DEFINING A COMMON VISION FOR CLIMATE NEUTRAL BUILDINGS

A COMPREHENSIVE AND HARMONISED FRAMEWORK FOR WHOLE-LIFE CARBON MEASUREMENT ACROSS EUROPE

BPIE

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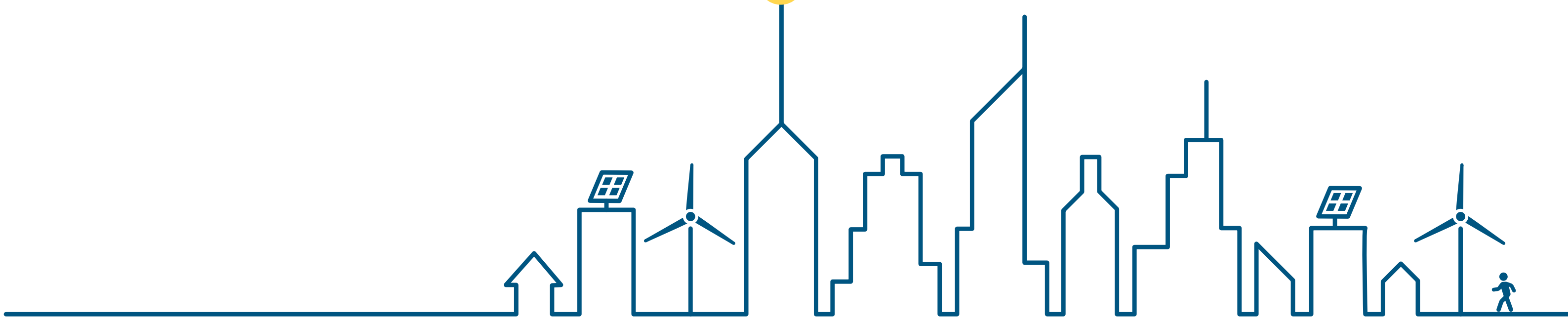


EXECUTIVE SUMMARY

Buildings are at the forefront of climate change impacts and play a critical role in combating the climate crisis. Decarbonising the EU building stock to meet climate neutrality goals requires significant and rapid reductions in greenhouse gas (GHG) emissions across the entire life cycle of buildings, comprising both operational and embodied emissions. Buildings account for over a third of the EU's energy-related carbon footprint, and this figure is likely higher when considering the emissions associated with construction materials' life-cycle, from extraction and manufacturing to transportation, maintenance and eventual disposal.

The sector is not on track to achieve a net zero carbon building stock by 2050. Life-cycle thinking and novel circular business models are essential to facilitate the sector's transition towards sustainable construction and renovation practices and develop sustainable growth opportunities. Urgent action is required to implement effective policies that swiftly reduce emissions throughout the life-cycle, thereby incentivising innovation across the value chain.

While regulatory focus is already on the decarbonisation of industry and the need to increase energy efficiency, policy levers to reduce embodied emissions at the building level have not yet been fully exploited. This is expected to change significantly with the implementation of the recast Energy Performance of Buildings Directive (EPBD) which sets out a framework for measuring and reducing whole-life carbon (WLC) emissions, based on common standards and methodology.

To guide and support national authorities in the consistent and effective implementation of these WLC provisions, the Commission must adopt a Delegated Act by 31 December 2025. The act will establish an EU-wide methodology for calculating life-cycle global warming potential (GWP). This paper is intended to inform the preparation of the Delegated Act by identifying common principles and methodologies to be taken into account by the European Commission and Member States when developing robust, comparable and practical approaches to WLC assessment and reporting.

The report builds on a review of existing WLC accounting standards and regulations and analyses the main methodological challenges and their implications concerning the dynamics of operational and embodied carbon, renovation vs. new build, and data and skills requirements. Subsequently, it establishes a possible set of principles to be considered when developing the EU methodology. Finally, the report concludes with a set of recommendations and necessary further steps towards the implementation of consistent WLC policies across Europe.

Recommendations aim to strike a balance between supporting EU-wide harmonisation of WLC methods and policies, and allowing flexibility for Member States to tailor certain aspects to their unique context. This is summarised in the table below.

Topic	Degree of flexibility for Member States	Rationale
Pace of implementation	**Medium**	The EPBD sets out a timeline with clear milestones for implementing standardised WLC calculation methodology and GWP reduction roadmaps. However, Member States have the flexibility to adopt measures aligned with their own policy pipelines and priorities, provided they meet EU-mandated deadlines.
Calculation methodology	**Limited**	Divergent WLC calculation methodologies hinder the comparability of results and the consistent definition of limit values and ambition levels across Member States.
System boundaries and scope: life-cycle modules and building elements	**Limited**	The scope of the assessment should be harmonised based on the Level(s) framework. The EU WLC framework should set out **clear boundaries in terms of scope**, specifying the life-cycle modules and building elements to be included. While flexibility may introduce concessions concerning data and scenarios, the ultimate objective must remain a consistent and aligned approach to national WLC methods.
Benchmarking methodology	**Medium**	There are established best practices for developing benchmarks that can be employed across Europe with minimal adaptations. These approaches are suitable to accommodate the diversity of the EU building stock. However, the effectiveness of the benchmarking methodologies relies on data availability, construction sector stakeholder participation and public authorities to effectively manage the system. Member States should determine the methods for compiling databases and setting benchmarks, ensuring the data remains accessible and transparent to the market.
Building types included	**High**	The diversity of building stocks across European countries necessitates a flexible framework that can adapt to national priorities. This flexibility is essential to effectively minimise the WLC of the entire stock.
Generic carbon data, benchmarks and default values	**Medium**	To address persistent data gaps, Member States should develop national reference databases to ensure consistent calculations. The use of default values should incorporate a penalty factor adjusted according to the building's development stage to encourage the generation of product-specific data, particularly in the later stages of the construction process. Member States should retain the flexibility to define their own penalties for the use of default values.
Limit values	**Varies per aspect:** **Approach and methodology: LIMITED** **Targets: HIGH** **Evolution in time: HIGH**	The framework for Member States to establish and communicate limit values should be harmonised to ensure comparability across the EU and avoid disparities in ambition levels. However, specific targets and timelines for reduction should remain flexible to accommodate the unique circumstances of each Member State.
Reporting and communication/ Training	**Medium**	Harmonisation of reporting and simplification of communication for end-users are essential. The content and focus of the training curricula should be locally directed, tailored to specific circumstances.

1.

SETTING THE SCENE

INTRODUCING OPERATIONAL, EMBODIED AND WHOLE-LIFE CARBON CONCEPTS AND THE EPBD LIFE-CYCLE GLOBAL WARMING POTENTIAL REQUIREMENTS

This section introduces the intricate interplay between operational and embodied carbon in buildings. It explains how the consideration of embodied carbon relates to the EU's "energy efficiency first" principle. It also provides an overview of the whole-life carbon-related provisions of the Energy Performance of Buildings Directive and highlights other policy files that will increasingly influence the supply and demand of whole-life carbon data.

OPERATIONAL, EMBODIED AND WHOLE-LIFE CARBON CONCEPTS

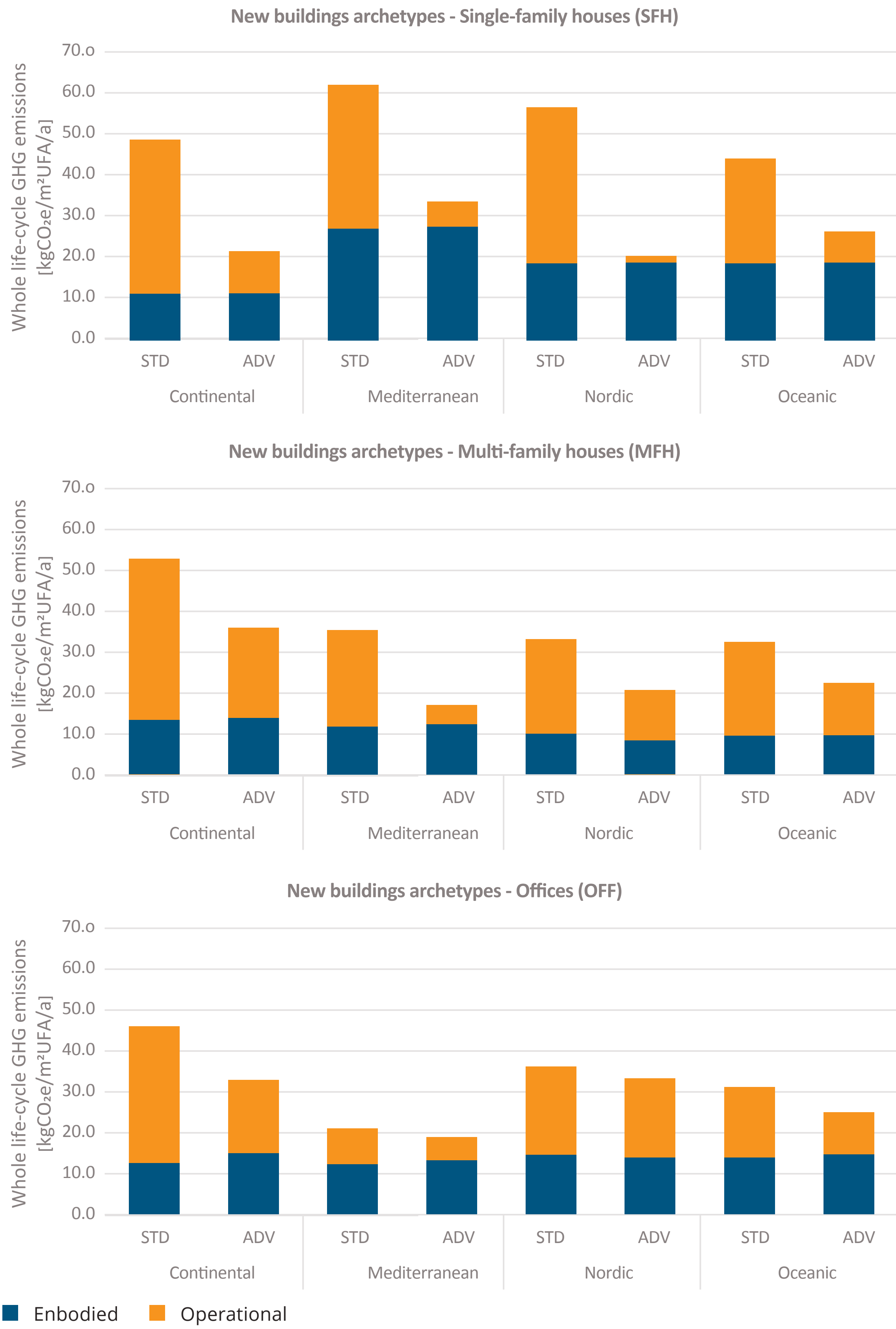
Efforts to reduce carbon emissions from the buildings sector have until recently focused on the emissions associated with energy consumption during the building use phase, notably from heating and cooling, but also from installations like lighting and ventilation. These are ***operational* carbon** emissions and occur relatively evenly over a building's use phase, which is typically estimated to last at least 50 years. Operational carbon emissions are influenced by both the energy consumption of a building and the carbon intensity of that energy. Annual operational carbon emissions can be reduced for new as well as existing buildings by improving the building envelope, selecting decarbonised heating and cooling technologies and energy-efficient installations, and optimising the operation of the building.

