CONSTRUCTION INDUSTRY COUNCIL

CIC GREEN PRODUCT CERTIFICATION

Assessment Standard

Reinforcing Bar and Structural Steel

(Version 2.0)

<u>Reinforcing Bar and Structural Steel</u>

Summary of Assessment Criteria

CORE CRITERIA

<table>
<tr><th rowspan="2">Criteria</th><th rowspan="2">Requirements</th><th rowspan="2">Verification</th><th colspan="2">Point</th><th rowspan="2">Index</th></tr>
<tr><th>Basic</th><th>+Bonus</th></tr>
<tr><th colspan="6">CARBON</th></tr>
<tr><td>CFP quantification</td><td>Provide a life cycle assessment report with the carbon footprint of products (CFP) in $kgCO_2e/t$ of product, covering at least A1 to A4 and meet the requirements in below.

<table>
<tr><th rowspan="2">Points</th><th colspan="2">CFP
(tCO_2e / t of product)</th></tr>
<tr><th>Rebar</th><th>Structural Steel</th></tr>
<tr><td>50 Point + 40 Bonus</td><td><1.26</td><td><1.42</td></tr>
<tr><td>50 Point + 30 Bonus</td><td>1.26-2.22</td><td>1.42-1.93</td></tr>
<tr><td>50 Point + 20 Bonus</td><td>2.22-2.41</td><td>1.93-3.22</td></tr>
<tr><td>50 Point + 10 Bonus</td><td>2.41-2.68</td><td>3.22-3.73</td></tr>
<tr><td>50 Point</td><td>2.68-3.02</td><td>3.73-4.25</td></tr>
</table></td><td>CFP quantification report

OR

Environmental Product Declaration (EPD)</td><td>50</td><td>+10/+20
+30/+40</td><td>4.1.1</td></tr>
<tr><td></td><td></td><td>Subtotal:</td><td>50</td><td>+40</td><td></td></tr>
</table>

NON-CORE CRITERIA

<table>
<tr><th rowspan="2">Criteria</th><th rowspan="2">Requirements</th><th rowspan="2">Verification</th><th>Points</th><th rowspan="2">Index</th></tr>
<tr><th>+Bonus</th></tr>
<tr><th colspan="5">RESOURCE</th></tr>
<tr><td>Solid Waste Reuse</td><td>Products that achieve 90% utilization rate.</td><td>Solid waste audit reports with supporting

AND

Waste management initiatives</td><td>+5</td><td>4.2.1</td></tr>
</table>

<table>
<tr><th rowspan="2">Criteria</th><th rowspan="2">Requirements</th><th rowspan="2">Verification</th><th>Points</th><th rowspan="2">Index</th></tr>
<tr><th>+Bonus</th></tr>
<tr><td>Raw Materials</td><td>Products contain a minimum percentage of recycled contents listed below.<table><tr><th>Product Type</th><th>Required %</th></tr><tr><td>Reinforcing bar</td><td>BOF: 20% by mass
EAF: 80% by mass</td></tr><tr><td>Structural steel</td><td>15% by mass</td></tr></table></td><td>Material summary with supporting</td><td>+5</td><td>4.2.2</td></tr>
<tr><td>Water Efficiency</td><td>The manufacturing process achieves water recycling rate of at least 95%.</td><td>Water management report with calculation and supporting</td><td>+5</td><td>4.2.3</td></tr>
<tr><th colspan="5">ENVIRONMENT</th></tr>
<tr><td>Regional Materials</td><td>Meet 95 % localisation degree of raw materials.</td><td>Self-prepared calculation report with supporting documents (e.g. purchase order, location map, etc.)</td><td>+5</td><td>4.3.1</td></tr>
<tr><th colspan="5">PERFORMANCE</th></tr>
<tr><td>Advancement</td><td>Products that demonstrate enhanced performance, such as improved strength and durability.</td><td>Product catalogue, technical datasheet, lab test report(s)</td><td>+5</td><td>4.4.1</td></tr>
<tr><th colspan="5">INNOSMART</th></tr>
<tr><td>Innovations & Additions</td><td>Adopt new practice, technology and strategy; OR
Achieve exemplary performance</td><td>Narrative with supporting</td><td>+5</td><td>4.5.1</td></tr>
<tr><td></td><td></td><td>Subtotal:</td><td colspan="2">+10 (Maximum)</td></tr>
</table>

TABLE OF CONTENTS

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 have jointly developed this Technical Assessment Standard (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

Reinforcing bar (known as "rebar") and structural steel are integral to the construction industry, serving as essential components in the development of durable structures. The steel sector is also a significant contributor to greenhouse gas (GHG) emissions, with steel production accounting for approximately 7% of global emissions. (RMI, 2023)

This Standard covers non-alloy steels in accordance with BS EN 10020:2000 "Definition and Classification of Grades of Steel". It contains by mass more iron than any other single element, having a carbon content generally less than 2% and containing other elements. It is applicable to two broad steel product categories, namely: (i) steel reinforcing bar; and (ii) steel (Table 1).

