



Decarbonization & ICMS#3



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Note: This document has been prepared for IFMA's World Workplace Asia Pacific event in Singapore on 23 July 2024. It should be noted that this document represents a summary of the issues addressed and does not constitute advice. The authors makes no representation as to its accuracy or completeness and the information should not be relied upon as such. Although care has been exercised in its preparation, the author accepts no legal responsibility for any loss or damage suffered as a result of any inadvertent inaccuracy. This document reflects the authors' current and personal views only. This document should not be relied upon without seeking, professional advice and obtaining the full version of the publications and sources referred to herein.

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With content from:

 RICS

 IFMA

 ICMS

Additional content and images are courtesy of the ISO, Standards Australia, AIQS, RICS and Autodesk; plus thanks also for the work of the Carbon Cure, IEA, MECLA, WorldGBC and WRI .

World Workplace Asia-Pacific
23-24 July 2024 | Singapore





Basis of today's Decarbonisation session

After


Next ...? It's up to you.

- 2024 July: WWAP'24 Singapore
- 2024 June: ISO/TR 41019 "FM's role in sustainability, resilience and adaptability", 1st edition
- 2023 Sept: RICS' "Whole life carbon assessment for the built environment", 2nd edition
- 2023 May: IFMA's FMCC Singapore event aborted, RLB September webinar in lieu.
- 2023 May: "Decarbonisation of the Built Environment: using ICMS integrated life cycle and carbon emissions reporting" paper for CIB W070 2023, Trondheim, Norway
- 2022: AIQS' "Life Cycle Cost Analysis information paper", 1st edition
- 2021: "International Cost Management Standard (ICMS), Global Consistency in Presenting Construction Life Cycle Costs and Carbon Emissions", 3rd edition
- 2020: RICS' "Cost Prediction, global professional statement", 1st edition
- 2019: "International Construction Measurement Standard (ICMS), Global Consistency in Presenting Construction and Other Life Cycle Costs", 2nd edition
- 2017: "International Construction Measurement Standard (ICMS), Global Consistency in Presenting Construction Costs", 1st edition


Before

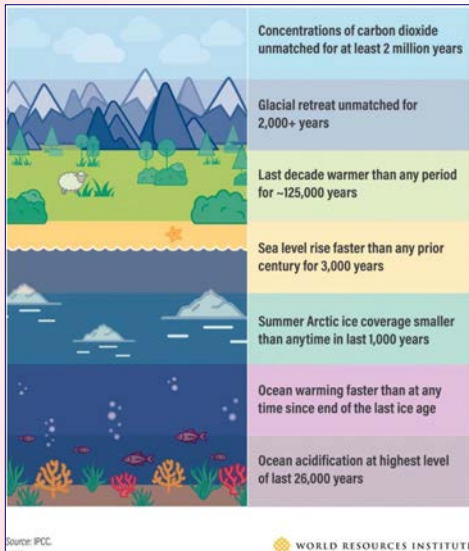
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Understanding the need





Source: IPCC
WORLD RESOURCES INSTITUTE

- “The cumulative scientific evidence is unequivocal: **Climate change** is a threat to human well-being and planetary health. Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and **rapidly closing window of opportunity** to secure a liveable and sustainable future for all”.


UN Certainty Assessment: *very high confidence*

Source: [IPCC - WGII Report: Impacts, Adaptation and Vulnerability, 28 Feb 2022](#)


- Buildings and construction’s 2020 share global energy (**36%**) and carbon emissions (**37%**).

Source: [2021 UNEP Global Status Report for Buildings & Construction](#)

in-touchadvisory.com Source: World Resources Institute based on [IPCC - WGI Report, 5 Aug 2021](#)



