University of Strathclyde Glasgow

Knowledge share

Embodied carbon

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29.05.24

These slides can be downloaded from jannikgiesekam.co.uk

Agenda

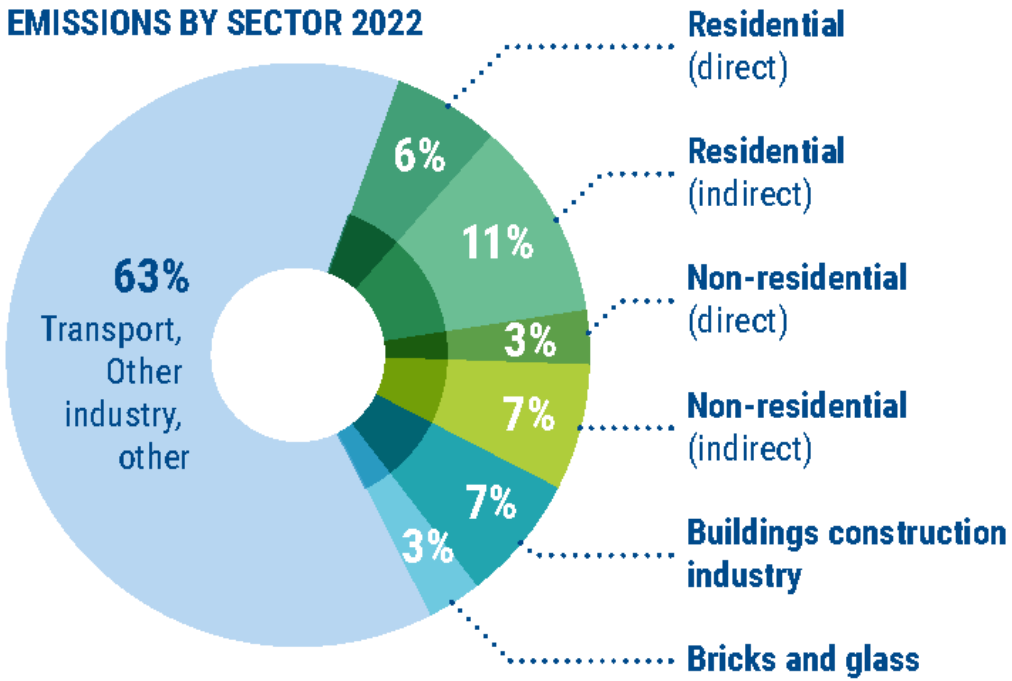
- What is embodied carbon?
- How do you assess it?
- What can local authorities do about it?
- How does the UK compare internationally?
- Will we end up with national regulations?
- How can I stay abreast of developments?

These slides can be downloaded from jannikgiesekam.co.uk

WHAT IS EMBODIED CARBON?

Terminology, guidance & trends

Global energy & process CO_2 emissions



27% operational carbon

10% embodied carbon
(of main construction materials)

63% everything else
(including some embodied carbon)

UNEP/GABC 2024 Global Status Report for Buildings & Construction

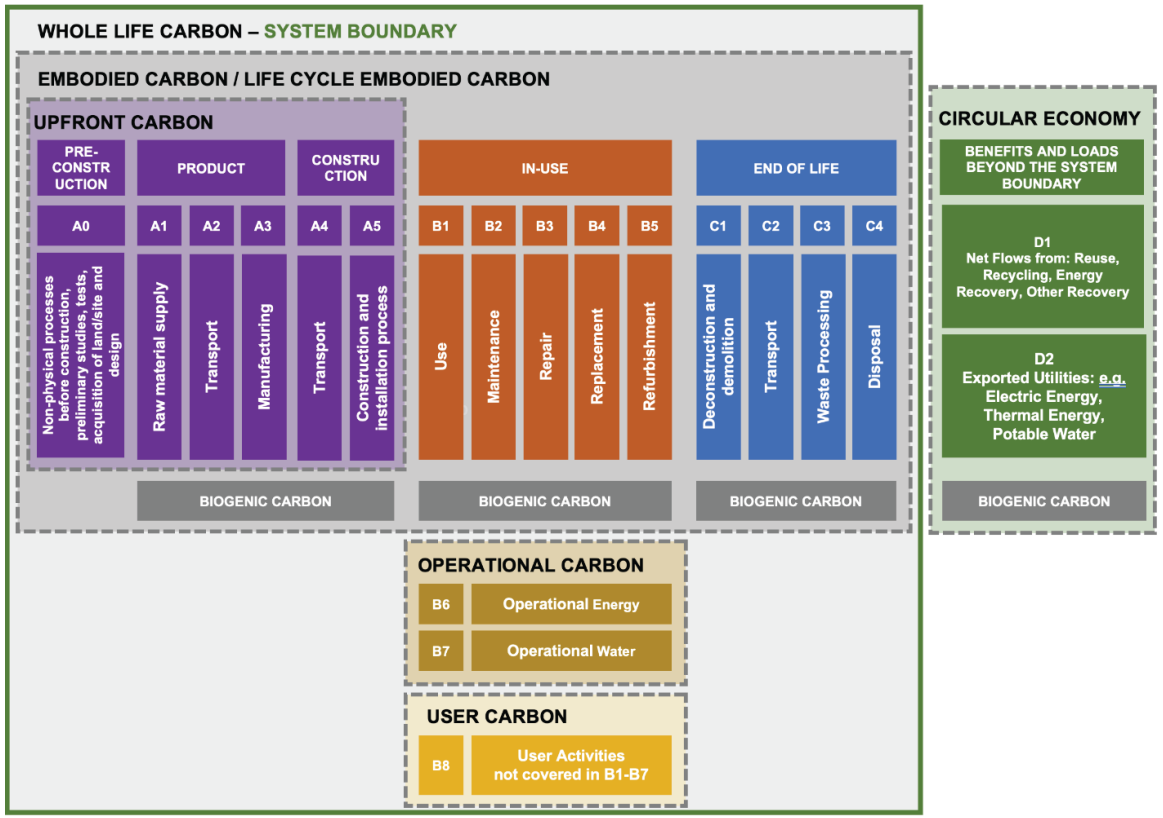
Improving Consistency in Whole Life Carbon Assessment and Reporting

Carbon Definitions for the Built Environment, Buildings & Infrastructure

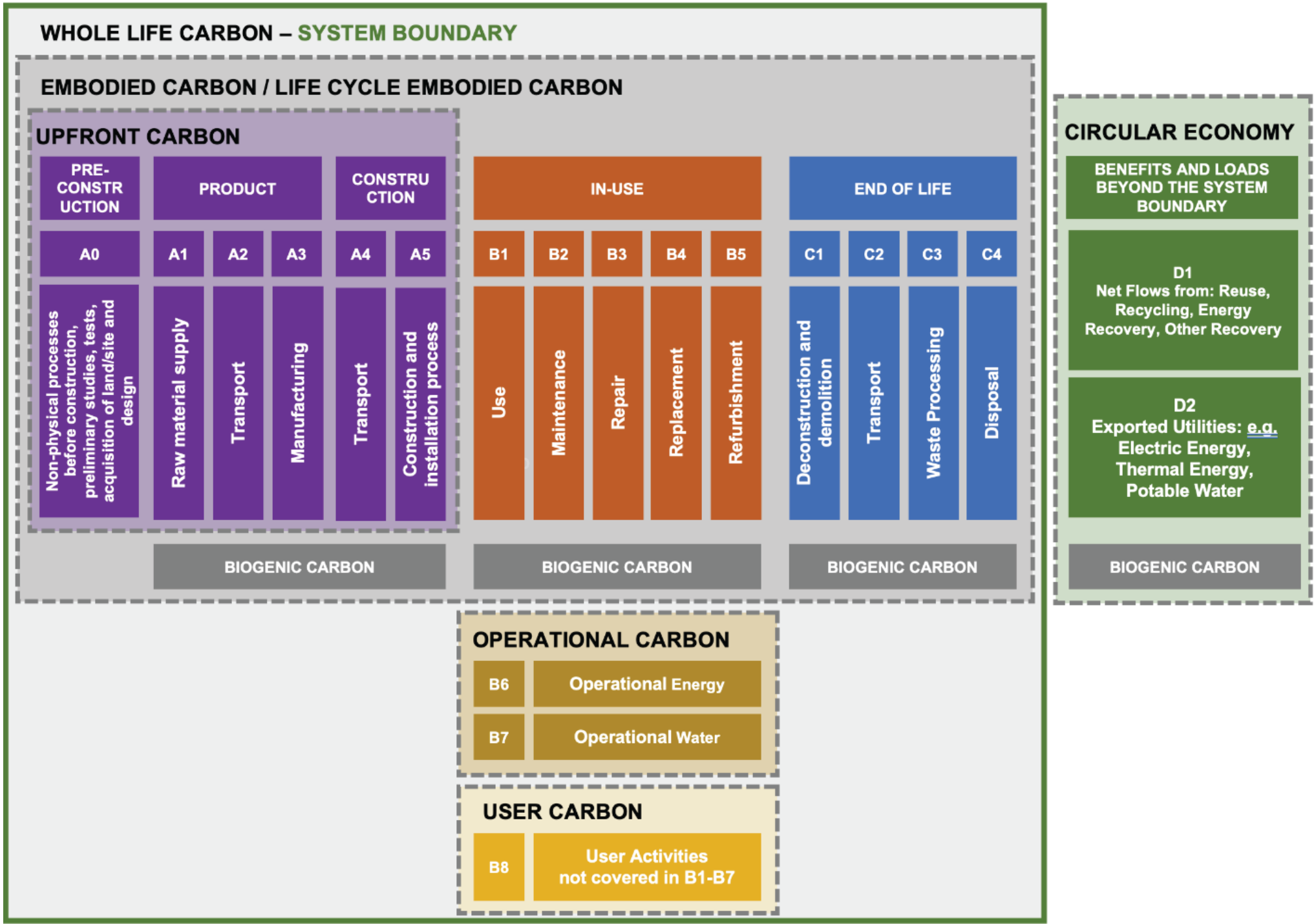
For inclusion in the update of the RICS Professional Statement: 'Whole life carbon assessment for the built environment'- 2023

January 2023

Definitions



WLCN et al. (2023) Carbon definitions for the built environment


WHOLE LIFE CARBON – SYSTEM BOUNDARY
EMBODIED CARBON / LIFE CYCLE EMBODIED CARBON
UPFRONT CARBON
PRE-CONSTRUCTION
PRODUCT
CONSTRUCTION
IN-USE
END OF LIFE
A0
A1
A2
A3
A4
A5
B1
B2
B3
B4
B5
C1
C2
C3
C4
Non-physical processes before construction, preliminary studies, tests, acquisition of land/site and design
Raw material supply
Transport
Manufacturing
Transport
Construction and installation process
Use
Maintenance
Repair
Replacement
Refurbishment
Deconstruction and demolition
Transport
Waste Processing
Disposal
BIOGENIC CARBON
BIOGENIC CARBON
BIOGENIC CARBON
OPERATIONAL CARBON
B6
Operational Energy
B7
Operational Water
USER CARBON
B8
User Activities not covered in B1-B7
CIRCULAR ECONOMY
BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
D1
Net Flows from: Reuse, Recycling, Energy Recovery, Other Recovery
D2
Exported Utilities: e.g. Electric Energy, Thermal Energy, Potable Water
BIOGENIC CARBON

UK's carbon footprint

25%

Other sectors of UK economy

Whole-life carbon in the built environment

Embodied carbon

Products

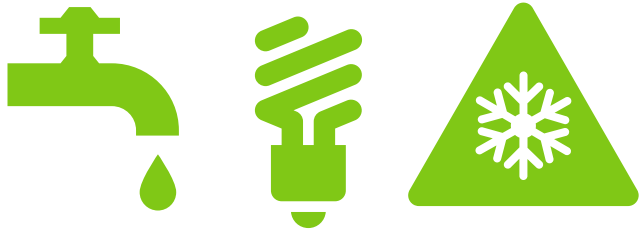
Construction

Maintenance

End-of-life

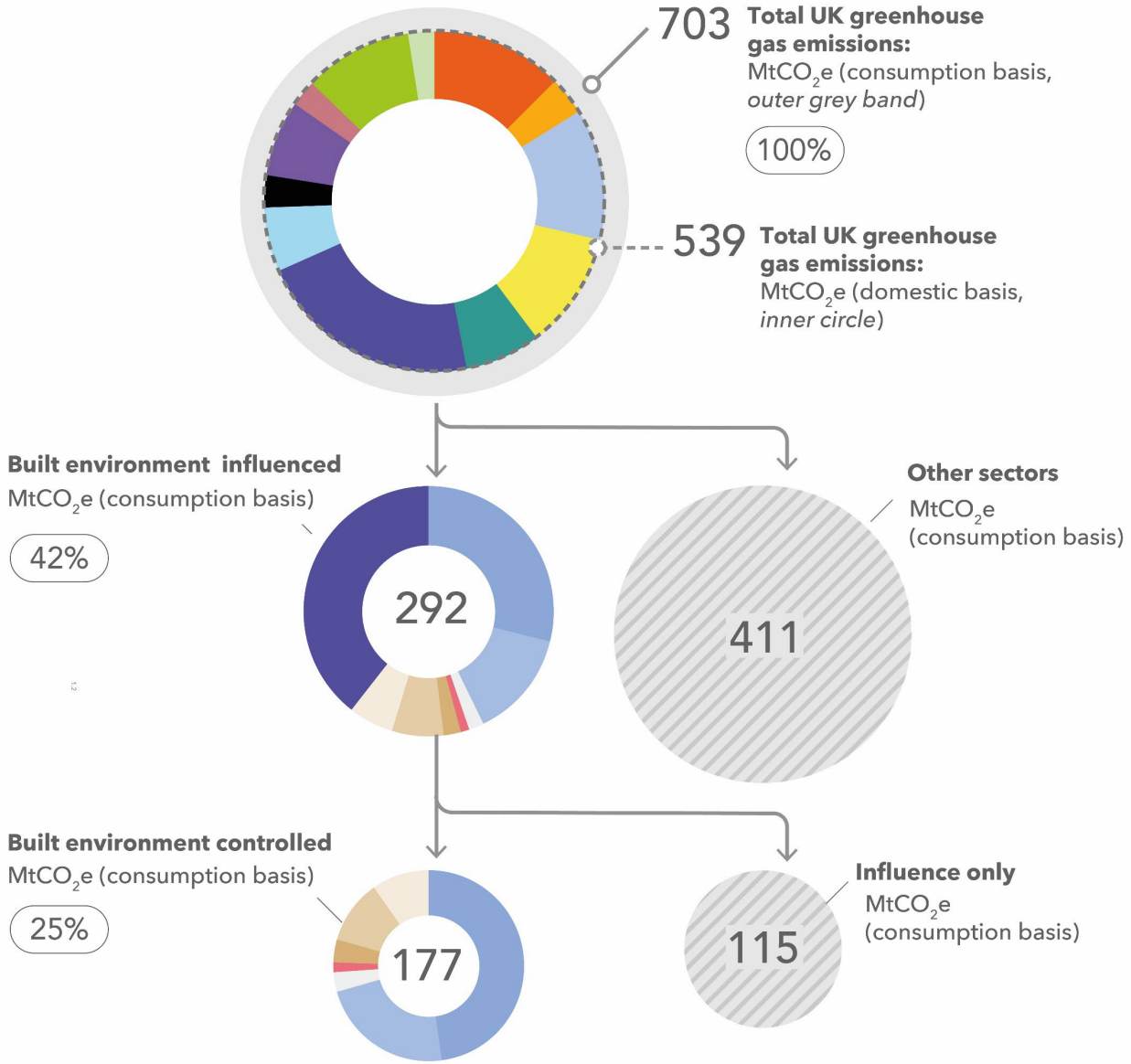
Operational carbon

Power, heating, cooling, water



Estimate from the UKGBC Net Zero Whole Life Carbon Roadmap for the Built Environment

Total UK GHG emissions (2018 CCC Data) showing proportion of Built Environment emissions



CCC SECTORS (TOP CIRCLE)

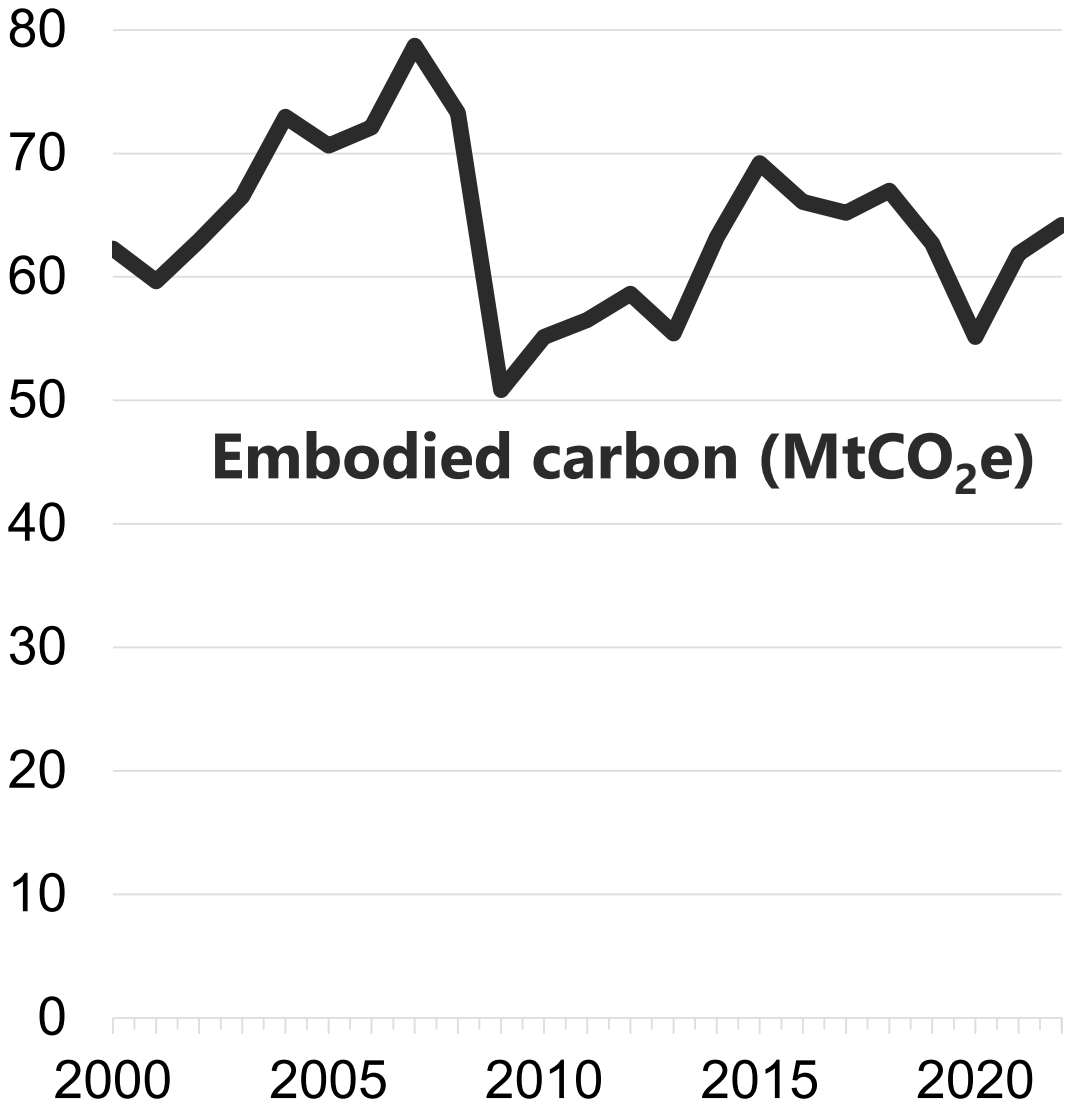
- Residential buildings
- Non-residential buildings
- Manufacturing & construction
- Electricity supply
- Fuel supply
- Surface transport
- Waste
- F-gases
- Aviation
- Shipping
- Agriculture
- Land Use, Land-Use Change & Forestry

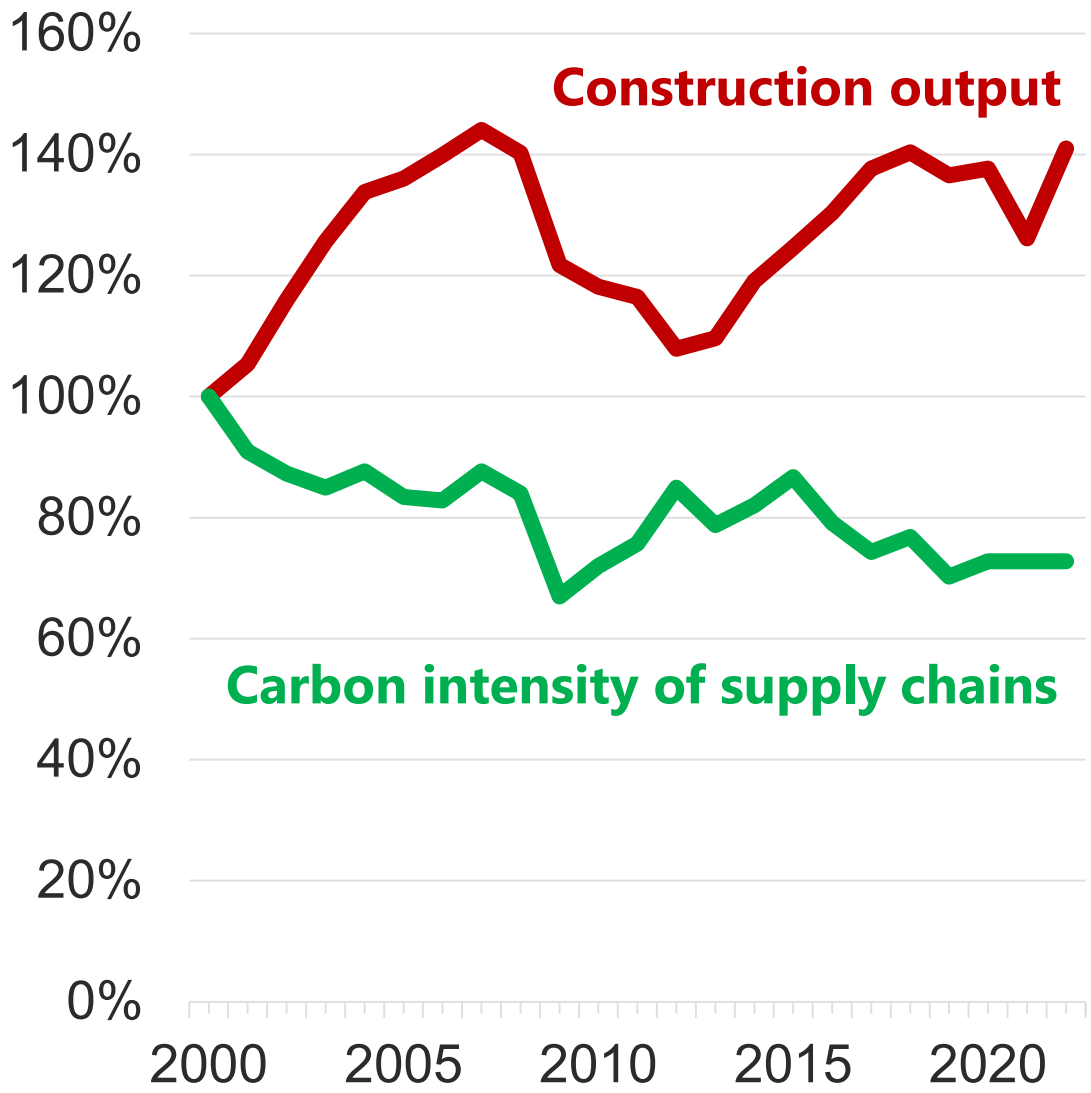
BUILT ENVIRONMENT SECTORS

- Buildings (Non Domestic) Embodied Carbon
- Buildings (Domestic) Embodied Carbon
- Infrastructure Embodied Carbon
- Infrastructure Operational carbon
- Buildings F-Gas
- Buildings (Non-domestic) Operational Carbon
- Buildings (Domestic) Operational Carbon
- Surface transport

UKGBC (2021) Net Zero Whole Life Carbon Roadmap

UK built environment trends





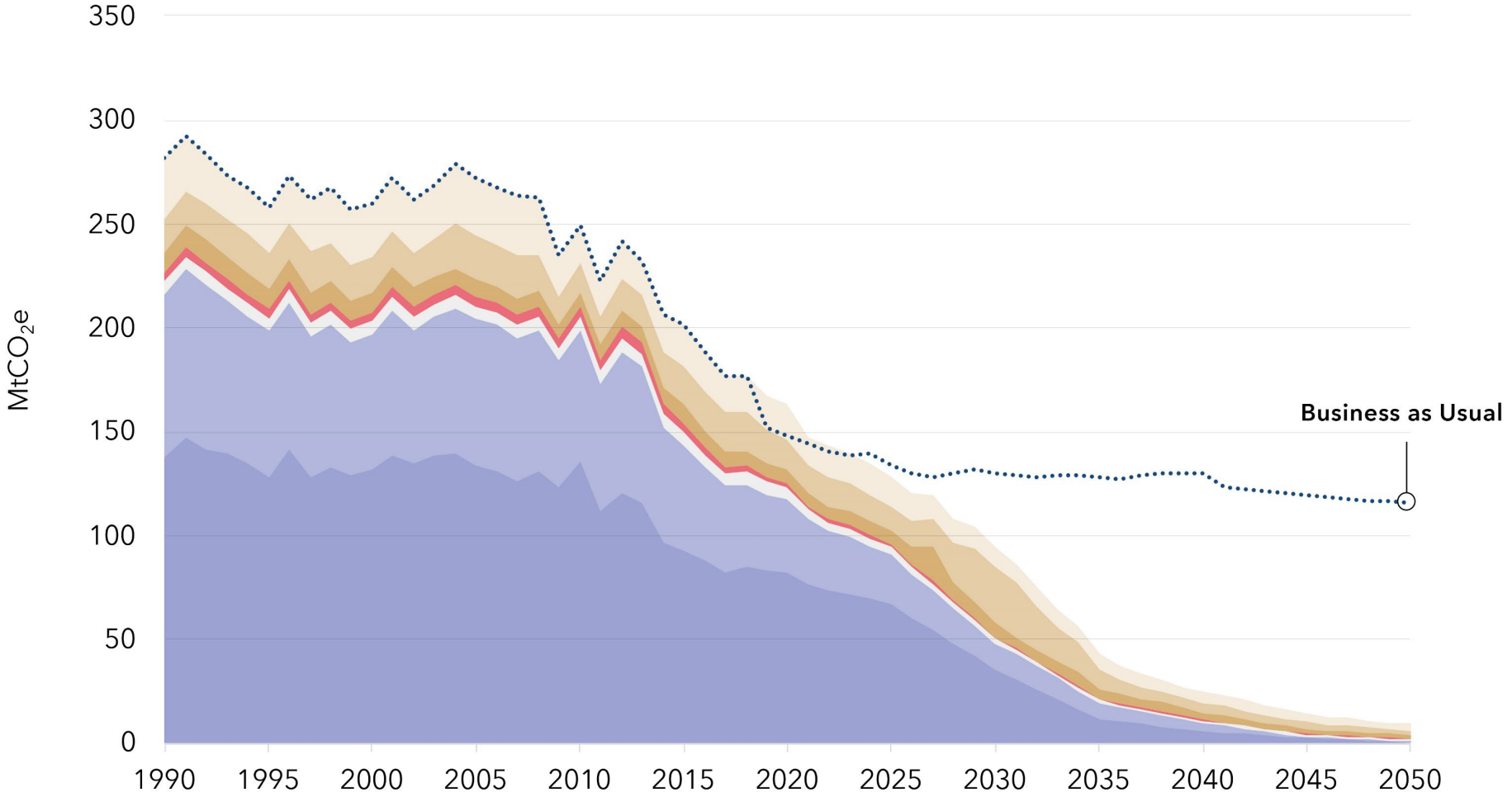
Net Zero Roadmap

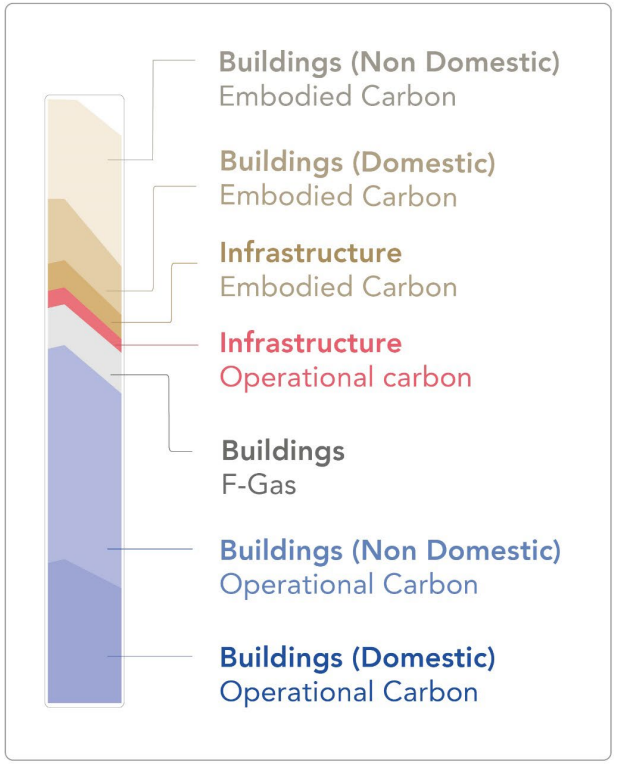
Outlines a common vision & industry-wide actions for achieving net zero carbon in the construction, operation, & demolition of buildings & infrastructure in the UK.

