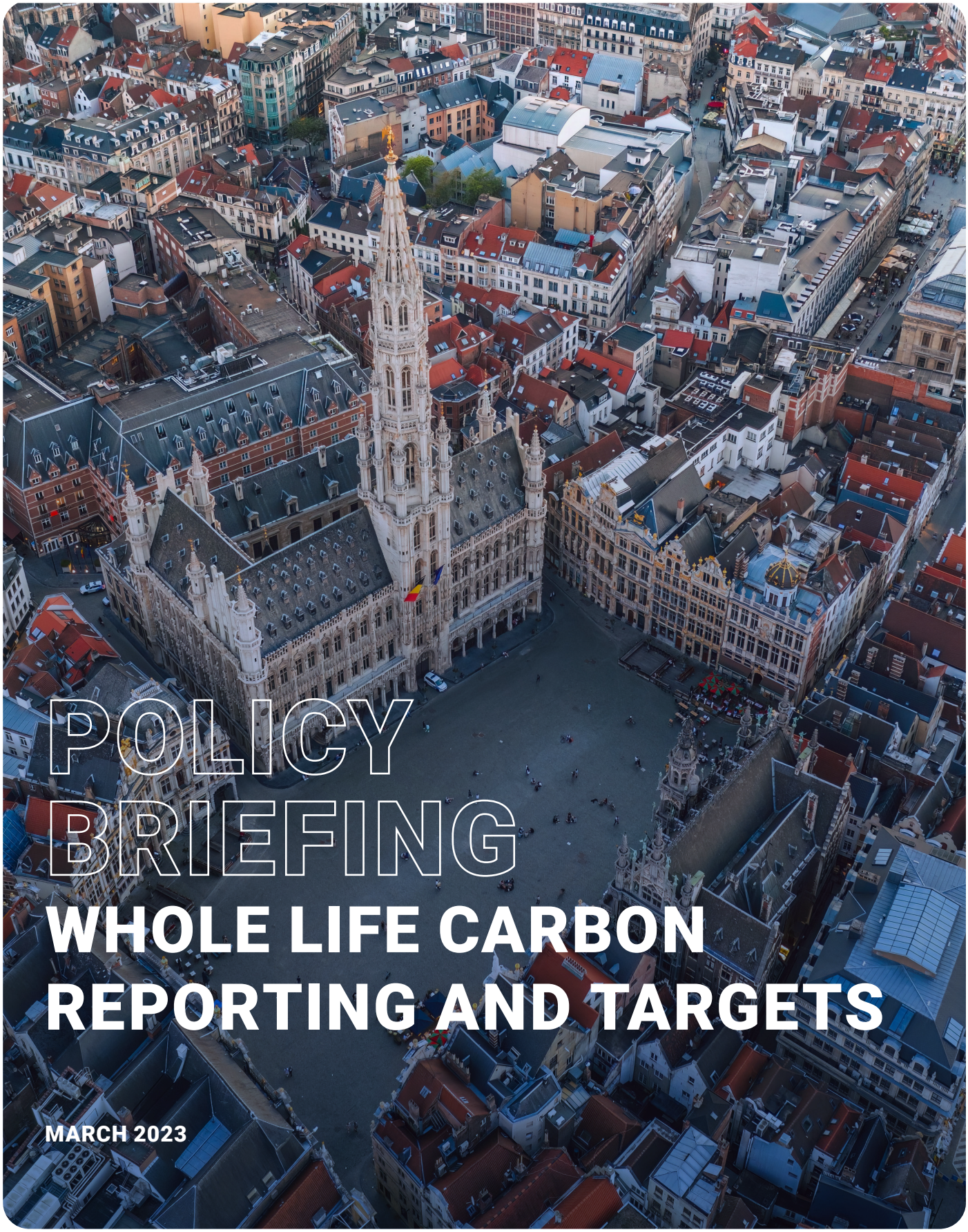


POLICY BRIEFING

WHOLE LIFE CARBON REPORTING AND TARGETS

MARCH 2023

EUROPE REGIONAL NETWORK

WORLD GREEN BUILDING COUNCIL

01
BACKGROUND

INTRODUCTION

Buildings account for 40% of energy consumption and 36% of carbon emissions in Europe[1]. These emissions take place not only when a building is in operation but at every stage of its lifecycle from manufacturing through to demolition. As buildings become increasingly energy efficient, embodied carbon will account for a greater proportion of carbon emissions from both the construction of new buildings and renovation.

Meeting the EU's climate change obligations under the Paris Agreement, including the EU Green Deal's goal of carbon neutrality by 2050 and Fit for 55, requires policymakers to introduce measures that address the Whole Life Carbon (WLC) impact - both operational and embodied carbon - of buildings.

As EU lawmakers begin to introduce WLC reporting and eventually targets into building regulations such as the Energy Performance of Buildings Directive (EPBD), both the building sector value chain and governments across Europe will need detailed guidance on how this transition will work in practice.

To this end, this paper sets out WorldGBC Europe's position on three key topics of particular importance:

1 In focus: Energy efficiency in buildings, European Commission, 2020

1 The Harmonisation and Standardisation of WLC metrics

2 Defining the Physical Scope of a building for WLC assessments

3 The Architecture of WLC targets

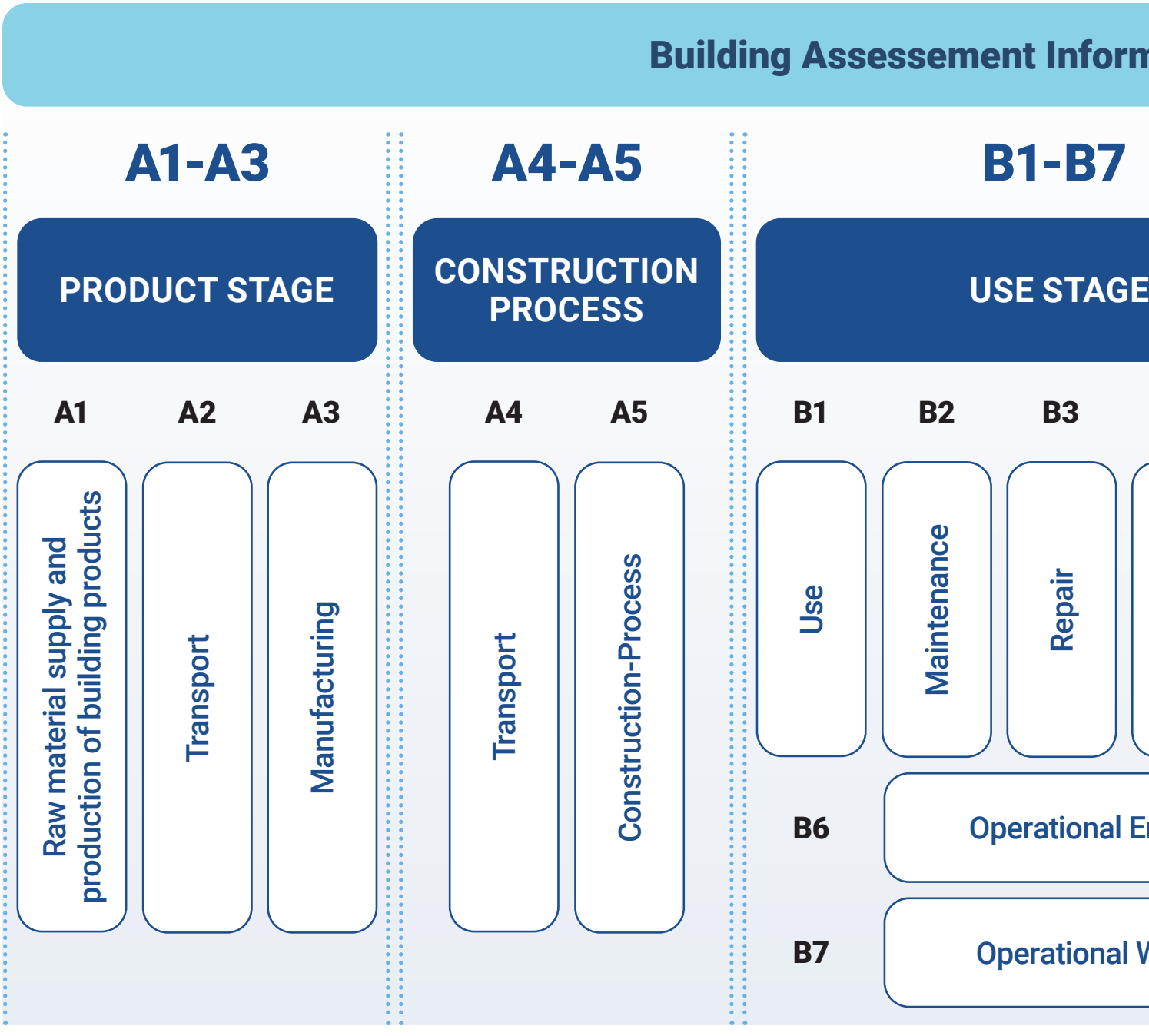
BACKGROUND

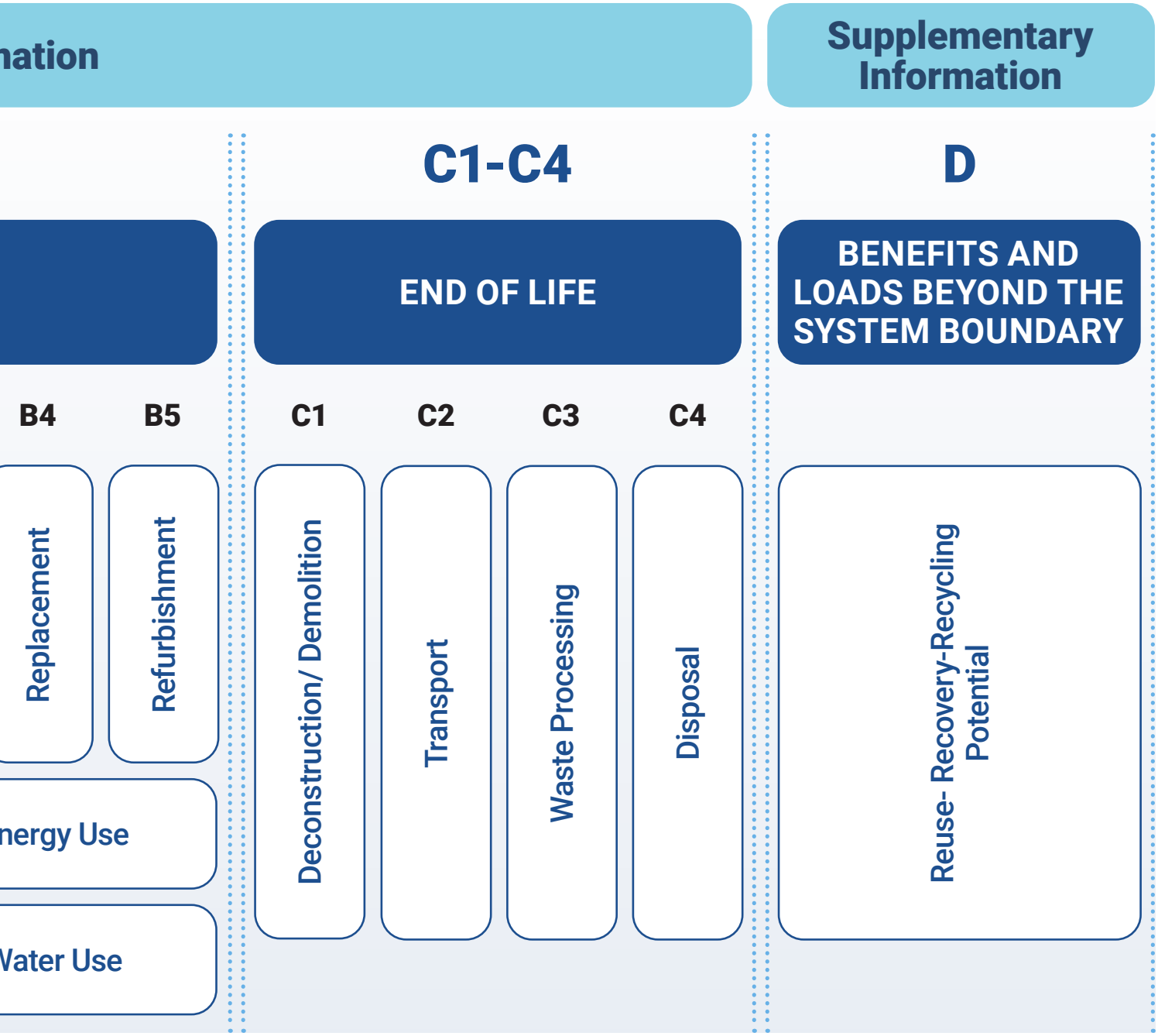
WHAT IS WHOLE LIFE CARBON?