Built Environment as a Carbon contributor



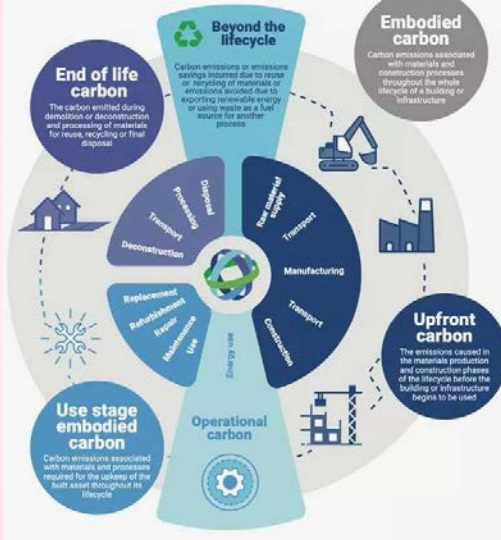
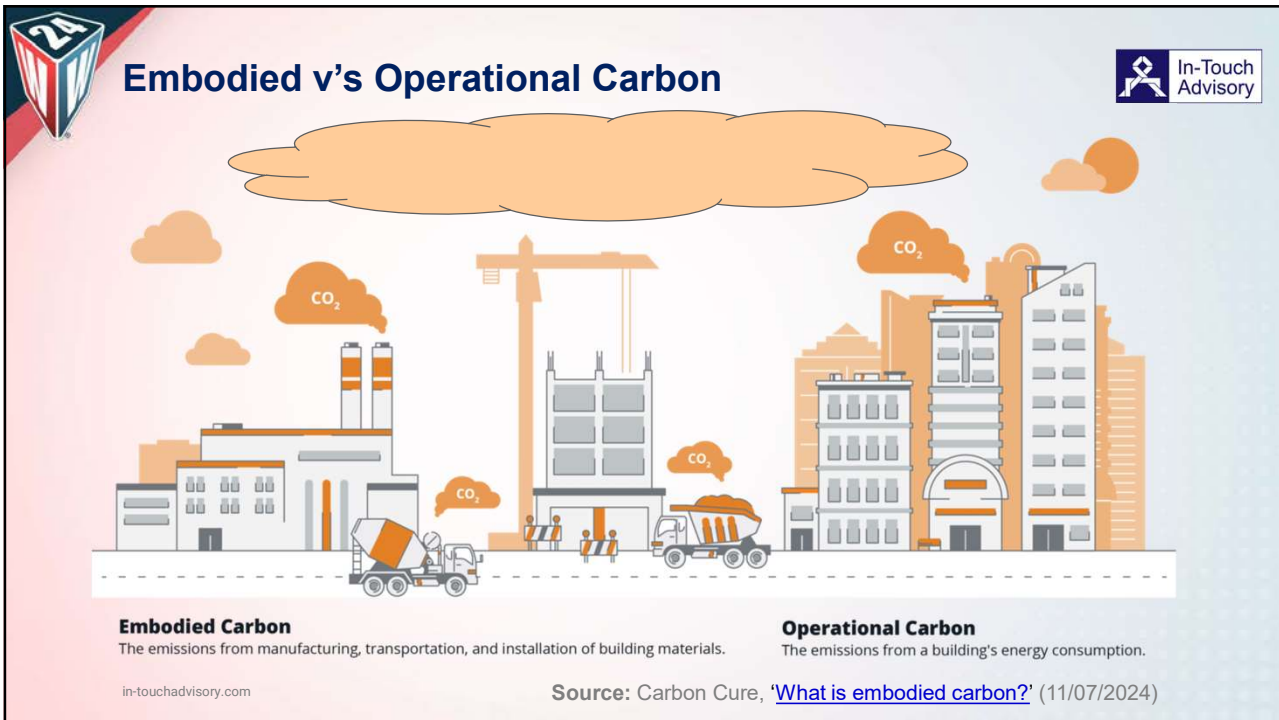
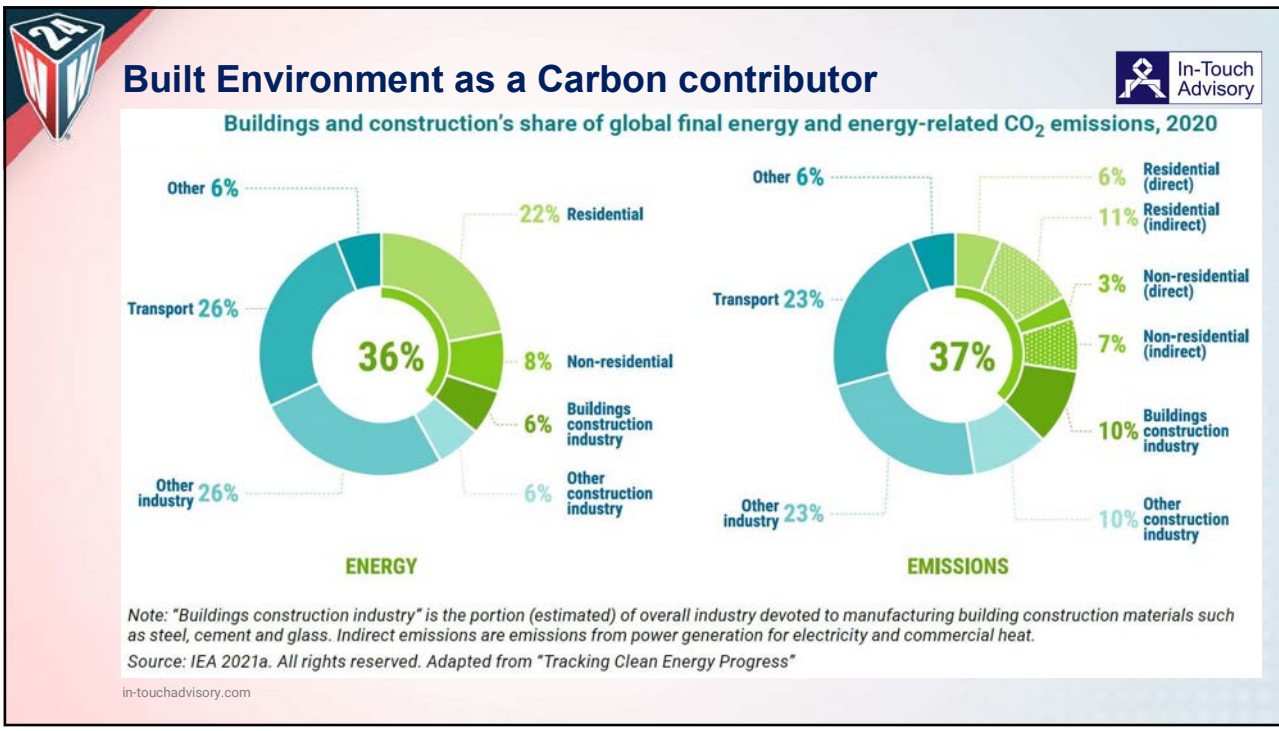



Figure 3: Project lifecycle showing both the scope of the definition and need for whole life consideration.