Reducing operational carbon will always be an essential requirement of a climate-neutral building, particularly for the existing building stock. Operational carbon however represents only a part of the building stock's total carbon footprint. There is a growing understanding that it is important to take a full life-cycle view of construction-sector greenhouse gas (GHG) emission reductions, to bring climate efforts fully in line with carbon-neutrality goals and that ensure that GHG emissions are not being simply shifted between life-cycle phases.

A considerable share of a building's climate impact stems from building life-cycle phases other than the use phase, most importantly from the manufacturing and construction stages, but also from the end-of-life phase, i.e. demolition and management of construction waste. There are also non-energy-related carbon emissions that occur at certain intervals during a building's operational phase due to e.g. renovations and maintenance. The emissions from these additional life-cycle phases and activities are called ***embodied* carbon**. They occur during a comparatively short period of time and are largely determined by decisions made in the planning and design of the building, before a project is shovel ready. Embodied carbon emissions typically make up 20-30% of the building's total carbon emissions, but in low operational carbon buildings this figure is 50% or even higher.[1]

[1] Le Den, X., Steinmann, J., Kovacs, A., Kockat, J., Toth, Z., Röck, M. and Allacker, K. (2023) *Supporting a Roadmap for the Reduction Whole Life Carbon in Buildings. European Commission*. DG Environment. https://op.europa.eu/en/publication-detail/-/publication/923706b7-8f41-11ee-8aa6-01aa75ed71a1/language-en

Figure 1: Whole-life embodied and operational carbon emissions (annualised) for different new buildings (single family homes, multi-family homes, offices), per region and energy performance levels (STD=current building practices and ADV=passive houses, low-energy buildings, near-zero energy or net-zero emission buildings). Source: Le Den at al. (2023)



Operational and embodied carbon emissions together make up a building's **whole-life carbon emissions**. Adopting a life-cycle view on carbon emissions is necessary to bring the buildings sector to carbon neutrality by 2050. This approach is crucial not only because the operational and embodied carbon emissions from the buildings sector are significant and offer actionable opportunities for reduction, but also because effective decarbonisation policies must account for the synergies and potential trade-offs between these two aspects.

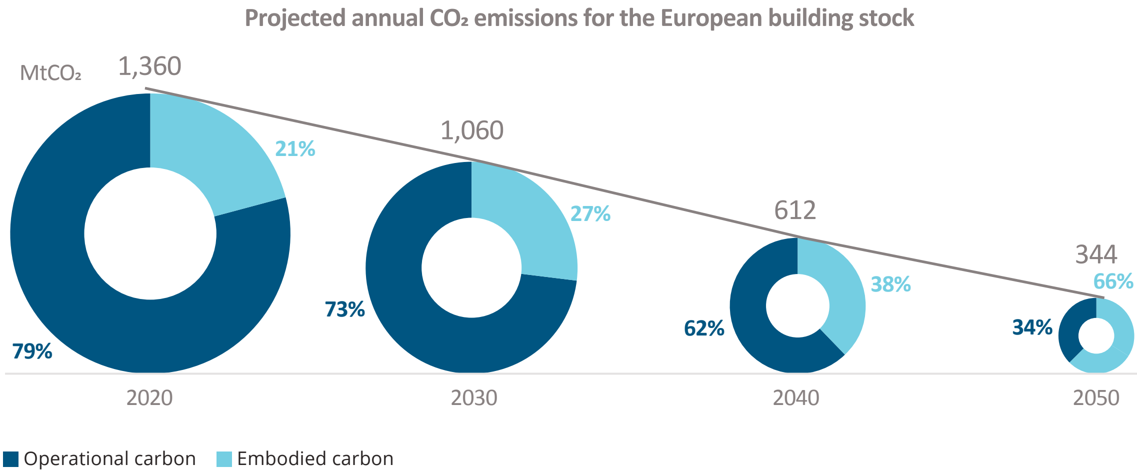
For instance, improving a building's envelope through additional insulation or high-performance windows can significantly improve thermal performance, reducing operational carbon emissions by minimising heating and cooling needs. However, these measures often come with higher embodied carbon due to the additional materials and energy-intensive manufacturing processes involved. Similarly, integrating renewable energy systems, such as solar panels, reduces operational emissions but can add to embodied carbon through the extraction and manufacturing of raw materials. In both cases, there is a point where the marginal gains in operational carbon reduction no longer justify the increased embodied carbon. Striking the right balance requires **careful life-cycle analysis to ensure the net carbon benefits align with long-term sustainability goals**. This example illustrates the need for ***whole-life carbon assessment*** to quantify emissions throughout a building's life-cycle, identify carbon hotspots and mitigation opportunities, and provide robust data for a comprehensive and unified comparison of low-carbon solutions, design options, materials and products.

Another example illustrates how the concepts can complement each other: Two windows might have the same performance characteristics in terms of operational carbon savings but be made with different materials, resulting in different embodied carbon footprints. Considering operational carbon alone would not effectively steer the choice towards the low-carbon window, but a whole-life carbon perspective does.

AN INTEGRATED APPROACH TO REGULATING OPERATIONAL AND EMBODIED CARBON

As the energy performance of new and existing buildings progressively improves, and their energy supply increasingly comes from low-carbon sources, operational carbon emissions will decrease and both the relative and absolute contribution of embodied carbon to the whole-life carbon emissions will likely increase. This is particularly true for new buildings.

Figure 2: Projected trend of whole-life carbon emissions for the European building stock in terms of scope and allocation. Source: BPIE, based on Le Den et al. (2023).



Both operational and embodied carbon emissions therefore need to be considered in an integrated manner to effectively steer the building stock towards climate neutrality. To align with the EU's energy efficiency first principle,[2] regulation of whole-life carbon should ensure that the ambition level remains high for both emission categories and close any opportunities to simply transfer accountability for carbon emissions between life-cycle stages or actors in the value chain.

Energy and carbon metrics are complementary and both are essential for decarbonising the building stock. Energy efficiency remains crucial to ensure rational use of energy as a limited resource, especially in view of the energy transition and the increasing demand for electricity. Minimum energy performance requirements will still have an important role to make sure the quality of the envelope and technical services is improved and that easy substitutions, such as carbon offsetting, are avoided.

The study carried out by Ramboll, BPIE and KU Leuven in support of the EU WLC Roadmap highlights the need to prioritise reducing operational carbon emissions. To meet climate goals, the entire building stock must be renovated by 2050, and space heating and cooling systems must be fully decarbonised. However, the study also finds that reducing operational carbon alone will not be enough to reach climate neutrality. Increases in floor space and emissions from the materials used in new construction and renovations will partially offset these gains, so production efficiency gains, process innovation and industry decarbonisation efforts are needed to counteract this trend. Ambitious measures targeting both operational and embodied carbon emissions are essential.

