GREENSHIP

AN ESTABLISHED MEMBER OF

GREEN BUILDING COUNCIL INDONESIA

WORLD GREEN BUILDING COUNCIL

The Holistic Green Building Approach Through Greenship Rating System

Net-zero & Neutrality, Rating System reliability & accountability, and the role of Building Components and Materials

Prepared By Iwan Prijanto@Juni 2024

Chairperson Green Building Council Indonesia

CEO Dex Solusi Transit

Iwan Prijanto, Ir, MM, GP

Chairperson

Green Building Council Indonesia

CEO PT DEX Solusi Transit

IWAN'S ROLE IN THE PAST 10 YEARS

- Since October 2018 Iwan has been appointed as Chairperson of GBC Indonesia
- Since 2019 Iwan also selected as member of Building Expert Team in Urban Architectrure (TABG-AP) of Jakarta Province, and continued until now as Professional Expert Team in Urban Architecture (TPA-AP)
- Since June 2015-2018 Iwan has been appointed as Chairperson of Ikatan A hli Bangunan Indonesia (IABHI)
- Since 2015 Iwan serves as CEO at PT DEX Solusi Transit, a sustainable urban development consultant specialized in infrastructure and urban redevelopment and green architecture design &development
- In 2017 Iwan has been appointed as strategic advisor for transit oriented development of PT MRT Jakarta 1st line.
- Strategic Adhoc Team Leader for Kediri Airport and urban redevelopment 2016-2017
- Since June 2015 until January 2016 he has been appointed by PT Jakpro as *Strategic Advisor* to initiate to prepare strategic development framework of LRT (*Light Rail Transit*) in Jakarta.
- Previously since the end of late 2008 to 2015 Iwan heads the Urban planning and Business Development Division of PT MRT Jakarta
- In 2008 Iwan has become one of the Corefounder of Green Building Council of Indonesia (GBC Indonesia)

EDUCATION & RELATED IMPORTANT CERTIFICATES

- *Architecture Degree from Catholic University of Parahyangan Bandung*
- Magister Manajemen *from PPM Business School*
- *Greenship Professional* (*Green Building accredited professional*),
- SKK Ahli Penilai Bangunan Hijau from BNSP-LPJKN since 2023
- *Senior Environmental Development* Program from BCA (*Building Construction Authority Singapore*)
- MRT Transit Architecture Design fromLTA (*Land Transport Authority Singapore*) dan SIA (*Singapore Institute of Architecture*),
- Certificate on MRT & TOD from JICA & Certificate on MRT from Delhi Metro

Carbon Neutrality in Built Environment:
The Importance of Green Building criteria to reach emission reduction target

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Global Greenhouse Gas Emissions by Gas

Building consume

35%
World Energy

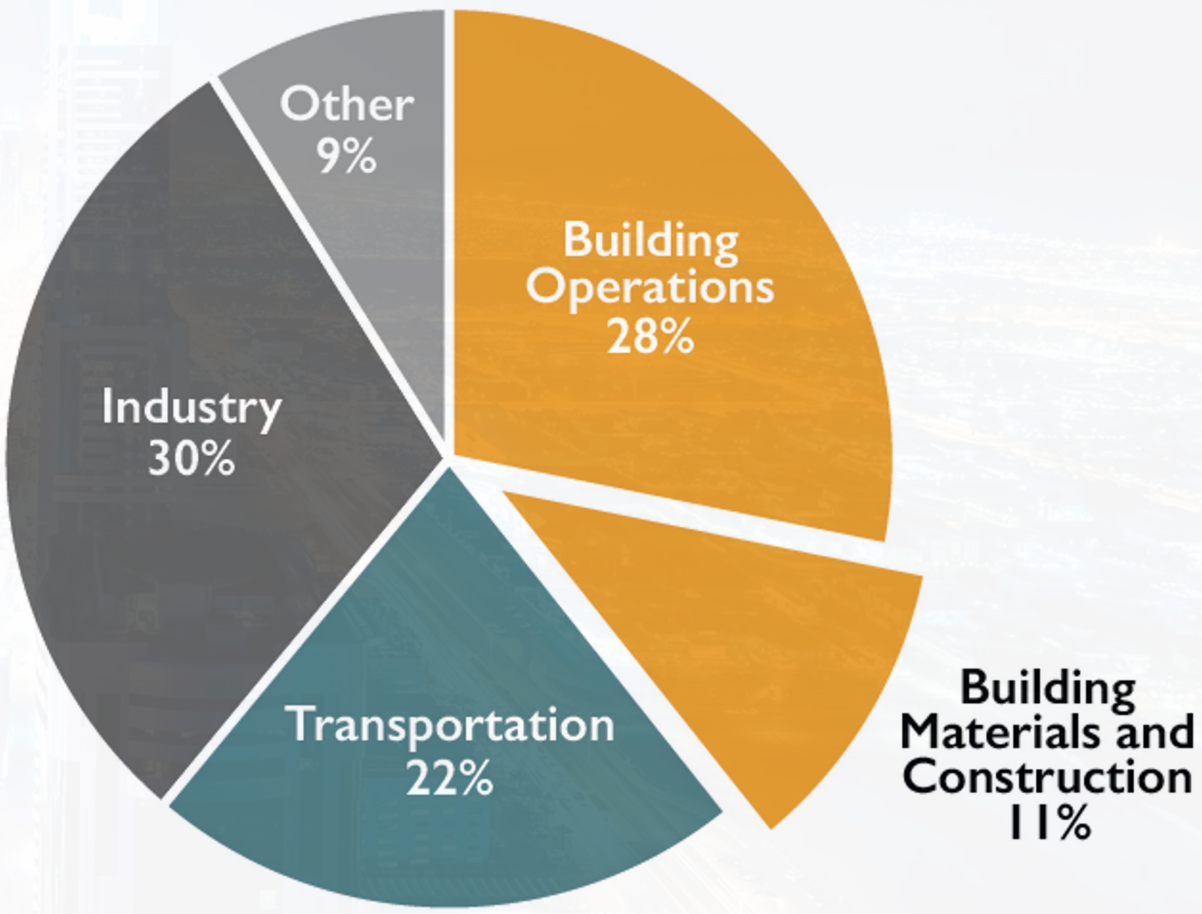
12%
Water

Generate

25%
Waste

39%
GHG Emission

Global CO_2 Emissions by Sector



Whole Life Carbon Vision

Target Karbon Netral dari World Green Building Council

2050

New buildings, infrastructure and renovations will have **net zero embodied carbon,** and all buildings, including existing buildings, must be **net zero operational carbon.**

Net Zero Operational Carbon

Definition

A net zero carbon building is highly energy efficient with all remaining energy from onsite and/or offsite renewable sources

Guiding Principles

1. **Measure and disclose carbon**
   Carbon is the ultimate metric to track, and buildings must achieve an annual operational net zero carbon emissions balance based on metered data
2. **Reduce energy demand**
   Prioritise energy efficiency to ensure that buildings are performing as efficiently as possible, and not wasting energy
3. **Generate balance from renewables**
   Supply remaining demand from renewable energy sources, preferably on-site followed by off-site, or from offsets
4. **Improve verification and rigour**
   Over time, progress to include embodied carbon and other impact areas such as zero water and zero waste

Net Zero Carbon Buildings Commitment

All buildings within direct control to operate at net zero carbon by 2030

2030

New buildings, infrastructure and renovations will have at least **40% less embodied carbon** with significant **upfront carbon** reduction, and all new buildings must be **net zero operational carbon.**

Net Zero Embodied Carbon

Definition

A net zero **embodied carbon** building (new or renovated) or infrastructure asset is highly resource efficient with **upfront carbon** minimised to the greatest extent possible and all remaining **embodied carbon** reduced or, as a last resort, offset in order to achieve net zero across the lifecycle.