Whole Life Carbon encompasses both the operational carbon of buildings from when they are in use, and the carbon impact of the manufacturing, transportation, construction, and end-of-life phases of built assets, often called embodied carbon.

WLC can be broken down into a number of modules which summarise the different stages within the lifecycle of a building, as defined in the European standard EN 15978[1] (see diagram below).

1 Whole life carbon assessment for the built environment, RICS, 2017

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WORLDGBC ON WHOLE LIFE CARBON

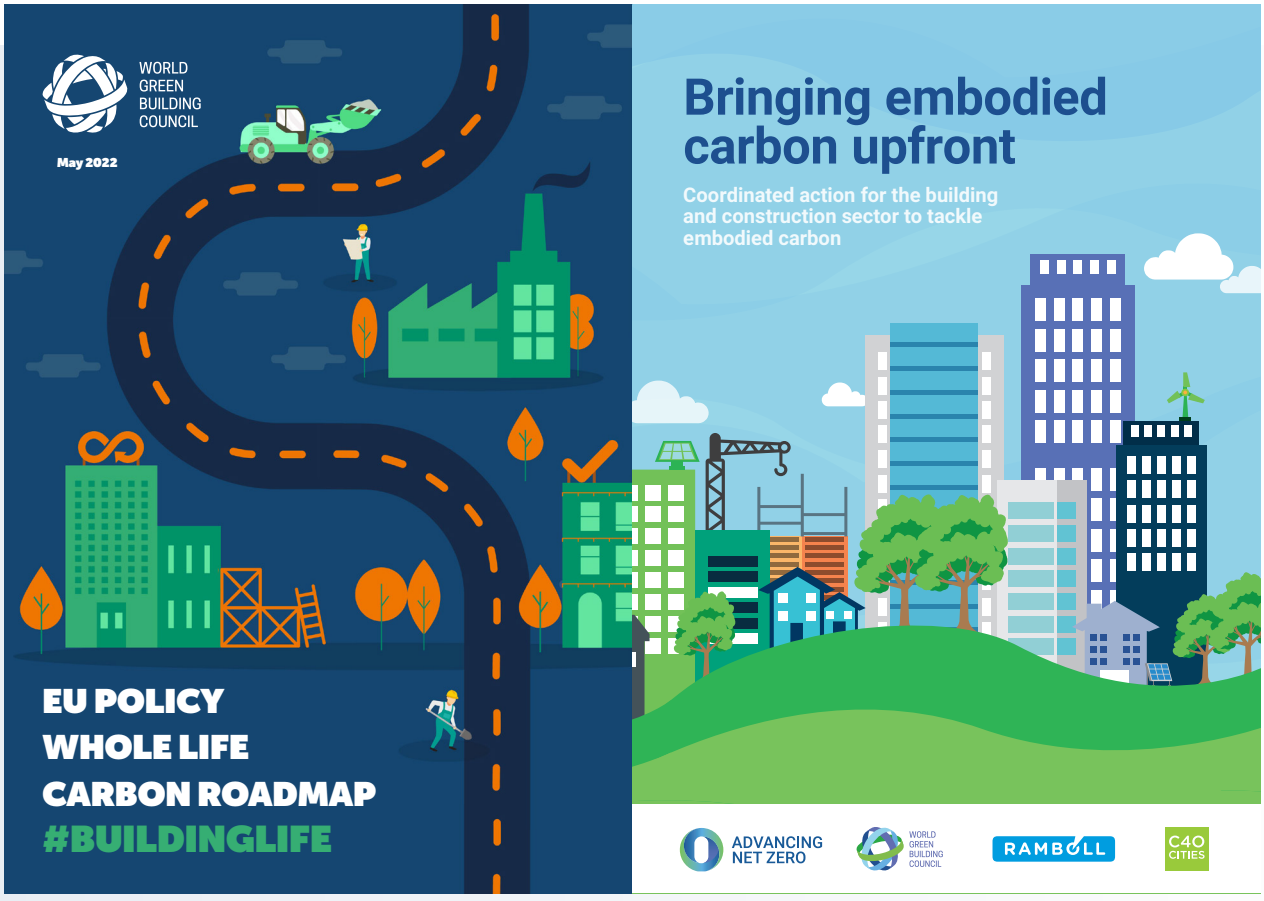
WorldGBC Europe has been calling on European policymakers to address the WLC impact of buildings for a number of years.