Based on input from >100 stakeholders across industry

Download the roadmap

UK Built Environment GHG Emissions 1990-2050





UKGBC 2021 Net Zero Whole Life Carbon Roadmap

Roadmap progress update

FIGURE 1: HISTORIC BUILT ENVIRONMENT EMISSIONS (1990-2022)

Excluding Transport, with Business as Usual Projections Overlaid onto the 2021 UKGBC Net Zero Whole Life Carbon Roadmap Data.

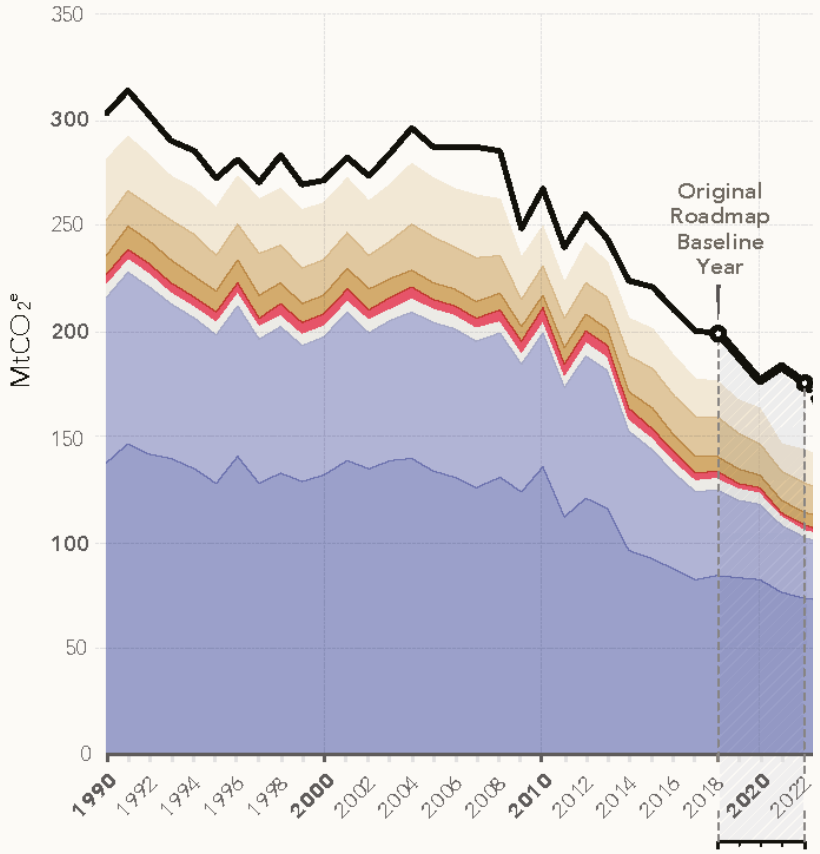
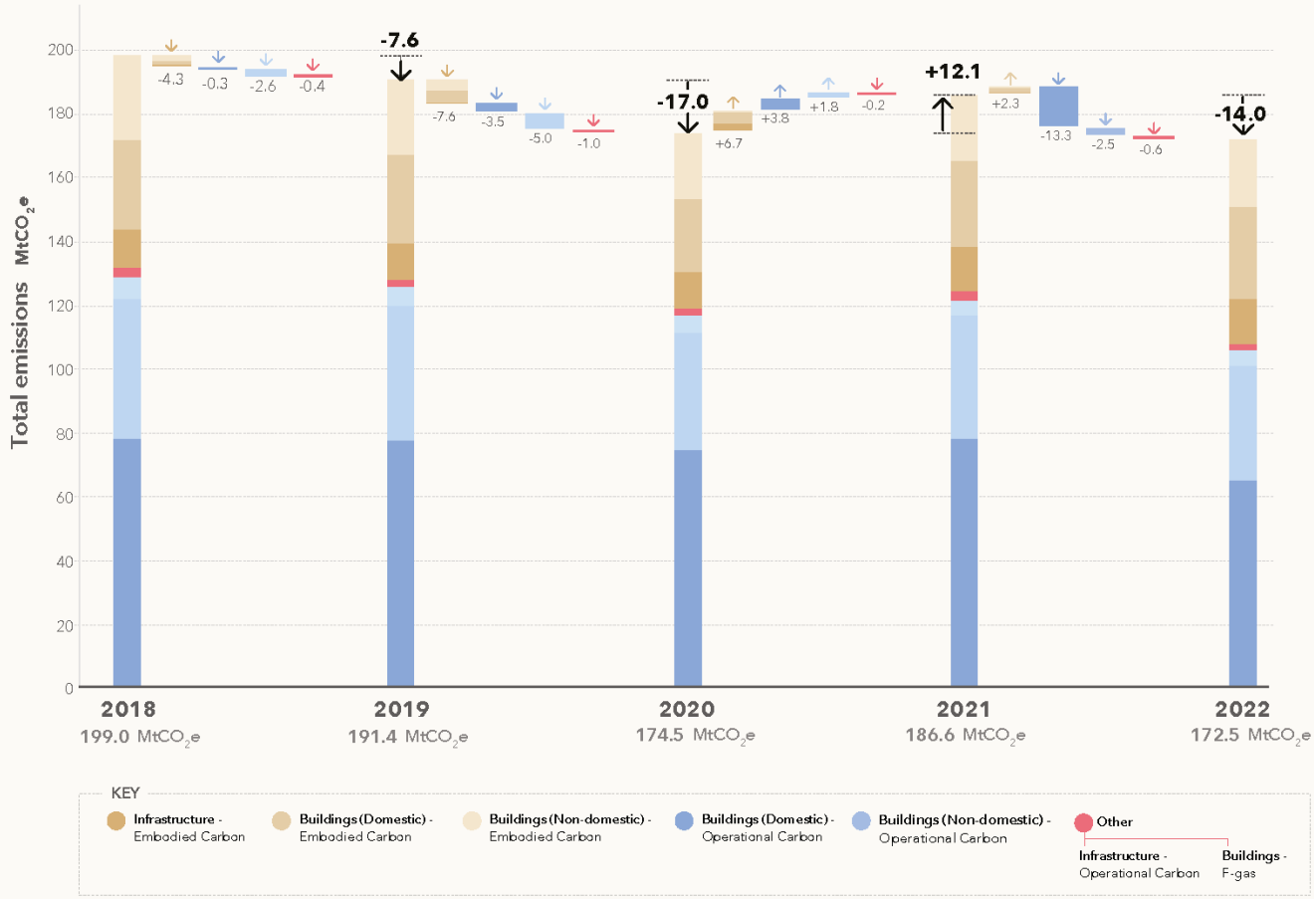


FIGURE 4 EMISSIONS CHANGES PER SECTOR FOR EACH YEAR 2019 - 2022



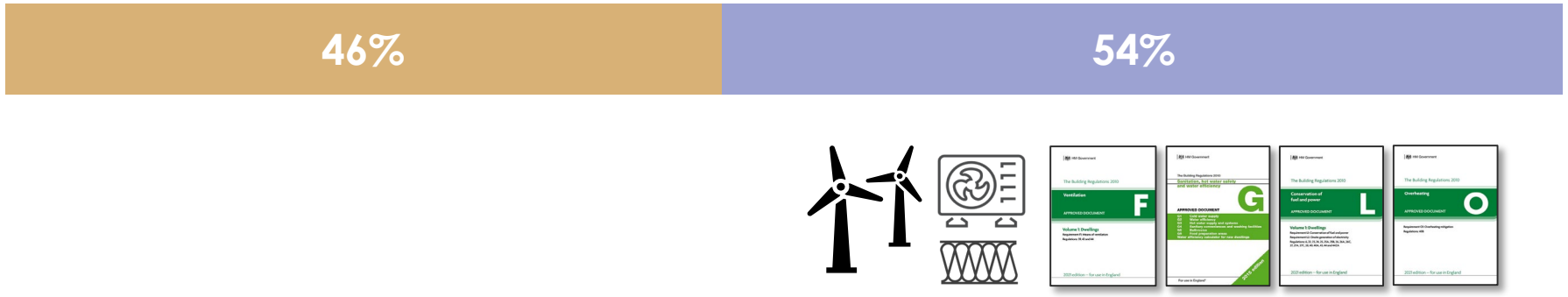
[UKGBC 2023 Net Zero Whole Life Carbon Roadmap: Progress Report]

Typical housing project split

Embodied carbon

Operational carbon

Current mass housebuilder designs that just meet regs

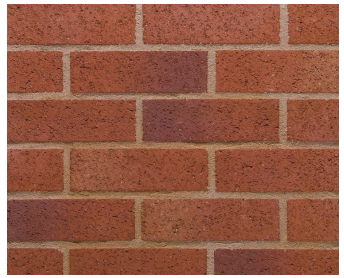


Modern, low-energy design that meets Future Homes Standard

Splits based on 2023 analysis of housebuilder designs from Future Homes Hub

Scale – buildings

1t | 10t | 100t | 1kt | 10kt | 100kt



4x brick pallets

~1 tCO2

At 232 kgCO_2e/t brick (A1-A5) from UK clay brick EPD

King's Cross Sports Hall

709 tCO_2e

2000m^2 facility, LETI B-rated for embodied carbon & sequesters 638 tCO_2

5 Broadgate

46,324 tCO_2e

13 storeys, 65,300m^2 of office space to practical completion

Landsec

Development Pipeline

209,051 tCO_2e

Forecasted total embodied carbon in 2021 Sustainability Report

Scale – infrastructure

10 kt | 100 kt | 1 Mt | 10 Mt

M54-M6 Link Road

81,890 tCO2e

1.6 miles new road
2 new junctions
& some realignment

A14 extension

981,432 tCO2e

23 miles of upgrades
7 miles widening
new bypass
& local modifications

HS2

13.3 MtCO2e

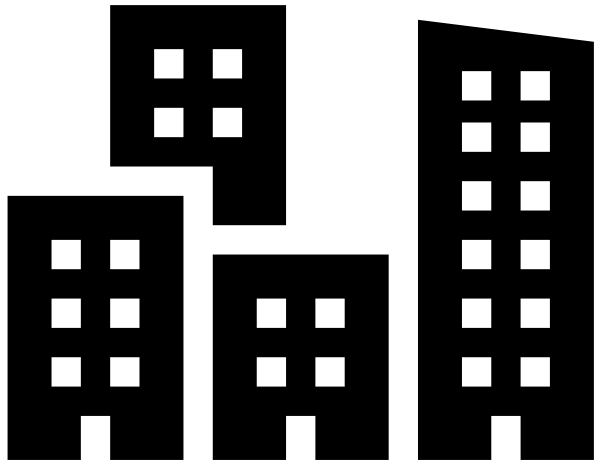
Heathrow 3rd runway

3.6 MtCO2e

HOW DO YOU ASSESS IT?

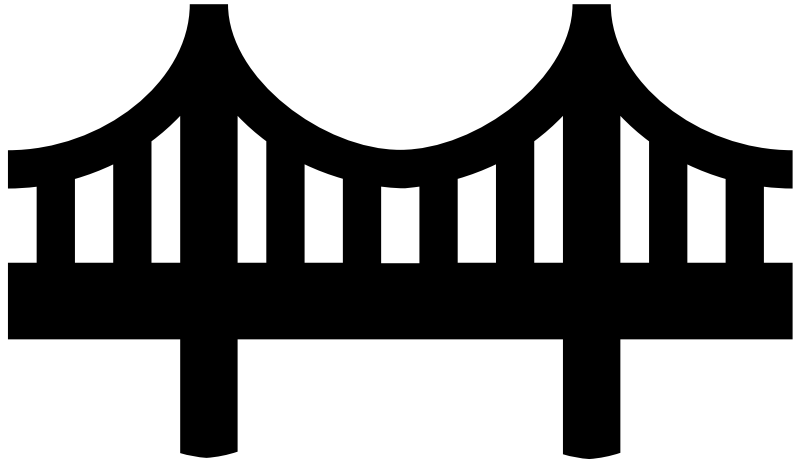
Data, standards & tools

Differences in terminology & standards



Buildings
e.g. BS EN 15978

v



Infrastructure
e.g. BS EN 17472

Basic calculation

$$\text{Embodied carbon } (kgCO_2e) = \sum_{\text{Sum for all materials}} \left(\boxed{\text{Quantity (kg)}} \times \boxed{\text{Carbon factor } (kgCO_2e/kg)} \right)$$

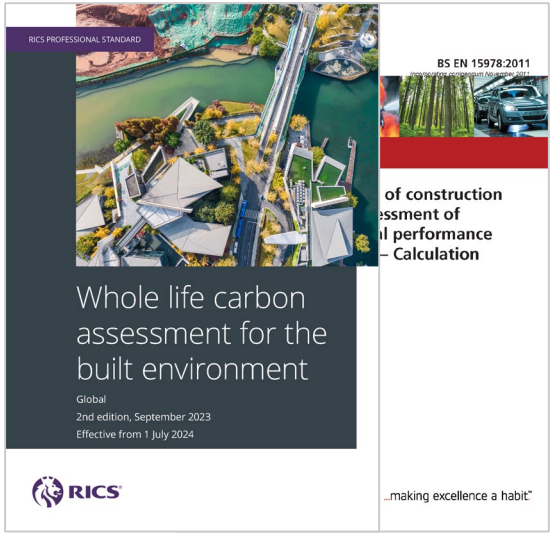
Typical assessment of a building

Material quantities
e.g. from building model or BoQ

+

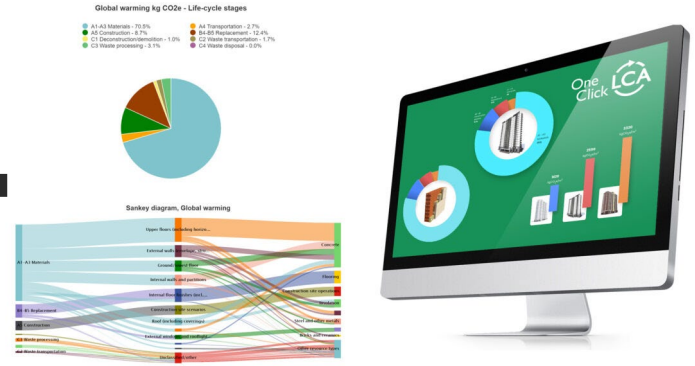
Product data
from EPD or generic carbon factors

+



Assessment standards
e.g. BS EN 15978 + RICS PS

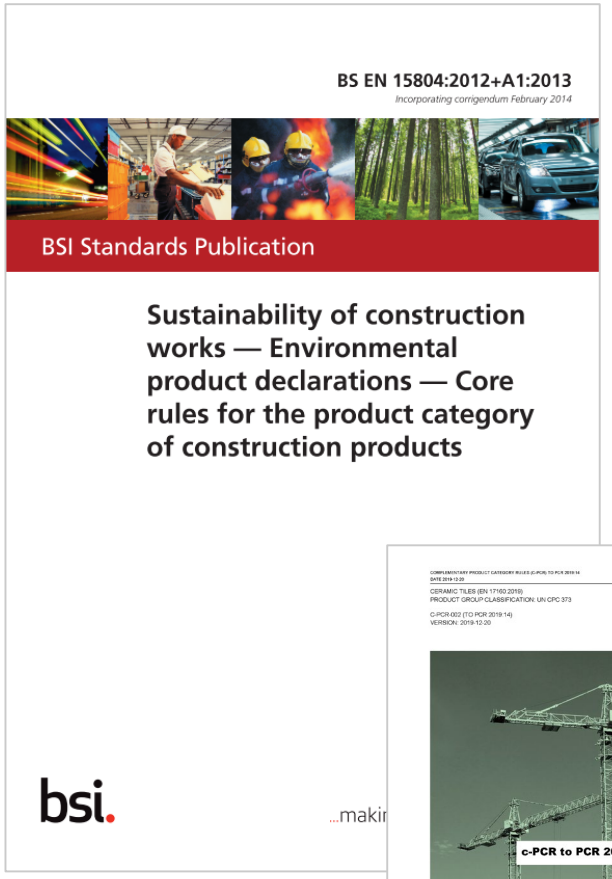
+



Software tool
e.g. OneClickLCA

What is an EPD?

- An Environmental Product Declaration provides environmental information from a LCA in a standardised format using a consistent methodology
- Based on standards combined with Product Category Rules (PCR) and independently verified
- Basically LCA+PCR = EPD



BS EN 15804
Core EPD rules
+
Product Category Rules

See these introductory resources on EPD from the Alliance for Sustainable Building Products for further information

bre

Statement of Verification

BREG EN EPD No.: 000311 Issue 02

This is to verify that the

Environmental Product Declaration

provided by:

Kingspan Insulation Ltd

BRE Global Verified EPD

is in accordance with the requirements of:

EN 15804:2012+A1:2013

and

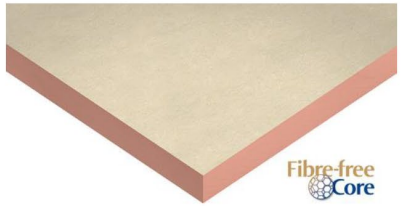
BRE Global Scheme Document SD207

This declaration is for:

Kingspan Kooltherm K5 External Wallboard, Kingspan Kooltherm K20 Concrete Sandwich Board

Company Address

Kingspan Insulation Limited
Pembridge
Herefordshire
HR6 9LA



Kingspan

Signed for BRE Global Ltd	Operator	Date of this Issue
Emma Baker		07 April 2022

Date of First Issue	Expiry Date
21 January 2021	20 January 2026

BRE Global Verified EPD

bre

Environmental Product Declaration

EPD Number: 000311

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2012+A1:2013
Commissioner of LCA study	**LCA consultant/Tool**
Kingspan Insulation Limited Pembridge Herefordshire HR6 9LA	BRE LINA Tool v2.07
Declared Unit	**Applicability/Coverage**
1m² of insulation at a thickness that gives an R-value of 2.857m².K/W (60mm)	Product Specific
EPD Type	**Background database**
Cradle to Gate with options	Ecoinvent 3.2

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☒ External
(Where appropriate [b])Third party verifier: Nigel Jones
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability
Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A1:2013. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A1:2013 for further guidance

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	**Parameter**	**Units**	**Results**
A4 – Transport to the building site	Description of scenario		
	Fuel type / Vehicle type	Litre of fuel type per distance or vehicle type	Lorry >32 metric tons
	Distance	km	523
	Capacity utilisation (incl. empty returns)	%	86
	Bulk density of transported products	kg/m^3	35
A5 – Installation in the building	Description of scenario		
	Installation wastage rate	% of product	2
	Installation waste sent to landfill	kg	0.042
C1 to C4 End of life,	Description of scenario		
	Transport type	Vehicle type	Lorry >32 metric tons
	Distance	km	523
	Crushing and compacting of waste into briquettes	MJ	9.48e-8
	Waste for energy recovery	kg	1.87
	Waste to landfill	kg	0.19

LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts									
			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	3.98e+0	4.83e-7	2.30e-2	5.14e-3	3.92e-3	3.07e-5	1.32e+2
Construction process stage	Transport	A4	1.00e-1	1.90e-8	3.43e-4	9.04e-5	7.10e-5	1.68e-7	1.56e+0
	Construction	A5	8.21e-2	1.02e-8	4.69e-4	1.06e-4	8.03e-5	6.19e-7	2.69e+0
Use stage	Use	B1	MND	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	MND	MND	MND	MND	MND	MND	MND
	Transport	C2	1.00e-1	1.90e-8	3.43e-4	9.04e-5	7.10e-5	1.68e-7	1.56e+0
	Waste processing	C3	1.58e-8	1.02e-15	8.58e-11	1.97e-11	4.88e-12	1.91e-14	2.44e-7
	Disposal	C4	1.97e-3	5.18e-10	1.38e-5	4.52e-6	2.29e-6	1.79e-9	4.83e-2
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND	MND	MND	MND

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

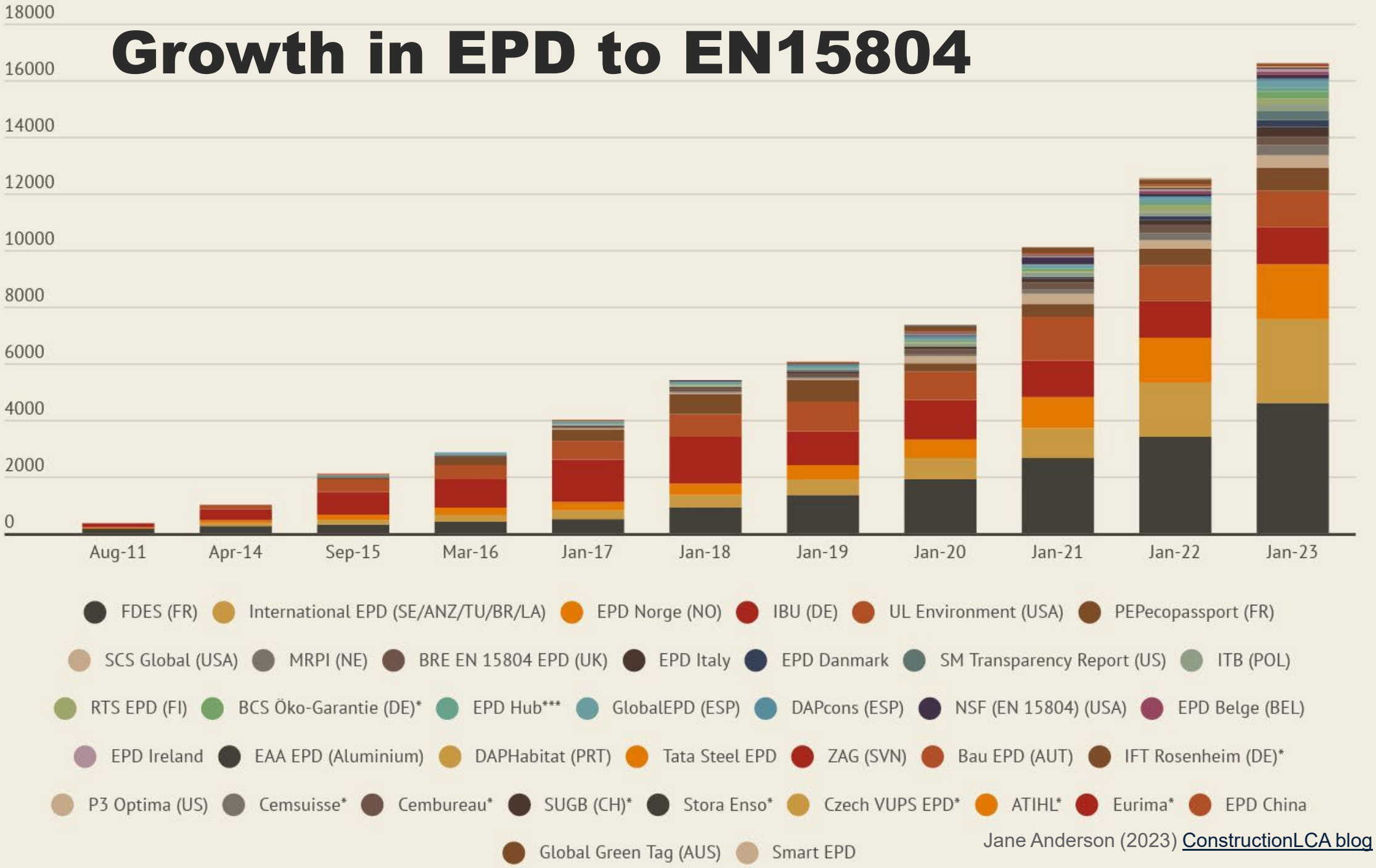
THE UNIVERSITY OF STRATHCLYDE

Common questions on EPD

- What are the different types of EPD?
- Is carbon content the same as embodied carbon?
- How is biogenic carbon treated in EPD?