Guiding Principles

1. **Prevent**
   Avoid embodied carbon from the outset by considering alternative strategies to deliver the desired function
2. **Reduce and optimise**
   Evaluate each design choice in terms of the upfront carbon reductions and as part of a whole lifecycle approach
3. **Plan for the future**
   Take steps to avoid future embodied carbon during and at end of life
4. **Offset**
   As a last resort, offset residual embodied carbon emissions within the project or organisational boundary where possible or if necessary through verified offset schemes

Net Zero Opertational Carbon

Net Zero Embodied Carbon

Basic Net Zero Roadmap Framework

LOW EMBODIED CARBON

TOTAL NET ZERO

CARBON NEUTRAL

CARBON PRICING
Carbon Trading/Tax

Embodied Carbon

Building Materials

Use Low Embodied Carbon

Operational Carbon

Green Building NetZero target

IKE* BASELINE

IKE NZR

Energy

Energy

RE

Reduce Energy Demand/ Consumption

Improve Energy Efficiency

Use Renewable Energy

Conduct LCA
Publish:
EPD, CPD etc
Lowering emission

Passive design simulation at neighborhood & building scale for solar and wind

Passive design simulation for day light & lighting (e.g Dialux)

Passive design simulation for adaptive thermal comfort & Indoor health

Calculate operational carbon & EUI

RE/Solar panel simulation

Netzero calculation

How to use Greenship NZ

Prepared by Iwan Prijanto@DEX4GBCI-2023

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GREENSHIP CERTIFICATE

- Category & Criteria
- Greenship Rating Types
- Parties involved in Green Building
- Trends & Updates

WORLD GREEN BUILDING COUNCIL

WORLD GREEN BUILDING COUNCIL

ESTABLISHED - OUR HIGHEST CATEGORY OF MEMBERSHIP

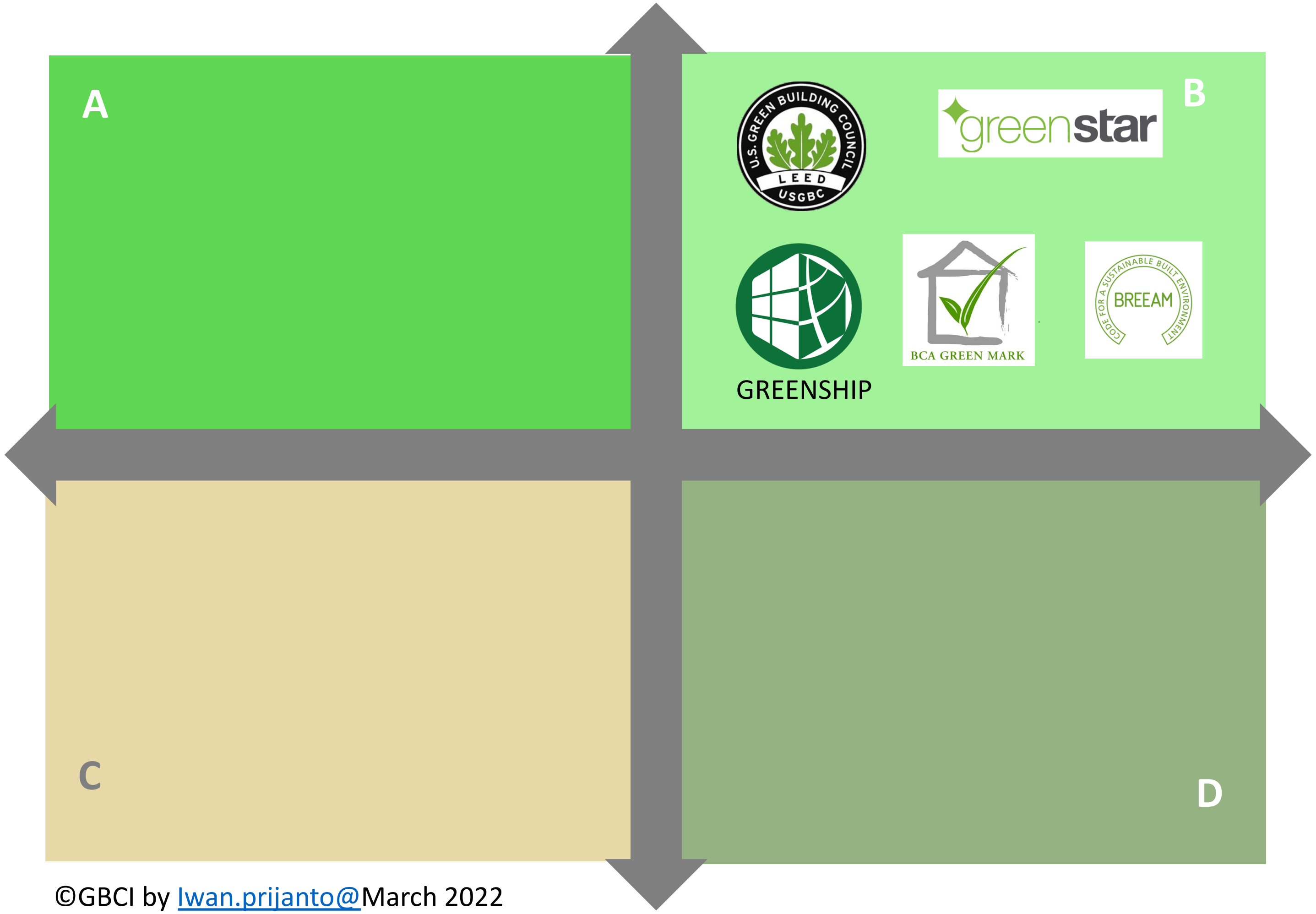
EMERGING

PROSPECTIVE

Brief History of Global Rating System Typology

Nationally Presence &
Internationally Recognized **(established member of World GBC)**