Table 1: Product Categorisation under the CIC Green Product Certification

Product Category	Product Sub-category
i. **Reinforcing bar**	-
ii. **Structural Steel**	a. Structural section (incl. Universal beam / column, H section, I section, Bearing pile) b. Hollow section c. Bar section (incl. Flat bar, Square bar, Round bar, Tee bar) d. Steel Pipe e. Steel Plate f. Others (Channel, Angle, Z section, Mesh)

2. DEFINITIONS & ACRONYMS

2.1. TERMS RELATING TO STEEL PRODUCTION

Coke Oven Gas:	A byproduct of coke manufacturing having a medium calorific value that is produced during the manufacture of metallurgical coke by heating bituminous coal to temperatures of 900-1000°C in a chamber from which air is excluded. The gas has an average heating value of 20,000 kJ/m3 such that it could be recycled and reused as a heating source.
Blast Furnace (BF):	An iron making furnace produces iron from iron ore through smelting at round 2000°C. Fuel, ore, and flux (limestone) are continuously supplied through the top of the blast furnace, while air is blown into the lower section of the furnace, so that the chemical reactions take place throughout the furnace as the material moves downward. The reactions in BF produce carbon dioxide, molten / pig iron, and slag, which can be further used to create granulated blast furnace slag (GGBS) for use in cement.
Basic Oxygen Furnace (BOF):	A steel making furnace which refines pig iron into steel by injecting hot pure oxygen at around 1600°C and lime to reduce carbon content and other impurities for primary steel making occur. Large quantities of CO produced by the reactions in the BOF are converted to CO_2 due to combustion.

Electric Arc Furnace (EAF): A steel making furnace which uses electric arc to melt recycled / scrap steels, DRI, or a combination of both materials through the electrical current and radiant heat emitted. Oxygen and other elements are introduced to adjust the final composition of the steel.

Direct Reduced Iron (DRI) Furnace: An iron making furnace where converts iron from iron ore in the solid phase by heating temperatures of around 1200°C in the presences of reducing gases, eliminating the need for melting. This process serves as an alternative to the BF method. DRI is generally designated alongside an EAF to produce steel from iron ore, but may also be used as a feedstock for BOF steel making.

Pelletising: A process turning the iron ore into the form which is eligible to be processed in the BF or DRI furnace. In the palletising plant, the iron ore is processed to make the marble sized product called pellet which is used as a feed for BF or DRI furnace to produce steel.

Sintering: A technology for agglomeration of iron ore fines into useful 'Blast Furnace' burden material.

CARES: UK Certification Authority for Reinforcing Steels Ltd, registered in England No 1762448.

2.2. TERMS RELATING TO LIFE CYCLE ASSESSMENT

For general 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 reinforcing bar or structural steel product to climate change expressed as CO_2e by quantifying all significant GHG emissions and removals over the reinforcing bar or structural steel 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 reinforcing bar and structural steel 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 reinforcing bar and structural steel product covered under this PCR.

The functional unit is defined as 1 tonne of the reinforcing bar / structural steel product. The CFP shall be reported in tCO_2e.

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

- Product manufacturer
- Product type as listed in Table 1 (e.g. reinforcing bar, steel plate, structural hollow section, etc)
- Production method (e.g. BF-BOF, scrap-based EAF, DRI-EAF, etc)
- Technical data and properties, including steel grade, yield strength and tensile strength.

3.3. SYSTEM BOUNDARY

The PCR is developed to capture the product stage A1-A4 as defined in ISO 14025:2006, ISO 14067:2018, ISO 21930:2017, GB/T 24067-2024 or BS EN 15804:2012+A2: 2019.