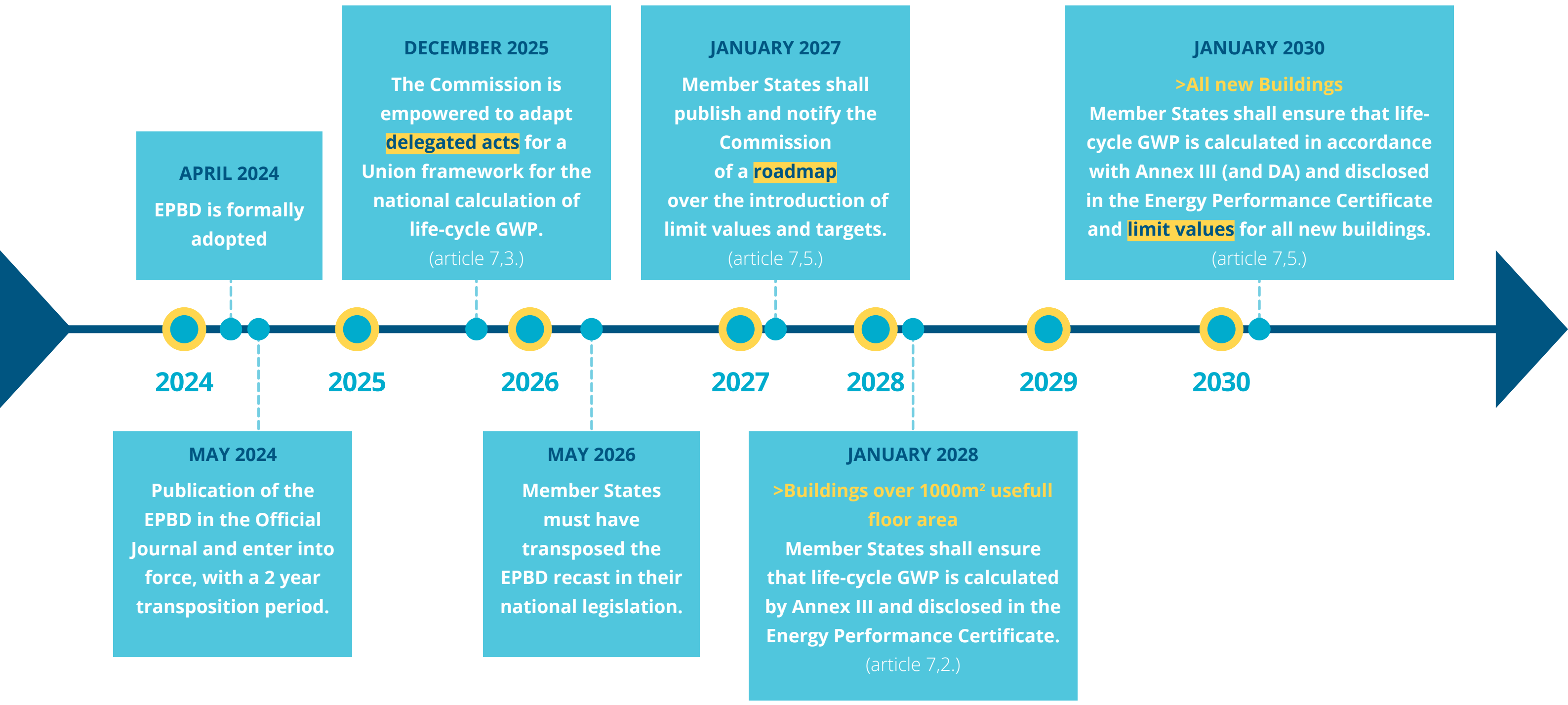
[2] https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-first-principle_en

A WLC approach, which integrates both operational and embodied impacts, offers significant flexibility to buildings sector stakeholders. It enables them to implement the most feasible and appropriate carbon reduction measures, while identifying synergies between solutions aimed at reducing operational emissions and those targeting embodied emissions. This approach also allows for compensating for carbon hotspots in certain building elements or life-cycle stages with mitigation in others. By pinpointing the sources and scale of embodied carbon in buildings, the industry and policymakers can prioritise efforts where carbon efficiencies are most needed.

WHOLE-LIFE CARBON IN THE EU POLICY FRAMEWORK

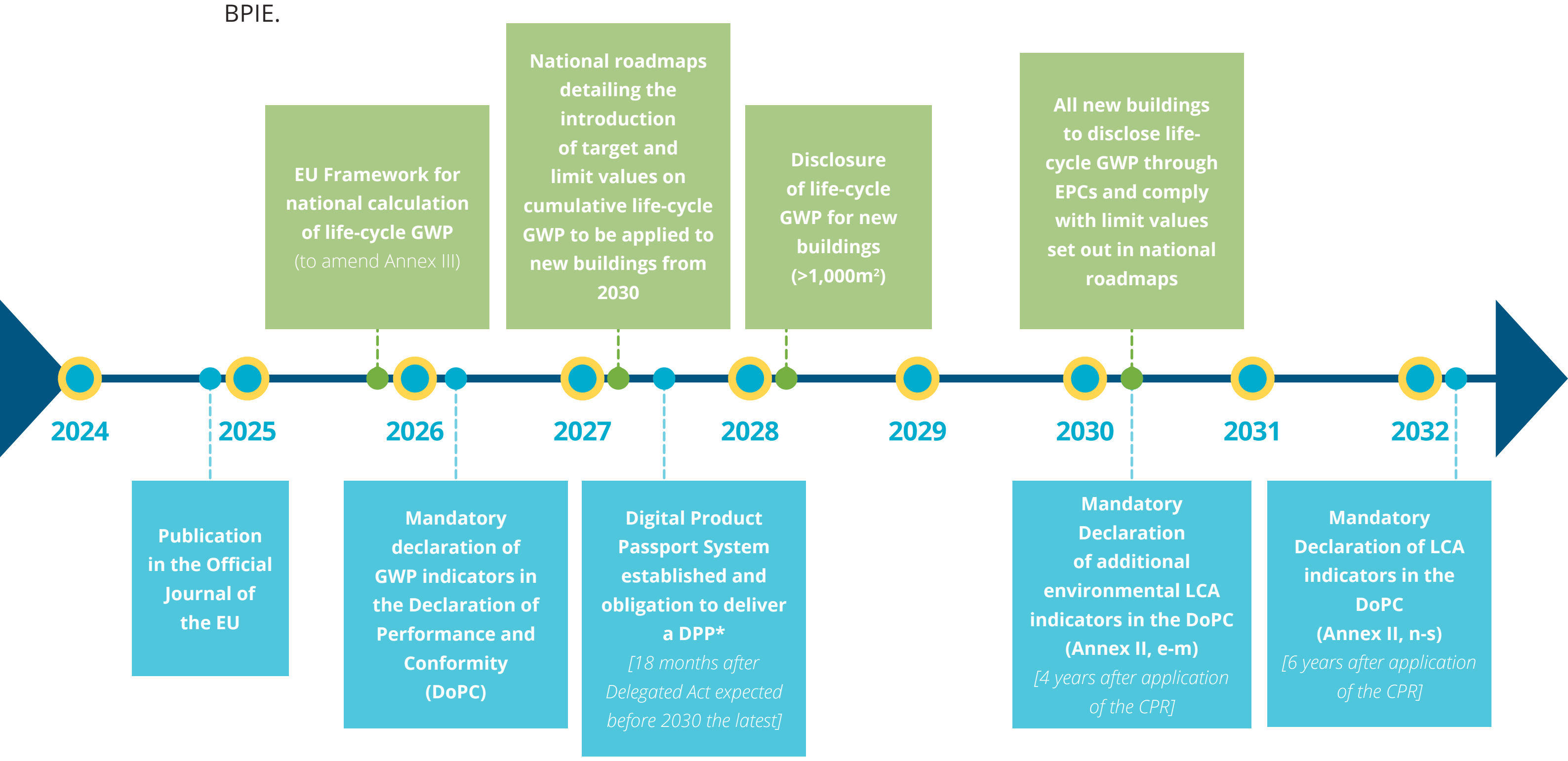
The EPBD is the EU's main policy initiative to deliver a climate-neutral building stock. The 2024 EPBD recast introduced the whole-life carbon concept into the EU buildings policy framework as a complement to existing provisions on energy performance. As a first step, the European Commission will adopt a Delegated Act that sets out a common framework for the calculation of whole-life carbon emissions. This calculation method will be the basis for a series of policy measures targeting the whole-life carbon emissions from buildings, which will be introduced in stepwise manner. These steps are listed in Figure 3 below.

Figure 3: Timeline of whole-life carbon provision of the EPBD recast



Another cornerstone of the EU WLC policy framework is the Construction Products Regulation (CPR). While the provisions in the EPBD apply to WLC at a building level, the CPR ensures the provision of environmental performance data at product and material level. It thus underpins the EPBD, which relies on this data for building-level WLC assessments. Manufacturers will provide this data in the format of a Digital Product Passport, a digital and harmonised product information sheet for all products on the EU single market which will be established in 2026. The CPR's requirement for a highly granular, standardised and comprehensive product-level life-cycle assessment sets a precedent for achieving a more complete and accurate whole building life-cycle GWP assessment once the CPR is fully implemented.

Figure 4: EPBD and CPR timelines on the implementation of life-cycle GWP requirements. Source: BPIE.