Mandatory/ Government-Led Rating System



Voluntary, Independent & Industrial-Led rating System

Nationally Presence,

Corporate Founders GBC Indonesia

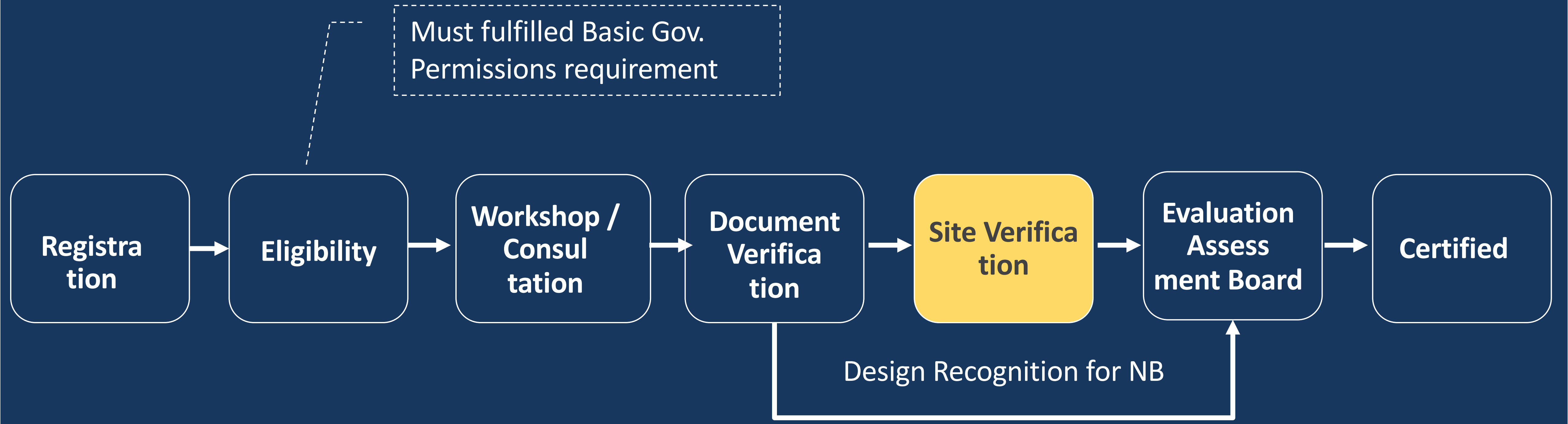
Credibility of Greenship Rating Tool

- GREENSHIP development process is involving experts and stakeholders from professional association, building product industry, developers, contractors, academician, NGO and Government as regulator, and wrapped up through national consensus
- Note: GBC Indonesia established by 50 core founders (multi discipline professionals) and 21 Indonesia most prominent corporate founders (industry, contractor, developer and SOC), plus around 100 corporate members
- Every GREENSHIP rating point will refer to any national standard/regulation whenever available as baseline criteria to be fulfilled

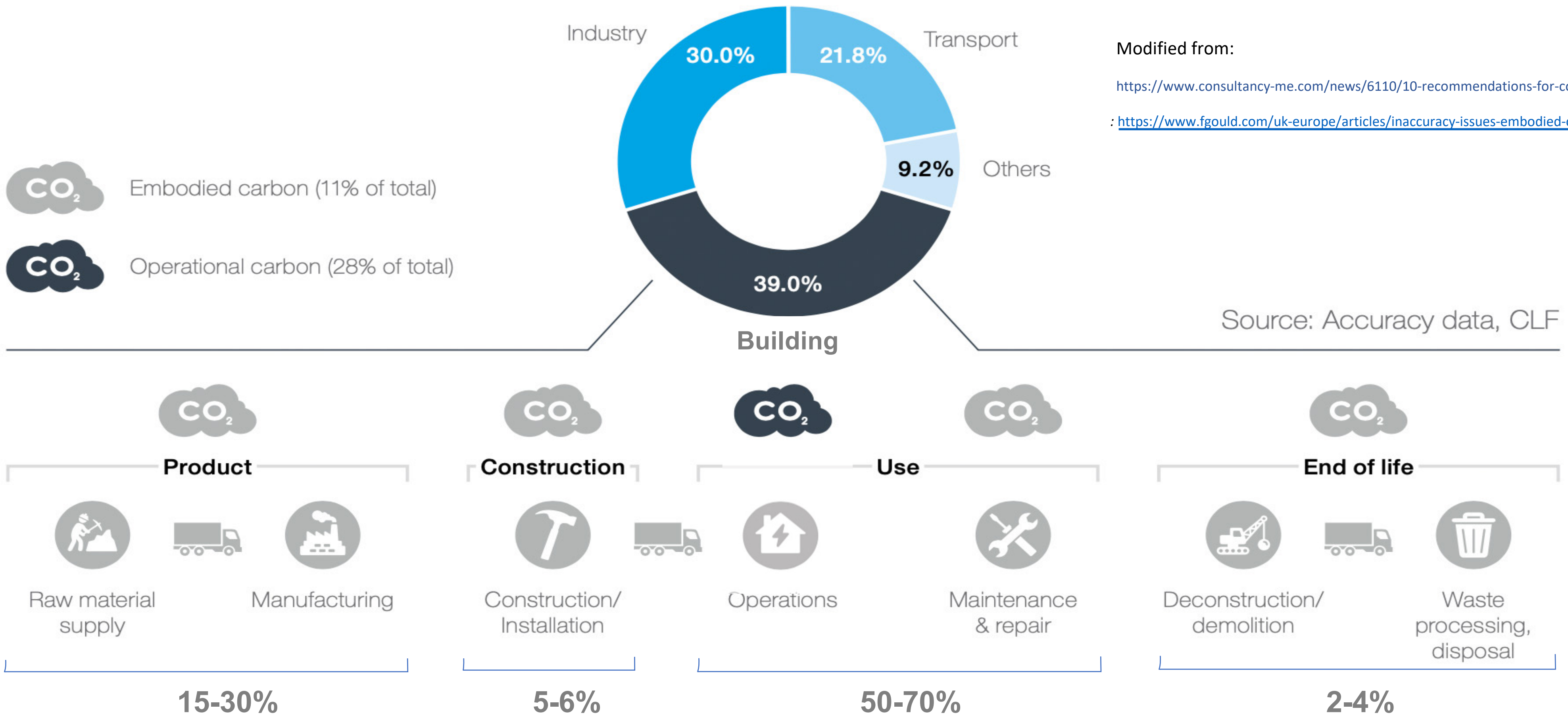
Literature study and site visit Expert Discussion [Draft 1] → Technical Advisory Group Discussion involving Stakeholders [Draft 2] → National Consensus [Draft 3] → Pilot Project [Finalization]

Why Greenship

- GREENSHIP certification process is independently conducted with proper transparency and accountability (among the most stringent Rating system)
- GREENSHIP complies with National Building Code & regulation
- Recertification in 3 years for buildings and 5 years for neighborhood
- GBC Indonesia is an Established Member of World GBC



Greenship Certification & Emission throughout Building & Material Lifecycle



Modified from:

https://www.consultancy-me.com/news/6110/10-recommendations-for-construction-to-reach-net-zero-by-2050

: https://www.fgould.com/uk-europe/articles/inaccuracy-issues-embodied-carbon-assessments/