WorldGBC Europe's responses to EU policy consultations on this topic have consistently called for the introduction of WLC, citing this as a crucial first step towards the establishment of benchmarks and targets.

In 2022 WorldGBC released an EU Policy Whole Life Carbon Roadmap[1], which set out a series of policy recommendations for the total decarbonisation of Europe's buildings by 2050, including recommendations around the introduction of WLC reporting and target setting. The Roadmap received endorsements from over 35 leading construction industry bodies from across the value chain, as well as from Member of European Parliament Ciaran Cuffe, who has served as the Rapporteur for the 2022 revision of the EPBD.

Additionally, publications produced by WorldGBC on this topic have included the Bringing Embodied Carbon Upfront report in 2018 - a landmark report which set out a bold vision towards net zero embodied carbon[2].

1 EU Policy Whole Life Carbon Roadmap, WorldGBC, 2022
2 Bringing Embodied Carbon Upfront report, WorldGBC, 2018



WHOLE LIFE CARBON - THE EU POLICY OPPORTUNITY

EU policymakers are recognising that measuring and reducing the WLC impact of the building sector is essential to meeting European climate objectives. Notably, the latest revision of the EPBD proposed the introduction of WLC reporting for all new buildings from 2030 and all large buildings from 2027[1].

The European Commission (Commission) also started work on its own WLC roadmap for the built environment. When released in 2023, this is expected to contain operational and embodied carbon milestones between the present day and a completely decarbonised built environment sector by 2050. The roadmap will draw on a supporting study conducted by Ramboll, Buildings Performance Institute Europe (BPIE) and KU Leuven, which when completed by March 2023, aims to have established a baseline for embodied carbon emissions of buildings across European regions.

The Commission has developed the Level(s) Framework[2], which aims to provide the European building sector with a harmonised and EU-approved methodology for assessing the environmental impact of buildings, including WLC. The Level(s) Framework is based on the European standard EN 15978 and most building labelling schemes in Europe (including those run by GBCs) align or have engaged work streams to align with Level(s). Level(s) is cited in the 2021 EPBD revision text and the EU Taxonomy[3] as a methodology to use to begin reporting on the Global Warming Potential (GWP) of buildings.

The introduction of WLC reporting into the EPBD and the Commission's WLC roadmap indicate that the EU policy framework could eventually introduce requirements for Member States to set limits for the WLC of buildings. Indeed, policy regulating the WLC impact of buildings has already been introduced in France and the Netherlands and will be introduced shortly in Denmark, Finland, and potentially in Sweden, showing that this is already a priority for countries that are front runners on climate policy.

It is therefore crucial that EU policymakers take on board the following recommendations for WLC reporting and target setting that will provide clarity and facilitate a smooth transition for the building value chain in all Member States.

1 Proposal for a Directive of the European Parliament and of the Council on the energy performance of buildings, European Commission, 2021
2 Level(s): a common language for building assessment, European Commission, 2021
3 Delegated Act on Climate Change Mitigation and Adaptation, 2022

02

WORLDGBC'S RECOMMENDATION

WorldGBC's recommendation on how the European Commission and Member States should implement Whole Life Carbon policy is summarised in the following way:

1

Harmonisation and Standardisation

WLC reporting should encompass EN 15978 modules A1-A5, B1, B4, B5, B6, C1-C4 and D (with D reported separately).

2

Physical Scope of WLC reporting

WLC reporting should use the table of building elements on pages 25-6 of Level(s) User Manual 2 as the basis for defining the physical scope of a building.

3

The Architecture of WLC targets

Member States should establish overarching WLC targets for buildings, as well as separate operational and embodied carbon targets.

WORLDGBC'S RECOMMENDATION

HARMONISATION AND STANDARDISATION

When calculating WLC, or Global Warming Potential (GWP)[1] as it is referred to in the EPBD, the European Commission will need to set a minimum of a building's lifecycle modules that should be reported on when such a calculation takes place.

The harmonisation and standardisation of WLC reporting would mean that the EU, as well as all actors in the building sector, and public authorities and financial institutions, would be able to compare building data from Member States far more efficiently and directly and assess national progress on setting and reaching building emissions targets.

The Level(s) Framework methodology[2] (see page 7 for more information) was developed with the support of the European Commission with the purpose of providing a common reporting framework and bases its approach on collecting data from all A, B, C and D EN 15978 lifecycle stages (see diagram on page 4/5). With its visibility across Europe and backing from European policymakers, it can serve as a crucial tool to facilitate harmonisation across European countries.

This harmonisation is especially important as a number of divergent WLC reporting methodologies have been developed at the national and international level in recent years, which has the potential to cause delays and confusion for actors in the building sector.

An engineering consultancy, Ramboll, conducted a study (see diagram on p.11) of the modules required in different lifecycle reporting methodologies, which included the Level(s) Framework but also national methodologies from Denmark, Germany, Finland, Sweden, Norway and the UK.

Another study conducted by One Click LCA also compared lifecycle modules required by methodologies developed by the French and Dutch governments[3].

These studies demonstrate once again national and international disparities and the need for greater harmonisation in WLC reporting methodology.