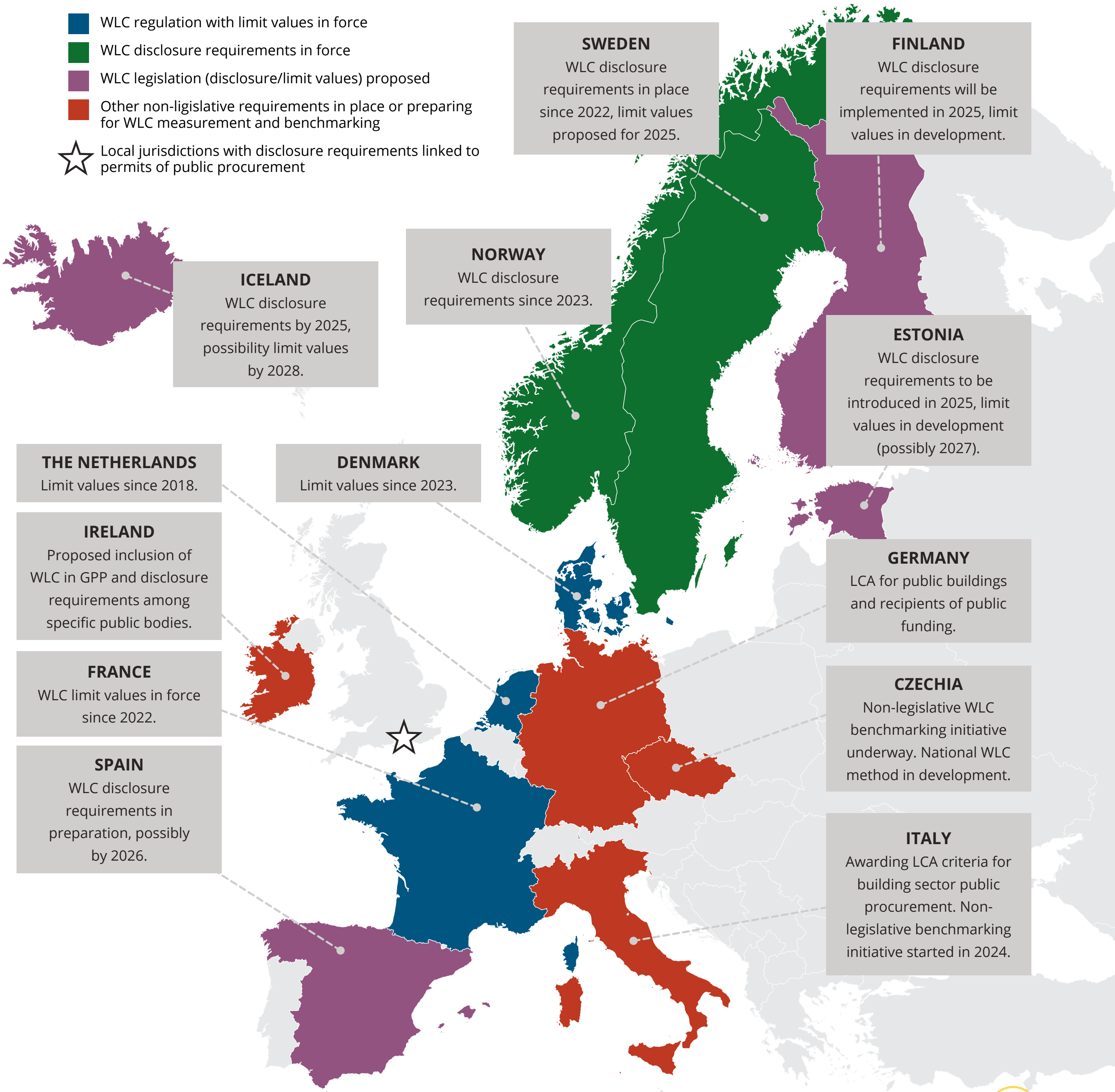


Finally, the new reporting obligations under the Corporate Sustainability Reporting Directive (CSRD), the Sustainable Finance Disclosure Regulation (SFDR), the Corporate Sustainability Due Diligence Directive (CSDDD) and criteria under the Sustainable Finance Taxonomy create an unprecedented demand for environmental performance data, including building WLC emissions. This package of financial policies is a strong driver for actions in real estate and finance to start collecting WLC data before this becomes a regulatory requirement.

STATE OF PLAY FOR WLC REGULATION IN THE EU

The WLC provisions in the EPBD will need to be transposed into national laws and implemented by Member States. Several European countries have already introduced disclosure measures and thresholds while others are in the process of doing so ahead of the EU-level initiative. Figure 4 below provides the latest overview of these frontrunner and early-mover Member States.

Figure 5: Overview of WLC regulations and initiatives across Europe. Source: BPIE (2024) How to establish Whole-life Carbon benchmarks: Insights and lessons learned from emerging approaches in Ireland, Czechia and Spain.



Disparities can already be observed among these countries with regards to the approaches and design choices of their respective WLC schemes.[3] These include differences in the reporting metric, included life-cycle modules, building typologies covered, included building elements, reference study period, building reference area and approach to providing default values and data.

The various WLC schemes adopted by frontrunner Member States have undoubtedly played a positive role in advancing WLC regulations and offer valuable best practices for other countries to follow. However, the diversity of approaches also makes comparisons difficult. If different WLC approaches continue to multiply across Member States, it could limit consistency and comparability of assessments, and cause confusion, delay and higher costs for the construction industry. In the worst-case scenario, this could entrench the differences between national methodologies for an extended period.

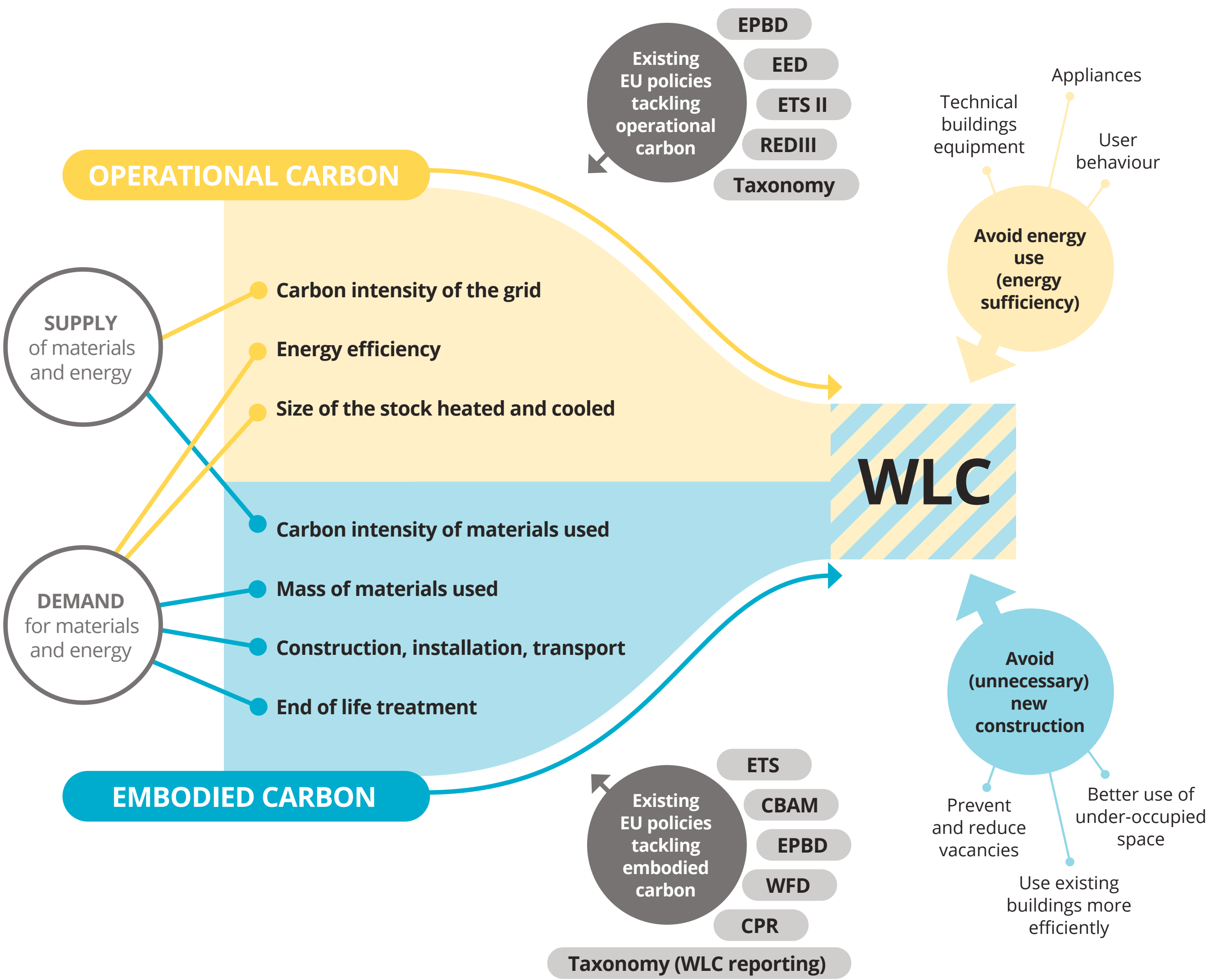
3 BPIE (2024). *How to establish Whole-life carbon benchmarks: Insights and lessons learned from emerging approaches in Ireland, Czechia and Spain*. https://www.bpie.eu/publication/how-to-establish-whole-life-carbon-benchmarks-insights-and-lessons-learned-from-emerging-approaches-in-ireland-czechia-and-spain. See also: Nordic Innovation (2024). Decarbonisation of the building stock. https://www.nordicsustainableconstruction.com/Media/638610345174988014/Decabonisation%20of%20the%20building%20stock_sep.%202024.pdf

THE LARGER PICTURE OF WLC REDUCTIONS: INTEGRATING PRODUCT, BUILDING AND BUILDING STOCK PERSPECTIVES

Whole-life carbon emissions are cross-sectoral and extend beyond what is typically considered within the scope of the buildings sector (i.e. the operation of the buildings). Reducing the WLC footprint of the sector requires demanding less material, minimising energy use, and implementing low-carbon and renewable heating, cooling, material and construction technologies at scale, while promoting the decarbonisation of the energy, transportation and material manufacturing sectors in parallel. These sectors have their own themes and respective pathways. WLC regulations, including the roadmaps introducing limit values for life-cycle GWP, will need to recognise synergies and interdependencies between different policy fields and building life-cycle stages.

The strategies to reach net zero will vary from project to project. A whole-life carbon perspective introduces a novel approach to considering potential decarbonisation measures within the buildings sector. It highlights the importance of prioritising the existing stock, thoughtful design and material choices, as well as increasing traceability and circularity of materials (see Figure 6 below).

Figure 6: Overview of factors impacting whole-life carbon emissions of the building stock and how they are addressed by current EU regulations. Source: BPIE.



2.

SETTING THE VISION

FOR CONSISTENT WHOLE-LIFE CARBON ACCOUNTING METHODS AND POLICIES

Life-cycle thinking and whole-life carbon assessment is the foundational approach informing better building design and materials selection, including designing with less material and waste, selecting materials with a lower carbon impact and designing buildings for resilience, flexibility or longer lifespan. It enables stakeholders from across the built environment to take collective responsibility and understand the environmental impact of their decisions regarding the procurement, design, construction, use and disposal of built assets. In this chapter we present the core principles of a whole-life carbon framework and discuss the main design choices and their implications.

Consistent, transparent and robust whole-life carbon assessment underpins policy action, informs decarbonisation strategies and financing decisions, encourages innovation and creates a lead market for low-carbon solutions. Conversely, divergent approaches can stifle climate efforts, innovation and investments. Common principles and standards are at the basis of consistent, transparent and comparable national methodologies and frameworks to assess and report life-cycle GWP and, in the future, the broader sustainability performance of buildings.

The principles set out below are aimed to guide the EU framework on reporting and regulating the life-cycle GWP of buildings.

HARMONISED FRAMEWORK AND TAILORED NATIONAL APPLICATIONS

The EU WLC framework should ensure transparency and comparability while allowing flexibility for Member States to create ambitious WLC measures adapted to their unique building stock.