Pilot project
GREENSHIP
Solution Endorsement
Low Embodied CO2

Pilot project
GREENSHIP
SERVICE QUALITY Building Construction Company

GREENSHIP
NEW BUILDING & EXISTING BUILDING & HOMES & INTERIOR

GREENSHIP
NEIGHBORHOOD

GREENSHIP
NETZERO

GREENSHIP
DATA CENTER

GBCI will also released

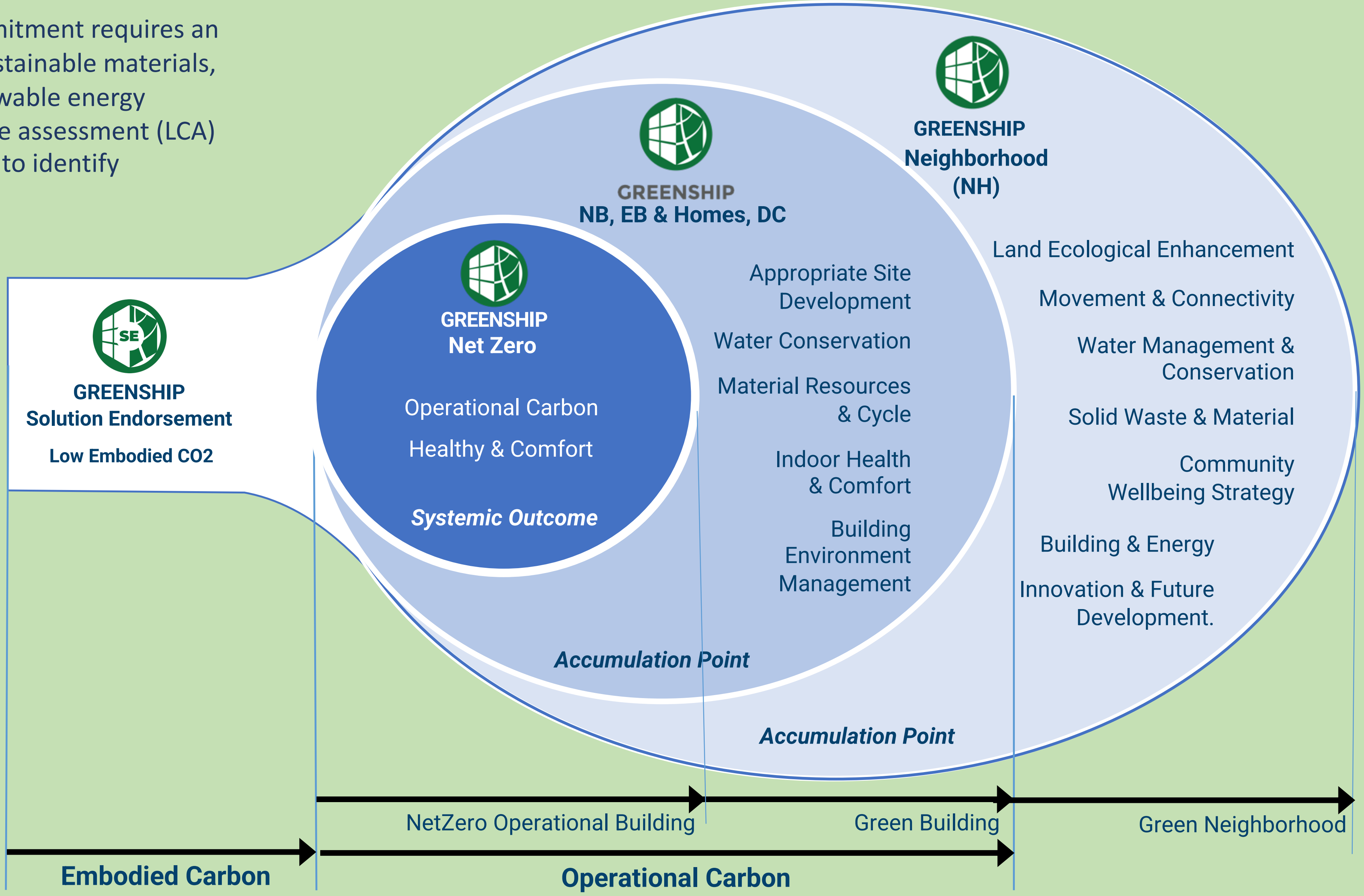
- Greenship Transit Station

Whole-life carbon Approach of GBCI through Greenship Certifications

Implementing a whole-life carbon commitment requires an integrated design approach, utilizing sustainable materials, energy-efficient technologies, and renewable energy sources. It also involves rigorous lifecycle assessment (LCA) to quantify emissions at each stage and to identify opportunities for reduction.

This approach promotes the use of low-carbon materials, innovative construction techniques, and strategies for energy efficiency and renewable energy generation.

By reducing both embodied and operational carbon through various Greenship certification from GBCI can significantly lower their overall carbon footprint, contributing to global efforts to mitigate climate change and achieve sustainability goals.



10.	**Bangunan Berwawasan Lingkungan yang Memenuhi Standar atau Sertifikasi yang Diakui Secara Nasional, Regional, atau Internasional**	• Bangunan ramah lingkungan (*green building*) adalah suatu bangunan yang menerapkan prinsip lingkungan dalam perancangan, pembangunan, pengoperasian, dan pengelolaannya dan aspek penting penanganan dampak perubahan iklim. (Permen Lingkungan Hidup No. 8 Tahun 2010) • Bangunan dapat dikategorikan sebagai bangunan ramah lingkungan apabila memenuhi kriteria antara lain: a. Menggunakan material bangunan yang ramah lingkungan yang antara lain meliputi: 1) Material bangunan yang bersertifikat *eco-label*; 2) Material bangunan lokal.	- Pembiayaan pada bangunan yang telah memiliki sertifikat bangunan hijau, seperti *Greenship* atau standar pengukuran lainnya yang berdasarkan efisiensi penggunaan air, konservasi, penghematan penggunaan energi, ataupun ketersediaan ruang terbuka hijau pada bangunan serta pengelolaan sampah yang baik.

No.	Kategori Kegiatan	Pengertian	Contoh Kegiatan Usaha
		b. Terdapat fasilitas, sarana, dan prasarana untuk konservasi sumber daya air dalam bangunan gedung antara lain: 1) Mempunyai sistem pemanfaatan air yang dapat dikuantifikasi; 2) Menggunakan sumber air yang memperhatikan konservasi sumber daya air; 3) Mempunyai sistem pemanfaatan air hujan. c. Terdapat fasilitas, sarana, dan prasarana konservasi dan diversifikasi energi antara lain: 1) Menggunakan sumber energi alternatif terbarukan yang rendah emisi gas rumah kaca; 2) Menggunakan sistem pencahayaan dan pengkondisian udara buatan yang hemat energi. d. Menggunakan bahan yang bukan bahan perusak ozon dalam bangunan gedung antara lain: 1) Refrigeran untuk pendingin udara yang bukan bahan perusak ozon; 2) Melengkapi bangunan gedung dengan peralatan pemadam kebakaran yang bukan bahan perusak ozon. e. Terdapat fasilitas, sarana, dan prasarana pengelolaan air limbah domestik pada bangunan gedung antara lain: 1) Melengkapi bangunan gedung dengan sistem pengolahan air limbah domestik pada bangunan gedung fungsi usaha dan fungsi khusus; 2) Melengkapi bangunan gedung dengan sistem pemanfaatan kembali air limbah domestik hasil pengolahan pada bangunan gedung fungsi usaha dan fungsi khusus. f. Terdapat fasilitas pemilahan sampah; g. Memperhatikan aspek kesehatan bagi penghuni bangunan antara lain: 1) Melakukan pengelolaan sistem sirkulasi udara bersih; 2) Memaksimalkan penggunaan sinar matahari. h. Terdapat fasilitas, sarana, dan prasarana	- Pembiayaan bangunan yang didirikan dengan menggunakan material bekas atau material ramah lingkungan. Contoh bangunan ramah lingkungan: Sequis Center, Menara BCA, Gedung Sampoerna Strategic, Kementerian PU, Kantor L'Oreal Indonesia, dan Mal Pacific Place, Apartemen The Pakubuwono, Kantor Bank Indonesia Solo. Bangunan-bangunan diatas memenuhi sertifikasi *Greenship* dari *Green Building Council* Indonesia.

Circularity in Green Building

A circular building **optimises the use of resources while minimising waste throughout its whole life cycle**. The building's design, operation and deconstruction maximise value over time using:

- Durable products and services made of secondary, non-toxic, sustainably sourced, or renewable, reusable or recyclable material
- Space efficiency over time through shared occupancy, flexibility and adaptability
- Longevity, resilience, durability, easy maintenance and reparability
- Disassembly, reuse or recycling of embedded material, components and systems
- Life-cycle assessment (LCA), life-cycle costing (LCC) and readily available digital information (such as building material passports). The results of LCA for a product or material are increasingly communicated in the form of environmental product declarations (EPDs).