1 To evaluate global warming potential of different greenhouse gases it is necessary to choose a timeframe for comparison, because they remain in the atmosphere for different lengths of time. The most common time period is 100 years.
2 Level(s) indicator 1.2: Life cycle Global Warming Potential, Joint Research Centre, 2021
3 Construction Carbon Regulations in Europe: Review and Best Practice, One Click LCA, 2022

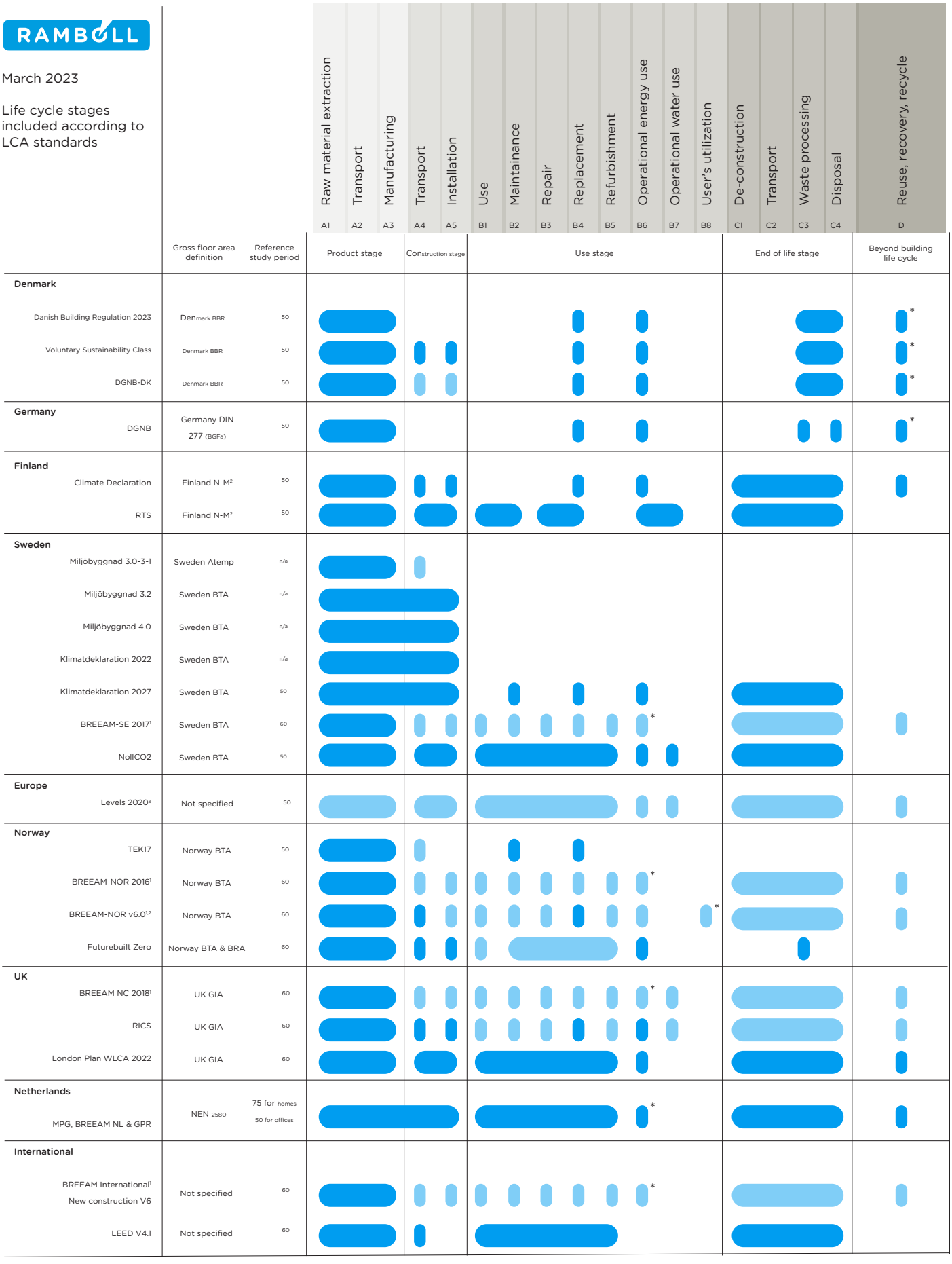
RECOMMENDATION

The European Commission should mandate that EN 15978 modules A1-A5, B1, B4, B5, B6, C1-C4 will be reported on when WLC reporting is introduced in the EPBD (see in orange on the diagram on pages 12-13). Module D should also be reported, but separately.

RAMBØLL

March 2023

Life cycle stages included according to LCA standards



1. More points available for LCA, when more life cycle stages are included

2. Only the required life cycle stages are required for showing reduction in GHG emissions. GHG reduction in construction (A5), energy use (B6), transport (B8) covered in other chapters