Definition of Product Stage Modules A1–A4:

A1: Raw material extraction and processing, processing of secondary material input (e.g recycling processes)

A2: Transport to the manufacturer

A3: Manufacturing

A4: Transport to the border of Hong Kong

3.3.1. Overview of Process Map of Steel Product Production

The key unit processes of reinforcing bar and structural steel manufacturing are presented in Figure 1 for CFP quantification. More than 80% of crude steel is produced via primary routes using mostly iron ore along with some scrap. The remainder is produced via secondary route which is mainly based on recycled scrap. (IEA, 2020). The upfront emission for a steel product includes raw material extraction, off-site transportation of raw materials to manufacturing plant, and the production of crude steel. The production of crude steel includes the processing of raw materials into steel, and fabrication of steel into a steel product for construction.

There are mainly three types of processes for producing steel from raw materials, including (i) BF-BOF process, which combines BF ironmaking and BOF steelmaking; (ii) scraped-based EAF process, which utilizes recycled / scraps steels for steel production; and (iii) DRI-EAF process, which integrates DRI as the ironmaking method with EAF steelmaking.

In the BF-BOF route, the first step is to produce pig iron from iron ore. A BF is fed with the treated iron ore from the sintering plant/pellet plant, coke and small quantities of fluxes (minerals, such as lime, which are used to remove impurities). Air which is heated and blown into the furnace through nozzles in the lower section, until a reaction occurs at around 2000°C. In BOF, a small number of recycled / scrap steels, typically up to 30% of total crude steel, are often added as an alternative source of pig iron units, and a cooling agent to absorb excess heat from the exothermic reaction (BCSA, n.d.; World Steel Association, 2021). The hot metal output from the blast furnace is directly fed into the BOF after pre-treatment to remove undesired elements like sulfur, silicon or phosphorous for producing steel. Molten steel in liquid form is obtained. Impurities go out in gaseous form and as slag.

DRI-EAF, as the alternative iron making process to blast furnace for make iron from iron ore in the solid phase, achieves lower carbon emissions opportunities in steel decarbonisation.

The principal differences between DRI-EAF and BF-BOF routes are:

- **Type of iron ore used** – Usually, high-quality DRI pellets are used in the DRI-EAF route, whereas the BF-BOF route has the flexibility to use iron ore with more impurities, and a combination of pellets, fines, sinter and lump ore.

- **State of matter during reduction process** – The iron ore is reduced in a solid state in the DRI furnace (as opposed to the liquid phase in the blast furnace), before being melted in the EAF, often in conjunction with some scrap.

- **Reduction agents** – Carbon and carbon monoxide is used as reduction agents in the BF-BOF route, while hydrogen and carbon monoxide play more balanced roles in the DRI-EAF route.

- **Energy inputs –** DRI-EAF facilities today mainly use natural gas to generate the reducing syngas (carbon monoxide and hydrogen) with coal being secondary energy source. While BF-BOF producers mainly use coke and coal, with natural gas injection being less common.

Scraped-based EAF are the most commonly used furnace for scrap-based production, which is the secondary route in the steel production. The blend consists of post-consumer scrap, post-industrial scrap and some flat iron or pig iron from an integrated steelworks possibly supplemented with direct reduced iron (i.e. gas reduction of iron ore without smelting). The materials are melted using heat generated with the aid of an electric arc produced by graphite electrodes to produce steel. In general, the production of primary steel is more energy intensive than the production of secondary steel via the EAF route due to the chemical energy required to reduce iron ore to iron using reducing agents. The main BF-BOF and EAF (both DRI-EAF and scrap-based EAF) routes combined account for 95% of global steel production (IEA, 2020).

Slag is a byproduct of both steelmaking and ironmaking processes, which is generated from BF, BOF, EAF, and DRI furnace to remove impurities. The slag has mineral and chemical composition and can be further used as a substitute for clinker in blended cements to reduce the carbon emission in cement manufacturing, rather than opting for disposal.

The fabrication of steel into a steel product includes casting, shaping, and finishing. Casting can be a batch (ingots) or a continuous process (slabs, blooms or billets). Finishing is the final production step, and may include different processes such as annealing, pickling, cutting and surface treatment.