For answers to most FAQ see this set of briefing papers from the Construction Product Association

Growth in EPD to EN15804



Jane Anderson (2023) ConstructionLCA blog

THE UNIVERSITY OF STRATHCLYDE

Built Environment Carbon Database

Single location for *product* data & *asset* data

(launched on 5th October 2023)

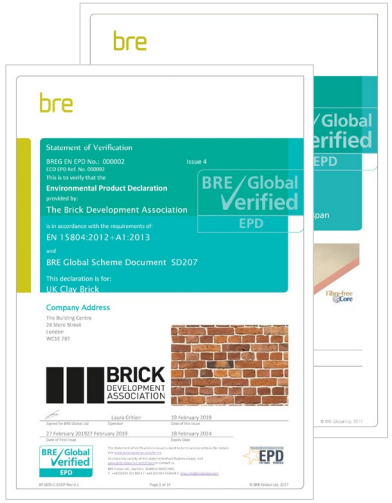
Collaborators

bre, CARBON TRUST, CIBSE, CIC, CIOB, ice, IStructE, RIBA, RICS, UK GBC

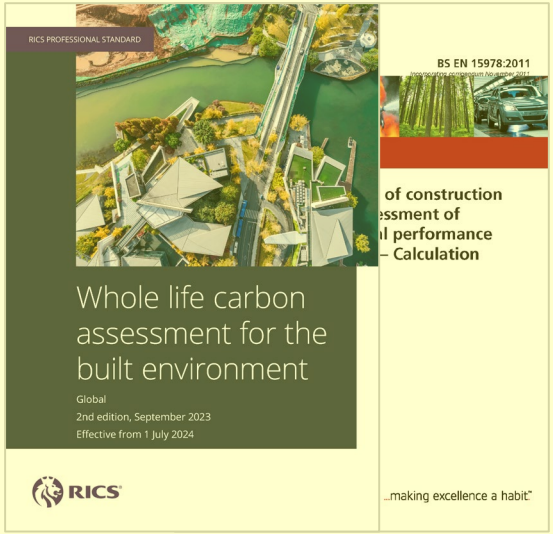
Available now at becd.co.uk

Typical assessment of a building

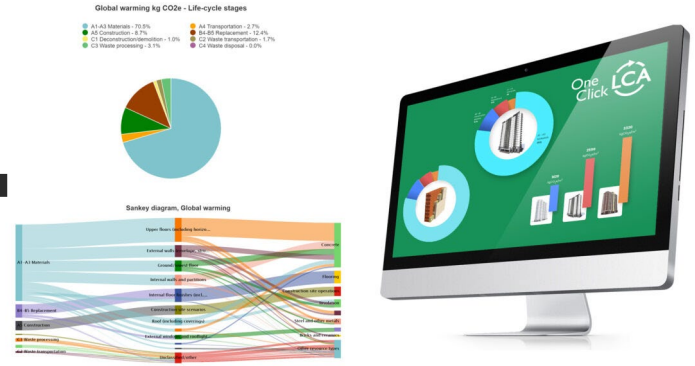
Material quantities
e.g. from building model or BoQ



Product data
from EPD or generic carbon factors

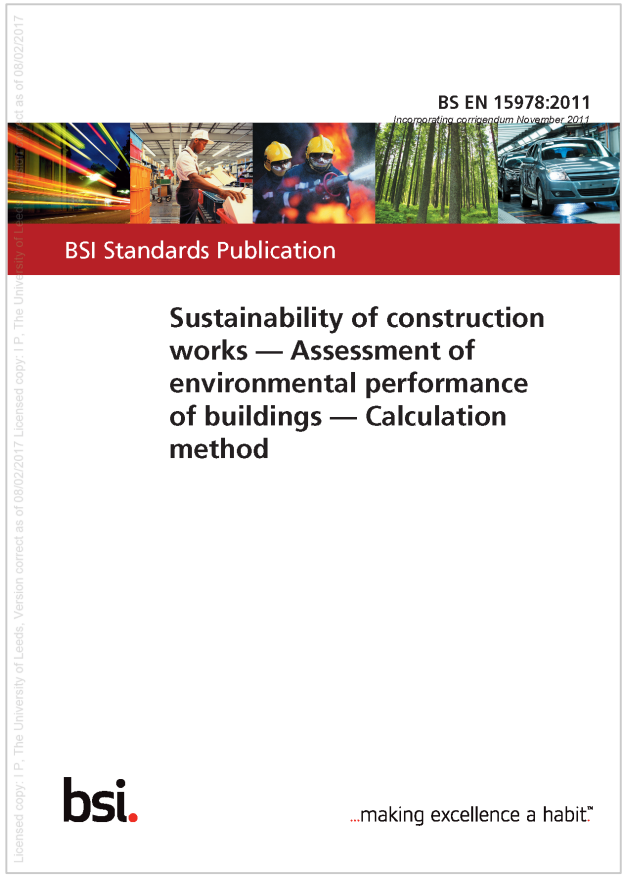


Assessment standards
e.g. BS EN 15978 + RICS PS



Software tool
e.g. OneClickLCA

Standards for calculations + products



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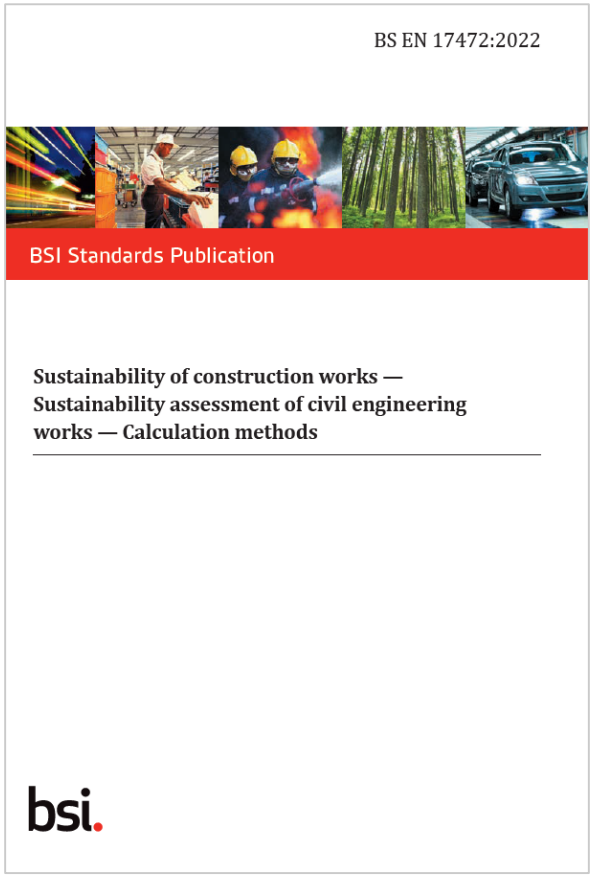

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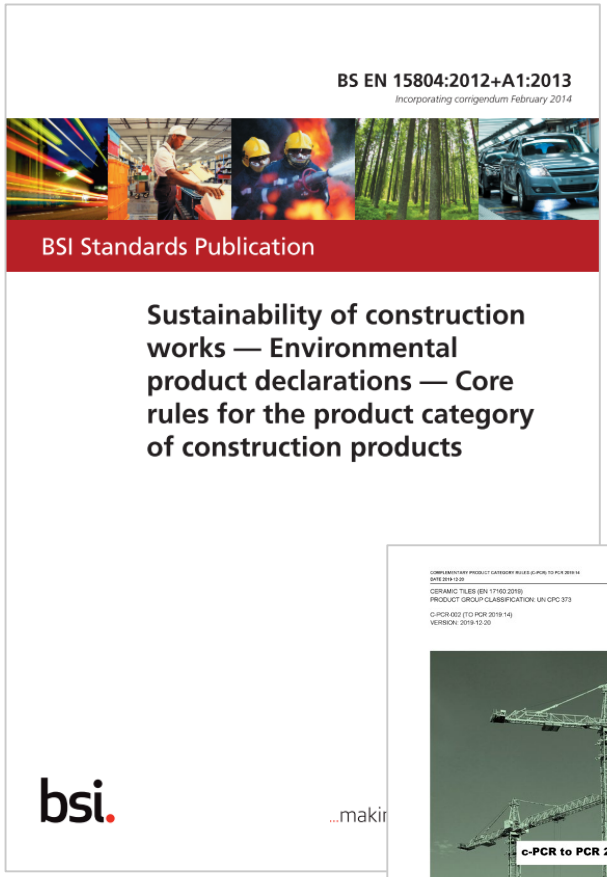
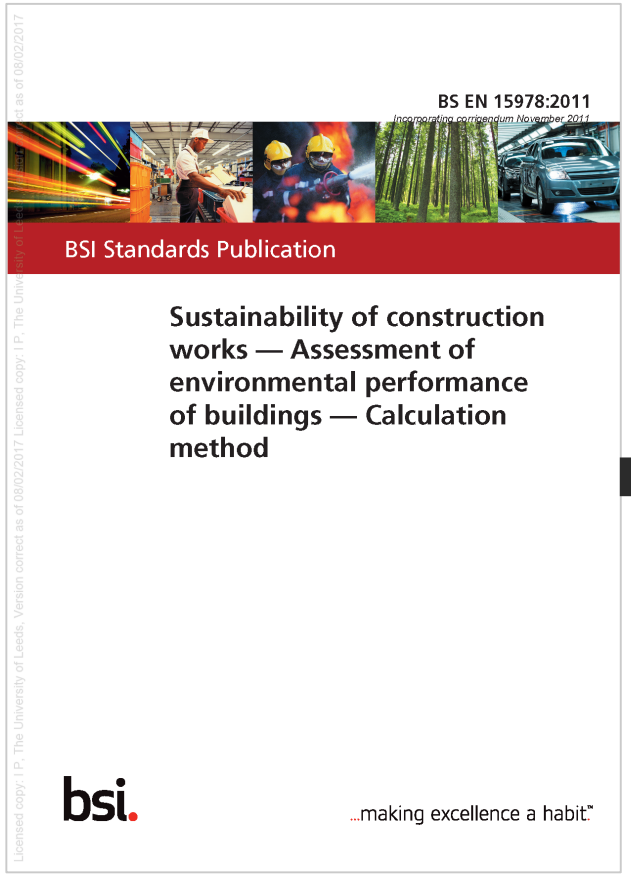


BS EN 15978
for buildings

BS EN 17472
for civil engineering works

BS EN 15804
Core EPD rules
+
Product Category Rules

For buildings

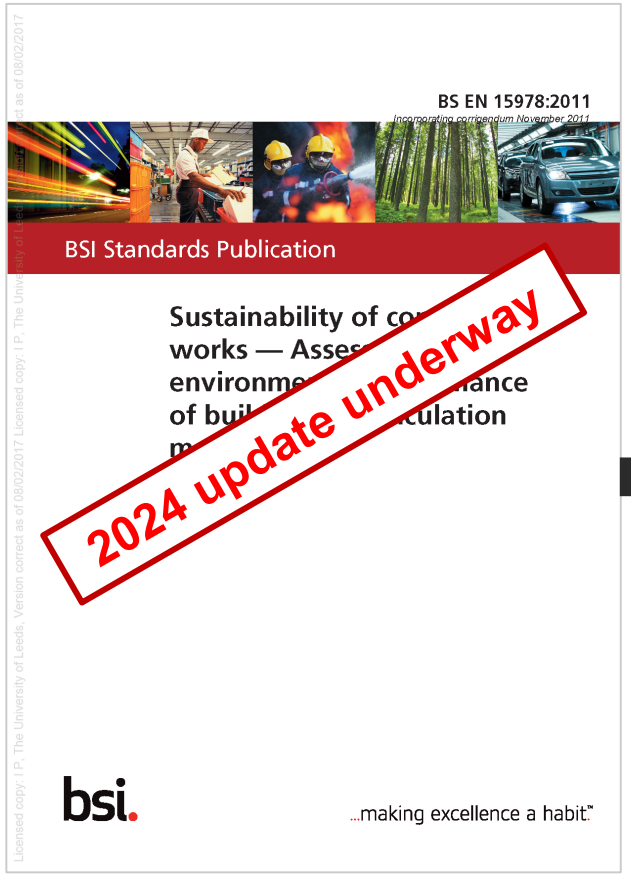


BS EN 15978

RICS PS

BECD

Evolution of reporting standards

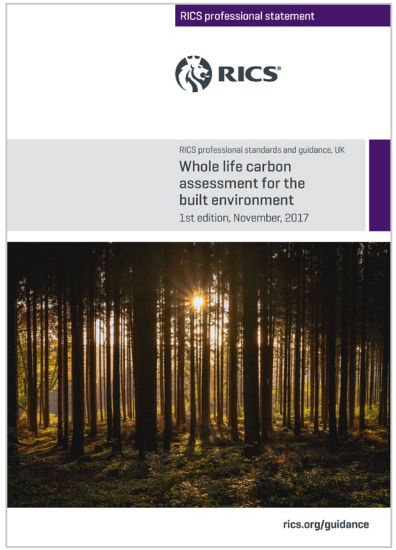


BS EN 15978

RICS PS

BECD

RICS PS Whole life carbon assessment



1st edition published in 2017

31 pages plus 3 appendices

2nd edition published in September 2023

Effective from 1st July 2024

137 pages plus 17 appendices & 6 templates

Steps in whole life carbon assessment

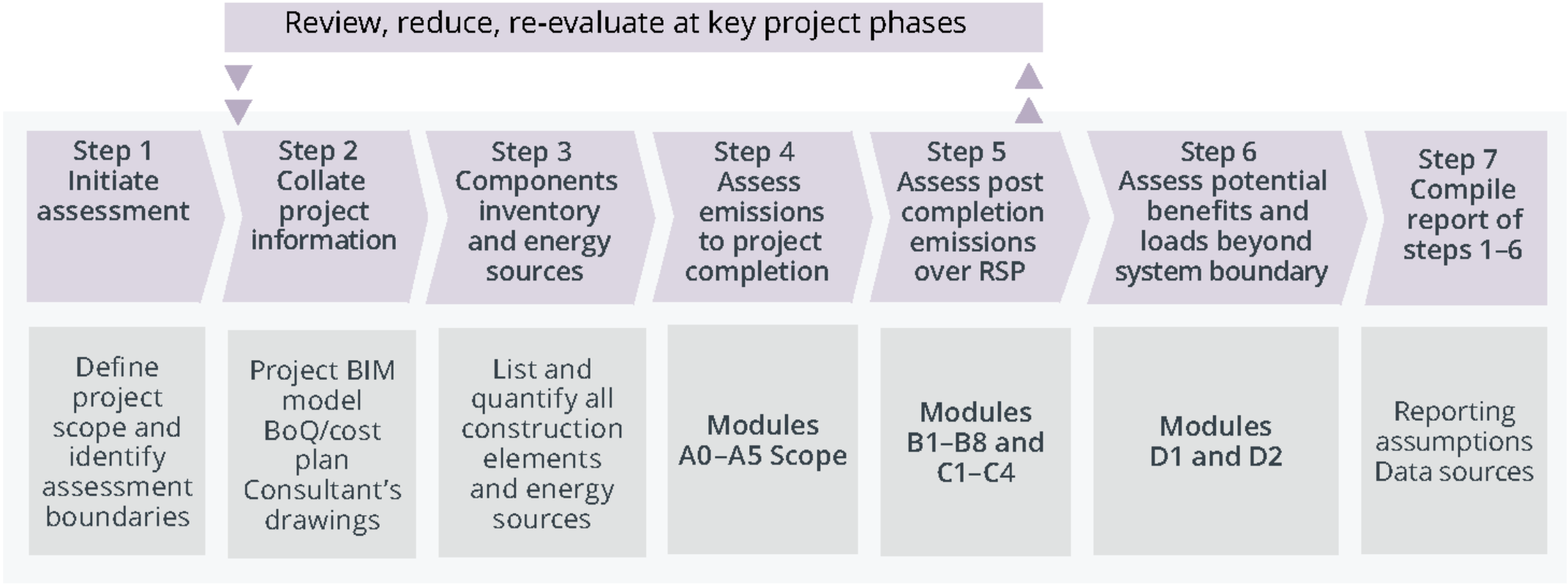
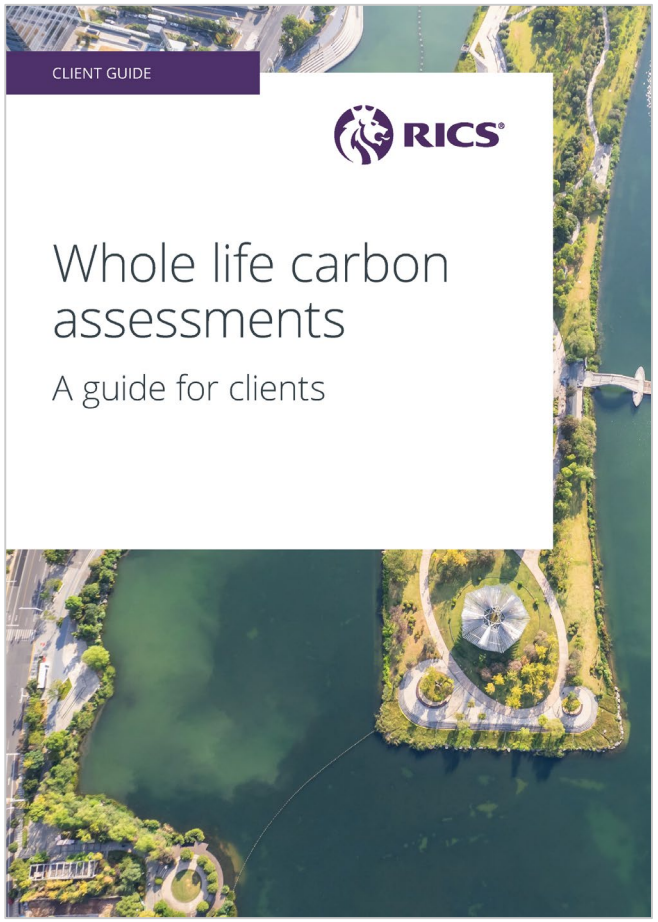


Figure 1 from RICS PS Whole life carbon assessment for the built environment 2nd edition

Introductory guidance



RICS Client Guide

RIBA guide for architects

LETI primer

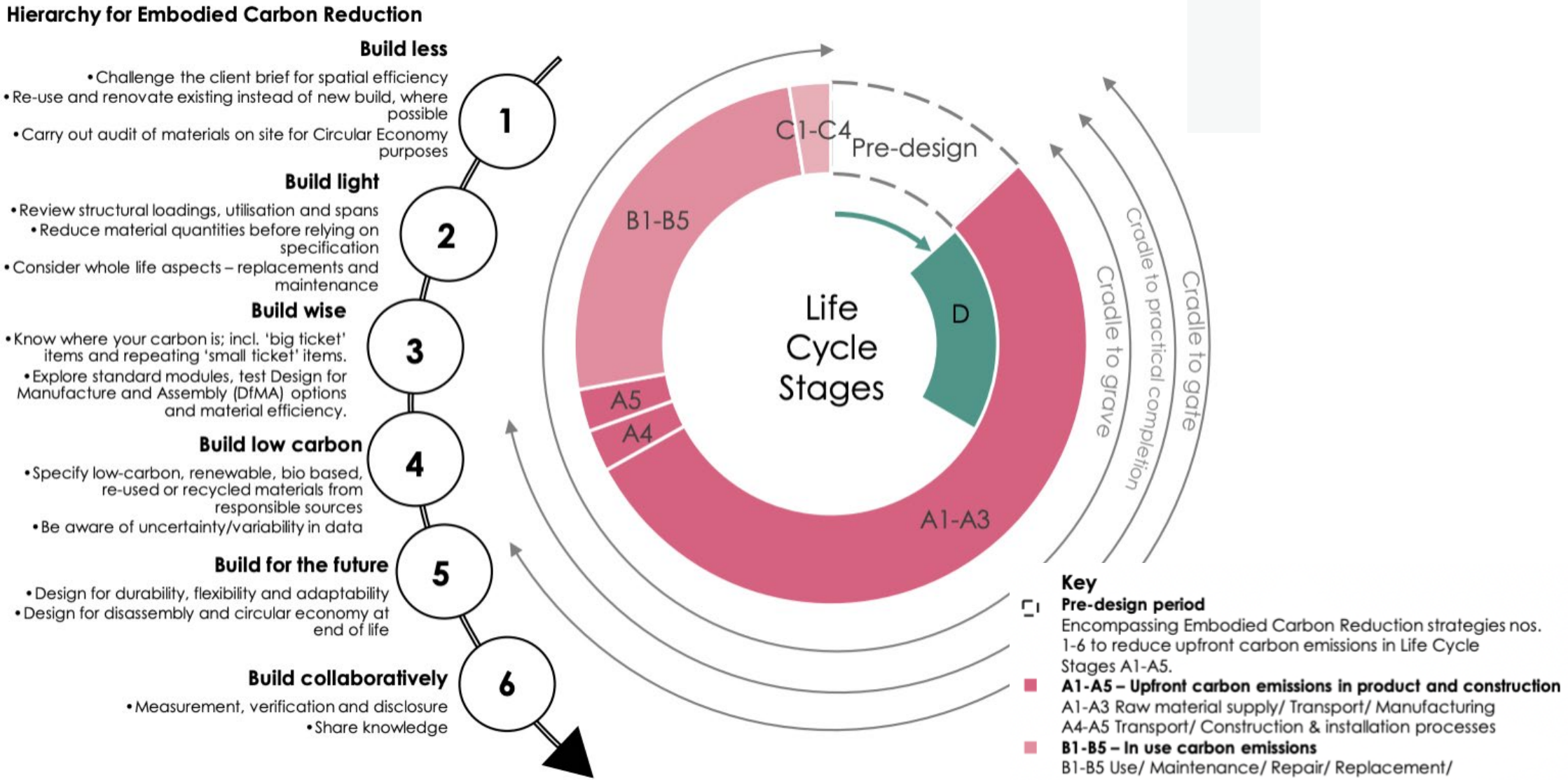
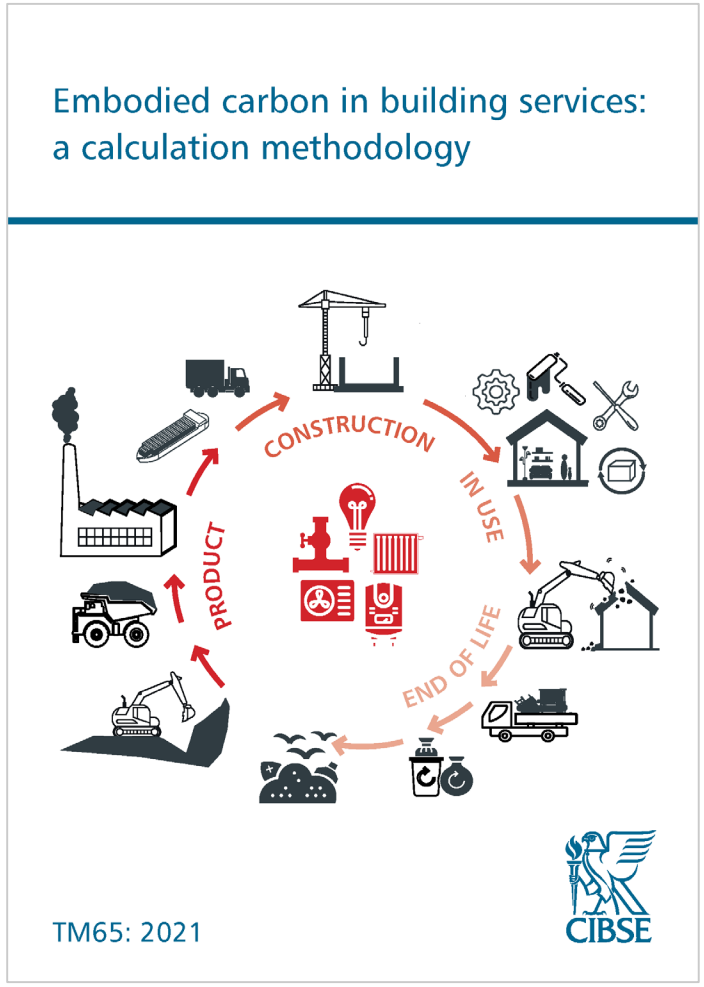