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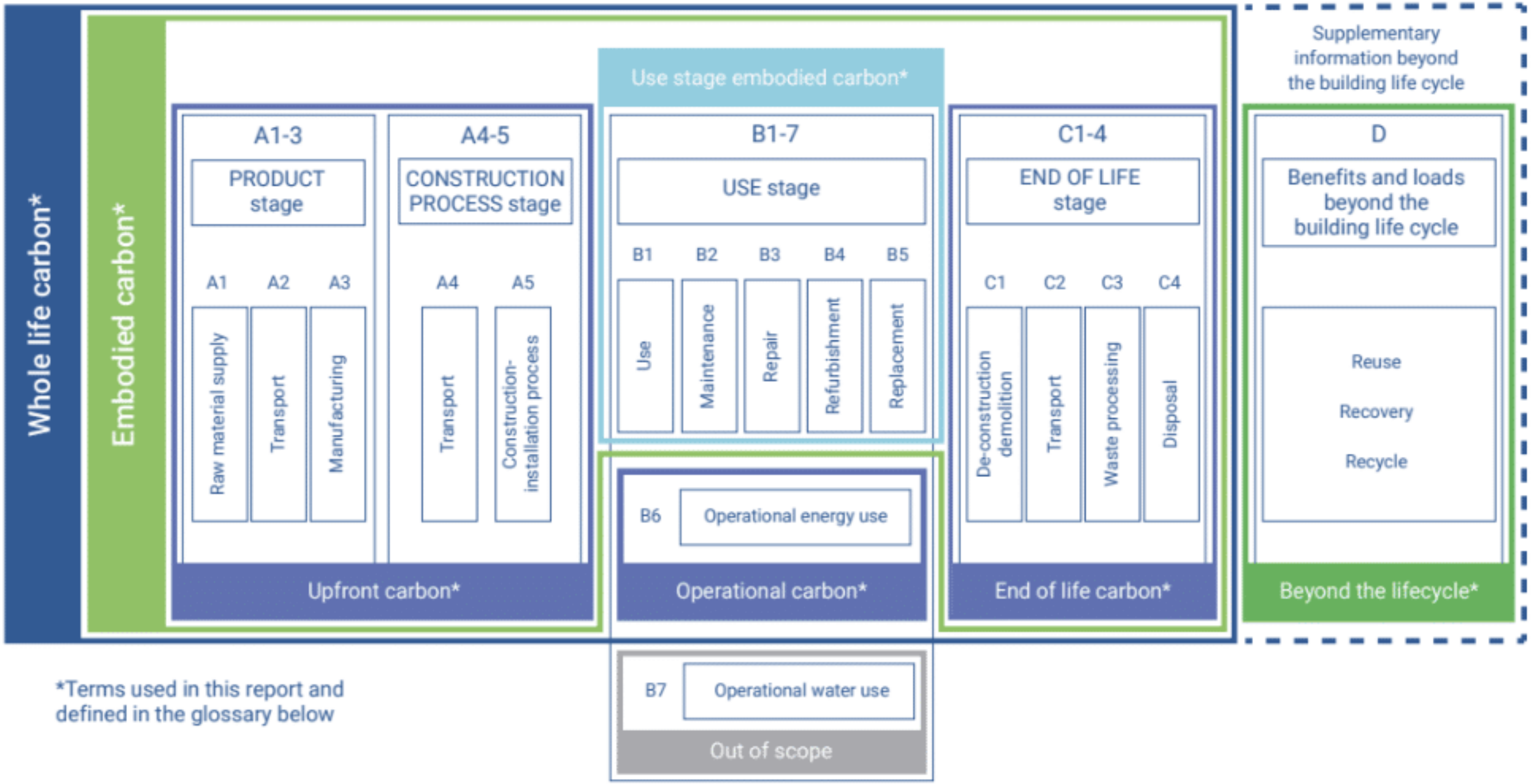
The role of building materials, products and technologies that help achieve Green Building

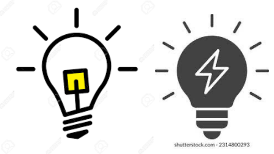
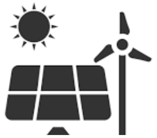
Life Cycle Stages

Lifecycle assessment
LCA allows us to calculate a wide range of environmental impacts of a material, a product or a whole construction project. Its use allows more informed decisions to be taken not only in terms of reducing carbon emissions, but also in relation to other aspects of the project's performance such as material, water and energy needs across the whole lifecycle.

The results of LCA for a product or material are increasingly communicated in the form of environmental product declarations (EPDs)



Logical Steps Towards NetZero (Operational Carbon)

Not use energy	Maximizing the use of natural ventilation while ensuring better outdoor air quality	
Use less energy	Seek hybrid solution that could maintain comfort & productivity with less energy needed	
Smart way to use energy	Find the smartest technology and method that enable the most efficient energy usage	
Use RE	Use renewable energy as much as possible to fulfill the already low energy usage/consumption intensity	
Offset	Balance the residual emission through reforestation, RE plant, sustainable plantation and other carbon capture investment certificate	

Very low EUI (kwh/sqm/year)

Net Zero (Operation Carbon)

Carbon Neutral

Prepared by Iwan Prijanto@DEX4GBCI-2023

Carbon Life cycle

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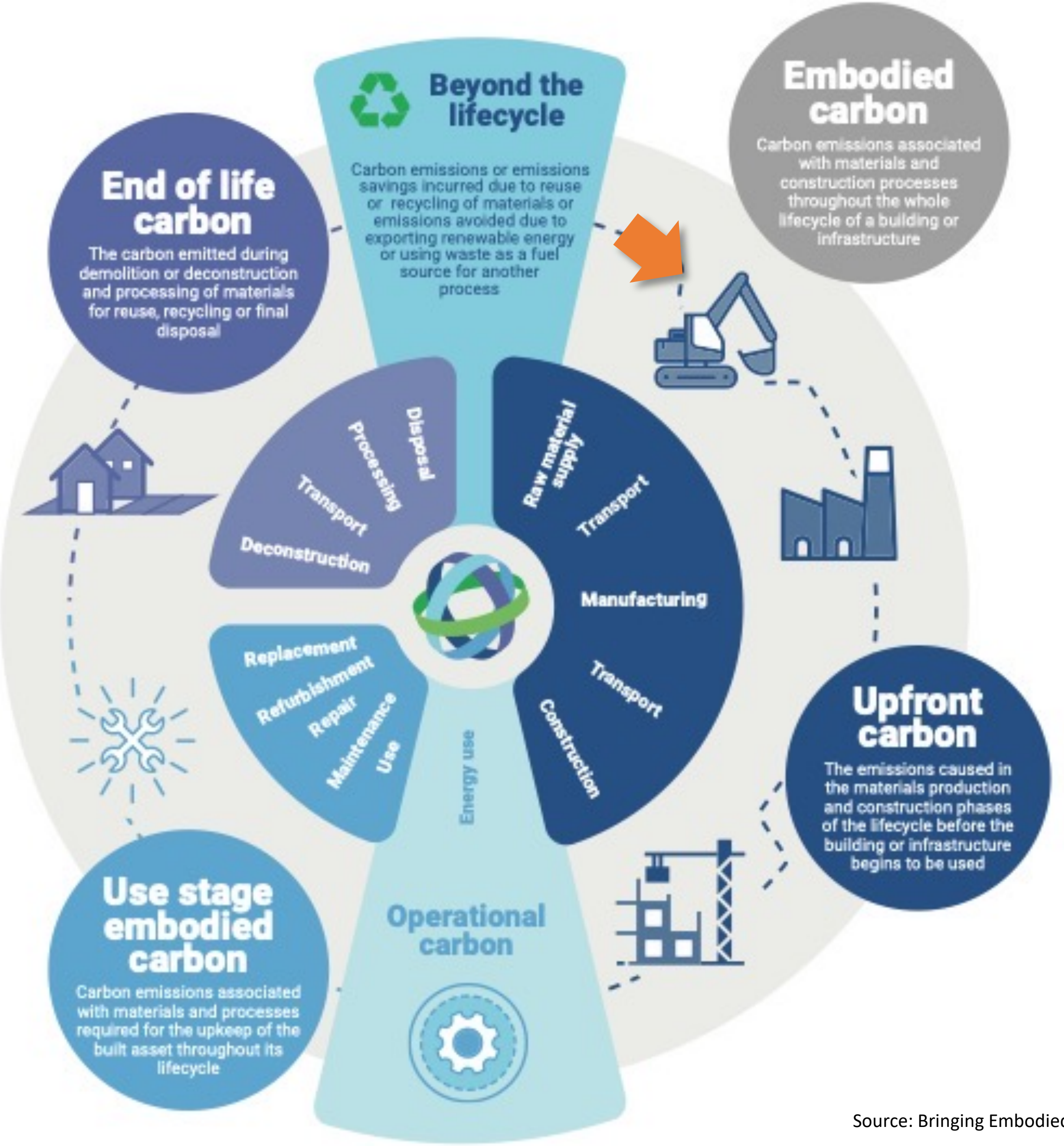