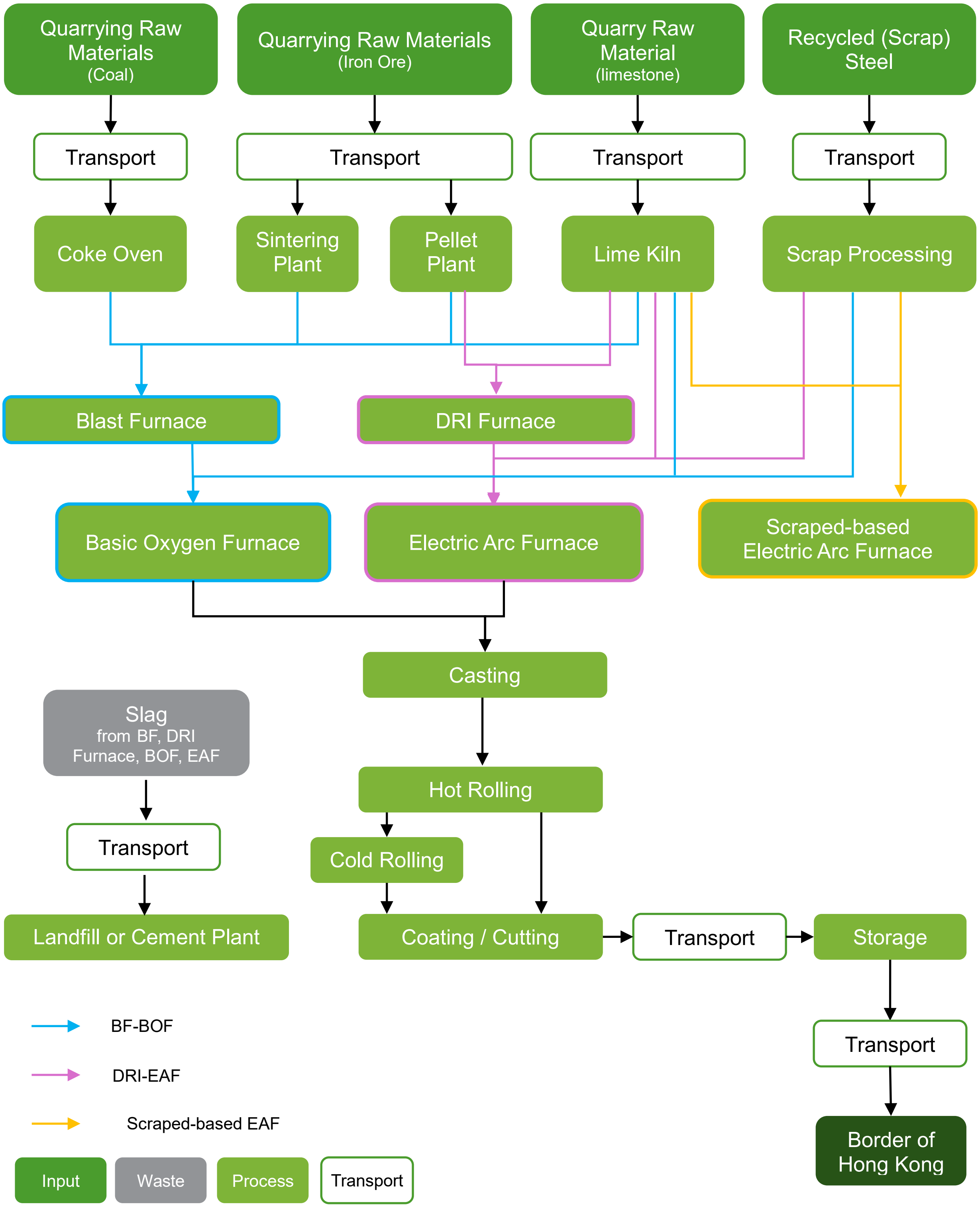

Figure 1 Process Map of Reinforcing Bar and Structural Steel Manufacturing[1]

[1] The figure shows typical process for BF-BOF and EAF (both DRI-EAF and scrap-based EAF) routes for steelmaking

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 reinforcing bar & structural steel 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 reinforcing bar / structural steel 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 reinforcing bar / structural steel product 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 (i) industrial processes; (ii) other stationary combustion sources not covered in industrial processes; and (iii) on-site mobile combustion sources.

i) Industrial Processes

CO_2 is released from the following industrial processes for steel production. Given that CO_2 and methane (CH_4) are the main GHG emissions from ferroalloy production, accounting for about 95% and less than 1% respectively of the total GHG emissions (Lindstad *et al*., 2007), CO_2 dominates the GHG emitted during the steel production. Other types of GHGs covered by the Kyoto Protocol (N_2O, PFC, HFC, SF_6) are not relevant in the steel production context and can therefore be ignored.