“**Carbon emissions** released before the building or infrastructure begins to be used, sometimes called **upfront carbon**, will be responsible for half of the entire carbon footprint of new construction between now and 2050, threatening to consume a large part of our remaining carbon budget.


As **operational carbon** is reduced, **embodied carbon** will continue to grow in importance as a proportion of total emissions.” **WorldGBC, 2019**

in-touchadvisory.com Source: [WorldGBC Bringing Embodied Carbon Upfront \(2019\).pdf](#)





The role of integrated reporting




Carbon Vocabulary

Materials and Embodied Carbon Leaders' Alliance (MECLA) is a collaboration of organisations who have come together to drive reductions in embodied carbon in the building and construction industry.

They seek to align with the Paris Agreement targets and principles of the circular economy and recognise that the building and construction sector is a complex ecosystem.


The **MECLA** Dictionary of Carbon
(Prepared on: 17/05/2022)




• COLLABORATION FOR CHANGE •

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Source: [MECLA-2022 Glossary Dictionary of Embodied Carbon.pdf](#)



Embodied v Operational Carbon



Embodied Carbon														
Product		Construction			In use					End of life				Beyond Building
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D
Raw material supply	Material transport	Manufacturing	Product transport	Construction & installation	Use	Maintenance	Repair	Replacement	Refurbishment	Deconstruction/demolition	Material transportation	Waste processing	Disposal	
Upfront Carbon					Operational Carbon					Circular economy				
					Operational energy									
					Operational water									
										Benefits & loads				
										Reuse Recovery Recycling				

Whole-life cycle carbon

Cradle to gate (A1-A5)

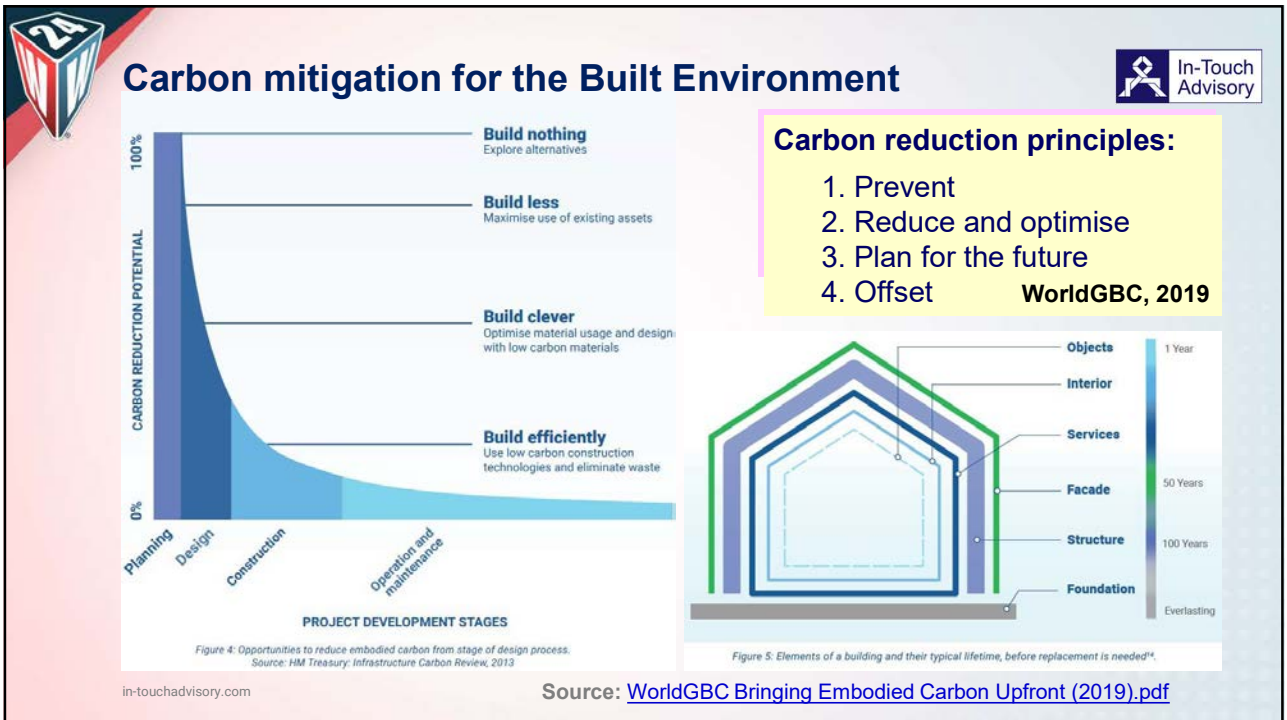
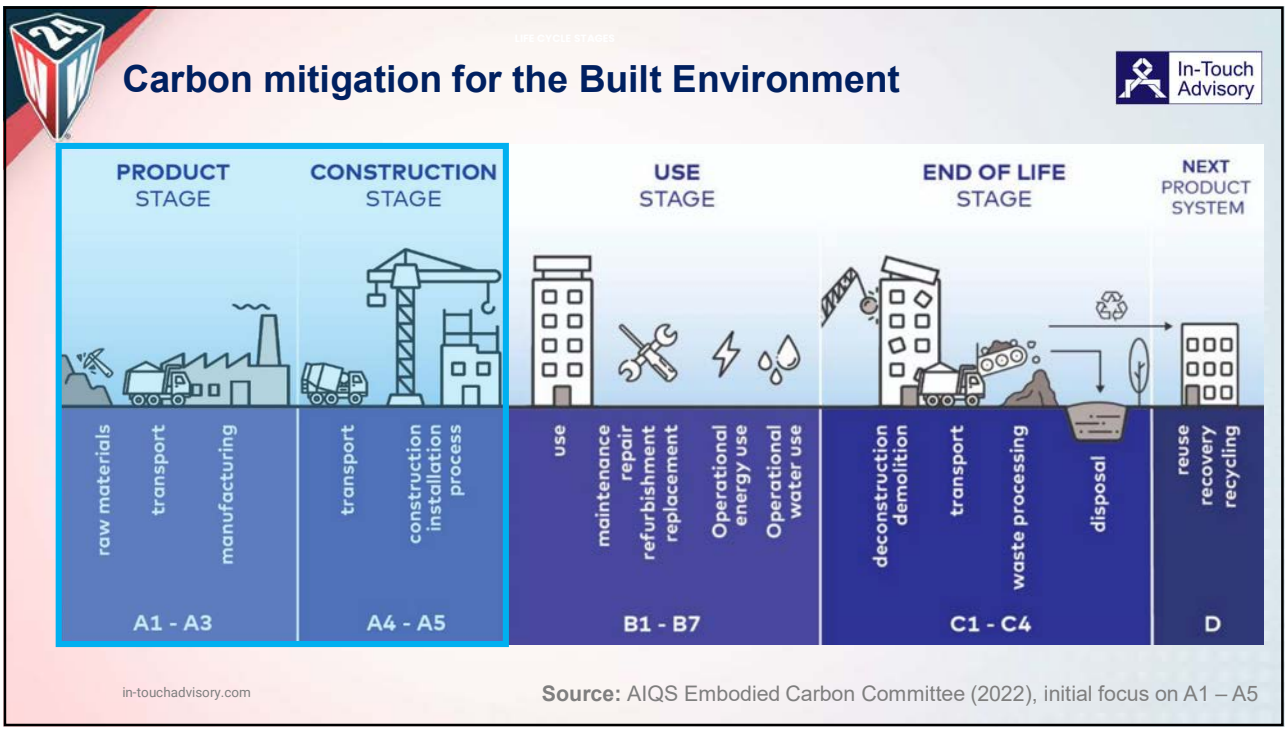
Cradle to practical completion (A1-A5, B1-B5)