3. There are two simplified reporting options. Option 1: A1-A3, B4, B5, B6. Option 2: A1-A3, B6, C3-C4, D.

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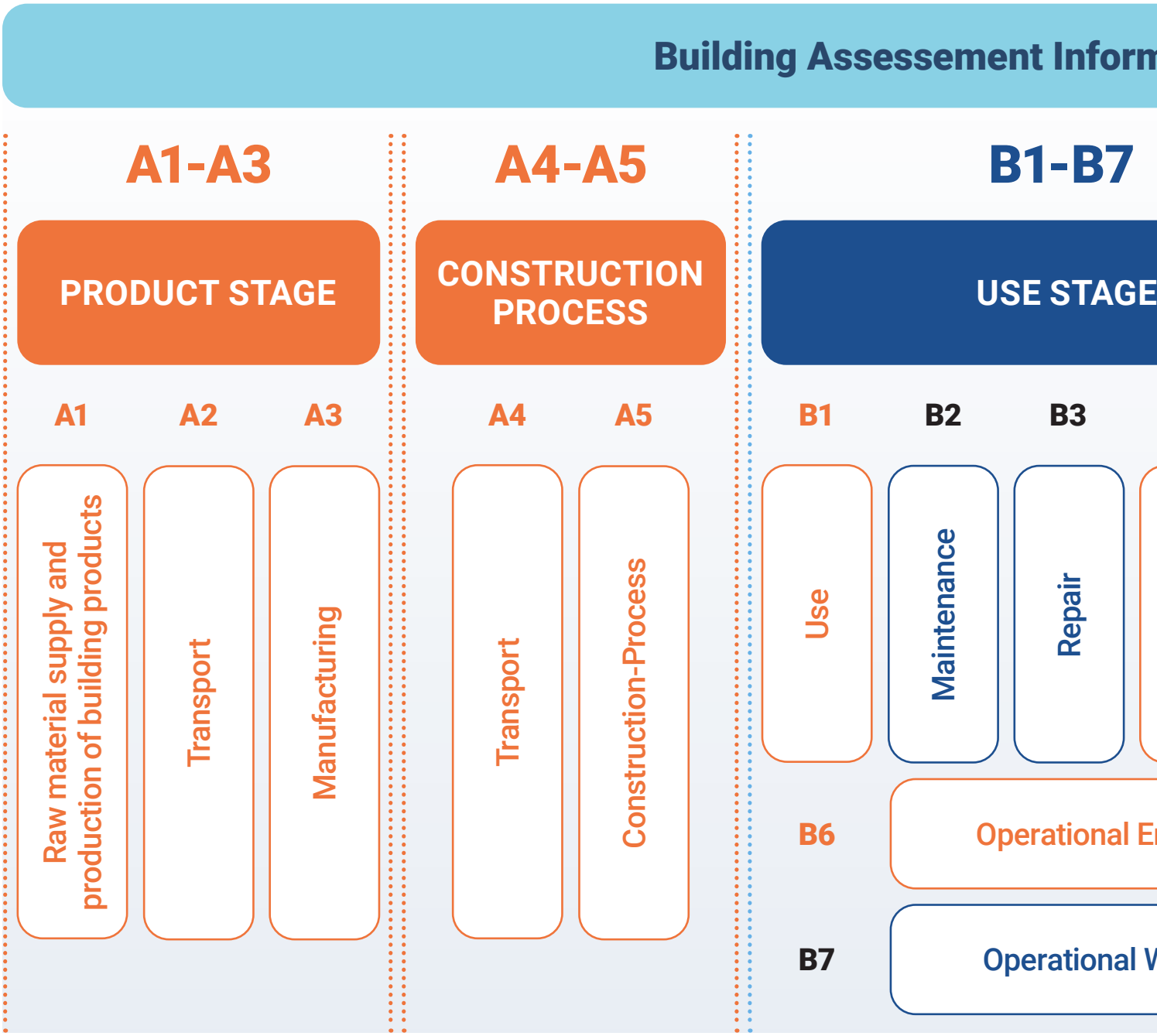
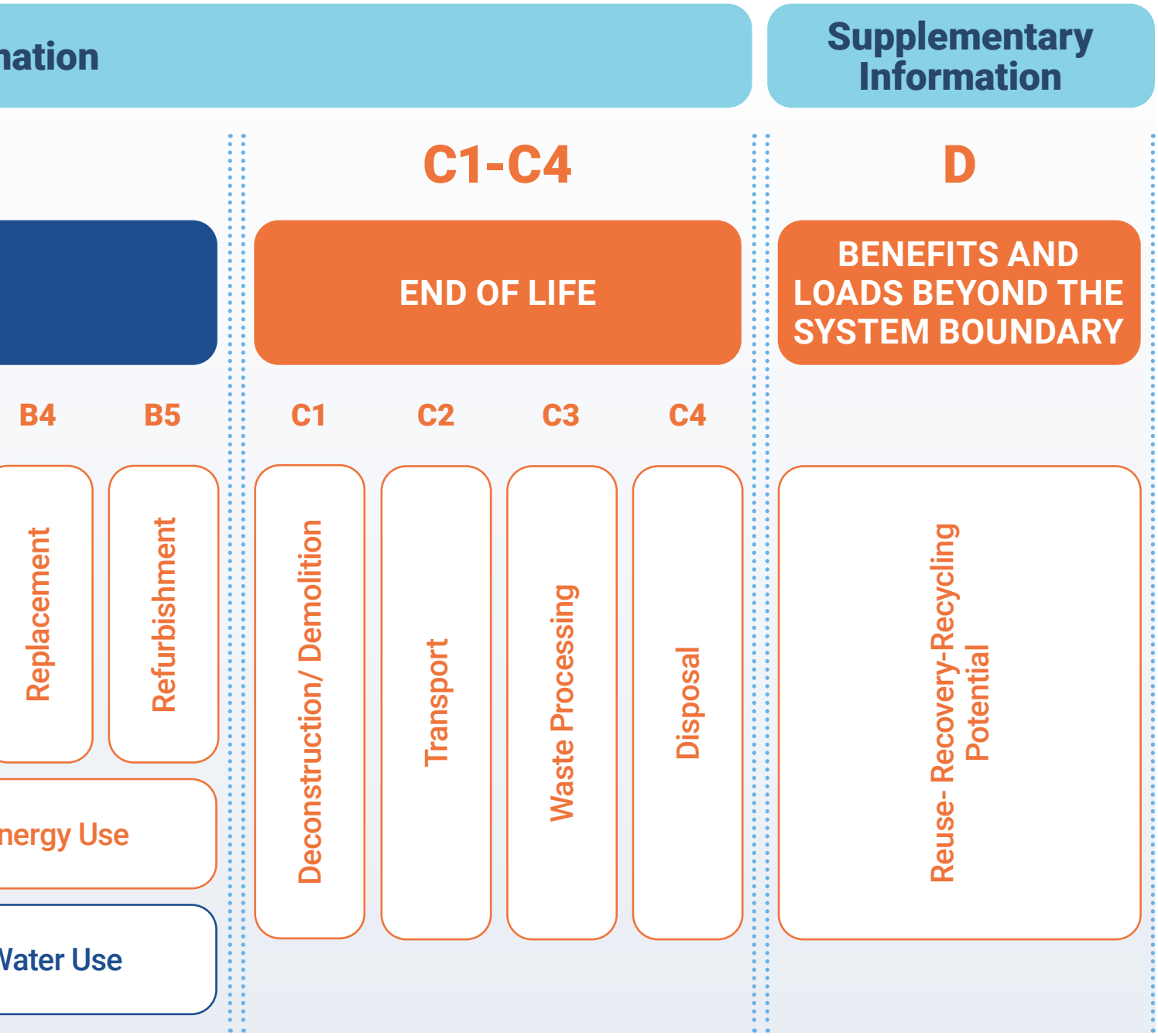


JUSTIFICATION

WorldGBC Europe justifies the inclusion of the specific life cycle modules listed in our recommendation in the following way.