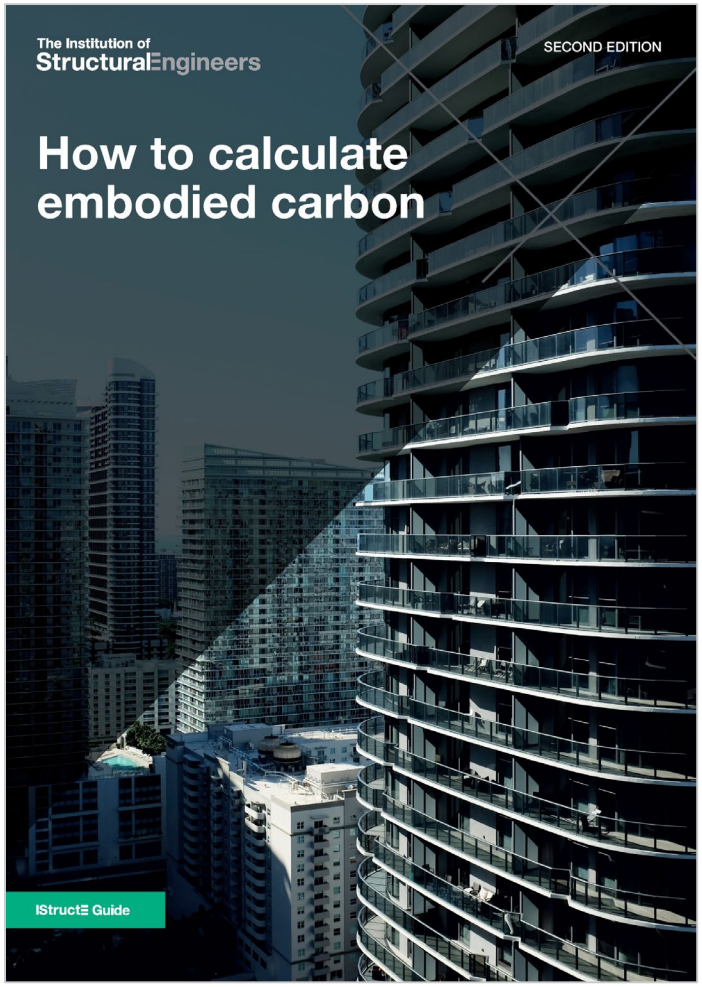
Figure from LETI Embodied Carbon Primer

Other key UK guidance



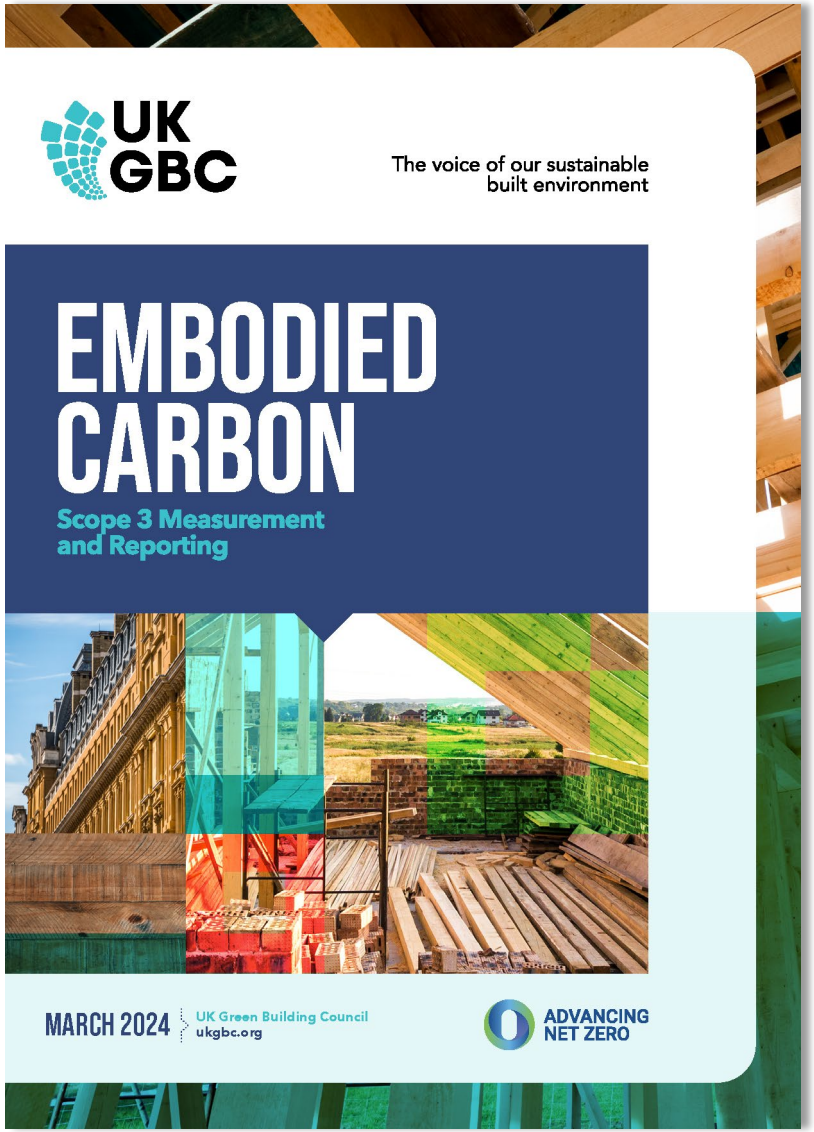
CIBSE TM65

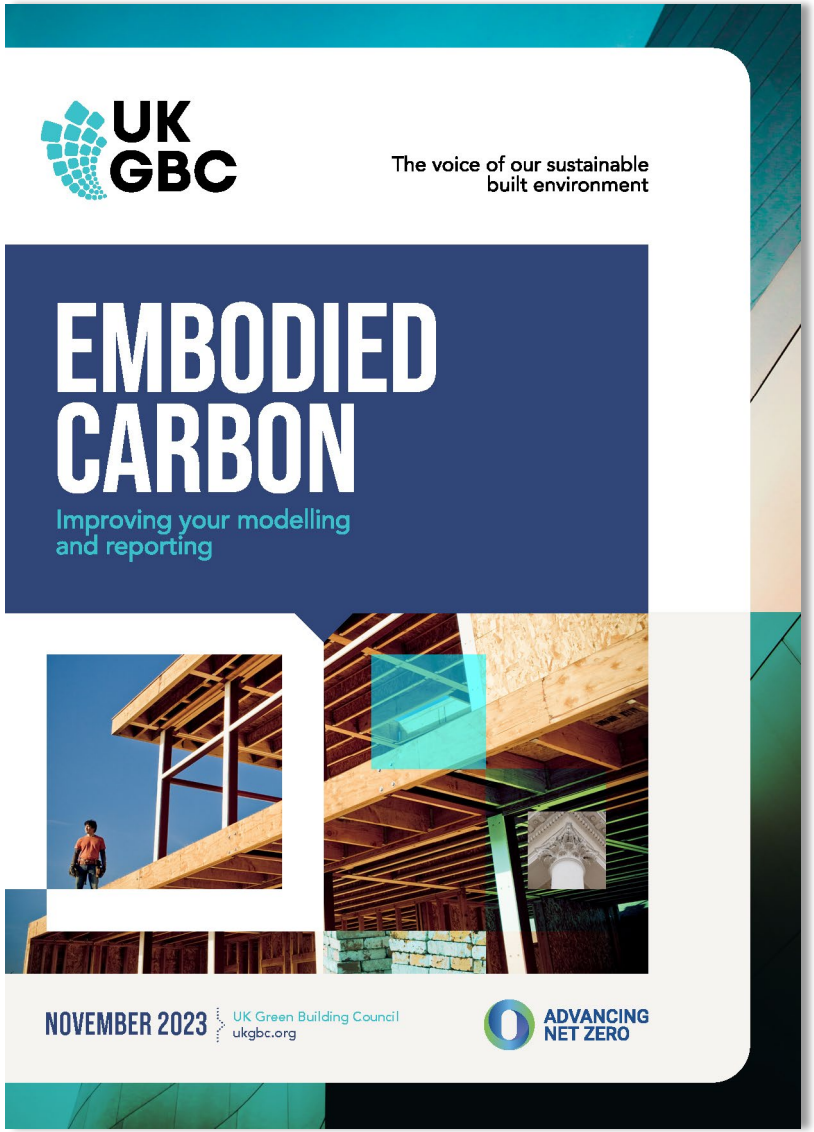
+



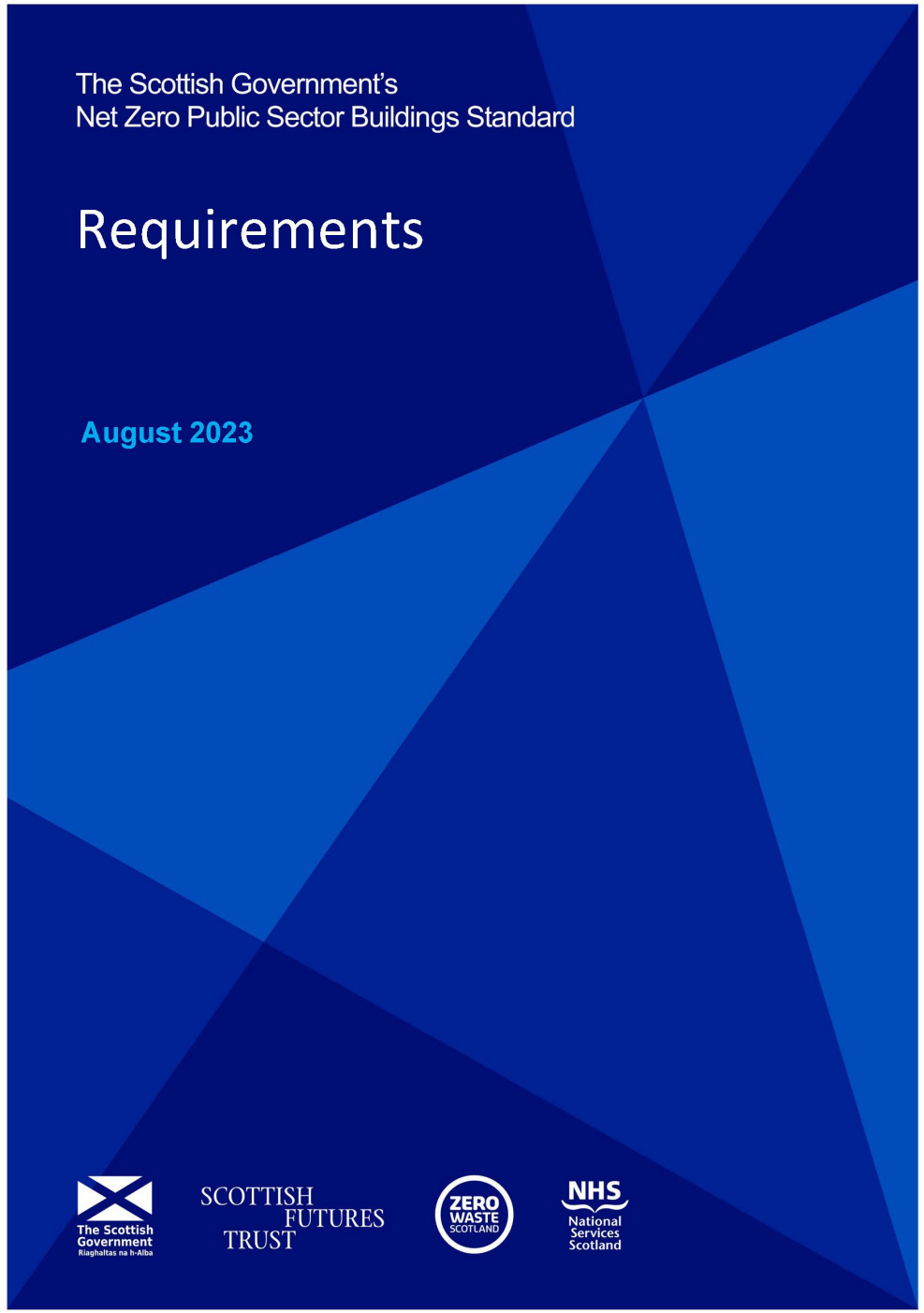
IStructE methodology

Recent UKGBC guidance





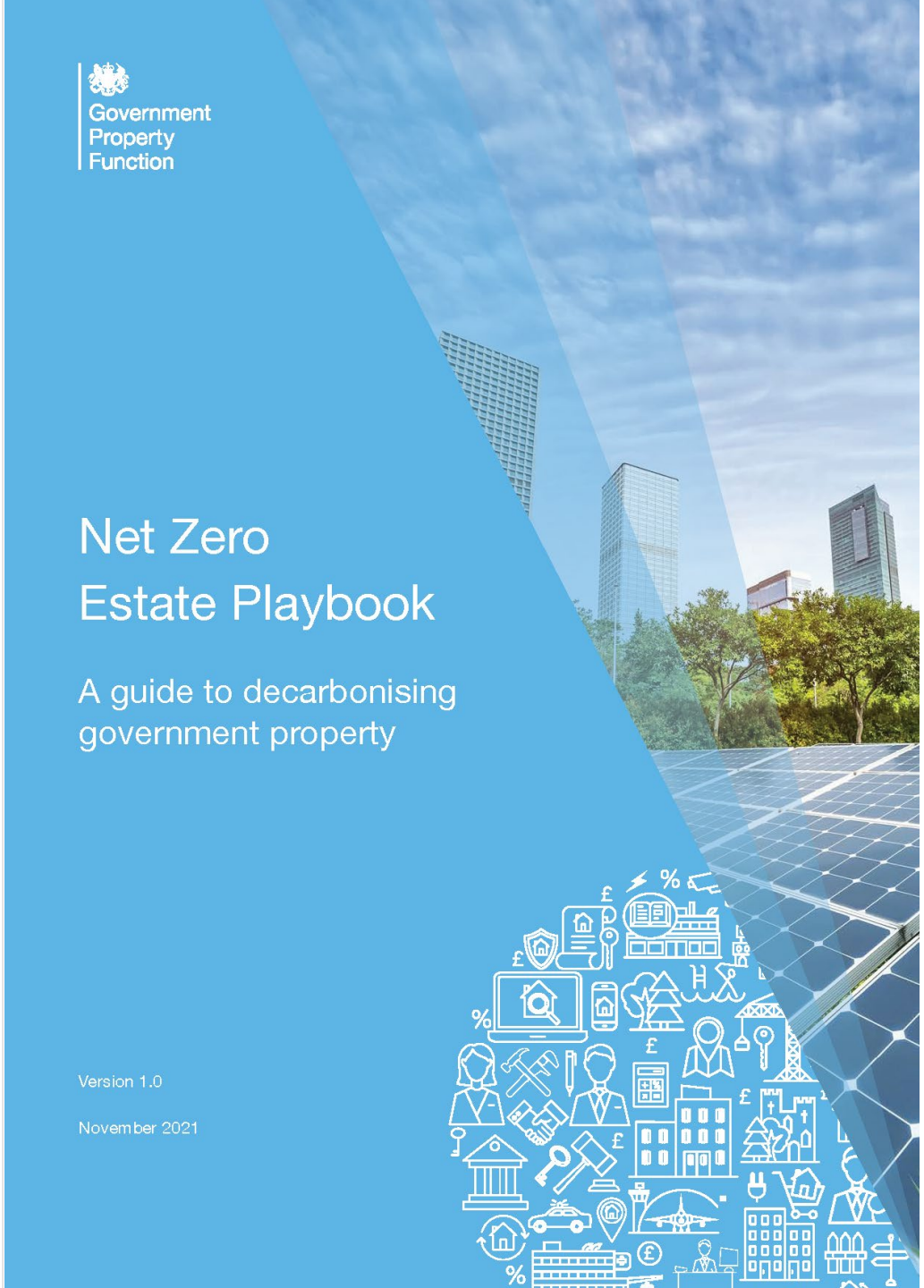
UKGBC recent embodied carbon guidance and resources



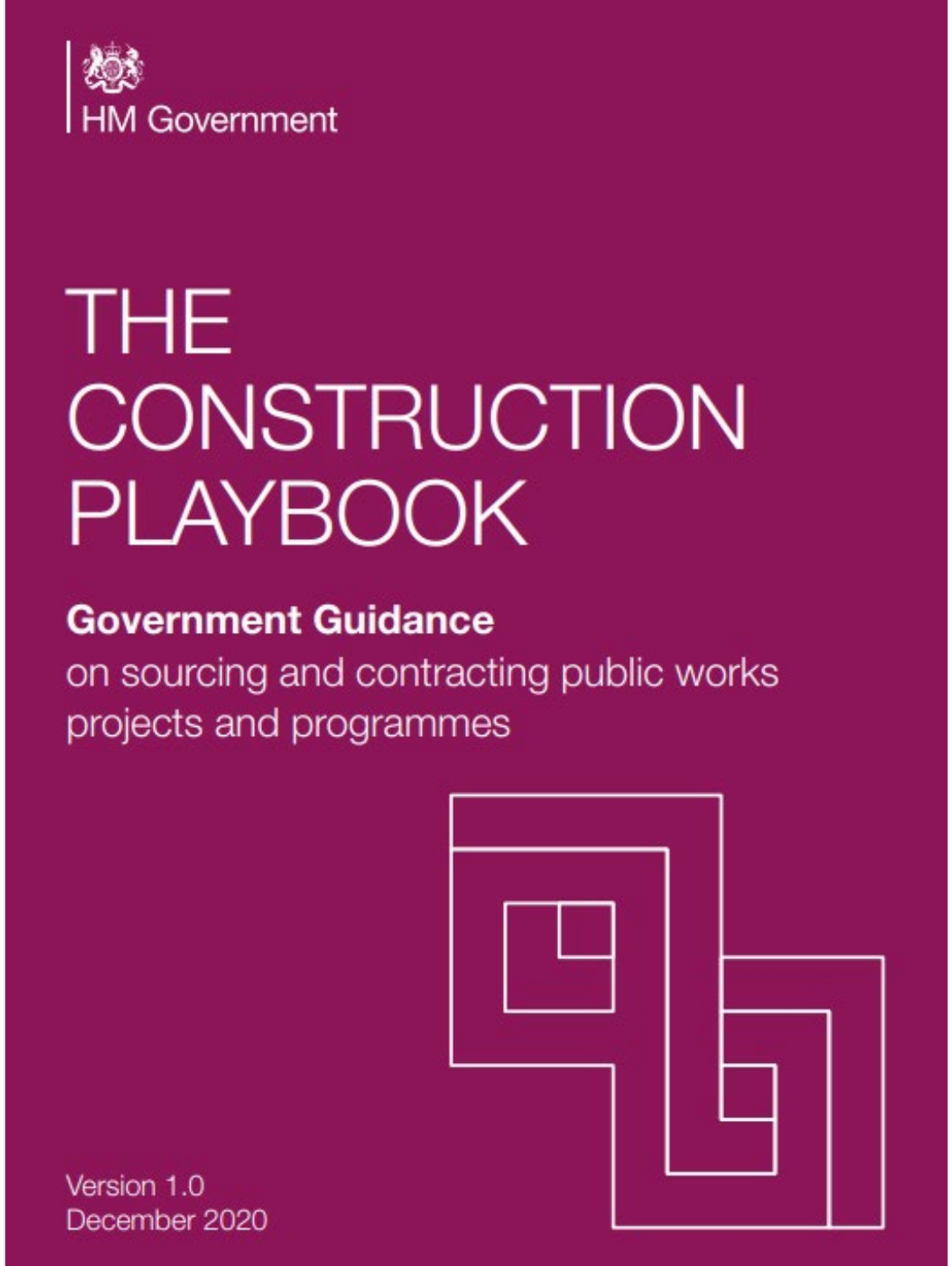
Objective 2: Construction Embodied Carbon

Targets 600 kgCO_2e/m^2 for upfront carbon"
(A1-A5 for new build or B4-B5, C1-C4 for existing buildings)

Alongside range of other related objectives e.g. OB.4 on 'Other whole life carbon'



As Net Zero Whole Life is still a developing and challenging area, further work will be needed to define the scope and requirements for this approach in a future version of this guidance. At present, organisations should follow the guidance set out in the Construction Playbook regarding the use of Whole Life Carbon assessments to inform decisions at early stages of project definition and option assessments”



Contracting authorities should adopt the use of whole life carbon assessments to understand and minimise the GHG emissions footprint of projects and programmes throughout their lifecycle... Contracting authorities should require that solutions put forward by potential suppliers are accompanied by a whole life carbon assessment."

NHS Net Zero Building Standard

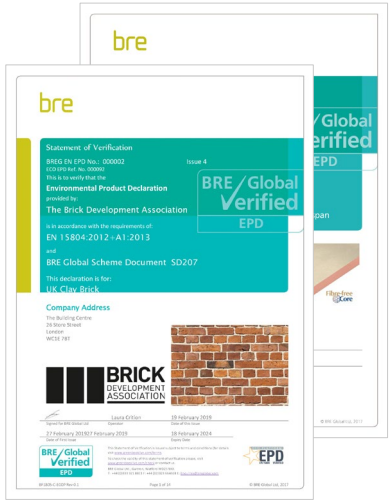
Ensure a WLC assessment is undertaken at each design stage, and used to inform design decisions, with data assessed, captured, and reported for all materials”
“Project bespoke Upfront Carbon Limits must be established by the client and project team...for sub-structure, super structure and facade…all other building components and lifecycle stages must be assessed and reported”

See Chapters 3-4 & Whole Life Carbon Compliance Tool for further detail

Typical assessment of a building

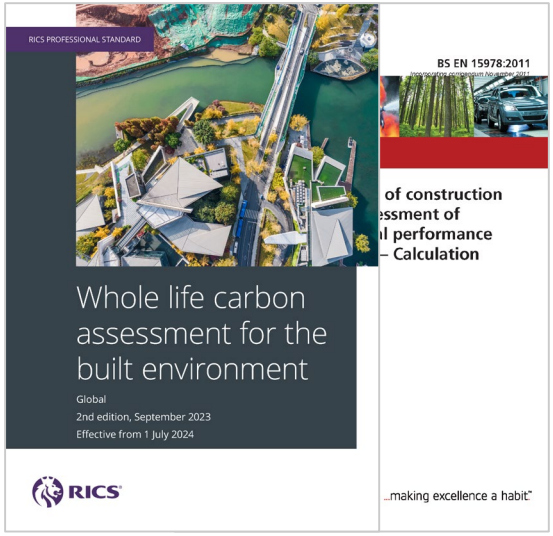
Material quantities
e.g. from building model or BoQ

+



Product data
from EPD or generic carbon factors

+



Assessment standards
e.g. BS EN 15978 + RICS PS

+

Software tool
e.g. OneClickLCA

Calculation tools

One Click LCA

eTool
A Cerclos Product

FCBS CARBON

tally™

EC3

The Structural Carbon Tool v2

HUB:ERT
Hawkins\Brown: Emission Reduction Tool

preoptima

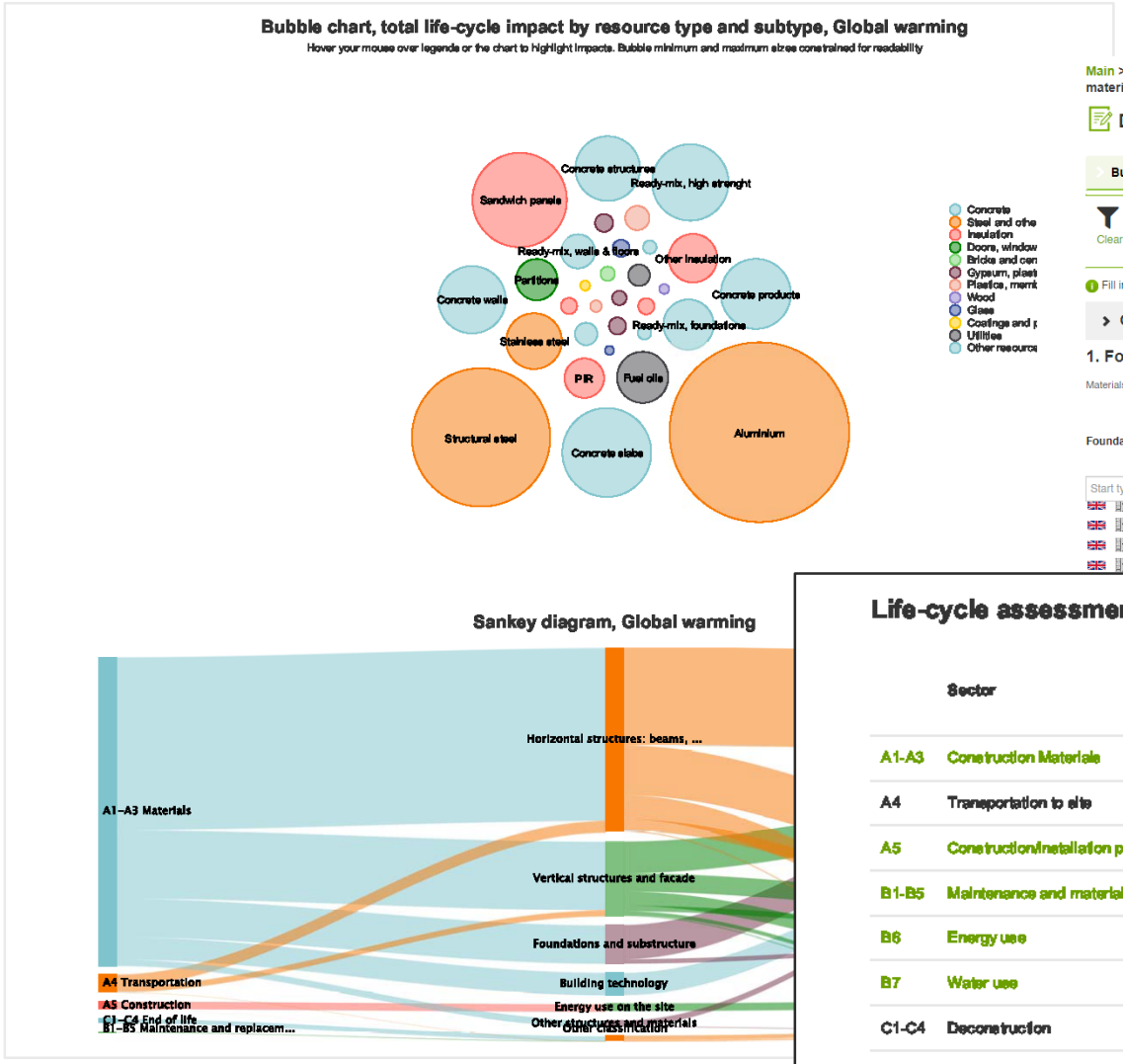
ECCOLAB

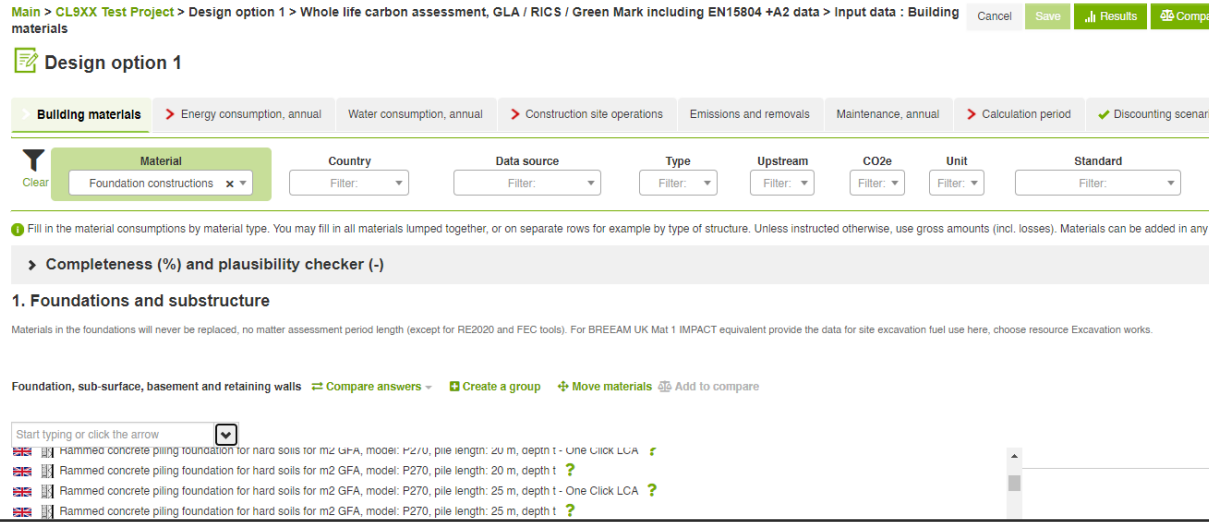
ZEBRA
Carbon and Energy Model

+ many more!