- Coke production
- Sinter production
- Lime production
- Iron and Steel production
- DRI production
- Flaring

The assessment of the GHG emissions generated and removed from the above industrial processes, except for lime production, 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 from the coke oven, 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 coke oven gas associated with the assessed product should be assessed and reported in the subsequent processes.

To assess the CO_2 emissions generated from the on-site lime production, data on the type(s) and quantity(ies) of the carbonate(s) consumed to produce lime, as well as the respective emission factor(s) for these carbonate(s) are required. Properties of the lime kiln dust (LKD) are also needed. For off-site lime production, an output-based method is acceptable that requires data only on the amount of lime that facilities import. These data are then multiplied by an emission factor that is based on the stoichiometric ratios and CaO / CaO·MgO contents of a combination of lime types that is assumed to typify the output of the lime production industry. The resulting estimate of CO_2 emissions is then corrected for the production of hydrated lime and of any LKD that is not returned to the kiln.

The GHG emissions calculations of these industrial processes have been embedded in the CFP quantification tool. Relevant equations can be found in The GHG Protocol Initiative (2008).

ii) Other Stationary Combustion Sources Not Covered in Industrial Processes

Apart from direct emission from the stationary combustion in the industrial processes, other stationary combustion fuel sources applied in iron and steel making processes shall be reported, by the following application types, to provide flexibility in the aggregation of emissions:

- On-site power generation, e.g. captive power plant boilers
- On-site gas generation
- Re-heating furnaces
- Equipment
- Room heating / cooling

Carbon in stationary combustion fuels is assumed to be fully oxidised. The resulting overestimation of emissions will usually be small and can be neglected in the CFP assessment.

To calculate GHG emissions from fuels in stationary combustion sources, fuel consumption, lower heating values and the matching GHG emission factors are required.

Default emission factors per GJ lower heating value are extracted from IPCC (2006) 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.

In cases where the same type of fuel is employed in direct emission calculation, the CO2e emission factors reported must be consistent. If such correspondence cannot be maintained, plant-specific measured emission factors should be utilized, if available; otherwise, default values specified in the CFP quantification tool may be applied.

When electricity is internally (e.g.on-site generated electricity) produced and consumed for a product under study, life cycle data for that electricity shall be used for that product. Conversely, 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 and gas production” under indirect emissions.

iii) On-Site Mobile Combustion Sources

Emissions from all mobile sources which serve within the physical boundary should be included in the GHG inventory.

Road transport is assumed as the primary on-site mobile source. Similar to stationary combustion, the calculation of GHG emissions from fuels in mobile combustion sources requires fuel consumption, lower heating values and the corresponding GHG emission factors.

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

3.3.2.2.Indirect Emissions

Key indirect GHG emissions arising from the production of reinforcing bar and structural steel products include: (i) external production of electricity and gas consumed by steel 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 and Gas Production

The following priorities for utilizing GHG emission data associated with external electricity and gas production:

- **Specific Life Cycle Data**: When a supplier can provide specific life cycle data for their electricity / gas product, and guarantee that no double counting of sales and associated GHG emissions, that data should be used.
- **National Data**: If the supplier does not provide specific GHG data for their product, the GHG emissions associated with the national data where the life cycle stage occurs shall be used.

- **Regional Data**: In cases where a country lacks national data but has several regional datasets, or where multiple countries share a common energy grid, the GHG emissions associated with the relevant area from which the electricity or gas is obtained shall be used.
- **Recognized Databases**: If life cycle data on a process within the electricity supply system is difficult to access, data from recognised databases may be used.

The GHG emissions shall include: the emissions arising from the generation of electricity/gas, e.g. combustion of fuels, and generation of electricity/gas lost in transmission and distribution in the grid; upstream GHG emissions (e.g. the mining and transport of fuel to the energy 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 energy generators or treatment of ashes from coal fired electricity plants); as well as GHG emissions related to construction, maintenance and decommission of the energy supply system.

ii) Production of Bought Raw Materials and Energy Commodities

GHG emissions and removals associated with the use of raw materials such as limestone, dolomite, iron ore, coke, lime etc. bought from third party in the production and packaging of the finished steel 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 is available.