An EU-level WLC framework must prioritise harmonisation, consistent national methodologies and comparability to ensure effective and efficient implementation across Member States. The framework should set clear boundaries in terms of scope, specifying the life-cycle modules and building elements to be included, data sources and scenario assumptions and metrics. While flexibility may introduce concessions in terms of speed of implementation, the ultimate objective must remain a consistent and aligned approach to national WLC methods.

Harmonisation is critical not only to enable the comparison of results and ensure transparency, but also to accelerate the adoption of new WLC schemes in Member States by incorporating best practices from leading EU countries. A lack of harmonisation would risk creating barriers and inefficiencies in the internal market, leading to higher costs and slower progress in decarbonising the building stock.

Meanwhile, the framework must allow sufficient flexibility for Member States to adapt their WLC schemes according to their unique building stock, while still ensuring the same level of ambition. The current state of the national building stocks, climatic conditions, culture and practices, and – perhaps most importantly – the national energy mix vary greatly across the EU.

Keeping this overall picture and linking WLC strategies to the features of each building stock will enable Member States to develop effective and coordinated strategies for reducing operational and embodied carbon, and adapt their respective ambition levels, in alignment with the reality of their building stock's energy demand profiles. This is important given that the energy performance of buildings also varies widely across Member States.

In addition, some Member States have already had WLC regulation in place for several years, while others are starting from scratch in response to the new EU laws. Flexibility is therefore needed to ensure ambitious but feasible WLC regulation in each Member State with its unique prerequisites. Notwithstanding, it is essential that a WLC scheme is harmonised *within* each Member State.

COMPREHENSIVE WITH FOCUS ON WHAT MATTERS

A comprehensive and harmonised scope of life-cycle stages, modules and building elements is needed, but should be kept simple for practitioners by using conservative default values for most elements and modules.

Next, the EU-level framework and its implementation in Member States must balance comprehensiveness with simplicity. A complete WLC assessment considers all emissions across a building's entire life-cycle, from material sourcing and construction to use, disposal and the potential reusability and recyclability of all the building elements. In theory, this approach enables the identification of the most climate-efficient building design options. However, such comprehensive assessments are time-consuming, resource intensive, and constrained by data gaps and insufficient input data.

The Level(s) indicator 1.2: Life-cycle GWP[4] provides a robust framework with a 'cradle to grave' system boundary, including product stage (A1-5), use stage (B1-6) and end-of-life stage (C1-4) with benefits and loads beyond the system boundary (D) reported separately. For the purpose of comparability, Level(s) also establishes a minimum scope of building elements, components, products and materials to be assessed. To maintain consistency, the Delegated Act should align with the scope and system boundaries defined by Level(s).

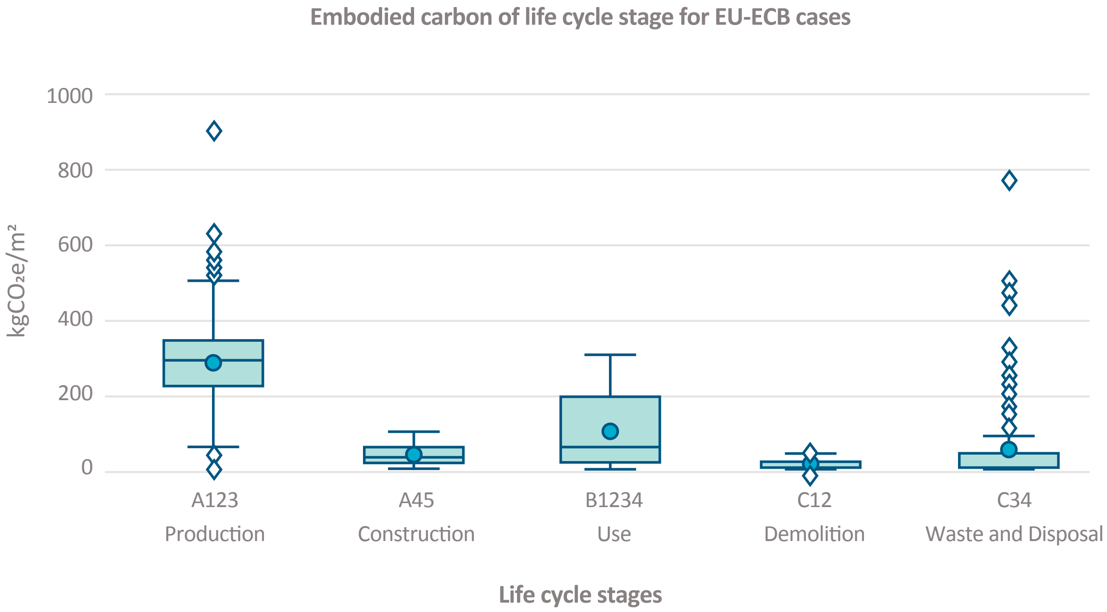
The WLC framework should guide and incentivise the construction sector to focus its efforts on reducing emissions from the building types, life-cycle phases (including operation) and building elements that have the greatest impact. A comprehensive scope of assessment is needed to ensure that carbon hotspots can be identified wherever they may be. Meanwhile, the framework should minimise administrative burdens for aspects with marginal impact on total life-cycle emissions.

Achieving such a comprehensive yet manageable scope may require the use of default values for most building elements. To encourage innovation and accuracy of input data, these default values should be highly conservative, ensuring that reliance on them alone will not suffice to meet performance or limit values.

The availability of robust data and benchmarks is particularly important when establishing limit values that encompass the full scope of life-cycle modules and building elements. Without accurate benchmarks, limit values risk lacking a solid and credible performance framework, ultimately weakening their effectiveness as a policy tool for reducing carbon emissions where it matters most. Existing research on embodied carbon across Europe indicates that upfront emissions are the largest source of embodied emissions. This is also where data is most reliable, as these emissions are being released now. Life-cycle stages A1–A3 should therefore always be included. However, other significant carbon hotspots such as A4–A5 (transport and construction), B1–B4 (use phase embodied carbon) and C3–C4 (end-of-life processing and disposal) should also be accounted for. In line with a comprehensive WLC framework, operational emissions during the use phase (B6) should be included, as is already the case in leading countries with established WLC regulations.

[4] Dodd, N., Donatello, S. and Cordella, M. (2021). Level(s) indicator 1.2: Life-cycle Global Warming Potential (GWP). European Commission, JRC technical reports. https://susproc.jrc.ec.europa.eu/product-bureau/sites/default/files/2021-01/UM3_Indicator_1.2_v1.1_37pp.pdf

Figure 7: Typical embodied carbon values in buildings across Europe according to life-cycle stages. Source: Röck et al. (2022) Towards Embodied Carbon Benchmarks for Buildings in Europe - #2 Setting the Baseline: A Bottom-up Approach. https://doi.org/10.5281/zenodo.5895051



The inclusion of statistically representative default values for most of these building elements and life-cycle modules offers two key benefits: it reduces the workload for stakeholders and provides a clear view of emissions distribution. This insight is particularly valuable during the early stages as the industry learns to identify carbon hotspots. **It is important for these default values to be conservative – for example, by incorporating a 20% penalty factor above the average – to prevent targets or regulatory limits from being met solely through the use of generic data.** This approach incentivises designers to explore low-carbon options and optimise outcomes by targeting the largest contributors to life-cycle emissions. Similarly, conservative default values could encourage manufacturers to create and promote Environmental Product Declarations (EPDs) that surpass the default standards, thereby driving improvement across the industry.

PRAGMATIC APPROACH TO DATA

The EU WLC framework should support launching national regulations before input data is perfect, but also include incentives to improve data availability and quality over time.

WLC regulation is heavily dependent on data, so an EU framework will need to address several data considerations. Various types of data are required both for assessing WLC and for defining benchmarks. While consistency and completeness of data sources are essential for reliable and accurate WLC results, striving for perfection should not hinder progress. **It is important to build a functional data foundation even if it is not yet perfectly accurate, while also providing incentives for data improvement.**

A good example of this is the above-mentioned provision of default carbon data and material inventories which facilitates completeness and low-cost assessment of less impactful carbon sources, but which comes with a carbon penalty. The default value could for example correspond to “worst-in-class” or at least below-average performance, so that actors throughout the value chain are encouraged to provide specific data that yields a more favourable and thus competitive result in the assessment.

The common EU framework should establish clear criteria for data selection and a transparent data hierarchy so WLC assessment can get started before data is perfect, while ensuring mechanisms are in place for the progressive improvement of data availability and quality. A comprehensive and detailed bill of materials means results can be refined and recalculated with minimal effort to reflect future scenarios – such as grid and industry decarbonisation projections – and when product-specific data becomes widely available.

BENCHMARKS TO CREATE PERFORMANCE TARGETS

The EU WLC framework should set governing principles for defining benchmarks and setting targets, while acknowledging that their numeric value will vary among Member States.

Benchmarks and gradually increasing performance thresholds are an essential component of a WLC scheme that ensures progress towards the long-term goal of a climate-neutral buildings sector. Due to the heterogeneity of the European building stock, the absolute value of these thresholds must be set individually by Member States at a level that is ambitious in their unique national context. Representative and reliable data is crucial for establishing these benchmarks and creating a clear pathway for target-setting. To develop statistically meaningful benchmarks, a significant number of WLC assessments must be conducted across buildings in various European countries and regions. These assessments should reflect local building stock and follow the standardised EU WLC accounting methodology outlined above.

By setting benchmarks with progressively escalating targets, Member States can guide the buildings sector toward near-zero emissions. These benchmarks should reflect current market practices and anticipate future needs, providing a clear direction for the industry. Though the absolute numeric value of benchmarks and targets will vary between Member States, **the EU WLC framework should provide guidance on the governing principles for defining benchmarks and setting targets**, e.g. how the targets should guarantee the necessary contribution to overall climate commitments.