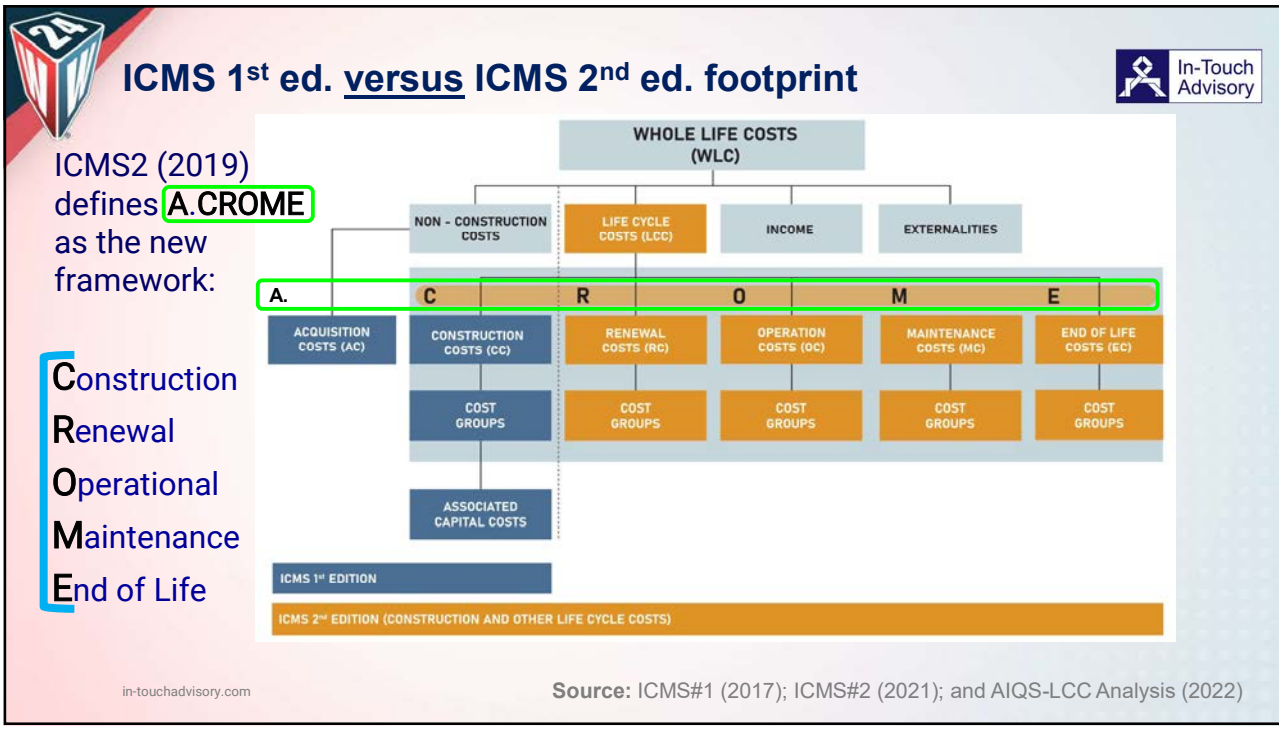
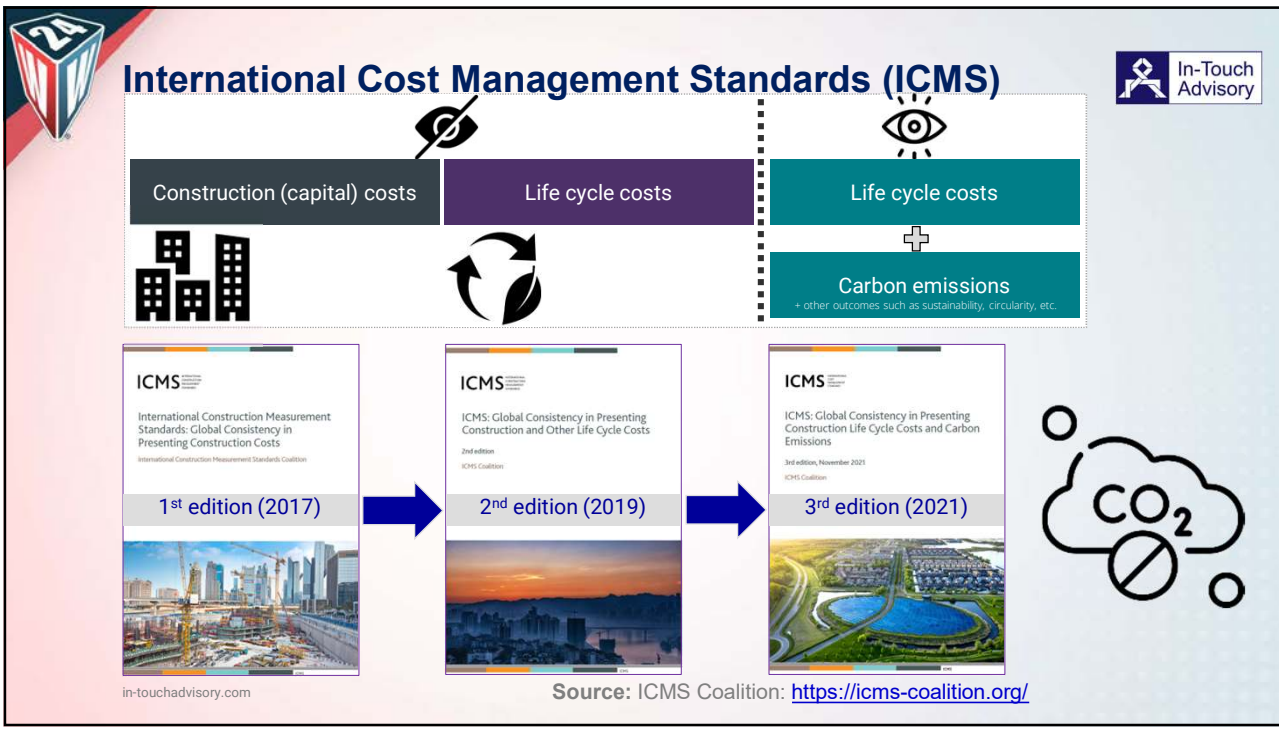
Cradle to grave (A1-A5, B1-B5, C1-C4, D)