Click logos for the tools. The Carbon Leadership Forum also provide a good overview of most tools for buildings

Example – One Click LCA





Life-cycle assessment results

	Sector	Global warming kg CO2e	Acidification kg SO2e	Eutrophication kg PO4e	Ozone depletion potential kg CFC11e	Formation of ozone of lower atmosphere kg Ethene	Primary energy MJ	
A1-A3	Construction Materials	1.59E7	5.32E4	1.37E4	9.83E-1	6.33E3	2.52E8	Details
A4	Transportation to site	9.22E5	3.28E3	5.91E2	1.15E-1	1.39E2	1.69E6	Details
A5	Construction/installation process	4E5	1.12E3	1.64E2	7.61E-2	5.95E1	6.81E6	Details
B1-B5	Maintenance and material replacement	2.75E4	1.07E2	1.6E3	1.07E-3	9.92E0	3.46E5	Details
B6	Energy use	0E0	0E0	0E0	0E0	0E0	0E0	Details
B7	Water use							Hide empty
C1-C4	Deconstruction	2.41E5	7.51E2	1.68E2	2.92E-2	3.78E1	4.48E6	Details
D	External impacts (not included in totals)	-6.93E6	-2.47E4	-2.6E3	-3.92E-2	-1.85E3	-1.12E8	Details
	Total	1.75E7	5.65E4	1.62E4	1.2E0	6.58E3	2.65E8	

Example – Structural Carbon Tool

IStructE

TSCT v1.1

Scheme name: Superstructure

The Institution of StructuralEngineers

Material	Material Type	Material Specification	Structural Element	Description	Volume [m³] or Mass [kg]?	Material Quantity [m³, kg]	Reinforcement [kg/m³]	Element Embodied Carbon [tCO₂e]	A1-A3	A4	A5w	C2-C4	D	Sequestration
Steel	Structural_sections	Europe avg EPD	Other	Columns	Mass [kg]	144,000		190	163	23	2	3	-59	
Concrete	Insitu	C32/40 - 25% GGBS	2.3 Roof beams	Beams	Mass [kg]	19		0	0	0	0	0	0	
Steel	Structural_sections	World avg	2.3 Roof beams	Beams	Volume [m3]	170		2360	2068	244	23	24	-454	
Steel	Plate		Other	Connections and baseplates	Volume [m3]	31		622	604	8	6	4	-394	
Concrete	Insitu	C32/40 - 25% GGBS	2.2 Upper floors/slabs	Stair slabs	Volume [m3]	37		13	11	0	1	2	0	
Concrete	Insitu	C32/40 - 25% GGBS	2.2 Upper floors/slabs	Composite floors	Mass [kg]	765	General Slab (110)	0	0	0	0	0	0	
Custom_EPD	Steel_EPD	Steel profiles	Other	Composite floors	Mass [kg]	32,000		94	88	1	5			
Custom_EPD	Steel_EPD	Steel mesh	Other	Composite floors	Volume [m3]	32		7	7	0	0			
Custom_EPD	Other_EPD	brick 7.3	2.5 Structural ext. walls	Masonry walls	Volume [m3]	208		45	33	1	11			
Custom_EPD	Other_EPD	Block 10	2.5 Structural ext. walls	Masonry walls	Volume [m3]	852		243	179	3	61			
Timber	Studwork_framing_flooring	Softwood	2.3 Roof beams	Timber beams	Volume [m3]	5		2	1	0	1	4	-1	-4
1.1 Excavation-Foundation					Mass [kg]	0								
1.1 Excavation-Other														

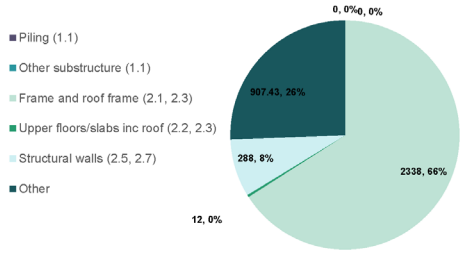
CO_2e Substructure & Superstructure

A1 - A5:	3,569 tCO_2e	7,138 $kgCO_2e/m^2$
Sequestered carbon:	-4 tCO_2e	-8 $kgCO_2e/m^2$
A-C:	3,603 tCO_2e	7,207 $kgCO_2e/m^2$
Module D:	-908 tCO_2e	-1,817 $kgCO_2e/m^2$

	A5a	C1
Global Values [tCO_2e]	24	2

	A	C	D	Sequestration
Total [tCO_2e]	3569	39	-908	-4

Superstructure - Element emission breakdown [tCO2e]



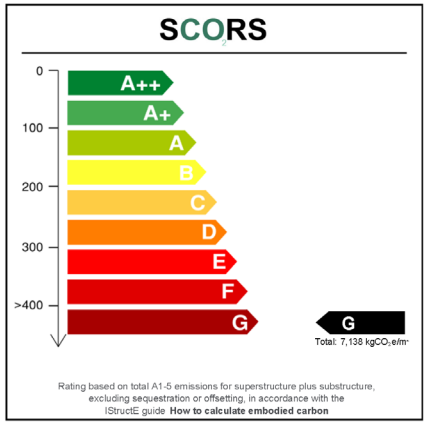
This project scheme releases carbon equivalent to:

- 4,199 one-way flights from London to New York
- 2,099 people's consumption of meat, dairy and beer for 1 year
- 1,155 average family cars running for 1 year

Scheme performance against targets:

SCORS:	137 $kgCO_2e/m^2$	Scheme does not meet target
RIBA:	144 $kgCO_2e/m^2$	Scheme does not meet target
LETI:	0 $kgCO_2e/m^2$	Target N/A

This project scheme has a SCORS rating of G



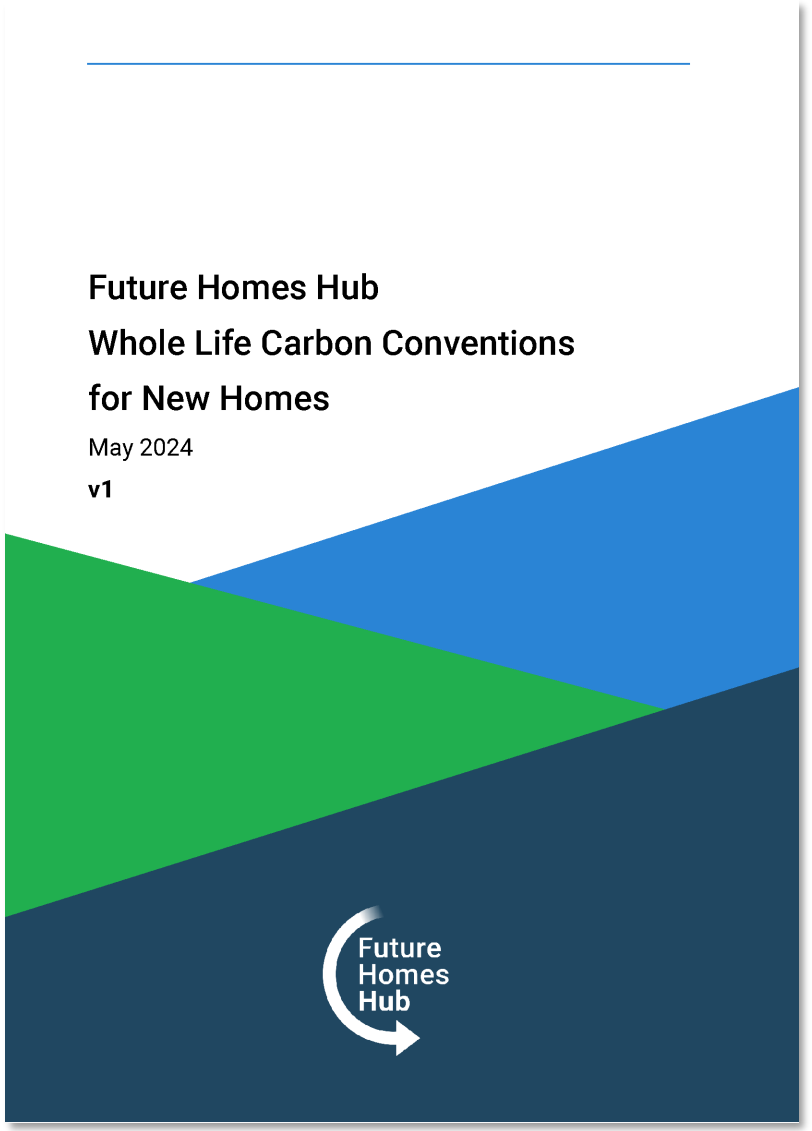
The Structural Carbon Tool was produced by Elliott Wood Partnership Limited in partnership with The Institution of Structural Engineers.

Excel tool available as free download – site also contains guidance documentation and videos

Future Homes Hub Conventions & Tool

Launched this month:

- **Whole Life Carbon Conventions for New Homes** to help the sector consistently measure & share
- **Future Homes Carbon Assessment Tool** accessible to SMEs & others starting on this topic



Future Homes Hub (2024) Whole life carbon conventions and tool

Typical modular reporting

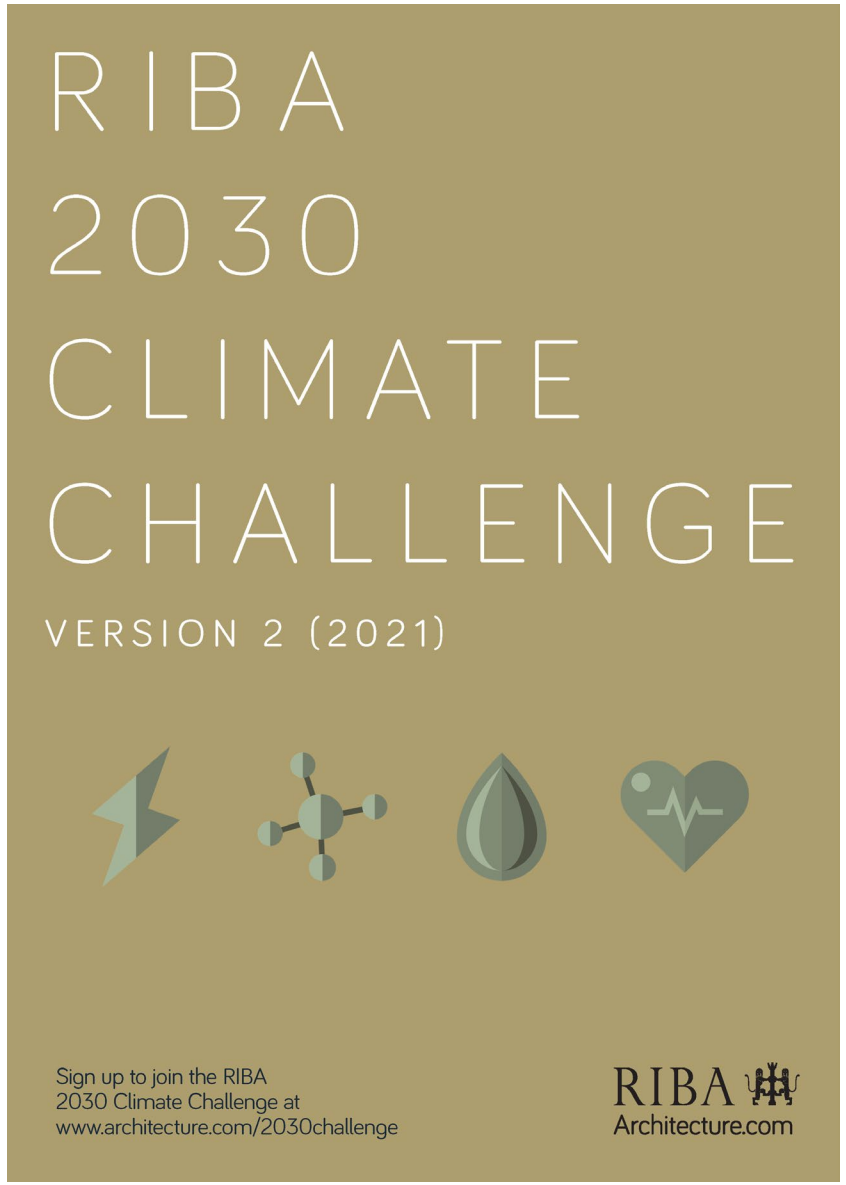
Life cycle stages & modules

Building elements

* Decarbonisation applicable - Report decarbonised values alongside non-decarbonised ones.	Global Warming Potential GWP [TCO_2e]																		
	Product stage				Construction process stage	Use stage							End of Life (EoL) stage				TOTAL*	TOTAL* normalised	Benefits and loads beyond the system boundary
	Biogenic (sequestered) carbon	[A]				[B]							[C]				[A] to [C] cradle to grave	[A] to [C] cradle to grave ($kgCO_2e/m^2$ or equivalent)	[D]*
Building element category		[A1]	[A2]	[A3]	[A4]	[A5]	[B1]	[B2]*	[B3]*	[B4]*	[B5]*	[B6]	[B7]	[C1]	[C2]	[C3]	[C4]			
0.1 Demolition prior to construction 0.2 Toxic/Hazardous/Contaminated Material Treatment Major Demolition Works																			
0.3 Facilitating works 0.4 Temporary Support to Adjacent Structures 0.5 Specialist Ground Works 0.6 Temporary Diversion Works Extraordinary Site Investigation																			
1 Substructure																			
2.1 Superstructure Frame 2.2 Upper Floors 2.3 Roof 2.4 Stairs and Ramps																			
2.5 Superstructure External Walls 2.6 Windows and External Doors																			
2.7 Superstructure Internal Walls and Partitions 2.8 Internal Doors																			
3 Finishes																			
4 Fittings, furnishings & equipment														building-related items	building-related items	building-related items	building-related items	building-related items	building-related items	building-related items
5 Services (MEP)	building-related systems non building-related systems	building-related systems non building-related systems		building-related systems non building-related systems	building-related systems non building-related systems	building-related systems non building-related systems	building-related systems non building-related systems	building-related systems non building-related systems	building-related systems non building-related systems	building-related systems non building-related systems	building-related systems non building-related systems	building-related systems regulated building-related systems others non building-related systems		building-related systems non building-related systems	building-related systems non building-related systems	building-related systems non building-related systems	building-related systems non building-related systems	building-related systems non building-related systems	building-related systems non building-related systems	building-related systems non building-related systems
6 Prefabricated Buildings and Building Units																			
7 Work to Existing Building																			
8 External works																			
TOTAL																			
TOTAL - normalised ($kgCO_2e/m^2$ or equivalent unit to be stated)																			

Example reporting template from RICS 2017 Professional Statement

RIBA & LETI targets for buildings



Upfront Carbon, A1-5 (exc. sequestration)

	Band	Office	Residential	Education	Retail
	A++	<100	<100	<100	<100
	A+	<225	<200	<200	<200
LETI 2030 Design Target	A	<350	<300	<300	<300
	B	<475	<400	<400	<425
LETI 2020 Design Target	C	<600	<500	<500	<550
	D	<775	<675	<625	<700
	E	<950	<850	<750	<850
	F	<1100	<1000	<875	<1000
	G	<1300	<1200	<1100	<1200

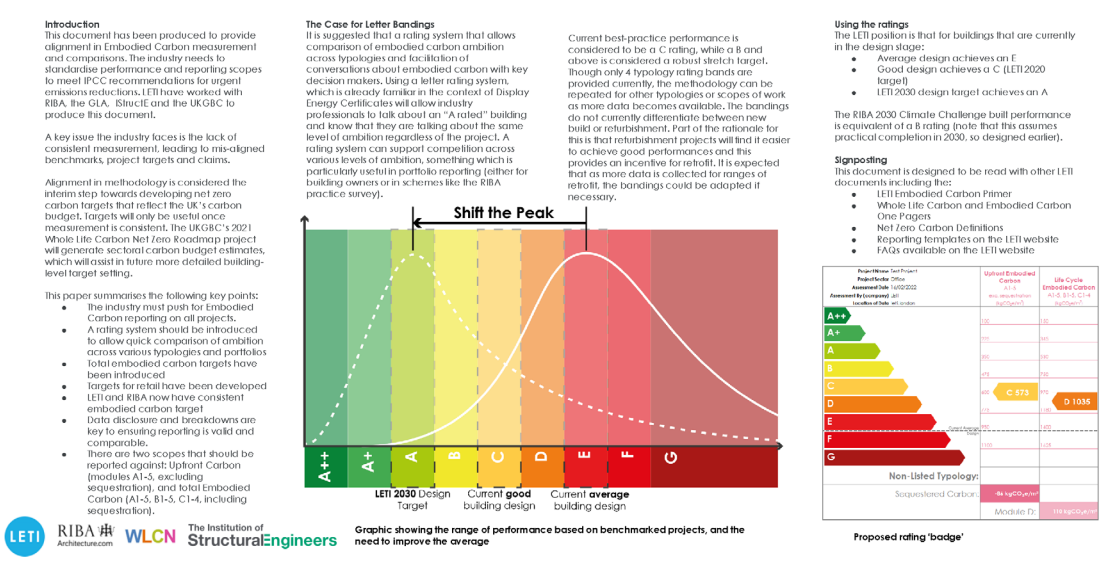
Embodied Carbon, A1-5, B1-5, C1-4 (inc. sequestration)

	Band	Office	Residential	Education	Retail
	A++	<150	<150	<125	<125
	A+	<345	<300	<260	<250
	A	<530	<450	<400	<380
RIBA 2030 Built Target	B	<750	<625	<540	<535
	C	<970	<800	<675	<690
	D	<1180	<1000	<835	<870
	E	<1400	<1200	<1000	<1050
	F	<1625	<1400	<1175	<1250
	G	<1900	<1600	<1350	<1450

All values in $kgCO_2e/m^2$ (GIA)

LETI grades – King's Cross Sports Hall

Embodied Carbon Target Alignment



Introduction
This document has been produced to provide alignment in Embodied Carbon measurement and comparisons. The industry needs to standardise performance and reporting scopes to meet IPCC recommendations for urgent emissions reductions. LETI have worked with RIBA, the GLA, IStructE and the UKGBC to produce this document.

A key issue the industry faces is the lack of consistent measurement, leading to mis-aligned benchmarks, project targets and claims.

Alignment in methodology is considered the interim step towards developing net zero carbon targets that reflect the UK's carbon budget. Targets will only be useful once measurement is consistent. The UKGBC's 2021 Whole Life Carbon Net Zero Roadmap project will generate sectoral carbon budget estimates, which will assist in future more detailed building-level target setting.

This paper summarises the following key points:

- The industry must push for Embodied Carbon reporting on all projects.
- A rating system should be introduced to allow quick comparison of ambition across various typologies and portfolios
- Total embodied carbon targets have been introduced
- Targets for retail have been developed
- LETI and RIBA now have consistent embodied carbon target
- Data disclosure and breakdowns are key to ensuring reporting is valid and comparable.
- There are two scopes that should be reported against: Upfront Carbon (modules A1-5, excluding sequestration), and total Embodied Carbon (A1-5, B1-5, C1-4, including sequestration).

The Case for Letter Bandings
It is suggested that a rating system that allows comparison of embodied carbon ambition across typologies and facilitation of conversations about embodied carbon with key decision makers. Using a letter rating system, which is already familiar in the context of Display Energy Certificates will allow industry professionals to talk about an "A rated" building and know that they are talking about the same level of ambition regardless of the project. A rating system can support competition across various levels of ambition, something which is particularly useful in portfolio reporting (either for building owners or in schemes like the RIBA practice survey).

Current best-practice performance is considered to be a C rating, while a B and above is considered a robust stretch target. Though only 4 typology rating bands are provided currently, the methodology can be repeated for other typologies or scopes of work as more data becomes available. The bandings do not currently differentiate between new build or refurbishment. Part of the rationale for this is that refurbishment projects will find it easier to achieve good performances and this provides an incentive for retrofit. It is expected that as more data is collected for ranges of retrofit, the bandings could be adapted if necessary.

Shift the Peak

A++ A+ A B C D E F G

LETI 2030 Design Target | Current good building design | Current average building design

Graphic showing the range of performance based on benchmarked projects, and the need to improve the average

Using the ratings
The LETI position is that for buildings that are currently in the design stage:

- Average design achieves an E
- Good design achieves a C (LETI 2020 target)
- LETI 2030 design target achieves an A

The RIBA 2030 Climate Challenge built performance is equivalent of a B rating (note that this assumes practical completion in 2030, so designed earlier).

Signposting
This document is designed to be read with other LETI documents including the:

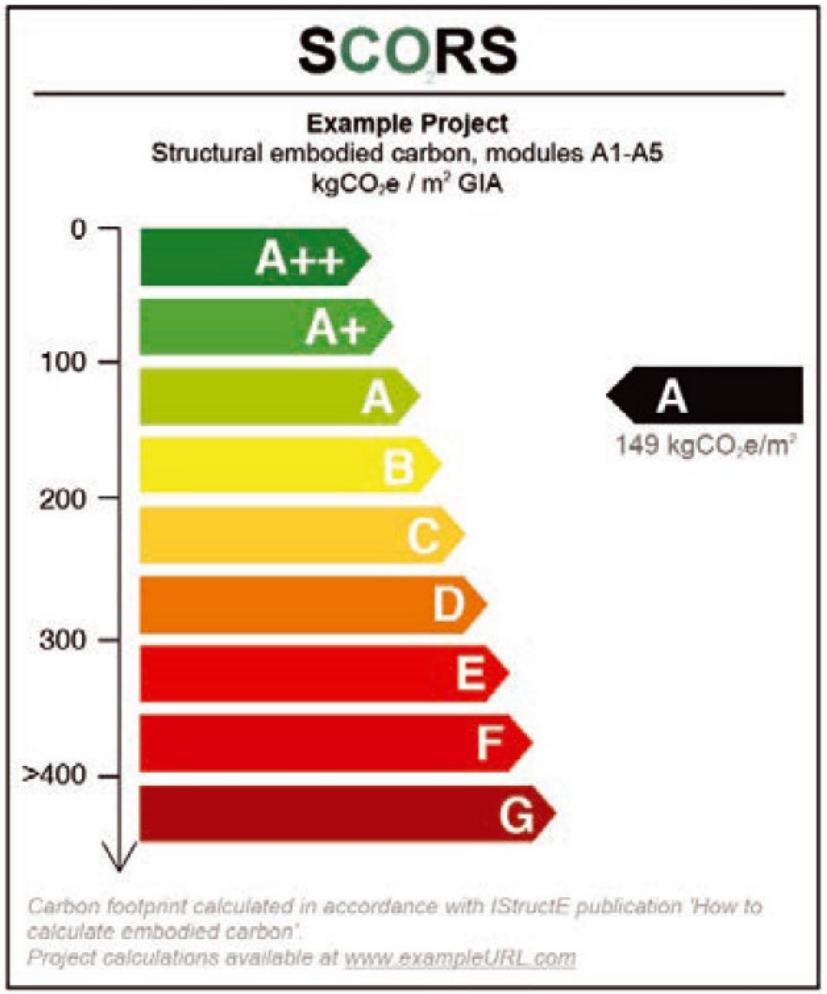
- LETI Embodied Carbon Primer
- Whole Life Carbon and Embodied Carbon One Pagers
- Net Zero Carbon Definitions
- Reporting templates on the LETI website
- FAQs available on the LETI website

Proposed rating 'badge'

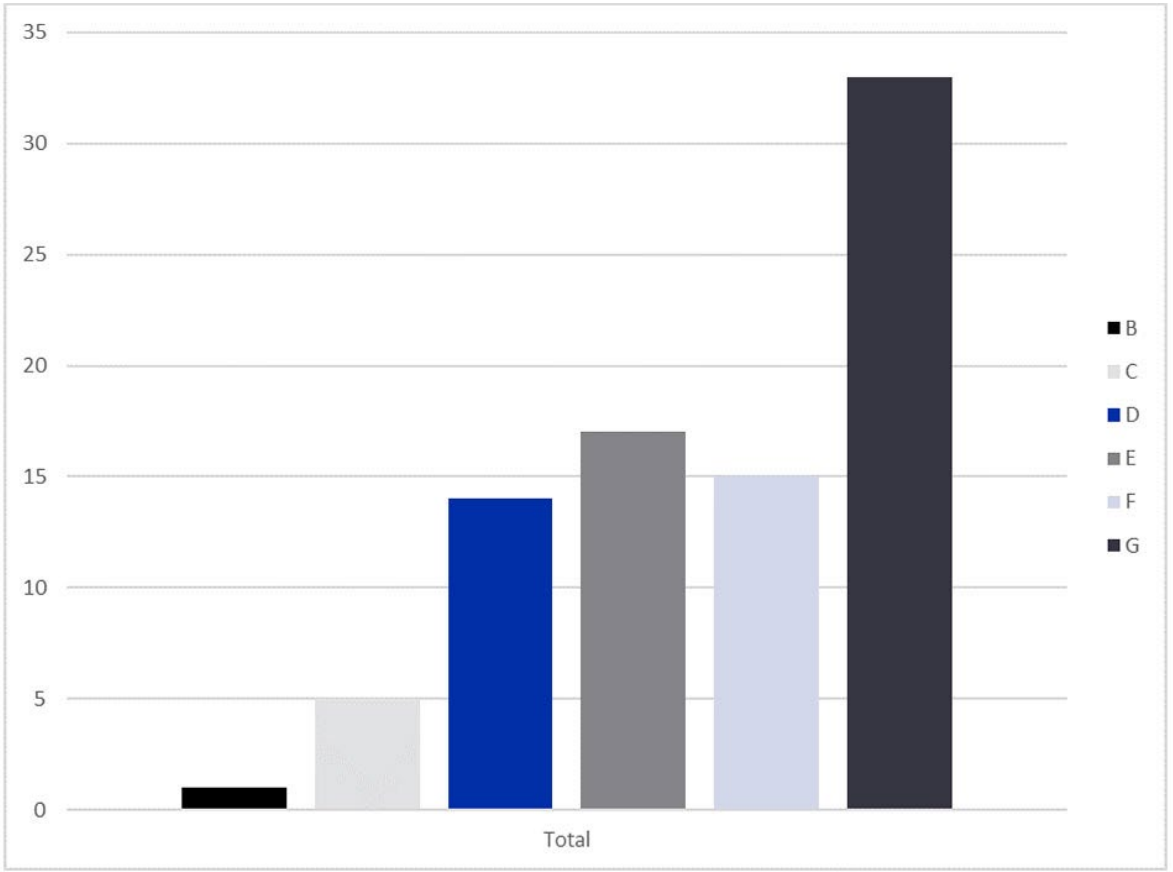
Project Name Sports Hall, King's Cross **Project Sector** Education **Assessment Date** 31/12/2020 **Assessment By (company)** BAM **Location of Data** https://bit.ly/3fXAmd4	**Upfront Carbon** A1-5 exc. sequestration ($kgCO_2e/m^2$)	**Embodied Carbon** A1-5, B1-5, C1-4 ($kgCO_2e/m^2$)
A++	100	125
A+	200	260 **A+ 201.8**
A	300	400
B **B 352.7**	400	540
C	500	675
D	625	835
E Current Average Design	750	1000
F	875	1175
G		
Non-Listed Typology:		
Sequestered Carbon:	-314 $kgCO_2e/m^2$	
Module D:		-186 $kgCO_2e/m^2$

LETI have published a great series of case studies including this example here

SCORS example



Price & Myers 2021 projects dataset SCORS



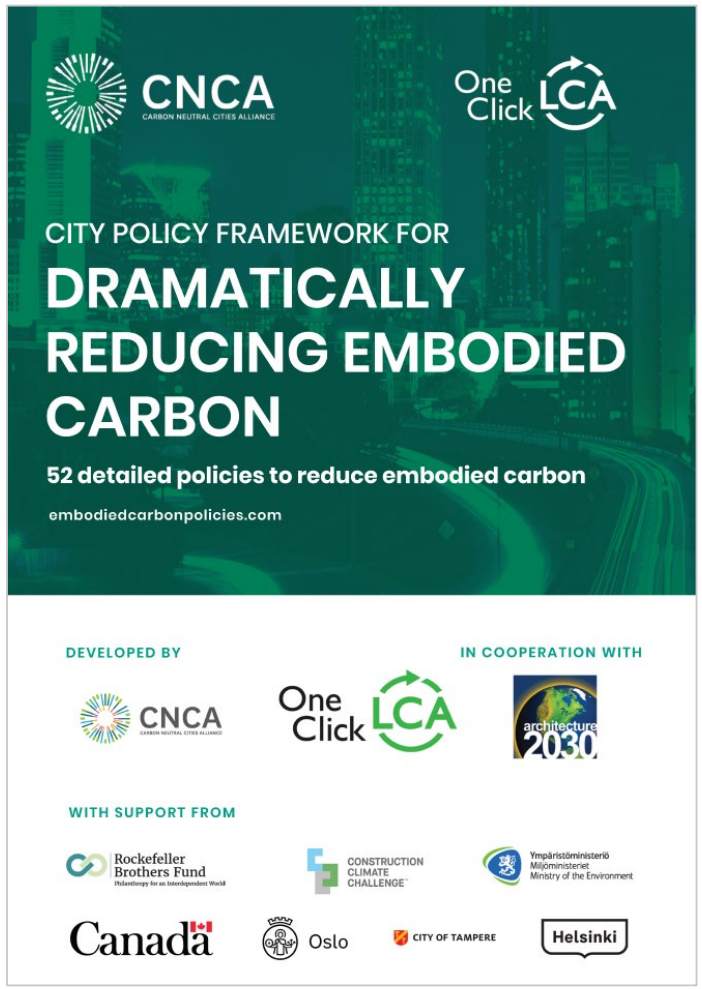
Graph showing the number of designs in each SCORS category

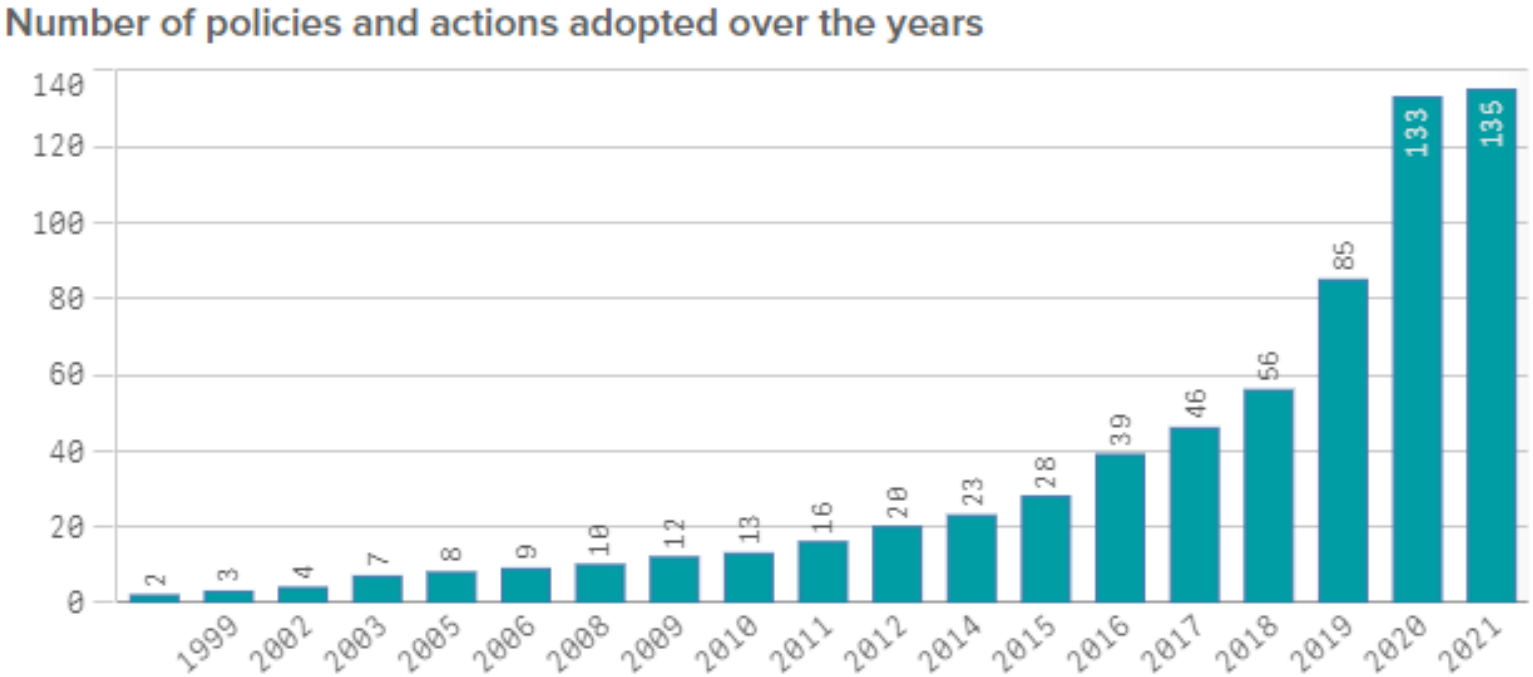
Find out more about SCORS or view the latest Price & Myers dataset (v3 2023)

WHAT CAN LOCAL AUTHORITIES DO ABOUT IT?