The successful setting and introduction of benchmarks and thresholds relies on effective communication and collaboration between governments and national stakeholders, notably from industry. Governments can strengthen the industry's ability to meet targets by raising awareness and offering the necessary support. The EU WLC framework should also include guidance on and models for stakeholder engagement and communication based on best practices.[5]

[5] See for example the Nordic Sustainable Construction project (www.nordicsustainableconstruction.com), the INDICATE project (www.indicatedata.com) or the French RE2020 legislation (www.ecologie.gouv.fr/politiques-publiques/reglementation-environnementale-re2020). The latter is a good practice example of how to collect data to establish robust benchmarks and ambitious reference values. In France, the environmental data necessary to conduct carbon benchmarking as part of RE2020 is collected in the INIES database (www.inies.fr) and easily accessible for free online. INIES is collectively managed by construction stakeholders and public authorities. Manufacturers are encouraged to submit their FDES (French equivalent to EPDs) to the website. Baselines are then monitored and regularly updated based on the most current building practice compiled in the database.

INTERNATIONAL COLLABORATION

The EU WLC framework should strive to align national approaches to WLC calculation and reporting.

National methodologies should be developed through European and global collaboration to ensure consistent outcomes. While both private and public whole-life carbon initiatives are growing, this expansion risks duplication, confusion and lack of clarity. However, with coordinated direction toward shared principles and common standards, this expertise can accelerate whole-life carbon policy. **Now is the time to align national approaches to WLC calculation and reporting, as a lack of clear vision may lead to fragmented efforts that are difficult to align later.** Collaboration is key in developing benchmarks with country- and region-specific timelines. Interoperable standards for environmental impact accounting, using consistent metrics across global markets, will support performance-based decisions on material use, selection of low-carbon solutions and design options.

3.

DELIVERING THE VISION

BUILDING BLOCKS OF AN EU-LEVEL WHOLE-LIFE CARBON REGULATORY FRAMEWORK

Existing analyses of whole-life carbon regulation in the EU[6] are typically based on experiences from pioneer Member States in Northern and Western Europe. With regards to identifying the necessary basic building blocks of a whole-life carbon framework, there is a great consensus among these studies. This section builds on the conclusions and proposed frameworks of these previous studies and puts them into the current policy context by pinpointing the most relevant aspects and considerations for the upcoming Delegated Act and national roadmaps respectively.

[6] Steinmann, J., Röck, M., Lützkendorf, T., Allacker, K. and Le Den, X. (2022). *Whole-life carbon models for the EU27 to bring down embodied carbon emissions from new buildings – Review of existing national legislative measures*; Steinman, J., Le Den, X., Röck, M., Allacker, K. and Lützkendorf, T. (2023). *Whole-life carbon models for the EU27 to bring down embodied carbon emissions from new buildings – Towards a whole-life carbon policy for the EU*; Nordic Sustainable Construction (2024). *Decarbonisation of the building stock; BPIE (2024). How to establish Whole-life carbon benchmarks: Insights and lessons learned from emerging approaches in Ireland, Czechia and Spain.*

CORE BUILDING BLOCKS

Leading policy examples targeting whole-life carbon emissions of buildings from across Europe have two main building blocks:

- **Methodology and data foundation**
- **Regulation and performance definition.**

In addition, best practice examples also highlight the importance of supporting measures such as capacity building and stakeholder engagement throughout the process of policy development and implementation.

The **methodology and data foundation** is expected to correspond to the scope of the Delegated Act, while **the regulation and performance definition** will be set out in the national roadmaps following the guidelines provided by the EU Commission. The national roadmap itself is a non-binding document, but it will serve as guidance on how disclosure requirements and targets should be enacted in national regulation.

This section outlines and examines these building blocks of the WLC framework, detailing the essential ingredients, the various design options, and the potential impacts of different choices. The building blocks and components are depicted in Figure 8.

Figure 8: The building blocks of a whole-life carbon framework

DELEGATED ACT

Methodology and Data Foundation

Method definitions

- The spatial boundary of the building/ property
- The included building elements
- Life-cycle modules to be considered
- The assumed lifetime of the building (Reference Study Period, RSP)
- Reference floor area (functional unit)

Data considerations

- Data sources
- Default values
- Data hierarchy
- Scenario assumptions

Reporting and metrics

- Template
- Metric

NATIONAL ROADMAPS

Regulation and Performance Definition

Sequence

- Data generation
- Data collection and analysis
- Baseline benchmarks
- Reduction pathways
- Target values and roadmaps

Governance

- Verified tools
- Compliance and quality assurance

Capacity building | **Stakeholder engagement** | **Policy links**

METHODOLOGY AND DATA FOUNDATION

A main objective of the methodology and data foundation is to ensure a minimum level of harmonisation across the EU Member States – a common denominator.

At the very least, the methodology and data foundation in the Delegated Act must set out ground rules for the core components:

1. **Method definition**
2. **Data considerations**
3. **Reporting format**

The European Standard EN15978 (currently under revision) sets out the principles of whole-life carbon measurement of buildings, while the Level(s) indicator 1.2 provides more detailed guidance and clarifications on the practical implementation of the EN standard. Using Level(s) indicator 1.2[7] is critical as Level(s) underpins current and future EU building legislation, and indicator 1.2 specifically is the indicator that provides the framework for the revised EPBD and the technical screening criteria for buildings in the EU Taxonomy.

There should be alignment of the most relevant requirements that affect the results of a WLC assessment, including scope and system boundary, assumed building (and elements) lifespan, allowed data sources, life-cycle assessment assumptions and scenarios.

METHOD DEFINITION

An assessment method is made up of a set of decisions and assumptions. These decisions determine the bill of materials which should have their carbon impact accounted for, as well as how these results are contextualised in relation to the utility of the building. This includes selecting:

- The spatial boundary of the building/property
- The included building elements
- Life-cycle modules to be considered
- The assumed lifetime of the building (reference study period)
- Reference floor area.

The method definition must clarify which parts of the building and property – **both spaces and specific building elements** – should be included in the bill of materials. Level(s) indicator 1.2 outlines a broad scope, while the list of building elements covered by existing WLC regulations in different countries tends to be less comprehensive. However, some elements, such as the building's substructure and superstructure, are consistently included across these regulations.

Defining the spatial boundary also includes deciding how to deal with energy flows from on-site renewable energy generation (e.g. building-integrated photovoltaics, BIPVs), which may be self-consumed, exported to the grid, or a combination of these.

[7] Dodd, N., Donatello, S. and Cordella, M. (2021). Level(s) indicator 1.2: Life-cycle Global Warming Potential (GWP). European Commission, JRC technical reports. https://susproc.jrc.ec.europa.eu/product-bureau/sites/default/files/2020-10/20201013%20New%20Level(s)%20documentation_Indicator%201.2_Publication%20v1.0.pdf

The method must also define what **life-cycle phases** to include. Clarifying the scope – whether certain modules or building elements are included or excluded – has implications beyond data collection and capacity building. It directly influences investment and innovation in low-carbon solutions.

In frontrunner countries, upfront emissions (A1-A3), i.e. the emissions from the extraction and manufacturing of construction materials, are consistently included, but there is large variation with regards to the subsequent phases of construction (A4-A5), use (B1-B7) and end-of-life (C1-C4). The advantage of focusing on a subset of life-cycle modules is that it reduces the administrative burden and cost. However, excluding life-cycle phases means forfeiting the opportunity to collect data and build capacity for the whole life-cycle. This comprehensive data is necessary for identifying new carbon hotspots and making balanced design decisions in the medium and long term. When focusing only on upfront emissions like A1-A3, and not accounting for emissions at end-of-life, there is also a risk of introducing a bias for products that store carbon in the upfront phase, even if this carbon is later released. If a subset of life-cycle phases is chosen, calculation methods must be defined so that this bias is avoided.

To perform a fully comprehensive carbon assessment, every single building element – down to the screws and nails – and all life-cycle phases should be accounted for. This level of detail would require a tremendous effort that cannot necessarily be motivated. Defining cut-off criteria, by mass or type of product, in line with Level(s), can significantly improve the practical feasibility of the assessment.

Another important variable is the assumed lifetime of a building, called the **reference study period**. This value is typically set to 50 years, but in the Netherlands, it is 75 years for residential buildings. Raising the reference study period is likely to shift the relationship and thus the optimal trade-off between operational and embodied carbon. A longer building lifetime increases the relative contribution of operational carbon and reduces that of embodied carbon since operational carbon accumulates over a longer period of time, while embodied carbon gets “spread out” over more years. A longer reference study period can also reflect the intrinsic qualities and advantages of certain materials, such as durability, repairability, recyclability and maintenance.

The total carbon emissions are typically expressed per **floor area**. The floor area thus represents the functional unit for the assessment. It is necessary to define what building spaces should count towards that floor area. The most common reference floor area in frontrunner countries is gross floor area, but the definitions are not identical, and the EPBD requires useful floor area. Assessing a building's WLC footprint requires quantifying all energy and material flows, with the reference floor area serving as the denominator for reporting results (e.g., $kgCO_2eq/m^2$). To incentivise meaningful carbon reductions and discourage unnecessarily large buildings, it is recommended to base the calculation on the building's utility or “useful space”. It is also important to choose the reference floor area so that embodied carbon cannot be “diluted” by increasing spaces that do not add to the bill of materials or to the actual utility of the building.

Table 1 shows what life-cycle phases and building elements have been included in some Nordic frontrunner countries. There is some variation in setting the system boundaries. This is likely caused by different priorities in terms of comprehensiveness versus administrative burden and cost. Without harmonisation of these aspects at the EU level, comparison of results from building WLC assessment becomes difficult.

Table 1: Life-cycle modules and building elements covered in frontrunner countries in the Nordic region. Source: Adapted from Nordic Sustainable Construction (2024).