Cradle to cradle (A1-A5, B1-B5, C1-C4, D, Reuse/Recovery/Recycling)

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Source: MECLA's Dictionary of Carbon (2022)





C.R.O.M.E. explained

ICMS2 (2019) **CROME** approach as a relationship framework of the significant contributors to the asset / facility life cycle.

☐ **COST** is a powerful communications tool across the influencers.

C	R	O	M	E
CONSTRUCTION COSTS	RENEWAL COSTS	OPERATION COSTS	MAINTENANCE COSTS	END OF LIFE COSTS
DESIGNER		CONSTRUCTOR		FM EXPERT

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Source: ICMS#1 (2017); ICMS#2 (2021); and AIQS-LCC Analysis (2022)

International Cost Management Standards (ICMS3)

Whole Life Cycle Costs and Carbon Emissions

- Non-Construction Costs and Carbon Emissions
- Life Cycle Costs and Carbon Emissions
 - A** Acquisition Costs and Carbon Emissions
 - C** Construction Costs and Carbon Emissions
 - R** Renewal Costs and Carbon Emissions
 - O** Operation Costs and Carbon Emissions
 - M** Maintenance Costs and Carbon Emissions
 - E** End-of-life Costs and Carbon Emissions
- Income
- Externalities



Reporting Groups and Reporting Sub-Groups are shown for each category.