Figure 3: Project lifecycle showing both the scope of the definition and need for whole life consideration.

Source: Bringing Embodied carbon upfront WorldGBC,2019

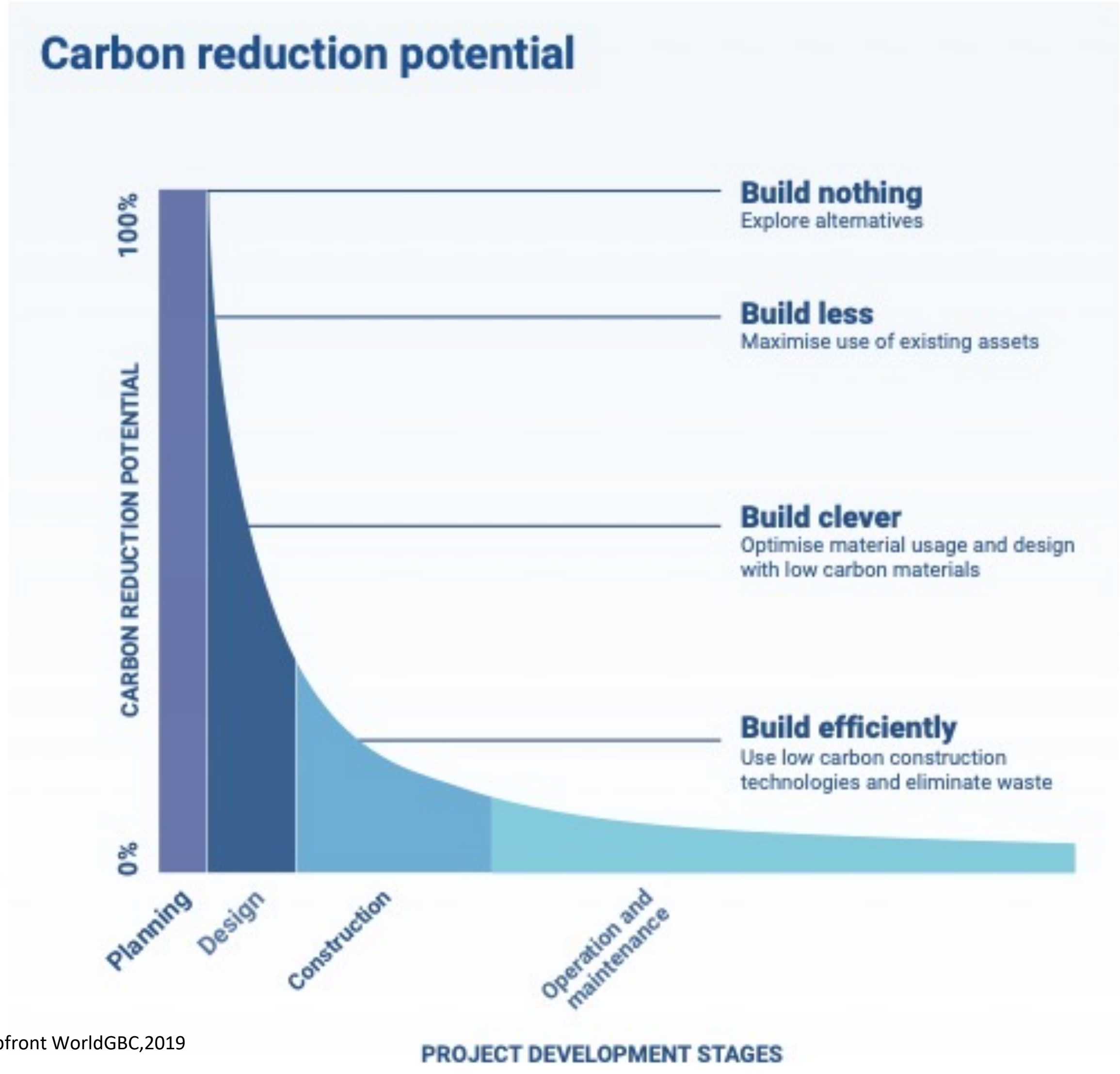
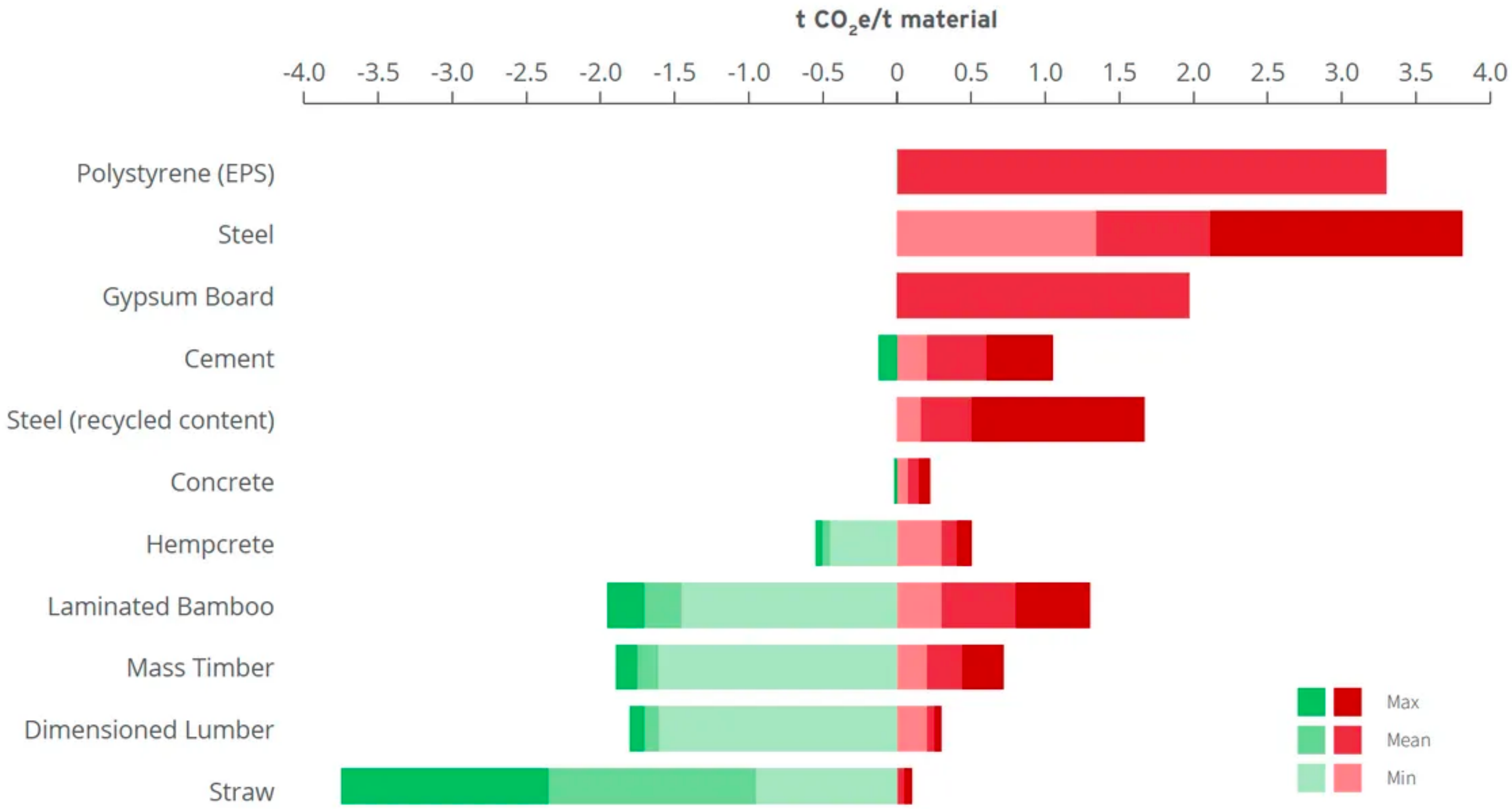