Topic	Denmark	Estonia (proposed)	Finland (proposed)	Sweden
Life-cycle modules*	**A1-3, B4, B6.1, C3-4. D1-2 2025: A4-5**	**A1-3, A4, A5, B4, B6.1, C3-4; D1 & D2**	**A1-3, A4, A5, B4, B6.1, C1, C2, C3-4**	**A1-3, A4, A5 2027 proposed: B2, B4, C1-4**
Building elements**	• Substructure • Superstructure • Building services • External works	• Substructure • Superstructure • Building services	• Substructure • Superstructure • Building services • Furnishing	• Substructure • Superstructure • PV panels • Building services • Furnishing

* though there is consensus around including modules A1-5, different approaches to biogenic carbon apply
** specific exclusions apply for different countries

DATA CONSIDERATIONS

Next to the decisions and assumptions that define the method, the input data plays a pivotal role for robustness, comparability and accuracy of WLC calculations. The data gathering for the assessment starts with the quantification of the materials (bill of materials). This follows from the definition of system boundaries prescribed by the method. For each item on the bill of materials, carbon data is required for products and processes across the life-cycle. Data on scenarios for the transportation, installation, maintenance, use, deconstruction and waste treatment is also required.

To ensure the quality and reliability of the input data, and the comparability of the results, specifications are needed for the following aspects:

- Data sources
- Default values
- Data hierarchy
- Scenario assumptions.

Data sources, default values and data hierarchy

Conducting a robust carbon assessment requires product-specific data for each item on the bill of materials. Since this data is not always available, it is necessary to provide default values as part of a WLC framework. Default values can also be a way to save time for less impactful building elements. To maintain an incentive for manufacturers and assessors to provide and use specific data, the default values are typically set with a slight carbon penalty, i.e. so that lower values and more favourable results can be obtained with specific data as compared to default values.

Typically, both product-specific data and generic datasets can be used in WLC assessments with the requirement for assessors to explicitly state the source of the data. Most countries that have WLC regulation have national databases that include both types of data, though the approaches to developing these databases vary. The choice of appropriate carbon data is largely dependent on the project phase during which the WLC assessment occurs. For instance, early design phases often rely on generic carbon factors, whereas the construction and post-completion phases can use product-specific carbon data from EPDs, with generic data as a fallback if EPDs are unavailable. Similarly, penalties for default values can be adjusted based on the building's development stage. Since generic datasets already include a penalty factor compared to product-specific data, no additional penalty might be applied during the design phase to avoid compounding penalties. The penalty could then gradually increase at subsequent stages, reaching, for example, 20% by the as-built phase.

In this sense, clarifying when the WLC assessment is required will likely influence the data used.[8] Regardless of timing, the EU Commission and Member States should encourage the generation of EPDs (and future Declarations of Performance and Conformity (DoPCs) as per the revised Construction Products Regulation), set out a clear data hierarchy to incentivise the use of high-quality data (such as applying conservative weighting factors when generic data is used), and require data confidence calculations.

Scenario assumptions

Level(s) offers helpful references and assumptions for life-cycle modules in EN15978, but it is strongly recommended to use alternative sources that better reflect national contexts. National scenarios can differ significantly due to variations in supply chains, construction practices, carbon intensity of energy grids and end-of-life processes. The key is to develop scenarios based on typical practices and realistic predictions about the building's lifespan, ensuring consistent use across assessments to make them both representative and comparable.

A large number of data categories and assumptions are required to conduct even a partial assessment. Member States need to develop potential data sources and make them available for the implementation of the EPBD. As things currently stand, potential data sources are defined for some of the life-cycle phases of a building in EN15978. For instance, data for A1-A3 could be sourced from Level(s), national generic datasets and EPDs. However, for a large number of life-cycle phases and the corresponding data categories, no harmonised and default data is available or defined.

Present and projected future electricity grid emissions and energy efficiency improvements significantly impact both operational carbon emissions (module B6) and the carbon intensity of construction materials. While energy performance certificate (EPC) databases typically record energy intensity, they do not account for the carbon emissions associated with building operations. To calculate operational carbon, emissions factors must be applied. The choice between static and dynamic scenarios plays a crucial role in the steering effect of regulations and should be carefully evaluated. It is recommended that Member States develop energy forecasts and align these scenarios with existing national policies and strategies, such as decarbonisation plans, renewable energy targets and carbon neutrality goals.

8 To achieve the greatest carbon reductions, WLC assessments should be conducted sequentially, beginning with the planning phase and continuing through design, construction and handover. This approach ensures that WLC data can best inform decision-making, track performance (comparing as-built to as-designed), and enhance the reliability of the assessment.

REPORTING FORMAT

The final core component that should be part of a methodology and data foundation is the reporting format, i.e. how the results of the assessment are expressed and reported. The aspects to be defined are:

- Reporting template
- Metrics and indicators.

To ensure that results of the WLC assessments get reported in a harmonised format it is necessary to establish **reporting templates**. The standardised data formats will allow easier aggregation of data. The templates should allow insights into the impacts of different building components and phases to help identify carbon hotspots.

A closely related aspect concerns the **metric** in which the results are expressed. The Delegated Act could set out a requirement for separate reporting of embodied and operational carbon to ensure neither category of emissions can be ignored entirely and some level of reduction must be achieved for each.[9] This approach could also support the introduction of separate limit values for embodied and operational carbon, alongside an overall lower WLC cap that combines the two. In the same vein, the reporting could include both relative kgCO2eq/m^2 metrics (in order to align with other widely used metrics such as energy use intensity) and absolute value total emissions in $kgCO_2eq$ so that results can be normalised (as e.g. $kgCO_2eq$/occupant) and to avoid rebound effects (e.g. buildings becoming increasingly larger and offsetting gains in lower carbon intensity).

Finally, assessment results and disaggregated data must be made accessible in a digital and interoperable format. This is in line with the requirement in the CPR and ESPR that product information must be transmitted digitally by means of digital product passports. Closer integration with data and software tools, such as digital product passports, digital building logbooks, EPCs and building information modelling, will significantly improve accessibility, accuracy and simplicity of conducting WLC assessments.

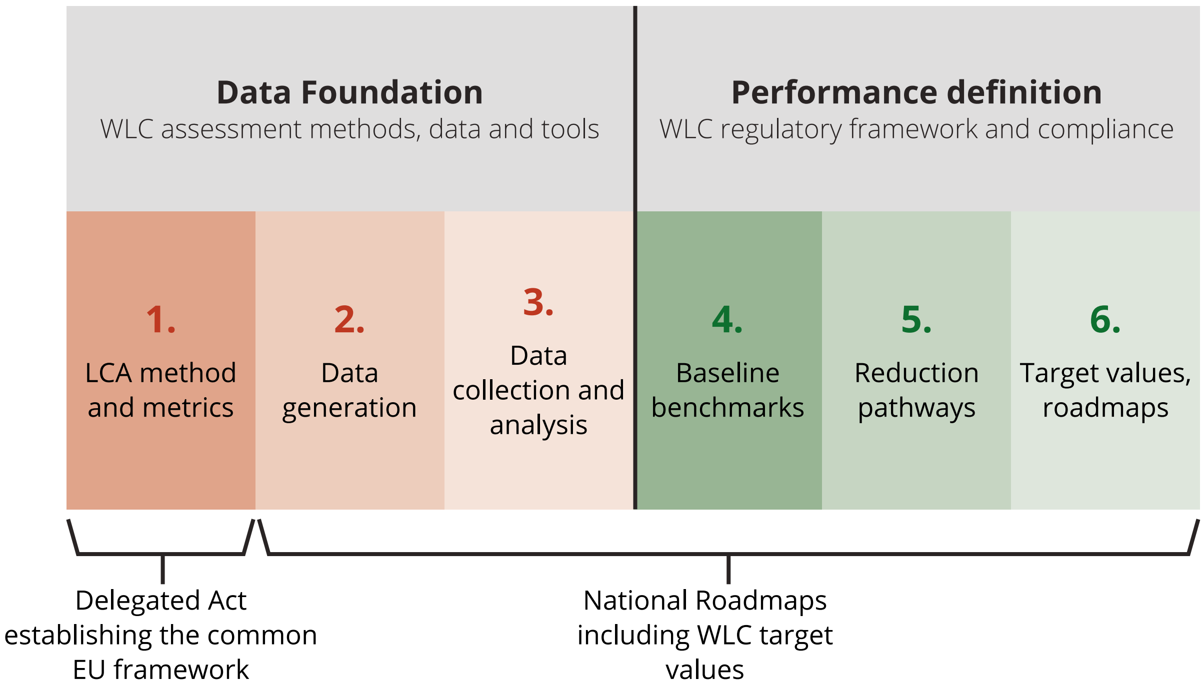
[9] For more details and justification, see WGBC (2023). *Policy briefing on whole-life carbon reporting and metrics.*

FIVE STEPS OF WHOLE-LIFE CARBON REGULATION

Based on the experiences from frontrunning countries, WLC regulation is best designed in a sequence of steps that begin with creating a data foundation, upon which benchmarks, limit values and targets can be based. The process can be described in the following five steps:

1. **Data generation**
2. **Data collection and analysis**
3. **Baselines and benchmarks**
4. **Reduction pathways**
5. **Target values, roadmaps**

Figure 9: Steps to advance policies for measuring and reducing WLC emissions in buildings. Source: based on Tozan et al. (2022).



WLC regulation is typically (though not always[10]) introduced with WLC reporting and disclosure requirements, but initially without limit values. The reporting and disclosure requirements **generate data** on the current state of practices in the construction sector. Governments must establish processes for **collecting and analysing this data**. It is strongly recommended that these processes are digital, and that the data is organised in central databases.

Next, **benchmarks** are based on a statistical analysis of the current building stock and represent 'average performance' of a typical building (building archetype). Establishing benchmarks allows for comparison between similar building projects and to set limit values corresponding to the maximum life-cycle GWP permitted for the building.

An important outcome of this step is the identification of what building typologies to include in the WLC regulation to achieve the desired impact. Typically, representative building types such as single-family homes, multi-family residential buildings, office buildings and schools are included while other types like religious buildings or military buildings are excluded.