Policy options & examples

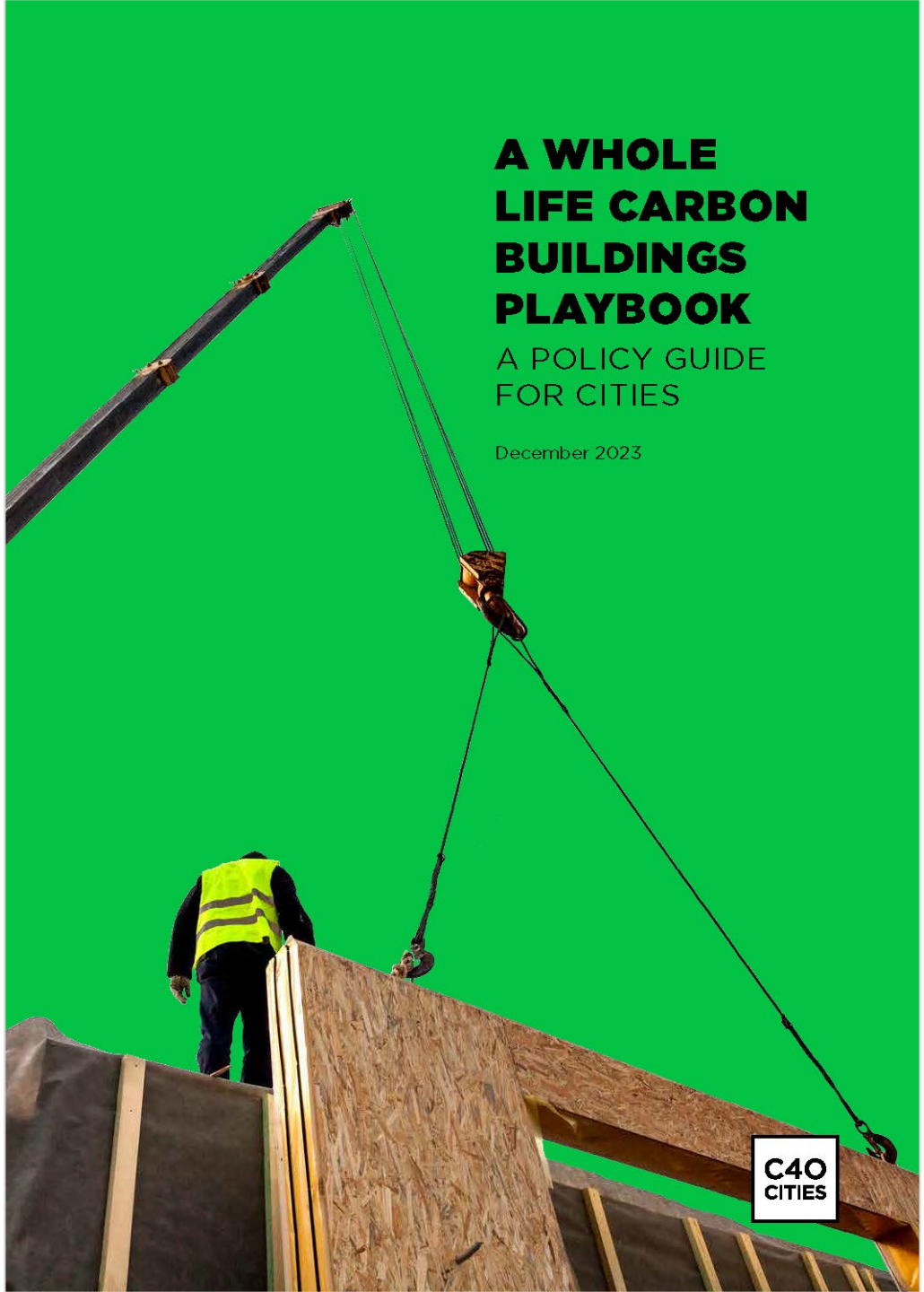
Local policy options





Uptake based on C40 Clean Construction Policy Explorer

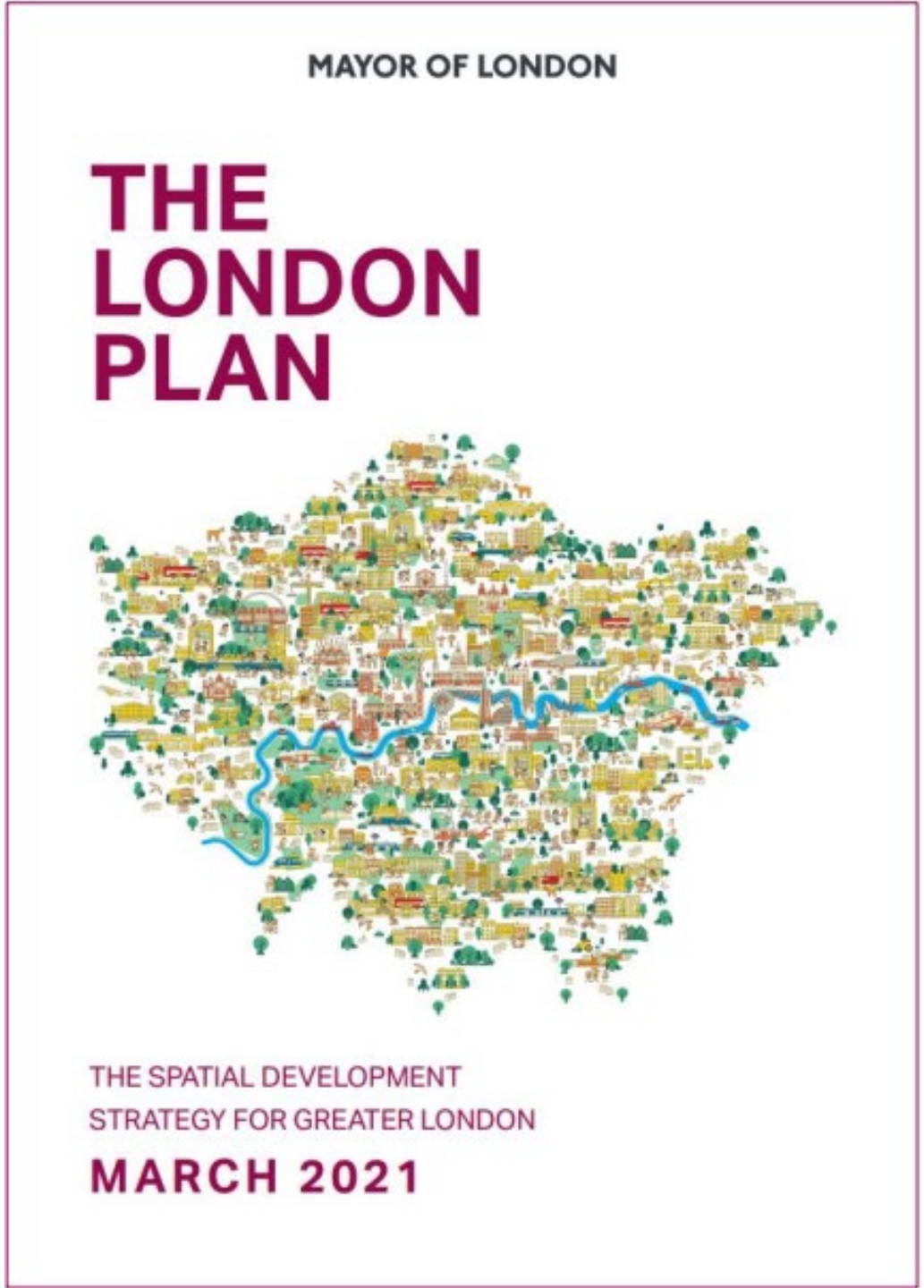
CNCA & OneClickLCA (2020) City Policy Framework for Dramatically Reducing Embodied Carbon
C40 (2020) Clean Construction Policy Explorer



C40 Policy Guide

- Covers wide range of policy options with examples
- Includes case studies from cities & local authorities around the world (e.g. Vancouver, New York, Oslo)

C40 (2023) A whole life carbon buildings playbook



London Policy SI2

F Development proposals referable to the Mayor should calculate whole-life cycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions

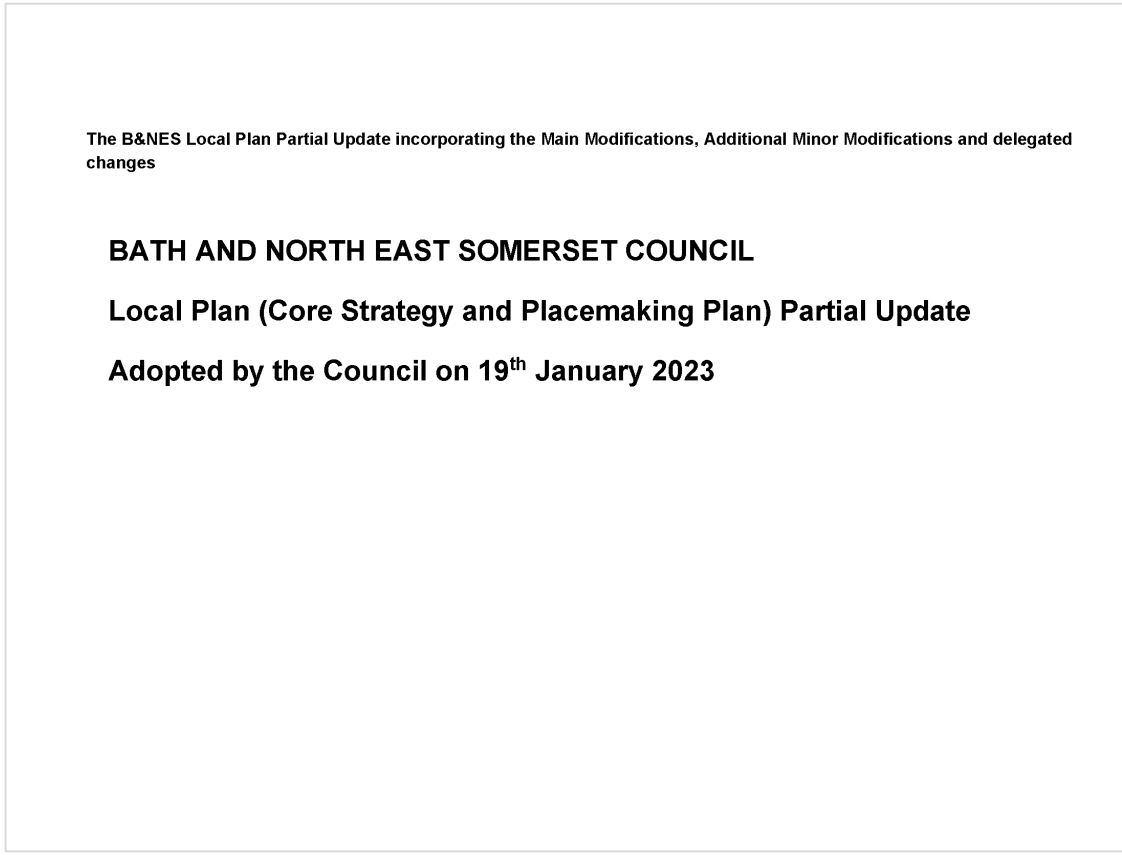
3 stage process

1. Pre-application
2. Stage 1 submission (i.e. RIBA Stage 2/3)
3. Post-construction

Results submitted using common template

B&NES Policy SCR8

"Large scale new-build developments (a minimum of 50 dwellings or a minimum of 5000m^2 of commercial floor space) are required to **submit an Embodied Carbon Assessment** having regard to the Sustainable Construction Checklist SPD that **demonstrates a score of less than 900kgCO_2e/m^2** can be achieved within the development for the substructure, superstructure and finishes."



The B&NES Local Plan Partial Update incorporating the Main Modifications, Additional Minor Modifications and delegated changes

BATH AND NORTH EAST SOMERSET COUNCIL

Local Plan (Core Strategy and Placemaking Plan) Partial Update

Adopted by the Council on 19th January 2023

Keep an eye on research project assessing implementation

Central Lincolnshire Local Plan Policy S11

"All major development proposals should explicitly set out what opportunities to lower a building's embodied carbon content have been considered, and which opportunities, if any, are to be taken forward.
In the period to 31 December 2024, there will be no requirement (unless mandated by Government) to use any specific lower embodied carbon materials in development proposals, provided the applicant has at least demonstrated consideration of options and opportunities available.
From 1 January 2025, there will be a requirement for a development proposal to demonstrate how the design and building materials to be used have been informed by a consideration of embodied carbon, and that reasonable opportunities to minimise embodied carbon have been taken.
Further guidance is anticipated to be issued by the local planning authorities on this matter prior to 1 January 2025."

Central Lincolnshire Local Plan 2023

Others with emerging requirements

- Bristol City Council
- North Somerset
- Greater Cambridgeshire
- Central Lincolnshire
- Leeds City Council
- Milton Keynes
- Cornwall
- And more…

Target levels

GREATER LONDON AUTHORITY	Offices:	950	$kgCO_2e/m^2$	Recommended limits
	Residential:	850	$kgCO_2e/m^2$	
	Offices:	600	$kgCO_2e/m^2$	Stretch goals
	Residential:	500	$kgCO_2e/m^2$	
Bath & North East Somerset Council	All buildings:	900	$kgCO_2e/m^2$	Planning requirement (major projects)
LETI, RIBA Architecture.com, IStructE	Offices:	600	$kgCO_2e/m^2$	Voluntary targets (adopted by developers)
	Residential:	500	$kgCO_2e/m^2$	
BCO British Council for Offices	Offices:	350-600	$kgCO_2e/m^2$	Target range

Climate Action Scorecards

- 2023 Council Climate Action Scorecards
- *Question 3.4* Does the council require developers to carry out a whole life cycle carbon assessment of new build developments?
- **42 single tier councils identified** (majority London boroughs)

See results for Question 3.4

Impact on high profile developments

FINANCIAL TIMES

The battle over M&S Oxford Street and construction's carbon footprint

Retailer's redevelopment bid has raised questions about the environmental costs of demolishing and replacing older buildings as opposed to retrofitting them

AJ Architects' Journal

Tulip rejected over embodied carbon and heritage concerns

11 NOVEMBER 2021 • BY WILL ING

Impact on infrastructure projects

Welsh road building projects stopped after failing climate review

Only 15 schemes reassessed by expert roads review panel under 'world-leading' policy will go ahead

New Civil Engineer

Revealed: National Highways spend on legal fees to defend its RIS2 road schemes

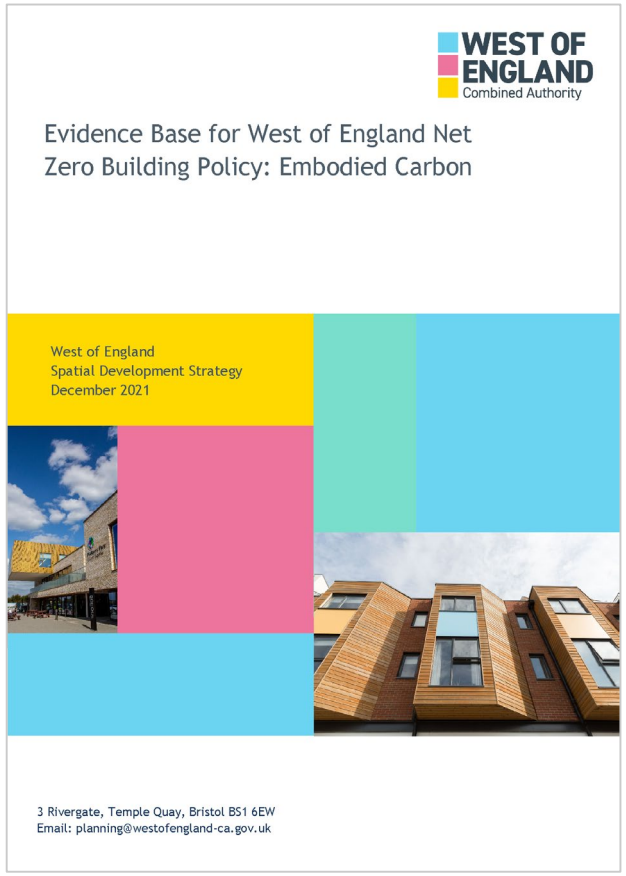
29 JUN, 2023 | BY ROB HAKIMIAN

National Highways has spent £330,000 on legal fees for six of Roads Investm Strategy 2 (RIS2) schemes, including more than £200,000 on its A303 Stonehenge tunnel, a freedom of information request from *NCE* has revealed

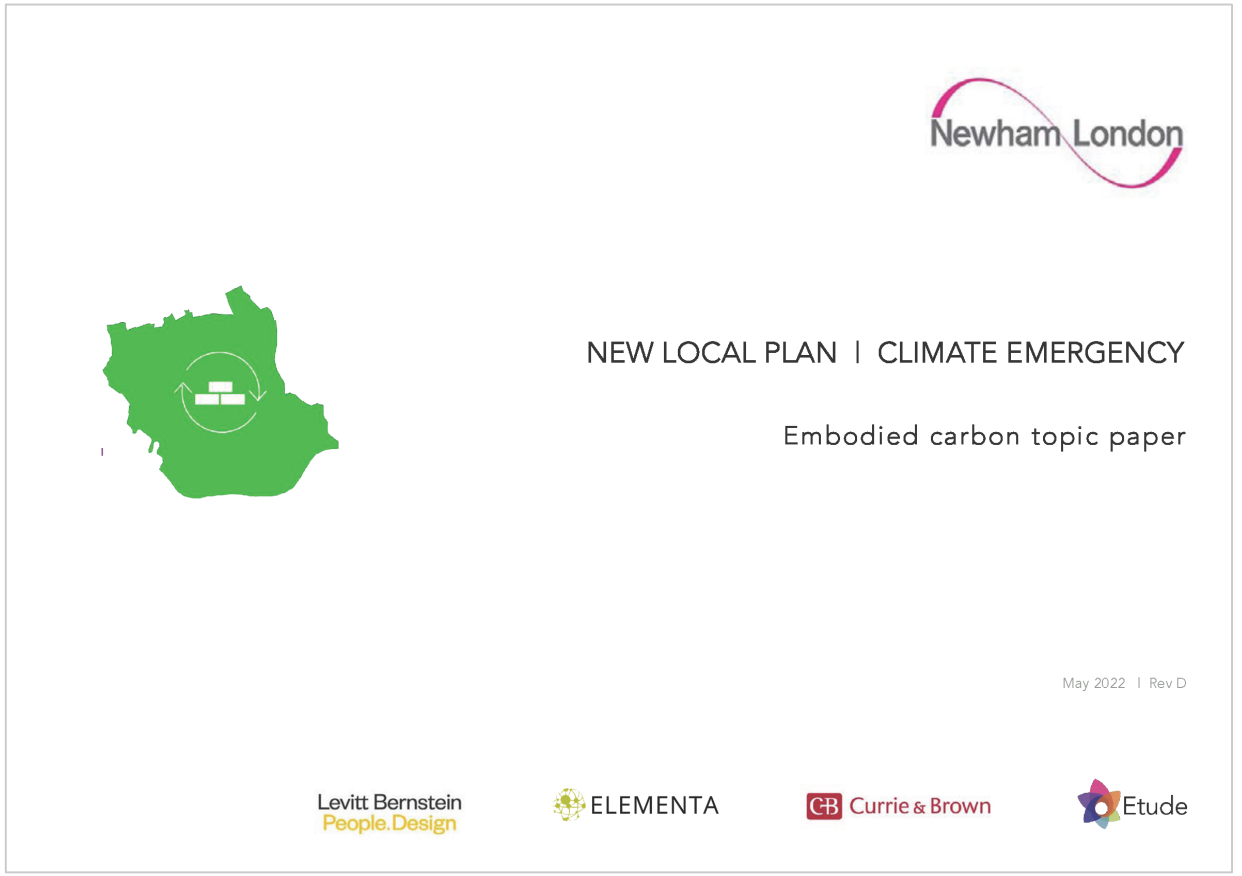
As the roads operator seeks to continue improving and expanding the nation's trunk network to add capacity and reliability, it has come up against challenges from campaigners who believe building new roads is incompatible with the need to decarbonise in the face of climate change. It is argued that road building is particula energy intensive and therefore polluting work and will ultimately encourage greater usage that will further pollute.

Read more from the Welsh Government on their revised approach

Examples of consultancy reports for LAs



Evidence base report for West of England

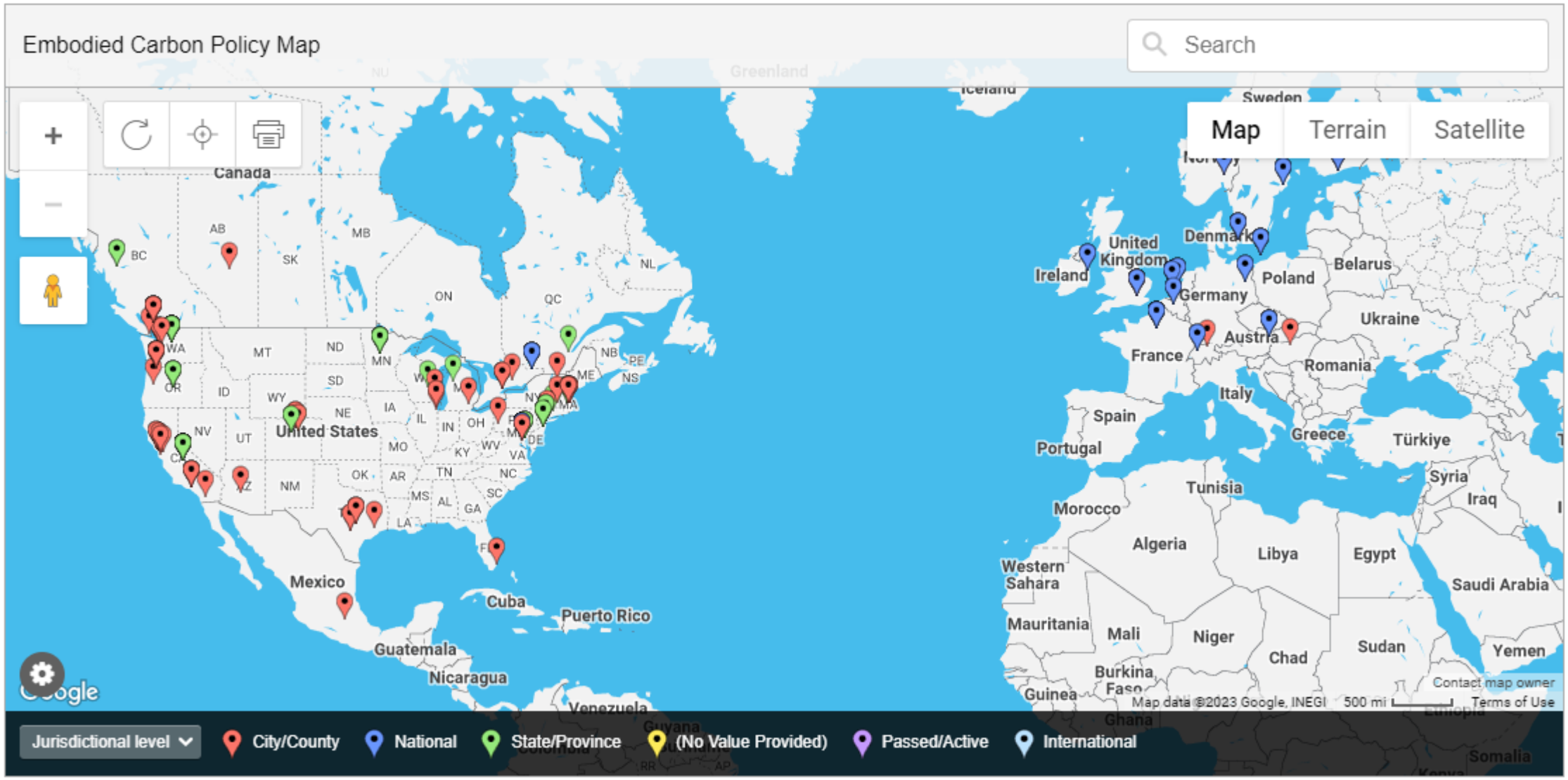


Topic paper for Newham

HOW DOES THE UK COMPARE INTERNATIONALLY?