Modules A1-3 refer to raw material supply, the transport of products and materials and the manufacturing of products. Reporting on these modules is crucial for the construction industry to quantify the embodied carbon of construction products and materials and to encourage a transition towards the decarbonisation of the manufacturing process and the wide availability of low-carbon construction products.

Modules A4-5 refer to the construction processes of a building, where significant emissions can result from the use of heavy machinery and vehicles on construction sites. Including these modules in WLC reporting could also encourage the construction industry to implement the greater use of electric and lower-carbon equipment and vehicles.



Module B1 (Use) largely refers to emissions related to refrigerants, among other things. The inclusion of this module allows more completeness in the carbon reporting of products used in the construction process and requires data that should be readily available or easily attainable. Its inclusion also reflects the fact that reporting on this data ensures compatibility with WorldGBC's Net Zero Carbon Buildings Commitment, which as signatories, businesses, organisations, cities and subnational governments commit to eliminating emissions from energy and refrigerants in existing buildings by 2030[1].

1 Net Zero Carbon Buildings Commitment, WorldGBC

WORLDGBC'S RECOMMENDATION

Modules B2 and B3 refer to emissions from the maintenance and repair of a building. These modules are not part of this recommendation due to issues widely noted by the construction industry related to data availability and data precision, as well as the fact that in comparison with other modules, they represent a low carbon impact.

Module B4 refers to the replacement of building parts and components which are either irreparably damaged or have come to the end of their manufacturer-specified end of life. Module B5 refers to refurbishment, which consists of major work carried out either to renew or repurpose a building or aspects of a building. The inclusion of these modules is especially important to ensure the embodied carbon impact of different types of building renovation and repair work is accounted for.

Module B6 (operational energy use) should be reported on as emissions from heating, cooling and electricity can be extremely high over a building's use phase. Its inclusion ensures that a focus will remain on improving the energy efficiency of buildings.

Module B7 covers the environmental impacts of water use. We have omitted this module as the carbon impact of water use is generally thought to be low compared to, for example, B6 (energy use), and is subject to much greater uncertainty.

Modules C1-4, which cover activities such as the deconstruction and demolition of a building, waste processing and waste disposal, should be reported on so that the building sector can quantify the full impact of buildings when they come to the end of their service life. Reporting on these emissions will drive a shift towards greater circularity and efficiency, ideally encouraging buildings that are designed for deconstruction rather than demolition, and the diversion of construction waste from landfill and incineration, for example.

Module D[2] should be reported on, but separately. This will enable the measurement of emissions from after the life cycle of a building and will encourage the construction sector to follow the waste hierarchy where the reuse of materials has a lower carbon impact than recycling.

2 **It is expected that Module D will be divided into D1 (potential benefits from reuse and recycling of components or energy recovery) and D2 (potential benefits of exported utilities) in the next update of EN 15978.**

PHYSICAL SCOPE OF WLC REPORTING

When calculating the WLC of a building, it is important to define the physical scope consistently to make fair comparisons, which consists of the building elements that are undergoing the life cycle assessment.

The Level(s) Framework Methodology sets out a minimum scope of building elements that are required to be assessed in life cycle assessments, which include elements from a building's shell, core and external works.

A table with a full list of these required building elements can be found on pages 25-6 of Level(s) User Manual 2 and is reproduced in full in the annex at the end of this paper [1].

1 User manual 2: Setting up a project to use the Level(s) common framework, European Commission, 2021

RECOMMENDATION

The European Commission should mandate the use of the table of building elements on pages 25-6 of Level(s) User Manual 2 (and in the Annex of this paper) as the basis for defining the physical scope of a building for WLC reporting.

Where there is a shortage of available data and where elements can reasonably be expected to represent a small carbon impact (for example, a door hinge), some flexibility should be permitted to make assumptions, use rules of thumb, or proxies for elements that can reasonably be expected to represent a small carbon impact.

Where such simplifications are applied, pre-determined error margins should be applied as a way to encourage the use of more accurate data when possible. The cut-off criteria for allowing simplifications and any associated error margins should be agreed upon and harmonised at EU level. Cut-off criteria are established in the Level(s) Manual on Global Warming Potential (GWP) which should form a basis for this process[1].

1 Level(s) indicator 1.2: Life cycle Global Warming Potential, Joint Research Centre, 2021, p.27

JUSTIFICATION

The Level(s) Framework's definition of the physical scope, which was developed with significant built environment sector input during the creation of the Framework, provides a comprehensive picture of what matters when calculating the WLC of a building. This methodology is cited by the European Commission in Annex III of the latest EPBD revision which stipulates guidance for the calculation of life-cycle global warming potential[1], and in the EU Taxonomy. Using this definition will help encourage a unified methodology among Member States and create greater comparability in WLC reporting and benchmarks.

The use of estimated figures for the carbon impact of certain parts of the physical scope reflects the fact that widespread data remains scarce for certain building elements, and in certain cases, this impact can be very small. This flexibility will ease the transition towards WLC reporting for the construction sector, while the application of pre-determined error margins will encourage the industry to fill any gaps with accurate data where at all possible.

