure could be enhanced. The soluble chloride ion content in all concrete shall not exceed 0.2% of the total weight of the concreted, measured in accordance with the General Specification for Civil Engineering Works (2020 Edition), Clause 21.2.6.

Verification

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

- Relevant laboratory test report(s) showing the soluble chloride ion content

4.5. INNOSMART

4.5.1. Innovations & Additions – Non-core Criteria

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

Requirements

Manufacturers who exceed the basic requirements can earn 5 bonus points by showcasing innovative, sustainable production practices.

Examples of incorporating various innovative and smart technologies to improve efficiency, reduce energy consumption, and optimise performance are given in Table 7.

Table 7: Example of innovative and smart technologies.

Examples	Description
Decarbonization Strategies	• Investigate using carbon capture and storage (CCS) technologies to capture and sequester the CO_2 emissions generated during the ready-mixed concrete production process. • Implement the use of low-carbon transportation fuels, such as biofuels or electric vehicles, for the concrete delivery fleet

Examples	Description
Environmental Impact Reduction	• 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. • GPS data can be combined with telematics to monitor truck performance and driving behaviour. This allows targeted training to improve fuel efficiency and reduce emissions from the concrete delivery fleet.
Digitalisation and Data-Driven Optimisation	• Develop a comprehensive digital platform that integrates all aspects of the concrete production and delivery process, enabling data-driven decision-making and optimisation. • Implement advanced analytics and machine learning algorithms to optimise the concrete mix design, production parameters, and delivery logistics based on real-time data.
Health and Safety Enhancements	• 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. • Develop real-time hazard detection and warning systems to identify and mitigate potential risks, such as equipment malfunctions or environmental hazards.

Verification

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

- Submit a written report with a maximum length of 1,000 words. The report should outline the solution, objectives, and evaluation to meet the criteria set by smart technologies., and
- The attachments should contain evidence of implementation and the technical specifications.

5. SCORING

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

Table 8: Points to be awarded under the assessment criteria of this Standard

Label	Evaluation criteria	Points		Related Beam Plus Credit
		Basic	+Bonus	
Carbon	CFP quantification [CORE]	50	+10/+20/ +30/+40	MW 10
Resource	Solid Waste Reuse	-	+5/+10	
	Recycled Materials	-	+5	MW 6
Environment	Regional Materials	-	+5	MW 8
	Use of Green Product	-	+5	MW 9
Performance	Advancement	-	+5	
InnoSmart	Innovations & Additions	-	+5	IA
	Total:	**50**	**+55**	

Applicants must demonstrate that they have achieved the basic points under the CORE criteria. They may also apply for other sustainability labels beyond the Carbon Label. However, only a maximum of 15 bonus points from any combination of TWO labels will be included in the final score for their rating. These bonus points can be earned from any assessment criteria under the Resources, 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 & Additions

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