GHG emissions from the mining and production of energy commodities such as coal, natural gas, oil, petcoke, etc. used in the steel 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

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. This includes both the transport of raw materials to the manufacturing site and the transport of finished steel products to the Hong Kong border from 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 steel 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

[2] The tool is accessible at: https://ghgprotocol.org/sites/default/files/2024-10/Transport_Tool_v2_7.xlsx

"Guidelines to Account for and Report on Greenhouse Gas Emissions and Removals for Buildings (Commercial, Residential or Institutional Purposes) in Hong Kong3" (2010 Edition). Fuel consumption data can also be estimated based on energy consumption indicators as provided by EMSD Energy Consumption Indicator4.

- **Transport of Raw Materials to Manufacturing Site**

  This stage covers the transportation of raw materials (e.g., iron ore, coal) from their extraction points or suppliers to the steel manufacturing facility. It includes all modes of transport used to bring raw materials to the factory gate.

- **Transport of Finished Steel Product to the border of Hong Kong**

  This stage involves transporting the finished steel product from the manufacturing site (factory gate) to the Hong Kong border. The calculation of emissions should be based on the actual travel distance covered by the transport vehicle. This distance reflects the real routes taken via roads, railways, waterways, or airways, including any detours, stops, or other logistical factors encountered during the journey.

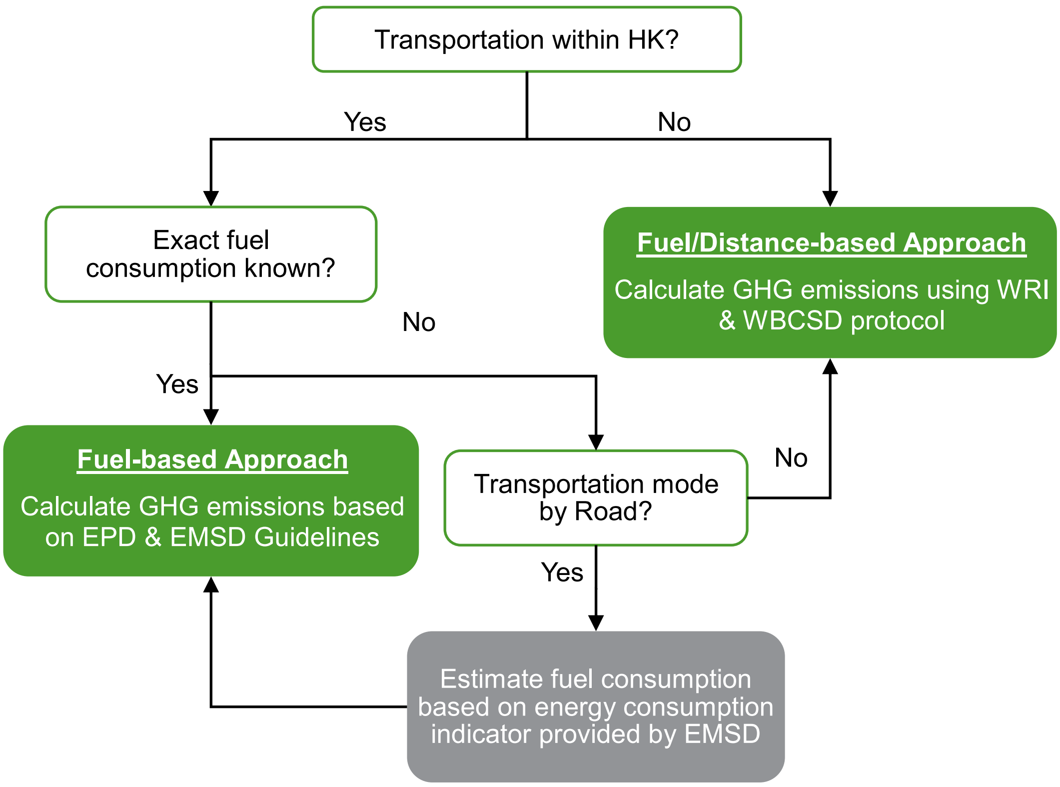

Figure 2: Method Selection for Off-site Transportation Emissions Calculati

[3] The guideline is accessible at : www.epd.gov.hk/epd/sites/default/files/epd/english/climate_change/files/Guidelines_English_2010.pdf

[4] The indicators are accessible at: https://ecib.emsd.gov.hk/index.php/en/online-benchmarking-tools/transport-sector

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 2 summarises the parameters involved, and the data sources for the calculation of carbon footprint of reinforcing bar and structural steel products.