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Source: ICMS#3 (2021)

ICMS 3rd ed. (ICMS3) provides a "high-level taxonomy and format for classifying, defining, measuring, recording, analysing and presenting life cycle costs and carbon emissions associated with built assets"

Measurement of Costs & Carbon Emissions

CAPITAL COST ESTIMATING

Description	Quantity	Unit	Cost Rate	Total
32 MPa concrete to suspended slab and beams	10	m3	\$500 /m3	\$5,000.00



Key substitution: Unit \$ cost rate, with CO2e factor

CARBON EMISSIONS

Description	Quantity	Unit	Carbon Rate	Total
32 MPa concrete to suspended slab and beams	10	m3	0.22 t CO2e /m3	2.20 t CO2e

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Presentation of Carbon Emissions (one example only)

EC3

Find & Compare Materials

- ▶ Concrete
- ▶ Masonry
- ▶ Steel
- ▶ Aluminium
- ▶ Wood
- ▶ Sheathing
- ▶ Thermal/Moisture Prot.
- ▶ Cladding
- ▶ Openings
- ▶ Finishes
- ▶ Network Infrastructure
- ▶ Asphalt
- ▶ Manufacturing Inputs
- ▶ Plan & Compare Buildings
- ▶ Level Bids
- ▶ Manage Data
- ▶ User Groups
- ▶ Organizations
- ▶ How to get an EPD
- ▶ Methodology

Our partners

AUTODESK

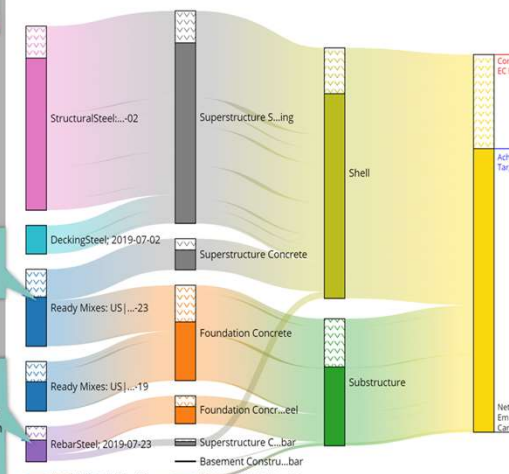
Simple visualizations of available reductions based on current supply chain

Locally produced rebar

30% reduction possible in concretes

Large variance in emissions of rebar based on manufacturing location

GWP SAVINGS OPPORTUNITIES



EC Intensity: 18.6 kgCO2e / m2

Conservative Embodied Carbon Baseline: 3.04M kgCO2e

Achievable Embodied Carbon Target: 25% reduction

Net Zero Embodied Carbon

Source: autodesk.com.au & building-transparency.org

Singapore Initiatives

SG GREEN PLAN ABOUT KEY PILLARS KEY ENABLERS TAKE ACTION LATEST NEWS RESOURCES CONTACT US

City in Nature
Energy Reset
Green Economy
Resilient Future
Sustainable Living

City of Green Possibilities

What Is The Singapore Green Plan 2030?

The Singapore Green Plan 2030, or the Green Plan, is a whole-of-nation movement to advance Singapore's national agenda on sustainable development.

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2024

SG GREEN PLAN

The Singapore Green Plan 2030 is our national sustainability movement, positioning us to achieve our target of net zero emissions by 2050. It is a living plan which continues to evolve. Here are the key updates and initiatives announced by our Green Plan Ministries during the Committee of Supply 2024.

[GreenPlan.gov.sg](https://www.greenplan.gov.sg)

JOINTLY LED BY

Source: [Singapore Green Plan 2030](https://www.greenplan.gov.sg)

Australian Update – Infrastructure NSW

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Decarbonising Infrastructure Delivery

Expert Advice

- Expert Advice
- Strategic Infrastructure Review
- State Infrastructure Strategy
- Decarbonising Infrastructure Delivery**
- Infrastructure Digitalisation Roadmap
- State Infrastructure Plan
- Information on Infrastructure Projects
- Cost Control Framework

Decarbonising Infrastructure Delivery Policy and Measurement Guidance

[Download Policy](#) [Download Measurement Guidance](#)

Source: [Decarbonising Infrastructure Delivery | Infrastructure NSW](https://www.infrastructure.nsw.gov.au)



Australian Update – Infrastructure NSW





February 2022




December 2022






April 2024

Source: [Decarbonising Infrastructure Delivery | Infrastructure NSW](#)



April 2024 Technical Guidance

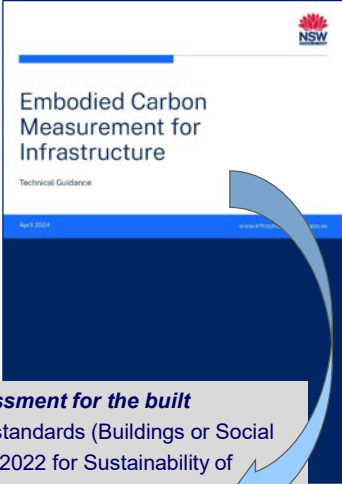


NSW for Transport's key targets include:


- 100% renewable energy for all operational electricity for the rail, light rail and metro train network by 2025 (currently at about 98%).
- 50% of light passenger vehicle fleet transitioning to all-electric by 2026.
- 100% of light passenger vehicle fleet transitioning to all-electric by 2030.
- 65% reduction operational emissions by 2030 (compared to 2018-19).
- Net Zero in their operational and fleet emissions by 2035.
- Fossil fuel-free Transport construction and maintenance by 2040.
- Net Zero in annual embodied emissions by 2045.
- Net Zero in transport sector emissions by 2050, negative by 2060

Page 9: "This Guide is also largely aligned with the *RICS Whole life carbon assessment for the built environment standard*, which uses these same underlying life cycle assessment standards (Buildings or Social Infrastructure – EN 15978:2011; and Civil (or economic) Infrastructure – EN 17472:2022 for Sustainability of construction works).