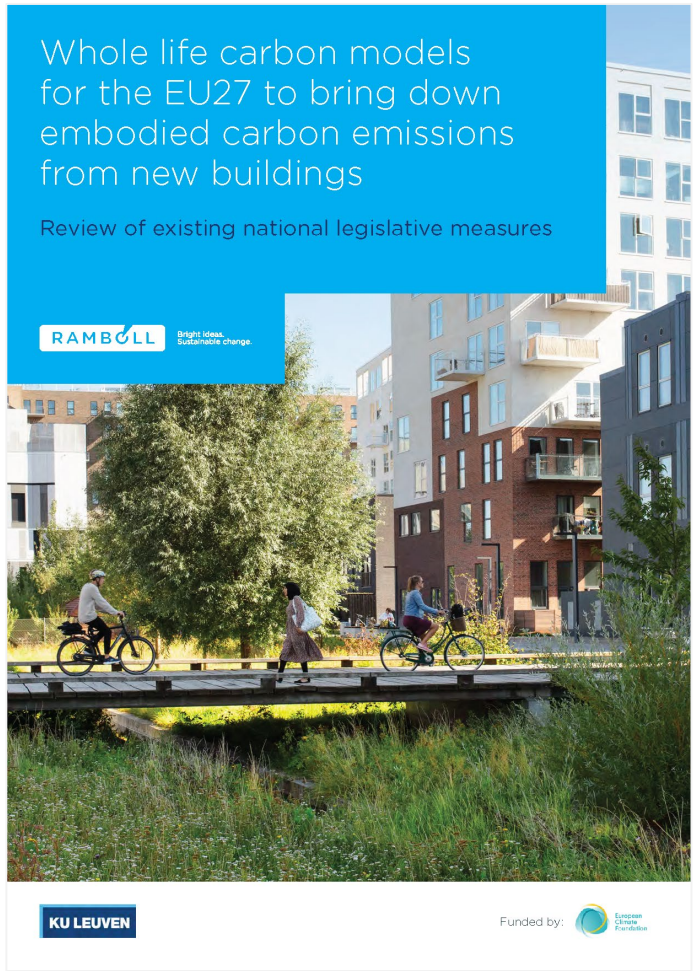
Policies & practice

Interactive policy map



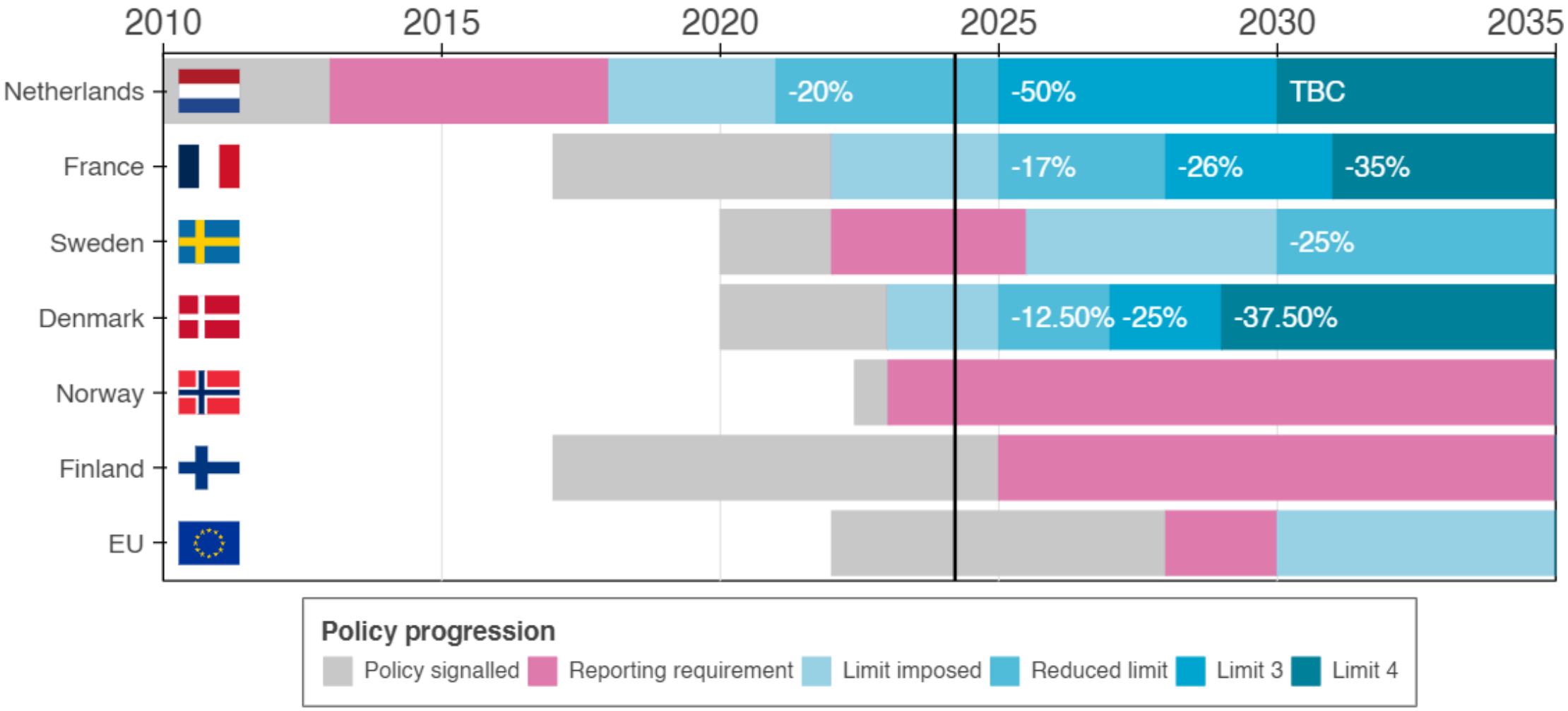
Map from [Carbon Leadership Forum](#) policy toolkit - last updated in October 2023

International policy reviews



2022 reports from Ramboll & OneClickLCA. Shorter 2023 briefing from WGBC

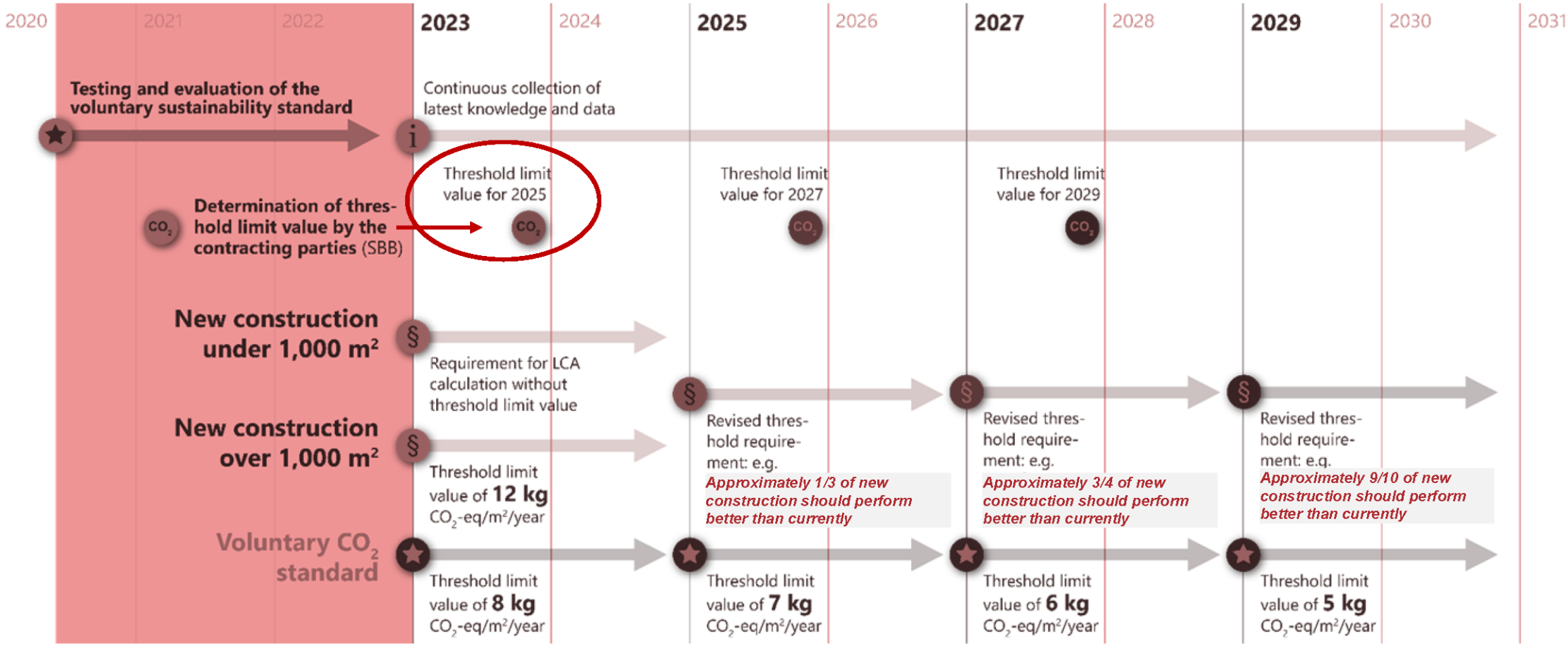
European regulatory trend



For interactive summary with links to regulations see jannikgiesekam.co.uk/embodiedcarbon/

Example – Denmark

Staged phasing and tightening of the CO_2-criteria



Slide from Helle Redder Momsen. Watch a recording of the 2023 Nordic Climate Forum for Construction for further information

Comparison within Nordic countries

	Included life cycle stages	Denmark	Estonia	Finland	Iceland	Norway	Sweden	Level(s)
A	A1-A3	√	√	√	√	√	√	√
A	A4 Transport to site	√	√	√	√	√	√	√
A	A5 Construction	√	√	√	√	√*	√	√
B	B1 Use in building							
B	B2 Maintenance							
B	B3 Repair							
B	B4 Replacements	√						
B	B5 Refurbishment							
B	B6 Energy	√						
B	B7 Water							
C	C1 Demolition works							
C	C2 Transport							
C	C3 Waste management	√						
C	C4 Final disposal	√						
D	Additional	√						

*Only waste included

	Included building parts	Denmark BR18	Estonia Proposed draft method for climate declaration (2021)	Finland Climate declaration	Iceland Climate declaration proposal (under development)	Norway TEK17	Sweden Climate declaration 2022	Sweden Limit values 2025 Climate declaration 2027 (Boverket's proposal)	Europe LEVEL(s)
	Site preparation	-	-	soil stabilization and site reinforcement elements	-	-	-	reported separately from 2027	?
Substructure	Foundations	X	X	X	X	X	X	X	X
Substructure	Piling	X	X	X				reported separately from	?
Substructure	Basement walls	X	X	X					
Substructure	Ground floor structure	X	X	X					
Superstructure (external elements)	Frame (columns, beams)	X	X	X					
Superstructure (external elements)	External walls, façade	X	X	X					
Superstructure (external elements)	External doors, windows	X	X	X					
Superstructure (external elements)	Balconies	X	X	X					
Superstructure (external elements)	Roof structures	X	X	X					
Superstructure (internal elements)	Internal walls, load- and non- load bearing	X	X	X					
Superstructure (internal elements)	Floor slabs	X	X	X					
Superstructure (internal elements)	Internal doors	X	X	X					
Superstructure (internal elements)	Stairs and ramps	X	X	X					
Internal finishes	Wall and ceiling interior finishes and coverings	X	X	X					
Internal finishes	Flooring materials	X	X	X					
Internal finishes	Suspended ceilings	X	X	X					
Building services	Lifts and escalators	X	X	X					
Building services	Electricity system	-	-	X					
Building services	HVAC system	X	X	X					
Building services	Renewable energy systems	X	X	X					
Building services	Water system	X	X	X					
Building services	Sewage system	X	-	X					
Building services	Other systems (e.g. firefighting)	-	-	X					
	External works	only if included in the area definition	-	only external structures on yard					
Furnishing	Fixed furniture	-	-	X					
Furnishing	User furniture	-	-	-					

					Within the building enclosure									Outside the building enclosure			
Country/ Region	(in place or proposed) Regulation	RSP	Floor area definition	External wall thickness	Primary functions	Secondary functions (e.g. circulation areas, storage)	Internal walls and columns	Basement/ cellar	Stairs	Common facilities (in multi-units, incl. staircase, lift, vertical voids)	Enclosed car park connected to building	Attic	Rooftop terrace	Plantrooms on roof	Balcony	External area including car park
Denmark	Danish Building regulation (BR18) – embodied part	50	reference area	X	X	X	X	If ceiling height > 1.25 m	X	counted for all floors	included with 50%	Only if > 1.5 m high	included with 25%	X	included with 25% (for external areas only when connected to the building)	
Denmark	Danish Building regulation (BR18) – operational part	50	heated gross floor area	X	Included if heated		X	If ceiling height > 1.25 m included with 40%	-	counted for all floors	-	Only if > 1.5 m high	-	-	-	-
Estonia	Proposed method for climate declaration (2021)	50	heated net floor area	-	Included if heated		X	Included if heated	?	?	?	?	?	?	?	?
Finland	Proposed method for climate declaration (2021)	50	heated net floor area	-	Included if heated		X	X	X	-	X	X	X	X	X	-
Norway	TEK17	50	gross floor area	X	X	X	X	Included if > 1.9m high for a width of ≥ 0.6m	-	-	X	Included if > 1.9m high for a width of ≥ 0.6m	Included in enclosed by glass	X	-	-
Sweden	Klimadeklaration 2022	N/A (50)	gross floor area	X	X	X	X	X	-	-	X	Included if > 1.9m high for a width of ≥ 0.6m	-	X	X	-
Sweden	Swedish Building regulation (BBR29) Operational energy calculation	50	heated net floor area	-	Included if heated		X	X	X	Included if heated	-	Included if heated	-	-	-	-
Europe	Level(s) – Office	50	IPMS 3 Useful floor area	-	X	X	X	If in exclusive use	-	-	-	-	Separate item	-	Separate item	-
Europe	Level(s) – Residential	50	IPMS 3B Useful floor area	-	X	X	X	Separate item	Only on ground floor	-	Separate item	Separate item	Separate item	Separate item (unless common facility)	Separate item	-

Follow Nordic Sustainable Construction or read more about comparisons

WILL WE END UP WITH NATIONAL REGULATIONS?

Recommendations, research & proposals

June 2022

Progress in reducing emissions

2022 Report to Parliament

Climate Change Committee

CCC recommendation since 2018

“Set out a plan to make an assessment of whole-life carbon and material use of public and private construction projects mandatory by 2025, to enable minimum standards to be set. The whole life carbon assessment should be sought at the planning stage to enable efforts to reduce embodied carbon and materials.”

June 2023

Progress in reducing emissions

2023 Report to Parliament

2023 Progress Report

"Overdue" with "some but insufficient progress"

R2022-252	Industry; Buildings; Surface transport	Set out a plan to make an assessment of whole-life carbon and material use of public and private construction projects mandatory by 2025, to enable minimum standards to be set. The whole-life carbon assessment should be sought at the planning stage to enable efforts to reduce embodied carbon and materials. **Primary responsibility: DLUHC** Supporting actors: DfT; DESNZ	2022 Overdue

Climate Change Committee

House of Commons
Environmental Audit Committee

Building to net zero: costing carbon in construction

First Report of Session 2022–23

Report, together with formal minutes relating to the report

Ordered by the House of Commons to be printed 11 May 2022

HC 103
Published on 26 May 2022
by authority of the House of Commons

EAC recommendation

“the single most significant policy the Government could introduce is a mandatory requirement to undertake whole-life carbon assessments for buildings. This requirement should be set within building regulations and the planning system. Following introduction of whole-life carbon assessments, the Government should develop progressively ratcheting carbon targets for buildings, to match the pathway to net zero. A clear timeline for introducing this should be set by the end of 2022.”

House of Commons
Environmental Audit Committee

Building to net zero: costing carbon in construction: Government Response to the Committee's First Report

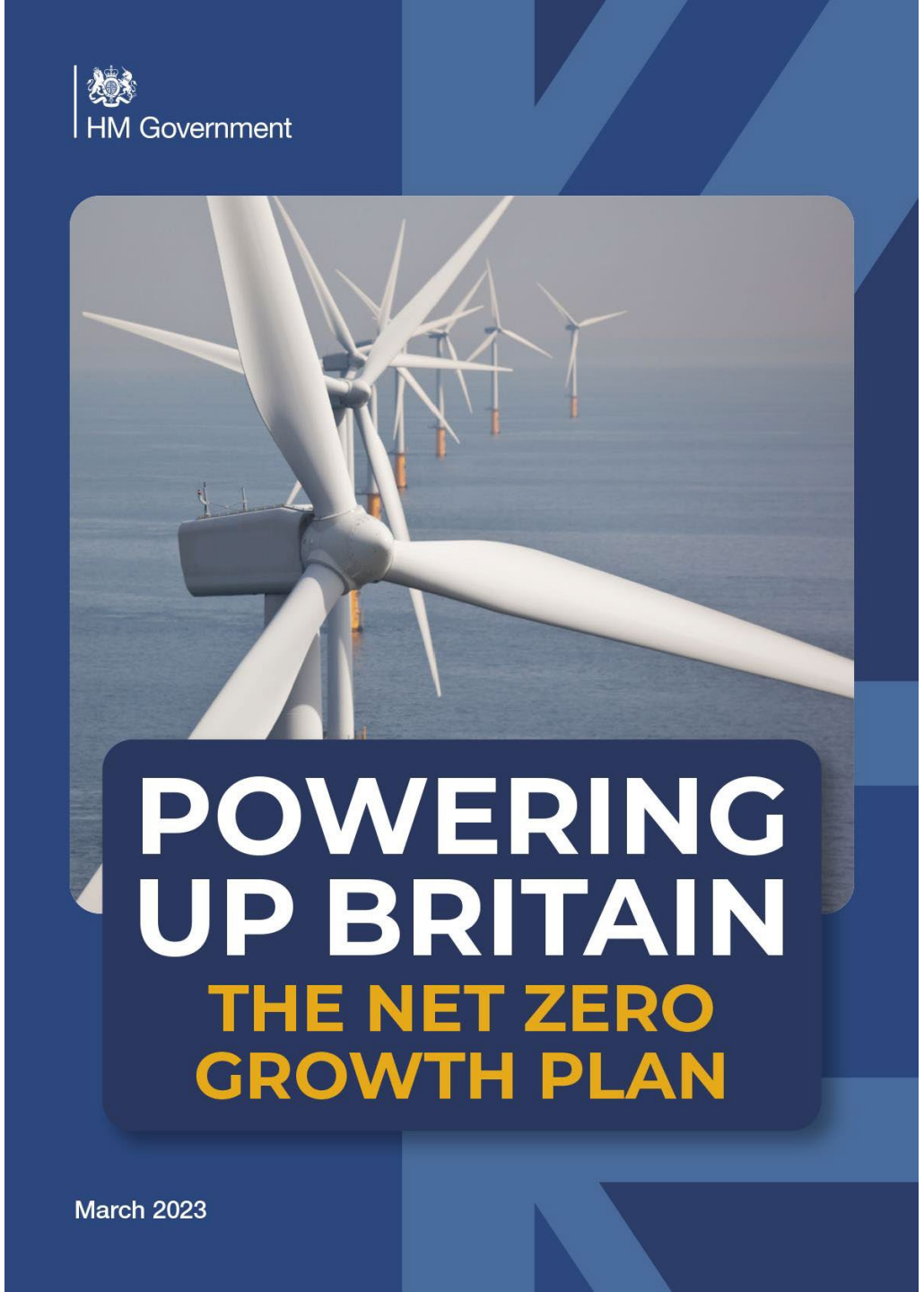
Third Special Report of Session 2022–23

Ordered by the House of Commons to be printed 7 September 2022

HC 643
Published on 30 September 2022
by authority of the House of Commons

UK Govt response

We agree with the Committee that whole-life carbon assessments are likely to have a significant role to play in delivering decarbonisation across the sector… Government intends to consult in 2023 on our approach and interventions to mainstream the measurement and reduction of embodied carbon in the built environment."



UK Govt Net Zero Plan

“Responded to the Environmental Audit Committee’s report on Building to Net Zero, outlining our intention to consult this year on our approach to the measurement and reduction of embodied carbon in new buildings”

Department for Levelling Up,
Housing & Communities

Statement of Requirements (Draft)

Measurement and Reduction of Embodied Carbon in New Buildings (CPD4124072)

Future Opportunities Notice

1. SCOPE OF REQUIREMENT

1.1 Through the contracted work, The Authority is seeking to establish detailed baselines on matters regarding WLCAs and reduction of embodied carbon in new buildings to inform policy development. The work has been divided into the below six in-scope areas:

1) The robustness of WLCAs, uncertainties in data used and their results and the challenges that creates for decision-making.
2) The impacts to business of carrying out WLCAs.
3) The supporting structure and data needed for WLCAs.
4) The design and construction choices that are made following WLCAs.
5) The appropriate and cost-effective areas for carbon savings and the relative savings available.
6) The design and material choices that would be encouraged by embodied carbon reduction and the impacts of those choices.

1.2 Across these six areas, the work will need data gathering and analysis, technical and practical modelling, and economic analysis in line with Green Book and related methodology and requirements. Also in scope are the possibilities of support for a public consultation and production of impact assessments.

1.3 Given the range work required, especially the inclusion of economic analysis, the Authority expects that many bidders will need the support of external contractors or consortium partners to ensure relevant expertise.

1.4 As this is a developing area of policy the Authority intends for the contract to have a call-off element to allow additional (or changed) work. This could be influenced either by results from earlier work under the contract or policy development by the Authority.

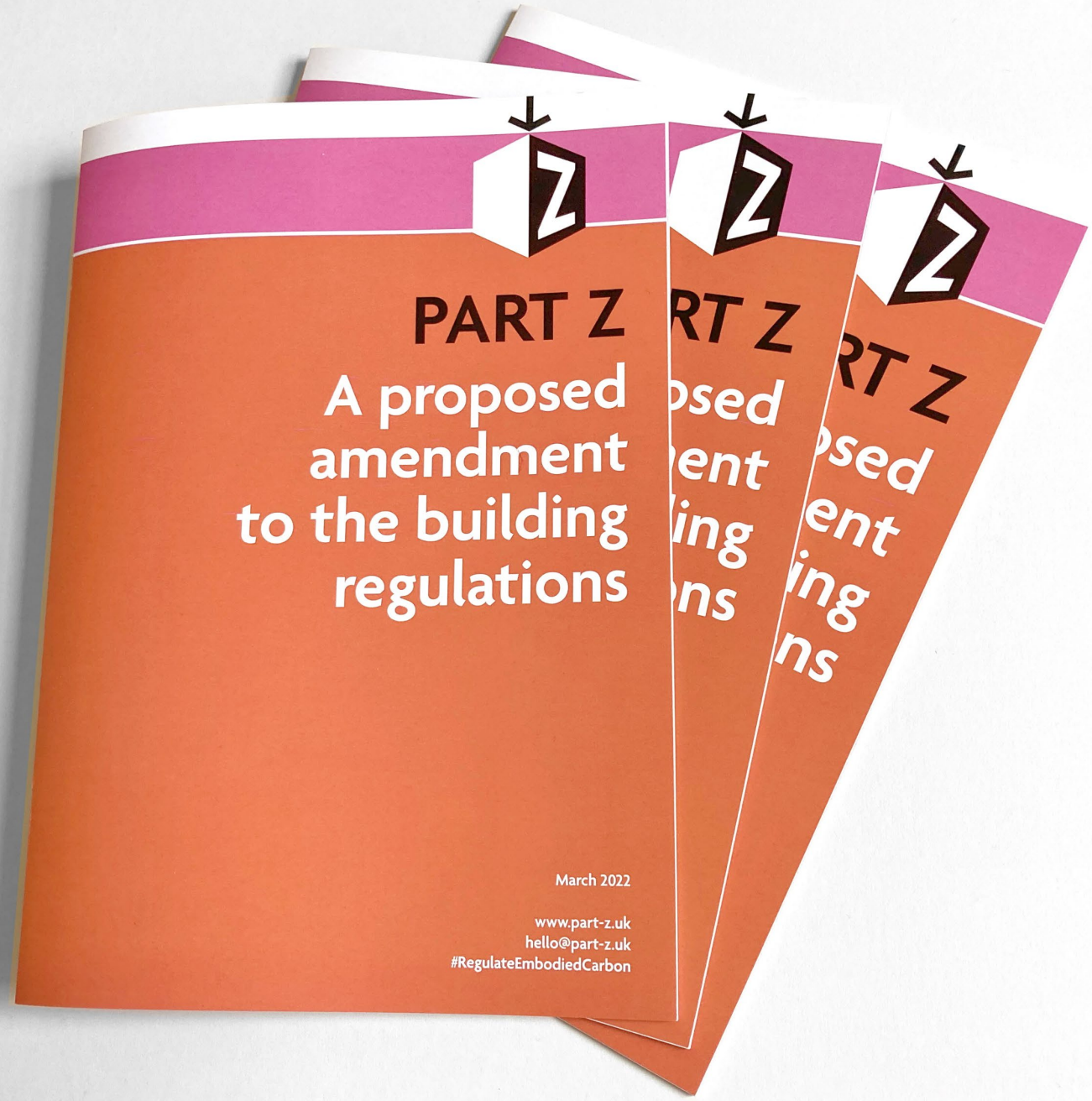
2. BUDGET AND TIMELINE

2.1 The maximum budget for the contract will be £250,000 (exc. VAT). Within that budget, the Authority intends that up to £50,000 (exc. VAT) will fund the call-off elements (see para 1.4).