1 Annex III of Proposal for a Directive of the European Parliament and of the C ouncil on the energy performance of buildings, European Commission, 2021

WORLDGBC'S RECOMMENDATION

THE ARCHITECTURE OF WHOLE LIFE CARBON TARGETS

'Architecture' refers to the need to clarify how to structure a WLC target, and whether this should stand alone, or be complemented with additional targets for operational and embodied carbon. If Member States are to begin setting WLC targets at the national level, it is crucial that EU legislation sets clear guidance for how to construct these targets and ensures they are as harmonised as possible across countries.

WorldGBC Europe has explored three possible ways to construct a target:

1. One overall target for WLC with separate reporting for embodied and operational carbon

2. A target for WLC, and separate targets for operational carbon and embodied carbon

3. No WLC target, and separate targets for operational carbon and embodied carbon

RECOMMENDATION

Overarching targets for WLC of buildings should be established, as well as separate operational and embodied carbon targets or 'backstops'.

An embodied carbon target should include, at a minimum, EN 15978 modules A1-A5, B1, B4-5 and C1-4, while an operational carbon target must include B6. A WLC target should therefore include all of these modules covering operational and embodied carbon. Module D should be reported on but should not be included in WLC targets.

The WLC target should be set to be more stringent than the sum of the operational and embodied carbon targets. The justification for this is given below.

WLC, operational and embodied targets should be set at the national level, and the European Commission should establish a reporting mechanism to assess Member State compliance. Member States should also conduct national grid intensity forecasts to inform these targets.

JUSTIFICATION

The separation of operational and embodied carbon targets reflects the fact that these two categories of emissions are reported in different modules as per EN 15978, and that the calculation method of operational carbon differs to that of embodied carbon as a consequence of when the emissions occur in a building's life cycle. The approach of having an overarching WLC target allows some design flexibility to optimise between reductions of embodied carbon and operational carbon for a given building. Adopting additional, separate embodied and operational carbon targets or 'backstops' that are ambitious but less stringent than the WLC target ensures that whilst optimisation is possible, neither category of emissions can be ignored entirely and some level of reduction must be achieved for each.

For consistency, the EN 15978 modules recommended for inclusion in WLC targets align with this paper's recommendations on which modules should be reported on when calculating WLC in the section on Harmonisation and Standardisation. This is with the exception of module D, which should not be included in WLC targets since it refers to the potential the building offers to save on emissions by re-use and recycling of its components in the future, outside its own lifecycle.

Module B6 is the sole module included in operational targets as it refers to operational energy use and is therefore not included in embodied carbon targets, which cover the remaining modules recommended for inclusion in WLC reporting aside from D (A1-5, B1, B4, B5, C1-4).

WORLDGBC'S RECOMMENDATION

HOW THESE RECOMMENDATIONS CAN BE TAKEN FORWARD

By implementing the recommendations of this paper, EU policymakers will provide the built environment sector and governments at the national and local level with welcome clarity on how the rollout of WLC reporting and targets will work in practice.

These recommendations around harmonisation and standardisation, defining the physical scope and the architecture of WLC targets should be integrated into key EU Directives and workstreams such as the EPBD and can inform the development of the European Commission's 2050 WLC roadmap. They should also inform parallel preparatory work at the Member State level for the introduction of WLC reporting and target setting.

The harmonisation of WLC reporting and target setting across the EU would ensure that data around the full life cycle impact of buildings will be fully comparable between Member States and nations will be able to learn best practices from each other more efficiently. This will also, crucially, make the WLC transition more manageable for the construction sector which will be implementing WLC reporting in practice on sites across the EU. Finally, harmonisation will send a signal up the supply chain that lower-carbon products will be preferred now and in the future, thereby giving manufacturers the confidence to invest in lower-carbon manufacturing processes.

ANNEX - LEVEL(S) FRAMEWORK PHYSICAL SCOPE TABLECARBON TARGETS

Building parts	Related building elements
Shell (substructure and superstructure)	
Foundations (substructure)	Piles Basement Retaining walls
Load bearing structural frame	Frame (beams, columns and slabs) Upper floors External walls Balconies

Non-load bearing elements	Ground floor slab Internal walls, partitions and doors Stairs and ramps
Facades	External wall systems, cladding and shading devices Façade openings (including windows and external doors) External paints, coatings and renders
Roof	Structure Weatherproofing
Parking facilities	Above ground and underground (within the curtilage of the building and servicing the building occupiers)[1]

Core (fittings, furnishings and services)

Fittings and furnishings	Sanitary fittings Cupboards, wardrobes and worktops (where provided in residential property) Ceilings Wall and ceiling finishes Floor coverings and finishes
In-built lighting system	Light fittings Control systems and sensors
Energy system	Heating plant and distribution Cooling plant and distribution Electricity generation and distribution
Ventilation system	Air handling units Ductwork and distribution
Sanitary systems	Cold water distribution Hot water distribution Water treatment systems Drainage system
Other systems	Lifts and escalators Firefighting installations Communication and security installations Telecoms and data installations

External works

Utilities	Connections and diversions Substations and equipment
Landscaping	Paving and other hard surfacing Fencing, railings and walls Drainage systems

1 If the share of underground car parking (usable area plus traffic area) accounts for more than 25% of the total useful floor area, the traffic area of the underground parking must be subtracted from the total useful floor area

LEAD AUTHOR

Miles Rowland

CONTRIBUTING AUTHORS

Audrey Nugent

Stephen Richardson

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Together, with 75+ Green Building Councils and industry partners from all around the world, we are driving systemic changes to:

Address whole life carbon emissions of existing and new buildings

Enable resilient, healthy, equitable and inclusive places

Secure regenerative, resource efficient and waste-free infrastructure

We work with businesses, organisations and governments to deliver on the ambitions of the Paris Agreement and UN Global Goals for Sustainable Development (SDGs).