RICS' document provides detailed guidance for buildings, and for assessing broader embodied carbon emissions".



Source: [Decarbonising Infrastructure Delivery | Infrastructure NSW](#)



Australian Update – Mandatory Disclosure



As at March 2024, the **Australian Treasury** concluded its public consultation outlining the proposed phased implementation of **mandatory climate-related disclosures in Australia** for all entities (subject to size thresholds) preparing annual reports under the Corporations Act. This would see Australia implement new requirements consistent with other comparable jurisdictions internationally.

Treasury has proposed a phased approach to the reporting requirements based on an entity’s size or level of emissions. The first group is required to report on financial years commencing on or after 1 July 2024.

The proposed timeline for mandatory reporting is as per this table.

The **NSW Climate Change (Net Zero Future) Act 2023 No. 48** has been passed for progressive implementation commencing on 1 July 2024. This mandatory sustainability reporting reflects the state’s whole-of-government climate action for net zero by 2050.

First annual reporting periods starting on or after	Large entities and their controlled entities meeting at least two of three criteria:			National Greenhouse and Energy Reporting (NGER) Reporters	Asset Owners
	Consolidated revenue	EOFY consolidated gross assets	EOFY employees		
1 July 2024 Group 1	\$500 million or more	\$1 billion or more	500 or more	Above NGER publication threshold	N/A
1 July 2026 Group 2	\$200 million or more	\$500 million or more	250 or more	All other NGER reporters	\$5 billion assets under management or more
1 July 2027 Group 3	\$50 million or more	\$25 million or more	100 or more	N/A	N/A

Source: Treasury c2024-466491-policy-statement: Mandatory climate-related financial disclosures (treasury.gov.au)

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IFMA’s Building Decarbonization Resources



ESG + FM
Building Decarbonization Resources
ESG Reporting Activity
SFP Credential

Building Decarbonization Resources

Overview & Awareness ↓

References & Tools ↓

Decarbonization Guides & Roadmaps ↓

Policy & Initiatives ↓

Frameworks ↓

Forums & Blogs ↓



Includes materials and links for the USGBC, Deloitte, ARC, US Dept. of Energy, New Building Institute, Worthen Foundation, ASHRAE, Planon & Schneider Electric, IMT, Nareit, ecoact, NUPC, US Environmental Protection Agency, Node Collective; **plus** Forums & Blogs, and redirects to the IFMA Knowledge Library for members.

in-touchadvisory.com **Source:** IFMA’s online resources - <https://pages.ifma.org/decarbonization>



Whole Life Carbon Assessment

RICS Professional Standard

RICS' whole life carbon assessment (WLCA) is set to become the **world-leading standard for consistent and accurate carbon measurement in the built environment.**

This **220 page 2nd edition** builds upon the success of the existing WLCA standard ready for 2024, having **extended to cover all buildings and infrastructure** throughout the built environment life cycle.

Based on the carbon cost of different design choices, the standard aims to **help manage carbon budgets, reduce lifetime emissions and deliver a net-zero.**






Scan for a copy.



Global
2nd edition, September 2023
Version 2, November 2023
Effective from 1 July 2024

RICS

Source: RICS' "Whole life carbon assessment for the built environment", 2nd ed (2023)




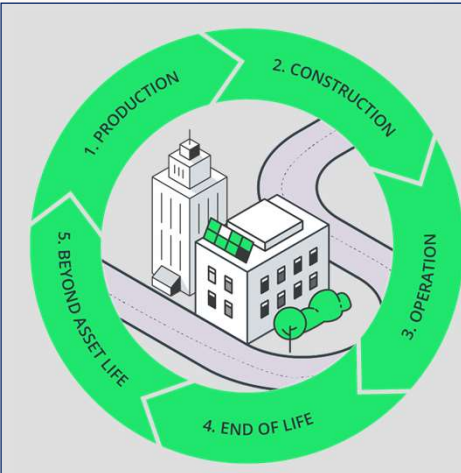
Whole Life Carbon Assessment

Methodology

Calculating and reporting carbon emissions over the life cycle of built assets / facilities through an assessment based on six key principles:

- Comprehensive
- Data-driven
- Consistent
- Practical
- Aligned
- Integrated







- 1. Production**
 - raw material extraction
 - manufacturing
 - transportation
- 2. Construction**
 - transportation
 - assembly
 - installation
- 3. Operation**
 - use
 - repair & maintenance
 - renewal
- 4. End of life**
 - deconstruction
 - waste processing
 - disposal
- 5. Beyond asset life potential for:**
 - reuse
 - recycling
 - energy recovery

With alignment to ISO 21930:2017, ISO 21931-1:2022 and ISO 21931-2:2019 for Sustainability in Buildings and Civil Engineering Works.