When the current performance of the building stock is known, **reduction pathways** are established to describe how WLC emissions should gradually decrease. There are two approaches to defining reduction pathways and setting limit values. The **bottom-up approach** starts from the current state of the building stock and could for instance mean that thresholds are set so that all new buildings meet a value that is better than the 25% worst performers. The advantage of the bottom-up approach is that it follows a relatively straightforward methodology to calculate and define the threshold, as well as what will be required to reach it. This is because it takes a building-specific view in isolation from other sectors, which reduces the complexity of the analysis. **The significant downside of the bottom-up approach is its risk and tendency to fall short of the required level of carbon mitigation efforts, i.e. a lack of alignment with necessary trajectories defined by climate science.**

The other approach for defining reduction pathways and setting thresholds is a **top-down approach** which ultimately starts from global climate commitments and sets limit values that would ensure that the building stock stays within remaining carbon budgets. Defining a top-down threshold is more complex since it must be derived by allocating the total required carbon mitigation efforts between different sectors, and subsequently between different possible courses of action within the buildings sector. It also results in more ambitious limit values, as it aligns more closely with climate science and ensures compliance with the Paris Agreement. The Danish Reduction Roadmap[11] sets a good example for deriving housing sector-specific thresholds with a starting point in the planetary boundary for climate change. Through a stepwise allocation process, targets are scaled down from the global level, to the national, to the industry, to housing, and down to target emission levels per square metre.

Given the urgency of the climate crisis, and persistent ambition gaps between bottom-up and top-down pathways, even in leading countries, there are good reasons to give more priority to top-down approaches when defining reduction pathways for building WLC emissions.

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[10] Denmark directly introduced limit values, but in a stepwise manner.
[11] Reduction Roadmap website.

REGULATION AND GOVERNANCE

In parallel with the sequence of steps described above, some horizontal aspects of the regulation are needed to ensure its effectiveness. These are:

- Calculation tools
- Compliance and quality assurance.

There is generally an array of different **life-cycle assessment tools** and software available on the market, that may be provided by public authorities as well as private businesses. Once decisions have been made about scope, assessment method and data sources, it is recommended to identify which of the available life-cycle assessment tools practitioners can use to conduct the calculations in accordance with the set boundaries and requirements. The identified tools can be published on a "verified list" for transparency and accessibility reasons.

Effective WLC regulation requires a robust **compliance control** regime, including verification and sanctions for non-compliance. Third-party verification of WLC assessments in line with the verification requirements set out in the EN 15978 or EN 17472 standards is highly recommended. All information used and decisions taken during assessment (materials inventories, operational energy calculations, scenarios, carbon data and the calculation procedure) should be presented in a transparent manner. Streamlining reporting through limited methodological choices and using accredited software tools can reduce errors and workload, while generic environmental data helps fill gaps when EPDs are unavailable.

Sanctions for non-compliance are largely dependent on the reporting stage (either during the building permitting or post-completion) and most frontrunning countries are still testing various approaches. Balancing market preparedness and robustness, lessons learned from EPC quality assurance schemes and clear guidance from the EU are highly valuable.

STAKEHOLDER ENGAGEMENT AND SUPPORTIVE POLICY

Though outside the scope of the Delegated Act and the national roadmaps, it is highly recommended to take complementary supportive measures to ensure a smooth roll-out of WLC schemes. These include:

- Stakeholder engagement
- Capacity and skills
- Links to other policy.

Stakeholder engagement facilitates development and validation of the method, collection of data to inform benchmarking, and generally preparing the sector for market uptake of forthcoming regulation. Stakeholder engagement and supportive policies are in place in Member States with WLC regulations. In most leading countries, there were initially voluntary certifications that integrated life-cycle assessment (BREEAM, LEED, DGNB). In many countries, a stakeholder process supported the decision to legally establish and implement life-cycle GHG thresholds. France offers a noteworthy approach by starting with a test phase,[12] which helped prepare the sector to develop a comprehensive approach addressing both operational and embodied carbon.

Measuring and reducing WLC in buildings require significant life-cycle assessment literacy and data skills. In Member States without WLC regulation in place, and without widespread voluntary sustainable construction certification schemes, these **skills and capacities** may not be readily available. It may be necessary to design targeted supportive actions – such as providing guidance, awareness raising and education – to overcome this initial barrier. Collaboration with industry stakeholders, academia and civil society is a key success factor for the identification of training needs and the development of programmes addressing them. Furthermore, investing in building such skills in the workforce is an opportunity for economic growth and necessary to create and secure jobs long-term in the green economy.

The introduction of life-cycle GHG limits is accompanied by **supporting policies and measures i**n the frontrunner countries. In order to increase the availability of data, the Netherlands[13] and Denmark are subsidising the creation of EPDs. Other examples are including WLC in green public procurement and capacity building.

[12] Website of the French pilot phase.
[13] The White Spots Project is currently subsidising the creation of EPDs in the third round with up to €2,500.

4.

CONCLUDING REMARKS

SCOPE AND CONTENT: CONSISTENCY, HARMONISATION AND FLEXIBILITY

It is expected that the Delegated Act will establish the high-level principles for the scope of the EU life-cycle GWP calculation, including clarifications related to the life-cycle modules and building elements considered, reference unit definition, scenarios, assumptions and allowable data sources. Instead of providing a fully harmonised and detailed step-by-step calculation methodology, the Delegated Act will set out a framework including minimum requirements (common denominator approach). This approach aims to accommodate Member States that already have WLC methodologies and regulations in place, as well as those just about to embark on this journey. In the longer term, the objective of the Delegated Act should be to foster close alignment between all Member States driven by science, data and common standards.

To ensure closer alignment and consistency of WLC assessments across Europe, **it is recommended that the EU framework require a comprehensive scope of all building elements and life-cycle modules** so that WLC disclosure captures the complete range of emissions. Conservative generic values can fill initial data gaps and incentivise data generation and accuracy over time.

The scope of limit values should cover all life-cycle modules and building elements, supported by robust data and benchmarks. Without accurate benchmarks, limit values risk lacking credibility and effectiveness in reducing carbon where it matters most. Research across Europe shows upfront emissions (A1–A3) are the largest and most certain source of embodied carbon, making their inclusion essential. Other significant hotspots, including A4–A5, B1–B4 and C3–C4, should also be included. Additionally, use phase emissions (B6) should be part of a comprehensive WLC framework, as seen in leading countries with WLC regulations.

There should be a common approach and rationale to setting limit values while recognising that the numeric values will vary between Member States. Scaling the number of yearly WLC assessments from 50-100, as is currently the case in many countries, to a magnitude of thousands or tens of thousands, as will be required by 2030 to cover all new constructions in a country, will unavoidably imply the use of default values, at least in the beginning, for both carbon intensity of materials and material inventories.

Introducing thresholds for total building WLC emissions (embodied and operational) will give flexibility to designers and incentivise innovative tailored approaches to cutting emissions in the most carbon- and cost-effective or otherwise most appropriate way for each project. Meanwhile, complementary thresholds should be set for the individual categories of operational and embodied carbon emissions. These disaggregated thresholds will work as safeguards that prevent a complete shift of emissions from one category to another, and maintain pressure to innovate low-carbon solutions in both domains.

However, even if thresholds have a limited scope initially, the disclosure requirements should be as consistent and comprehensive as possible. Only reliable and comparable WLC assessments can provide a solid source of reference for the industry and policymakers to establish benchmarks and future limit values. Comprehensive carbon assessment results provide Member States with an accurate picture of where the next carbon hotspots are and will enable moving forward with well-targeted thresholds further down the line. The EU WLC framework should therefore provide its guidance based on a complete WLC assessment scope, both in terms of life-cycle assessment modules and building elements, which could then support the development of credible national decarbonisation pathways.

Another key issue is the alignment with Level(s), which is the reference point quoted in the EPBD but also in the EU Taxonomy and reporting obligations under the CSRD and SFDR, and which is very comprehensive in scope. According to research, none of the existing national regulation methodologies fully cover the scope of Level(s) yet. For aspects of the methodology that are left flexible or left out, and thus may not be entirely harmonised across the EU, the guiding principle should be **transparency: it must be clear what assumptions and data sources are used and why, so that results can be interpreted correctly.**

Data sources

Product-specific carbon data according to the revised Construction Products Regulation will only start to be gradually available in the form of DoPCs after the EPBD takes effect, leading to **a transition period where generic data will be used**. Given the current inconsistencies in EPD data across countries, generic data may offer a practical interim solution. A clear data hierarchy should be established, prioritising third-party verified, product-specific data, followed by national carbon data, and EU data when national data is unavailable. When adopting foreign EPD data, data origin and assumptions should be thoroughly assessed (e.g. geographical, technological and temporal representativeness, carbon intensity of the energy grid).

Closer integration with Energy Performance Certificate assessment schemes

According to the recast EPBD, the WLC footprint of new construction will have to be disclosed on EPCs. This implies the need to integrate WLC assessments with existing EPC schemes and tools. This integration is even more relevant since much of the data required for EPCs, such as material quantities and surface areas, overlaps with data needed for WLC assessments, creating opportunities for streamlining the process. To meet the growing demand for WLC assessments across all new constructions (and future renovations), improving the links between EPC and WLC tools could significantly reduce the associated burden.

Establishing a positive narrative and leading by example

In the past, the industry has raised concerns about WLC assessments being time-consuming and costly, and their adequacy as a policy tool has been questioned due to varying quality and lack of methodological consistency. However, when done right, early WLC carbon assessments – especially when combined with life-cycle costing – lead to a range of benefits like improved resource efficiency and energy efficiency, reduced upfront capital costs, and lower long-term operational expenses. The points of criticism are all challenges that can be mitigated and solved with a well-designed WLC framework: data and tools will be made more readily available, skills and processes will be developed, and consistency and quality will be guaranteed. This contributes to lowering costs and the administrative burden of the assessments and creates a level playing field where businesses are accountable on the same basis.

A core strategy for Member States to contribute to a positive narrative, create acceptance and build capacity is to lead by example. The EPBD 2024 recast enshrines the principle of public buildings leading the way by adhering to stricter requirements at an earlier point in time, and this should trickle down to Member State implementation.

Now is the ideal time to establish a unified vision and core principles for WLC calculation and reporting across the EU to prevent a future where divergent national approaches become entrenched and difficult to align.

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