Table 2: Parameters and Data Sources for Calculating the Carbon Footprint of Reinforcing Bar and Structural Steel Products

Emission components		Parameters	Units	Sources of parameters
Direct Emissions	***Industrial Processes***			
	Coke production, Sinter production, Iron and Steel production, DRI production	Materials consumed Carbon content of materials consumed Molecular weight of CO_2 to that of carbon i.e. 44/12	t tCO_2/t n.a.	Measured at plant level Provided in the CFP Quantification tool n.a.
	On-site lime production	Carbonates consumption Emissions factors Amount of LKD Weight fraction of original carbonate in the LKD	t tCO_2/t t t/t	Measured at plant level Provided in the CFP Quantification tool Measured at plant level Measured at plant level
	Off-site lime production	Lime imported CaO / CaO·MgO content Stoichiometric ratios	t t/t n.a.	Measured at plant level Provided in the CFP Quantification tool Provided in the CFP Quantification tool
	Flaring	Volume of flared gas Mole ratio Mole volume	scf/yr n.a. n.a.	Measured at plant level Provided in the CFP Quantification tool
	Other Stationary Combustion Sources Not Covered in Industrial Processes			
	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
	On-site mobile combustion sources			
	Fuels	Fuel consumption Lower heating value Emission factor	t GJ/t fuel tCO_2e/GJ	Measured at plant level Measured at plant level IPCC defaults, or measured

Emission components		Parameters	Units	Sources of parameters
			fuel	
Indirect Emissions	**External electricity and gas production**	Power bought from external grid	GWh	Measured at plant level
		Emission factor	tCO_2e/GWh	Applicant-specific value or country grid factor
	Production of bought raw materials and energy commodities	Net raw materials and energy commodities purchased	t	Measured at plant level
		Emission factor	tCO_2e/t	Default factor / Input
	Off-site transportation	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:

- The products shall be grouped by the same manufacturer, product type, and production method.
- The products must share identical physical and mechanical properties, such as steel grade, yield strength and tensile strength. Variations in dimensions (e.g., different diameters) or shapes are permissible.
- All products in the same group product certification must meet the same benchmark level under the 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

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 covering modules A1 to A4 for quantification and reporting of the carbon footprint of products (CFP), following the guidance addressed in the General Requirements and detailed system boundary specified in Section 3. The CFP study report should be prepared in accordance with ISO 14067:2018.

OR

The Applicant shall provide the product's CFP value from a product-level EPD covering modules A1 to A3 and the calculated A4 emission for the transportation from the manufacturer's factory to the border of Hong Kong using the "GHG Emissions from Transport or Mobile Sources" (version 2.7, 2024). The EPD must be certified in accordance with one of the following standards: 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.

Points are awarded according to achieved CFP benchmark as listed in Table 3.

Table 3: Benchmark for Reinforcing Bar and Structural Steel Products under the CIC Green Product Certification

Points	**CFP** (tCO_2e / t of product)	
	Rebar	**Structural Steel**
50 Point + 40 Bonus	<1.26	<1.42
50 Point + 30 Bonus	1.26-2.22	1.42-1.93
50 Point + 20 Bonus	2.22-2.41	1.93-3.22
50 Point + 10 Bonus	2.41-2.68	3.22-3.73
50 Point	2.68-3.02	3.73-4.25

Verification:

To obtain the points under this criterion, either of 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 Criterion

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

Requirements

Manufacturers that achieve a solid waste utilisation rate of at least 90% 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 organisations. 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 definitions of common solid waste are listed in Table 4. 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 4: Types of Solid Waste

Common Solid Waste	Definition
Scrap Steel	Pre-consumer scraps such as steel offcuts, defective products, and overproduction, and post-consumer scraps.
Slag	By-products from steelmaking and ironmaking processes.

Verification

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

- Detailed 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
- Waste management initiatives/policies outlining solid waste management practices within the organisation; and

- Relevant supporting documentation such as a declaration letter, a trip ticket, a delivery note for recycling solid waste.

4.2.2. Raw Materials - Non-Core Criterion

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

Requirements

Products that contain a minimum percentage of recycled content listed below will be awarded 5 bonus points.

Product Type	Required Percentage
Reinforcing bar	BOF: 20% by mass EAF: 80% by mass
Structural steel	15% by mass

Raw material extraction is one of the significant contributors of embodied carbon in steel product production, therefore, the manufacturers are encouraged to reduce raw material consumption by using scrap steel. The percentage of recycled contents is calculated according to formula:

$$X = \frac{A}{P} \times 100\%$$

Where:

X = The percentage of recycled content of a reinforming bar / structural steel product.