Source: RICS' "Whole life carbon assessment for the built environment", 2nd ed (2023)




Whole Life Carbon Assessment




Outcomes


- ✓ Estimate the amount of carbon emitted throughout the life cycle of a constructed asset, from the early stages of development through to the end of life.
- ✓ Carbon classification by embodied carbon, operational carbon, and user carbon, something that is vital to carbon calculations.
- ✓ Deliver against both government and client targets for the measurement of embodied carbon, net-zero buildings and infrastructure.
- ✓ Meet expectations measuring and managing carbon emissions in a reliable and consistent manner.
- ✓ Take a long-term view of cost and carbon throughout the asset's life cycle, promoting sustainable and low-carbon building and infrastructure investments.



in-touchadvisory.com Source: RICS' "Whole life carbon assessment for the built environment", 2nd ed (2023)



Whole Life Carbon Assessment

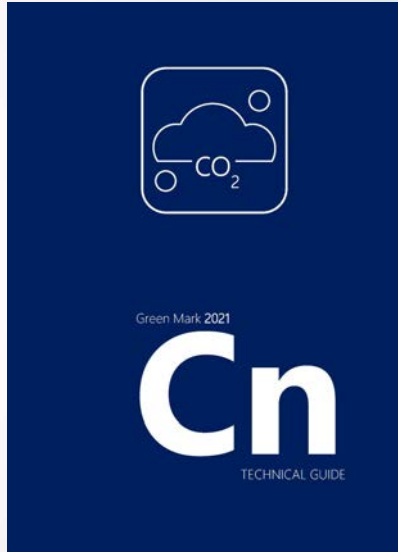


SINGAPORE GreenMark

2nd edition (01/01/2024)

Page 6: "Whole Life carbon (WLC) assessment guidance is consistent with BS EN 15978 and BS EN 15804 and to be read in conjunction with **RICS Professional Statement (PS): Whole Life Carbon assessment for the built environment, with adaptation to the local context....**


.... The **RICS PS** serves as a guide to the practical implementation of the **BS EN 15978** principles, which sets out technical details and calculation requirements, with adaptation to the local context in this document"




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ISO/TC 267 is responsible for the ISO 41000 series of FM Standards, current ISO on FM status: [click here](#)



ISO 41000 series of FM standards



P U B L I S H E D	<p>ISO 41001:2018 Facility management — Management systems — Requirements with guidance for use</p> <p>ISO 41001:2018/Amd 1:2024 Facility management — Management systems — Requirements with guidance for use — Amendment 1: Climate action changes</p> <p>ISO 41011:2024 Facility management — Vocabulary</p> <p>ISO 41012:2017 Facility management — Guidance on strategic sourcing and the development of agreements</p> <p>ISO/TR 41013:2017 Facility management — Scope, key concepts and benefits</p> <p>ISO 41014:2020 Facility management — Development of a facility management strategy</p> <p>ISO 41015:2023 Facility management — Influencing organizational behaviours for improved facility outcomes</p> <p>ISO/TR 41016:2024 Facility management — Overview of available technologies</p> <p>ISO 41017:2024 Facility management — Guidance on emergency preparedness and management of an epidemic</p> <p>ISO 41018:2022 Facility management — Development of a facility management policy</p> <p>ISO/TR 41019:2024 Facility management's role in sustainability, resilience and adaptability</p> <p>ISO/TR 41030:2024 Facility management — Existing performance management in facility management organizations — State of the industry</p>	UNDER DEVELOPMENT
	<p>ISO/AWI 41001 Facility management — Management systems — Requirements with guidance for use</p> <p>ISO/AWI 41002 Facility management — Development of the facility management organization</p> <p>ISO/AWI 41012 Facility management — Guidance on strategic sourcing and the development of agreements</p>	

CONGRATS SINGAPORE

releasing SS ISO 41001:2024

Source: ISO/TC 267 (2024-07-23) <https://www.iso.org/committee/652901/x/catalogue/p/1/u/0/w/0/d/0>

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ISO/TR 41019:2024





“Facility Management’s role in sustainability, resilience and adaptability”

An ISO technical report intended to provide concise and practical guidance for FM professionals and organizations that wish to:

- establish and improve a sustainable integrated FM system;
- embrace the wide-ranging and positive contribution that FM makes in managing the built environment;
- support the United Nations (UN) Sustainable Development Goals ([SDGs](#)).

Source: ISO/TR 41019:2024 published on 26 June – <https://www.iso.org/standard/68175.html>

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ISO/TR 41019:2024





Source: ISO/TR 41019:2024 and <https://sdgs.un.org/goals>

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“Sustainable development
 meets the needs of the
 present without
 compromising the ability
 of future generations to
 meet their own needs”

Gro Harlem Brundtland (1987)

Norwegian Prime Minister (1981, 1986–89, and 1990–96)
 World Health Organization’s Director-General (1998-2003)
 UN Special Envoy on Climate Change (2007-2010)
 Chair / Author, the UN’s Our Common Future,
 also known as the Brundtland Report, October 1987



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**Thank you &
 Questions**

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