Figure 4: Opportunities to reduce embodied carbon from stage of design process.
Source: HM Treasury: Infrastructure Carbon Review, 2013

CO2e Emission & Storage Capacity of Building Materials



Source: Table S6, Galina Churkina et al., "Buildings as a Global Carbon Sink," Nature *Sustainability*, 2020

Different Structural Elements Often Last Different Lengths Of Time

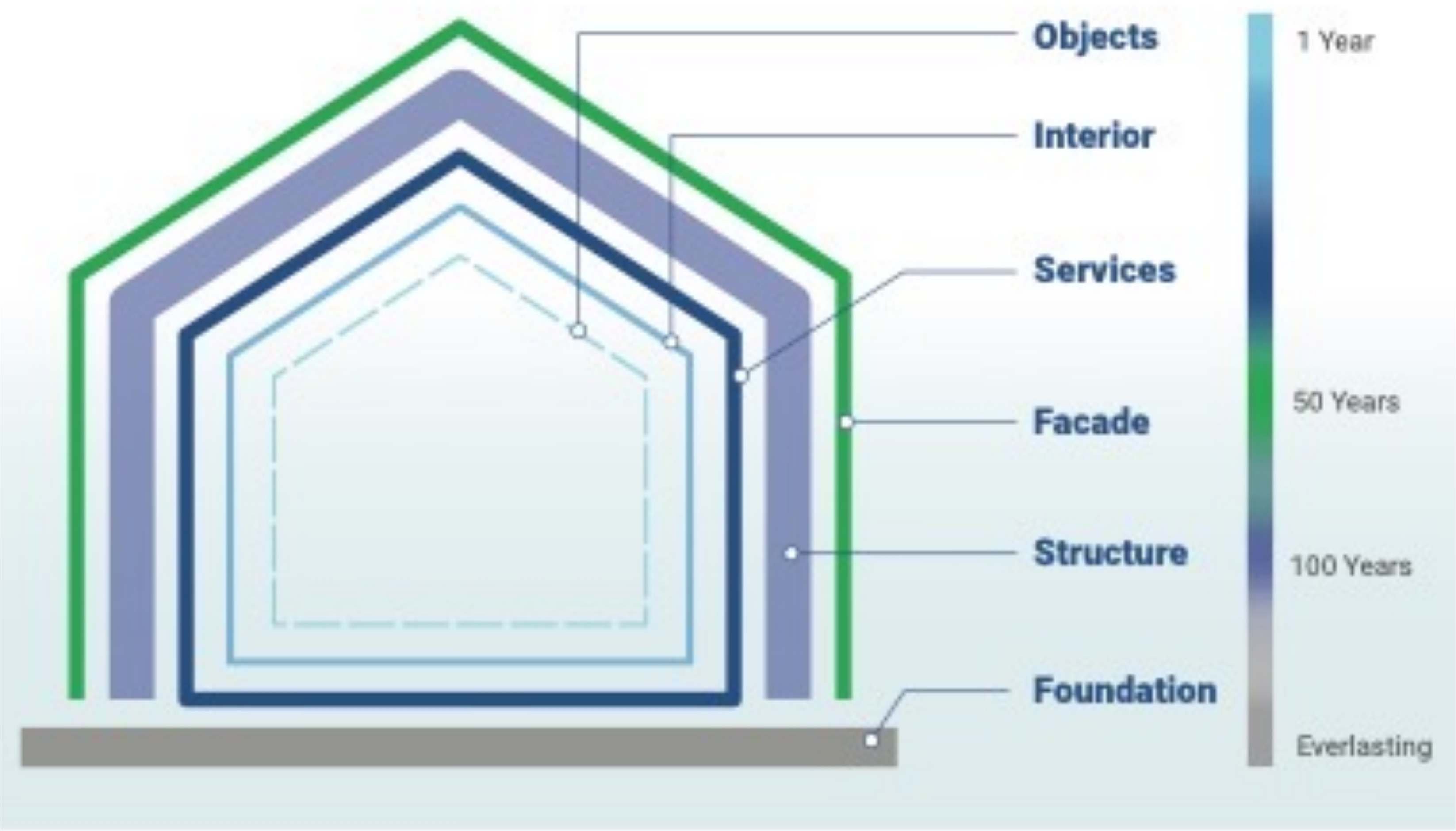


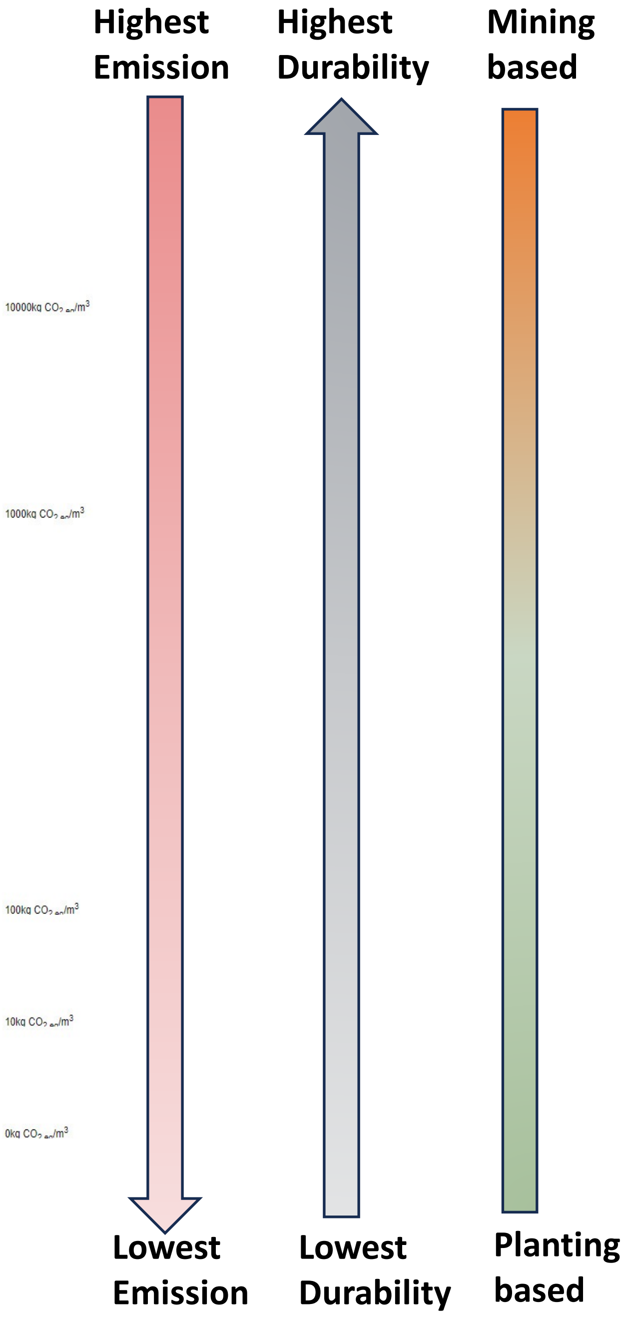
Figure 5: Elements of a building and their typical lifetime, before replacement is needed[14].