A = The mass of recycled materials of a reinforming bar / structural steel product, measured in kilograms (kg)

P = The mass of a reinforcing bar / structural steel product, measured in kilograms (kg)

Verification

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

- 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 test report or declaration letter to indicate the use of recycled materials in accordance with ISO 14021:2016, purchase order / delivery notes for the raw material purchased.

4.2.3. *Water Efficiency - Non-Core Criterion*

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

Requirements

Manufacturers that achieve water recycling rate of at least 95% will receive 5 bonus points. The average recycling rate is calculated using the formula:

$$R = \frac{V_t}{V_t + \ V_i} \times 100\%$$

Where:

R = Average process water recycling rate during the production process.

V_t = The amount of recycled water in the production process during the statistical period, measured in cubic meters (m^3).

V_i = The amount of makeup water added in the production process during the statistical period, measured in cubic meters (m^3).

The average water recycling rate 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.

Verification

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

- Process water management report with water recycling rate calculation, water reduction measures implemented within the production plant.
- Relevant supporting documentation such as monthly water usage and water tariff records.

4.3. ENVIRONMENT

4.3.1. *Regional Materials - Non-Core Criterion*

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 the formula below.

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

where:

T = The localisation degree of raw materials

M_{gt} = The total amount of primary raw materials used during the statistical period that were transported over a distance within an 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 documents, including but not limited to purchase order forms showing the quantity of raw materials used, a map showing the origin of each raw material, the location of the plant, and the transportation methods.

4.4. PERFORMANCE

4.4.1. Advancement - Non-Core Criterion

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

Requirements

Products that demonstrate enhanced performance will be granted 5 bonus points. Enhanced performance may include the utilization of high-strength steel, and coatings to improve durability. The following steel products demonstrate good examples of achieving advanced performance:

- Weathering steel (Corten Steel)
- Stainless steel rebar
- Epoxy-coated rebar

OR

The rebar products categorised as 500B under Construction Standard CS2:2012 achieve the tensile properties of 500C, as described in Section 1.6 of Construction Standard CS2:2012, will be granted 5 bonus points.

Verification

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

- Product catalogue, technical datasheet, lab test report(s) or other equivalent documents demonstrating the compliance of chemical and mechanical properties.

4.5. INNOSMART

4.5.1. Innovations & Additions – Non-core Criteria

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

Requirements

Manufacturers of reinforcing bar and structural steel who exceed basic industry requirements can qualify for 5 bonus points by showcasing innovative sustainable production practices. This includes, but not limited to, the implementation of Hydrogen-Based Steelmaking, Zero Slag Process, as well as digitalisation efforts that enhance operational efficiency.

Table 5 shows examples of various innovative and smart technologies that improve efficiency, reduce energy consumption and optimise performance.

Table 5: Example of innovative and smart technologies.

Sustainable Practices in Rebar / Structural Steel Manufacturing	**Energy-efficient processes**: Implementing energy-efficient machinery and utilizing renewable energy sources during manufacturing, which further reduce the environmental footprint of products. **Low carbon manufacturer:** Extra low carbon footprint of reinforcing bars, such as using 100% scrap combined with Electric Arc Furnace (EAF) technology. **Smart labeling:** The integration of smart labels on products allows for better tracking and management of materials throughout their lifecycle, enhancing transparency and accountability in sustainable practices.
Smart Manufacturing	**Advanced robotics:** Robotics will play a significant role in automating repetitive tasks within manufacturing processes, improving precision and reducing labor costs **Modular construction techniques:** The use of prefabricated components, including rebars, can streamline construction timelines and minimize waste on-site.

Verification

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

- Submit a writing report (maximum of 1000 words). The report should outline the solution, objectives, and evaluation to meet the criteria set by smart technologies.

- The attachment 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 6: 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]	**50**	+10/+20/ +30/+40	MW 10
Resource	Solid Waste Reuse	**-**	+5	
	Raw Materials	**-**	+5	MW 6
	Water Efficiency	**-**	+5	
Environment	Regional Materials	**-**	+5	MW 8
Performance	Advancement	-	+5	
InnoSmart	Innovations & Additions	**-**	+5	IA
	Total:	**50**	**+50**	

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 10 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 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 10: Life Cycle Assessment
- Innovations & Additions

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