2.2 The contract is likely to begin in March 2023 and run until March 2024.

Ongoing research

- DLUHC recruited AECOM to deliver 6 outputs staged across FY23/24 Q1-Q4
- Some initial outputs were presented at BE-ST Fest 2023



Part Z

Industry led proposed amendment to Building Regulations in England & Wales and suggested document for approval

Shortlisted for AJ 100 2023

Available from part-z.uk

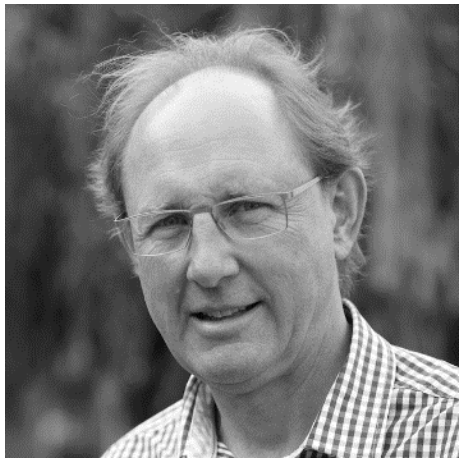
The Part Z authors

Will Arnold
Low-carbon structures

Tim den Dekker
Net zero architecture

Dr Jannik Giesekam
International policy

Dr Julie Godefroy
Environmental design



Simon Sturgis
Whole life carbon

IStructE

Feilden Clegg Bradley Studios

University of Strathclyde

CIBSE

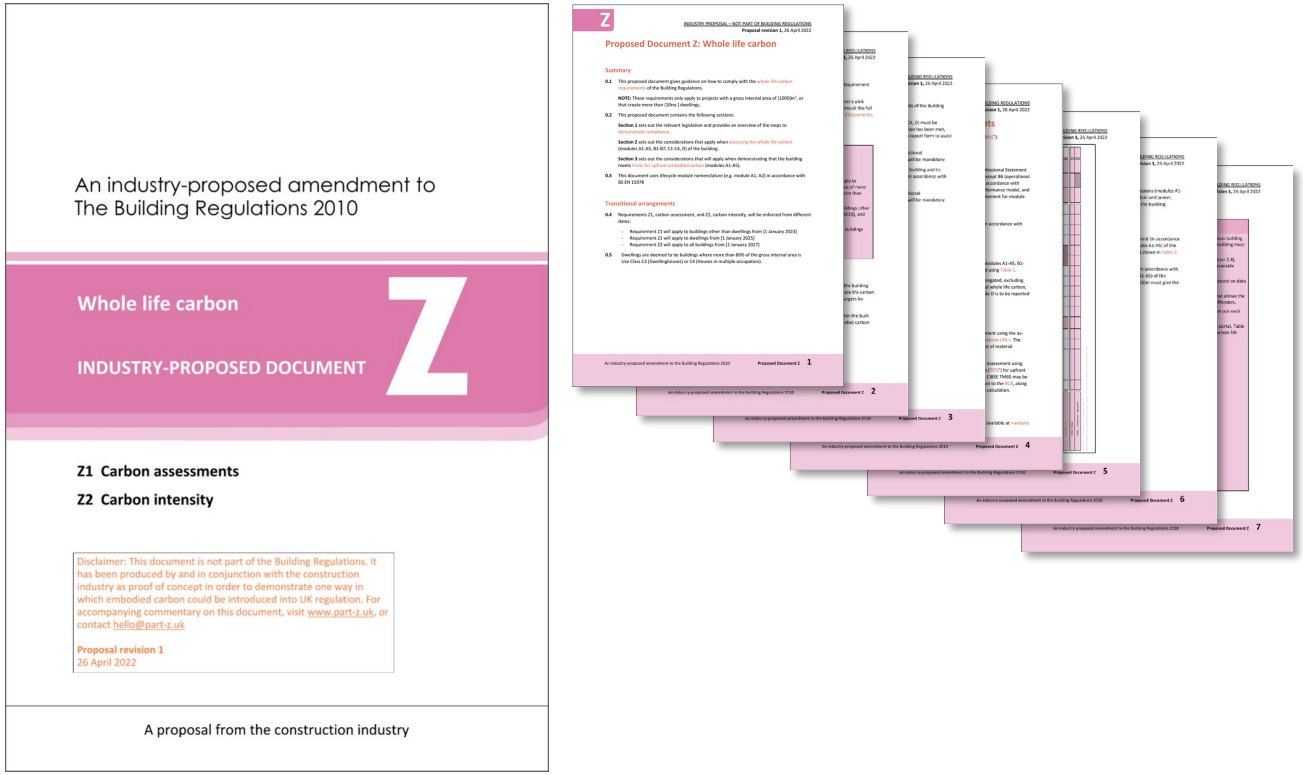
targeting zero

Amendment to Schedule 1 of the Building Regulations (2010)

	Requirement	*Limits on application:*
	PART Z WHOLE LIFE CARBON	
Z1	**Carbon assessment** **Z1.** Whole life carbon emissions shall be assessed and reported for the building and any other parts of the project where Building Regulations apply.	Requirements Z1 and Z2 only apply to projects with a gross internal area of more than [1000]m2, or that create more than [10no.] dwellings. Requirement Z1 will apply to buildings other than dwellings from [1 January 2023], and dwellings from [1 January 2025].
Z2	**Carbon efficiency** **Z2.** Reasonable provision shall be made for the minimisation of whole life carbon emissions by: (a) Minimising upfront embodied carbon; and (b) Where an item provides whole life carbon benefit, this is taken into account.	Requirement Z2 will apply to all buildings from [1 January 2027].

+

Proposed Document Z



Full proposals and commentary at part-z.uk/proposal

Industry support for the regulation of embodied carbon

We are grateful to the following companies for sharing the statements below so far:

abrdn Investments | AESG | Allford Hall Monaghan Morris | Allies & Morrison | Arcadis | Arup | Atelier Ten | Atkins Limited | Baily Garner | BAM Construct UK | BakerHicks | Barratt Developments | BDP | Bennetts Associates | B&K Structures Ltd | Black & White Engineering | Bouygues UK | British Land | Bruntwood | Buro Happold | Chartered Institute of Building | The Chartered Institution of Building Services Engineers | Civic Engineers | The Concrete Centre | Construction Industry Council | Cundall | dRMM Architects | Elliott Wood | Elmhurst Energy | Expedition Engineering | Feilden Clegg Bradley Studios | FMDC Ltd | Goss Structural Ltd | Greencore Construction | Grosvenor Great Britain & Ireland | Hawkins\Brown | Haworth Tompkins | Heyne Tillett Steel | Hoare Lea | Hopkins Architects | Hydrock Consultants Ltd | Igloo | JLL | The Institution of Civil Engineers | The Institution of Structural Engineers | ISG | Laing O'Rourke | Landsec | Lendlease | Levitt Bernstein | The London Energy Transformation Initiative | Mace Group | Max Fordham LLP | Morgan Sindall Group | Mott Macdonald | Multiplex Europe | The National Building Specification (NBS) | Natwest | Off Site Homes Alliance (OSHA) | Perkins & Will | Price & Myers | Ramboll | Ridge and Partners LLP | The Royal Institute of British Architects | Royal London Asset Management | The Royal Town Planning Institute | RPS Group PLC | Sheppard Robson | Sir Robert McAlpine | Skidmore, Owings & Merrill (SOM) | Stanhope PLC | Stanton Williams | The Steel Construction Institute | Stora Enso | The Structural Timber Association | Sweco | Thakeham Group | Thornton Tomasetti | Timber Development UK | tp bennett LLP | University College of Estate Management | Urban&Civic | Urban Splash | UKGBC | Walsh | Waugh Thistleton Architects | White Arkitekter | WilkinsonEyre | Willmott Dixon | WSP-UK ...and 98 more!

See full statements of support for regulation of embodied carbon at part-z.uk/industry-support

Barratt Developments "welcome regulation to mandate the reporting of whole life carbon, leading to the eventual introduction of embodied carbon limits in construction"

"**JLL** supports amendments to Building Regulations requiring assessment of whole life carbon emissions and limitation of embodied carbon emissions"

"**abrdn** Investments are supportive of the regulation of embodied carbon."

"**Royal London Asset Management** endorses the concept of regulation that mandates the reporting of – and sets limits on – embodied carbon emissions in the built environment."

"**Stanhope** fully supports the principle of regulating upfront embodied carbon in construction."

"**Landsec** […] fully supports these assessments becoming a legal requirement as part of Building Regulations."

See more at part-z.uk/industry-support

Inform, educate & debate

Why Part Z references the RICS Professional Statement

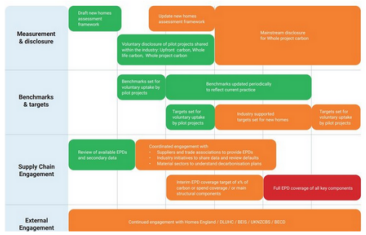
The RICS PS (2017) is the only UK-based WLCA guidance available for the interpretation and implementation of the framework put forward by EN 15978 and is widely used by industry professionals. The Part Z authors recommend that the UK Government standardise the use of the PS and identify key areas of development for its next revision.

Read More

Future Homes Hub releases implementation plan for WLC reduction in homes

The Future Homes Hub have launched their report "Embodied and Whole Life Carbon: 2023-2025 Implementation plan for the homebuilding industry". Amongst other measures, the report sets out the need for the homebuilding sector to implement a series of embodied carbon related actions over the next three years. The report calls for mainstream or regulated disclosure of whole life carbon on housing projects from 2025 – which is aligned with the regulation that the Part Z proposals have been calling for.

Read More



Housebuilders and the proposed Part Z

The Part Z authors have over the past few months spoken with housebuilders of all sizes to discuss the Part Z proposals. All of the housebuilders we met were supportive of the proposed Part Z, calling for the level playing field that will benefit all in the industry. This blog is a summary of our conversations around concerns raised by housebuilders.

Read More

Future Homes Hub

Department for Levelling Up, Housing & Communities

RTPI
Royal Town Planning Institute

Planning for Part Z

The Part Z authors have been in conversation with Richard Blyth, Head of Policy at the Royal Town Planning Institute (RTPI), to better understand what role planners and the planning process could play in relation to Part Z and whole life carbon.

Read More

AJ100 Panel Discussion: Getting Started with Embodied Carbon

UK Construction Week

futurebuild
the future of the built environment

Guerrilla Tactics
RIBA's creative business conference for small and medium sized architectural practices

SUPPLY CHAIN SUSTAINABILITY SCHOOL

FOOT PRINT +

TIMBER DEVELOPMENT UK

SCAPE

meshwork
together for a better built environment

Press coverage

Read more at part-z.uk/press

Engaging with Parliament

Environmental Audit Committee

Wednesday 17 November 2021 Meeting started at 1.17pm, ended 3.29pm

Environmental Audit Committee

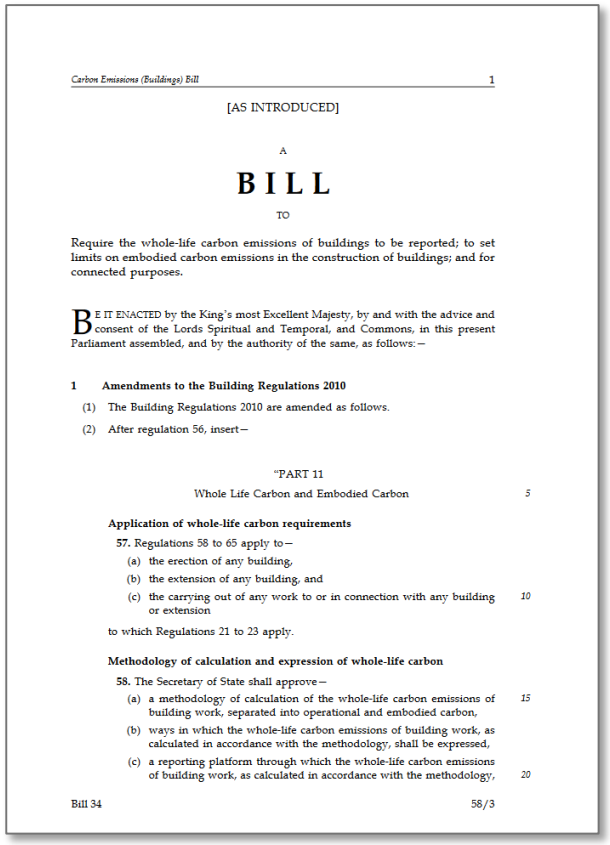
Wednesday 20 October 2021 Meeting started at 2.26pm, ended 4.29pm

Carbon Emissions (Buildings) Bill

- UK Parliament Private Members' Bill *"to require the whole-life carbon emissions of buildings to be reported; to set limits on embodied carbon emissions in the construction of buildings; and for connected purposes."*
- Private members bill with support from 4 parties introduced following Part Z proposals
- 2022 bill withdrawn before 2nd reading due to promotion of lead sponsor in DLUHC

Carbon Emissions (Buildings) Bill – take 2

- Second take sponsored by Jerome Mayhew (Conservative)
- 2nd reading on 25/11/22



Carbon Emissions (Buildings) Bill 1

[AS INTRODUCED]

A

BILL

TO

Require the whole-life carbon emissions of buildings to be reported; to set limits on embodied carbon emissions in the construction of buildings; and for connected purposes.

BE IT ENACTED by the King's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

1 Amendments to the Building Regulations 2010

(1) The Building Regulations 2010 are amended as follows.

(2) After regulation 56, insert—

"PART 11

Whole Life Carbon and Embodied Carbon

Application of whole-life carbon requirements

57. Regulations 58 to 65 apply to—

(a) the erection of any building,

(b) the extension of any building, and

(c) the carrying out of any work to or in connection with any building or extension

to which Regulations 21 to 23 apply.

Methodology of calculation and expression of whole-life carbon

58. The Secretary of State shall approve—

(a) a methodology of calculation of the whole-life carbon emissions of building work, separated into operational and embodied carbon,

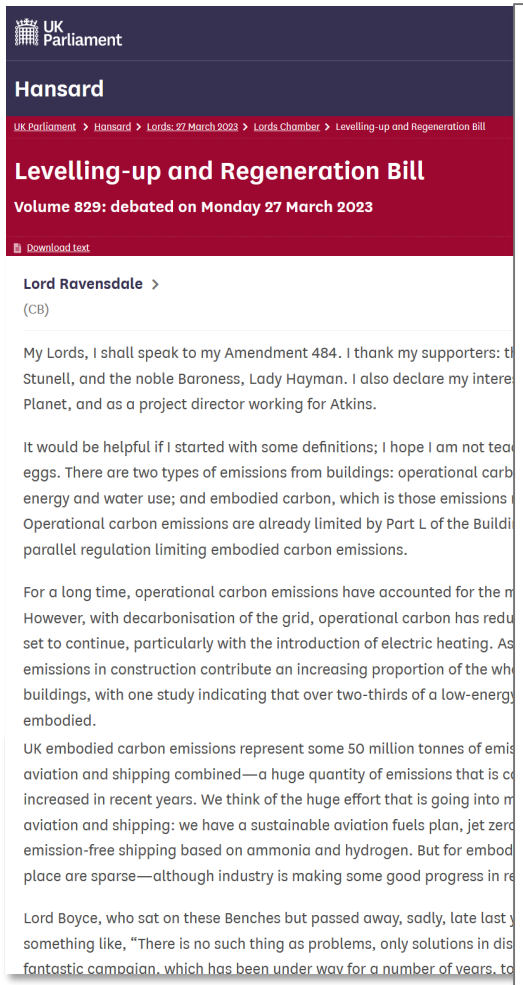
(b) ways in which the whole-life carbon emissions of building work, as calculated in accordance with the methodology, shall be expressed,

(c) a reporting platform through which the whole-life carbon emissions of building work, as calculated in accordance with the methodology,

Bill 34 58/3

Read the bill and debate transcripts

Amendment 280 to the Levelling-up and Regeneration Bill


UK Parliament

Hansard

UK Parliament > Hansard > Lords: 27 March 2023 > Lords Chamber > Levelling-up and Regeneration Bill

Levelling-up and Regeneration Bill

Volume 829: debated on Monday 27 March 2023

Download text

Lord Ravensdale >

(CB)

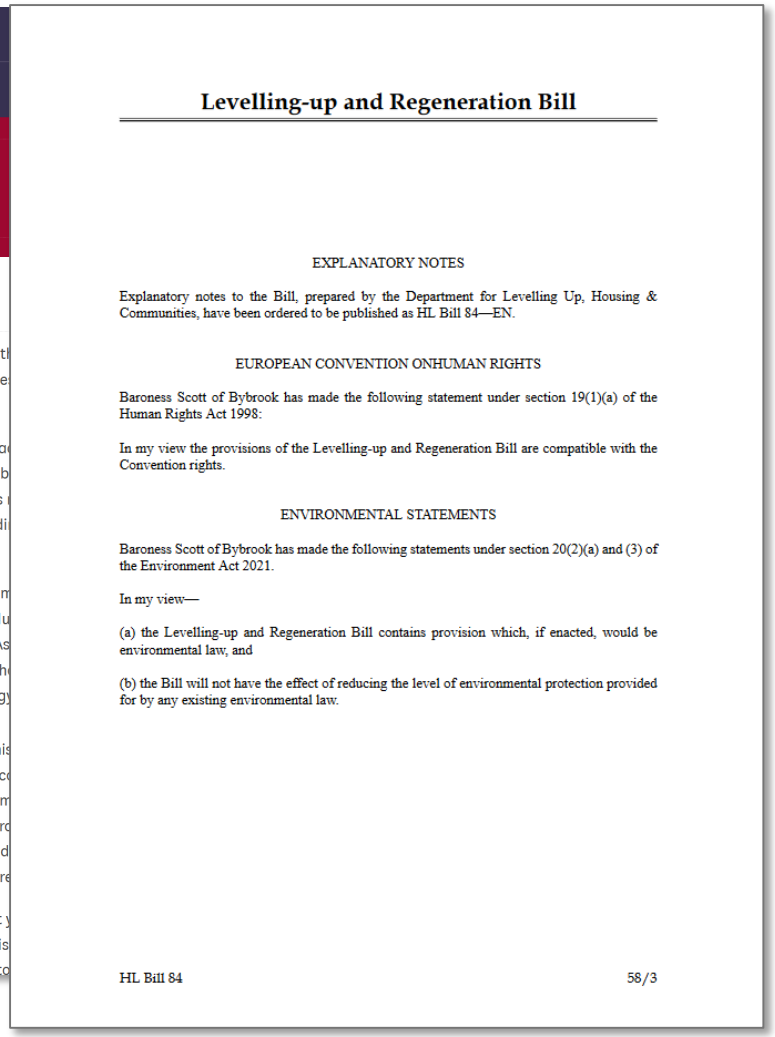
My Lords, I shall speak to my Amendment 484. I thank my supporters: t
Stunell, and the noble Baroness, Lady Hayman. I also declare my intere
Planet, and as a project director working for Atkins.

It would be helpful if I started with some definitions; I hope I am not tea
eggs. There are two types of emissions from buildings: operational carb
energy and water use; and embodied carbon, which is those emissions
Operational carbon emissions are already limited by Part L of the Buildi
parallel regulation limiting embodied carbon emissions.

For a long time, operational carbon emissions have accounted for the m
However, with decarbonisation of the grid, operational carbon has redu
set to continue, particularly with the introduction of electric heating. As
emissions in construction contribute an increasing proportion of the wh
buildings, with one study indicating that over two-thirds of a low-energy
embodied.

UK embodied carbon emissions represent some 50 million tonnes of emis
aviation and shipping combined—a huge quantity of emissions that is c
increased in recent years. We think of the huge effort that is going into m
aviation and shipping: we have a sustainable aviation fuels plan, jet zero
emission-free shipping based on ammonia and hydrogen. But for embod
place are sparse—although industry is making some good progress in re

Lord Boyce, who sat on these Benches but passed away, sadly, late last y
something like, "There is no such thing as problems, only solutions in dis
fantastic campaign, which has been under way for a number of years, to


Levelling-up and Regeneration Bill

EXPLANATORY NOTES

Explanatory notes to the Bill, prepared by the Department for Levelling Up, Housing & Communities, have been ordered to be published as HL Bill 84—EN.

EUROPEAN CONVENTION ONHUMAN RIGHTS

Baroness Scott of Bybrook has made the following statement under section 19(1)(a) of the Human Rights Act 1998:

In my view the provisions of the Levelling-up and Regeneration Bill are compatible with the Convention rights.

ENVIRONMENTAL STATEMENTS

Baroness Scott of Bybrook has made the following statements under section 20(2)(a) and (3) of the Environment Act 2021.

In my view—

(a) the Levelling-up and Regeneration Bill contains provision which, if enacted, would be environmental law, and

(b) the Bill will not have the effect of reducing the level of environmental protection provided for by any existing environmental law.

HL Bill 84 58/3

Debated in the House of Lords on 27 March 2023 & 4 September 2023

Read the debate around the amendment

2024 alignment of policy asks

- **Key ask: “Our government will move to reduce embodied carbon emissions in building construction within two years of taking office”**
- Within six months of taking office: Policy signalled confirming the dates and interventions below.
- By 2026: Mandate the measurement and reporting of whole-life carbon emissions for all projects with a gross internal area of more than 1000m2 or that create more than 10 dwellings.
- By 2028: Introduce legal limits on the upfront embodied carbon emissions of such projects, with a view to future revision and tightening as required.

31 January 2024

Policy Position Paper

Embodied carbon regulation – alignment of industry policy recommendations

Around 1 in 10 tonnes of the UK's total greenhouse gas emissions are so-called "embodied carbon" emissions, related to the production and use of construction materials. They total 64 million tonnes CO_2e per year, more than the country's aviation and shipping emissions combined.

Despite their magnitude, embodied carbon emissions are unregulated in the UK. Similar legislation has already been implemented in several European Countries, the state of California, and is in the latter stages of debate for cross-EU introduction – all demonstrating the feasibility for the UK to do the same.

Several construction industry initiatives have been launched in recent years, calling on the government to move to reduce embodied carbon emissions in construction. Collectively, these initiatives are supported by hundreds of businesses, including a number of the largest UK housebuilders, developers, contractors and financial institutions. These organisations see such regulation as key to bringing consistency and accelerated action in this area – and many of their statements of support are shown at www.part-z.uk/industry-support.

These UK industry initiatives have all called for reforms to regulation, though dates and details have varied as collective industry knowledge around embodied carbon has evolved. Now, at the start of 2024, a general election year, these initiatives are joining together to call on the next government with one voice.

For more information, contact: Will Arnold, Head of Climate Action, The Institution of Structural Engineers, will.arnold@istructe.org

The undersigned groups call on party leaders to make the following manifesto commitments:

Key ask:

- *"Our government will move to reduce embodied carbon emissions in building construction within two years of taking office."*

Specific steps:

- Within six months of taking office: Policy signalled confirming the dates and interventions below.
- By 2026: Mandate the measurement and reporting of whole-life carbon emissions for all projects with a gross internal area of more than 1000m² or that create more than 10 dwellings.
- By 2028: Introduce legal limits on the upfront embodied carbon emissions of such projects, with a view to future revision and tightening as required.

Signed by:

UK GBC · The Institution of StructuralEngineers · Part Z · RIBA Architecture.com · ice · RICS · ace · CIC Built Environment Professions Together · CIBSE · CIOB The Chartered Institute of Building · UK Built Environment Declares Climate & Biodiversity Emergency

Footnote: Please note that these policy recommendations are in addition to the 'carbon pricing mechanism' announced by the government in 2023 (due to be introduced in 2027).

IStructE et al 2024 Policy position paper

HOW CAN I STAY ABREAST OF DEVELOPMENTS?

Forums to join & projects to watch

New international forum

UN environment programme

Global Alliance for Buildings and Construction

WLCP.Co

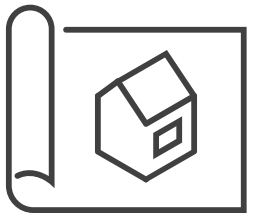
Whole Life Cycle Policy Coalition for the built environment

From Paris to projects...

International agreement

National policies

Sub-national requirements



Project implications

Corporate goals + voluntary standards

SCIENCE BASED TARGETS

UK Net Zero Carbon Buildings Standard

Icons from the Noun project (Andrei Yushchenko, Tom Walsh, Vectors Point & Randomhero)

BUILDINGS SECTOR SCIENCE-BASED TARGET-SETTING GUIDANCE

Version 0.2.1 - **Draft for Pilot Testing**

December 12, 2023

New SBTi guidance

Draft guidance consultation in July 2023 alongside buildings target setting tool

Pilot testing version launched at end of 2023

You can read more about the pilot testing

UK Net Zero Carbon Buildings Standard

Read latest update on standard development

Other ongoing projects to watch

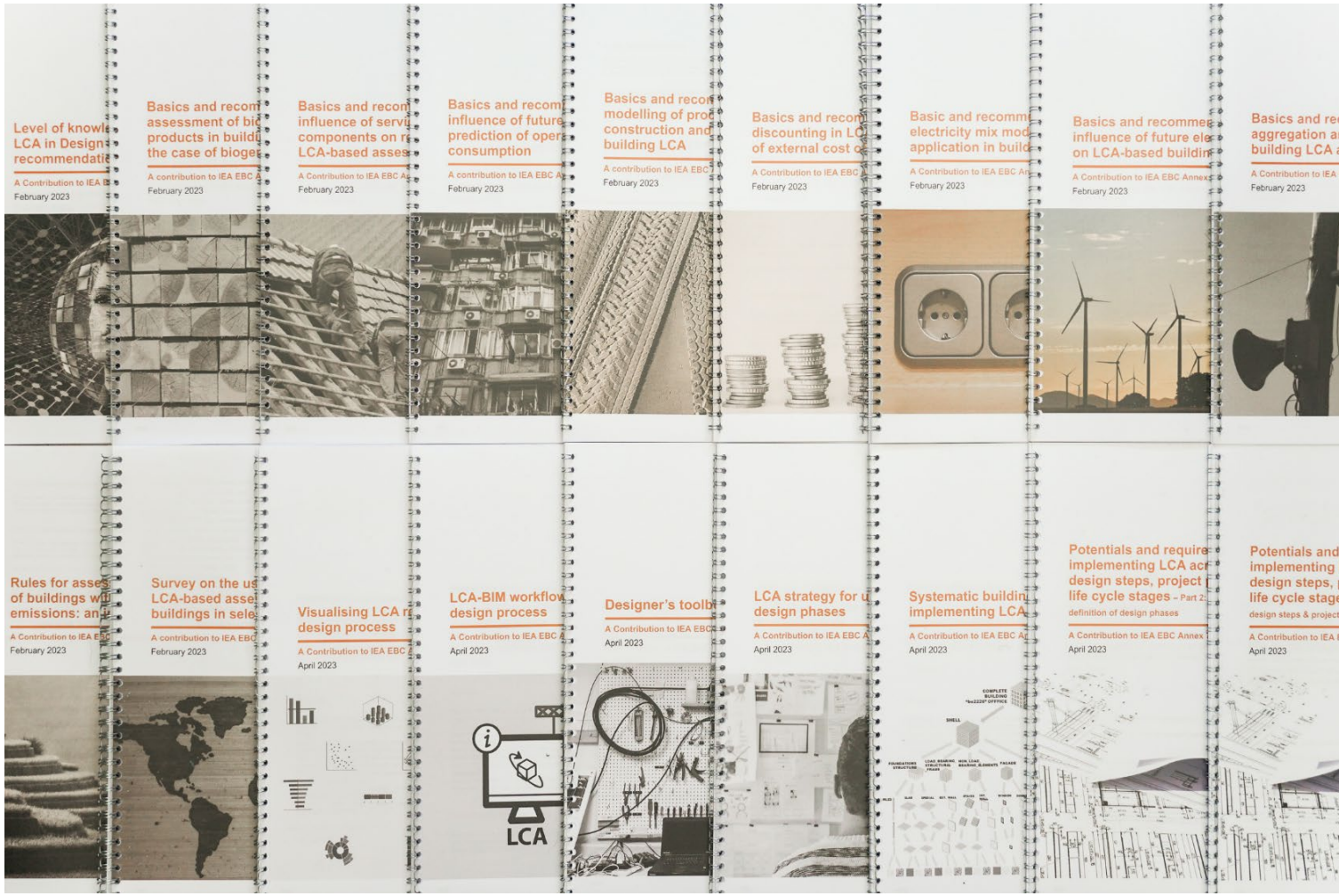
- Planning Application Carbon Evaluation and Reduction (PACER) Platform
- IEA Annex 89 - Ways to Implement Net-zero Whole Life Carbon Buildings

IEA EBC Annex outputs

EBC

Energy in Buildings and Communities Programme

- Annex 72 outputs published in May *(>1000 pages of comparative analysis)*
- Annex 89 (2023-2027) ongoing



View all outputs from Annex 72 and follow Annex 89

Future approach?

International Standards
ISO 14040
ISO 14044
BS EN 15978
BS EN 17472

UK assessment standard

UK Net Zero Carbon Buildings Standard — Voluntary standard

BECD Built Environment Carbon Database — Reporting database

PART Z An industry-proposed amendment to UK Building Regulations 2010 — Industry-proposed regulation

Guidance

RIBA CIBSE IStructE UKGBC LETI HMG

Tools

One Click LCA · eTool · FCBS CARBON etc

Adapted from IStructE diagram

ANY QUESTIONS?

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