Source: Bringing Embodied carbon upfront WorldGBC,2019

Building elements

Building elements such as foundations, frames and other forms of superstructure often represent the biggest contribution to embodied carbon13, not least because of the large volumes of material they use. But, additionally, these elements often contain carbon intensive load bearing structural materials such as steel, concrete and masonry. Facades may also contribute significantly if they utilise large amounts of aluminium and glass, both of which have carbon intensive production processes.

These different structural elements often last different lengths of time (see figure 5) – some require frequent replacement while others have the potential to outlast the asset and be reused.



Global Warming Potential (GWP)

Carbon emissions refer to all emissions of greenhouse gases. Their global warming potential (GWP) is quantified in units of carbon dioxide equivalence. A kilogram of carbon dioxide therefore has a GWP of 1 $kgCO_2e$.

Non conventional Green Materials

Source: https://www.engineeringforchange.org/news/building-sustainability-changing-the-way-we-look-at-construction-materials/

Green Material Characteristic

Characteristic	Technology/Technicalities	Systemic Factors
Renewability	Materials are sourced from renewable resources (e.g., bamboo, cork)	Encourages sustainable supply chains and reduces dependence on non-renewable resources
Recyclability	Materials can be recycled or reused at the end of their life cycle	Supports circular economy principles, reducing waste and resource consumption
Energy Efficiency	Production processes require less energy (e.g., low-energy cement)	Reduces overall energy demand and carbon emissions in the supply chain
Low Embodied Carbon	Materials have a low carbon footprint from production to disposal	Contributes to lower overall building emissions, aligning with climate targets
Durability	Long-lasting materials reduce the need for frequent replacement	Reduces long-term maintenance costs and resource use, enhancing lifecycle sustainability
Non-toxicity	Materials are free from harmful chemicals and pollutants	Ensures healthier indoor environments and minimizes environmental pollution
Local Sourcing	Materials sourced locally reduce transportation emissions	Supports local economies and reduces the environmental impact of transportation
Biodegradability	Materials can naturally decompose without harming the environment	Reduces landfill waste and environmental contamination
Innovation and Adaptability	Advanced technologies enable new material properties and applications	Encourages continuous improvement and adoption of cutting-edge sustainable practices

The Potential of Circularity in Total NetZero Scenario in Indonesia

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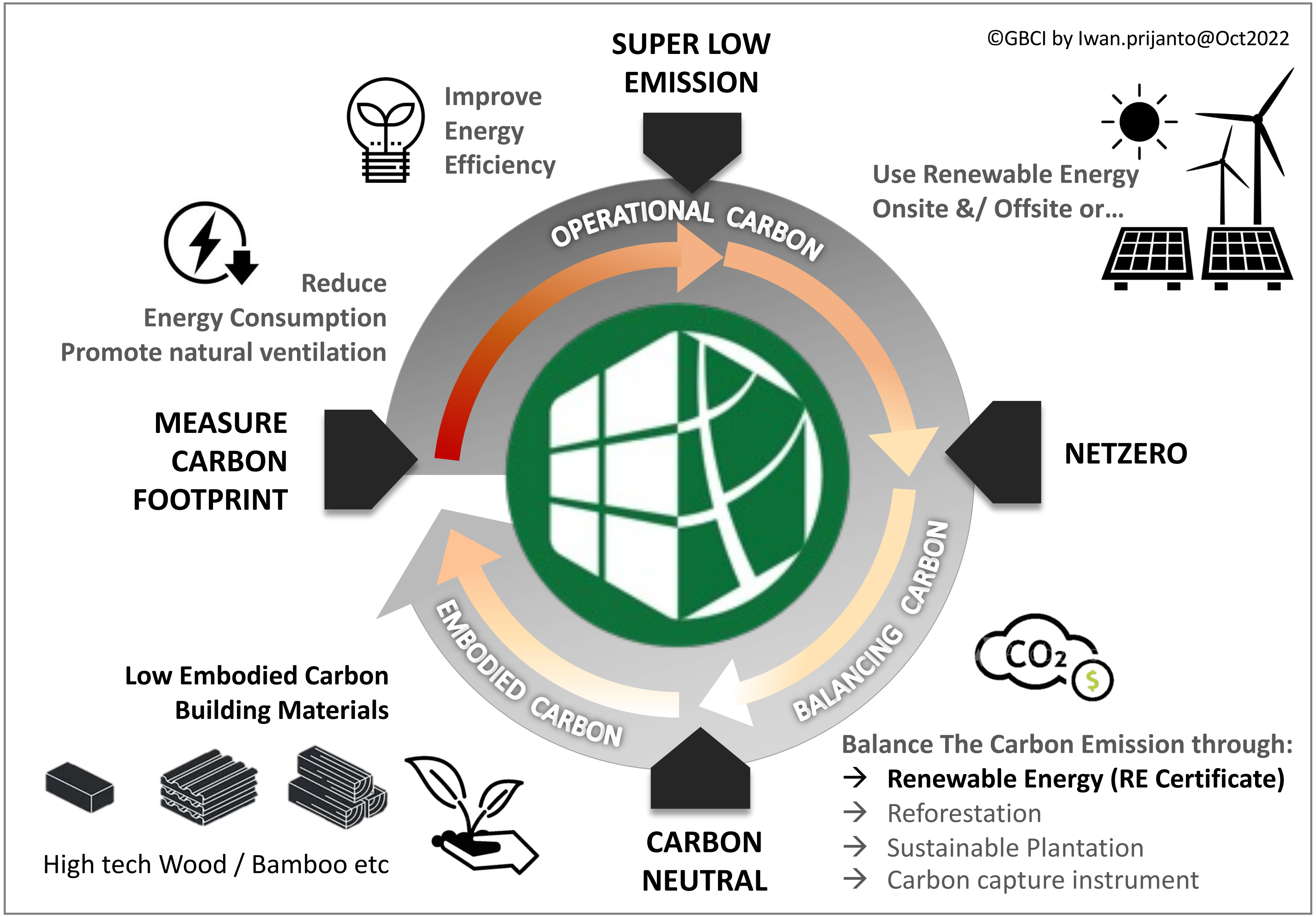

Mid to High-rise didn't have enough roof space for Solar PV

Bedawang Nala, a Nature Based Solution Towards NetZero

This structure serves as the ideal illustration of a nature-based solutions design. using only natural ventilation and using bamboo for the entire roof and building structure. The building has already received Greenship Netzero Ready since the rooftop solar panels already provide almost 20% of its energy needs.

**Bedawang Nala,
Jimbaran Hijau, Bali**

TERIMA KASIH

GREENSHIP

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www.gbcindonesia.org