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Exposing the invisible : lifecycle policies for climate neutral buildings

Introduction

The European Green Deal brought forward numerous policy initiatives to reduce the climate and environmental impacts of the construction ecosystem[1] and buildings. EU Policymakers aimed to accelerate decarbonisation of buildings by revising the Construction Products Regulation (CPR) and Energy Performance of Buildings Directive (EPBD), which introduce overlapping mandatory climate requirements for product lifecycle carbon emissions and buildings' Whole Life Carbon (WLC), both based on lifecycle Global Warming Potential (GWP) standards.[2].

As of 2021, EU's buildings were estimated to account for 36% of energy-related GHG emissions[3]. Evidence shows that by implementing all available decarbonisation levers, Europe could already deliver at least 75% CO2 reduction by 2050.[4] EU and National policymakers, as well as industry, must now increase their collective ambition in implementing the revised CPR and EPBD to achieve the necessary levels of decarbonisation and align with our 1.5°C Paris Agreement goal. In this context, this briefing outlines the policy framework, it analyses the progress and shortcomings of the recent revisions of both the CPR and the EPBD, and provides key recommendations for advocacy efforts regarding the overall climate policy framework for construction and buildings.

The CPR and EPBD in a nutshell

Today in the EU, 79% of the whole lifecycle carbon emissions of buildings come from their operational phase, or in simpler terms, when buildings are in use. This means that the remaining 21% relates to embodied carbon emissions, which are generated by the manufacturing of materials, transportation, construction, maintenance and their deconstruction.[5] Mainly due to a more ambitious EU policy framework that spurs more energy efficiency and renewable-based technologies in buildings (i.e. EPBD, EED, RED etc.), projections indicate that this could increase embodied carbon emissions up to 66% of building-related emissions by 2050.[6]

These prospects further highlight the importance of a life cycle assessment of technologies and construction products, and the need to reduce their environmental impact to ensure that buildings play a crucial role in achieving Paris-Agreement compatible climate neutrality goals. In this regard, a well-functioning Single Market, which the CPR aims to create, will be key to ensuring that more sustainable products are widely available. However, achieving the needed supply will also rely on strong sustainable building policies, public-sector initiatives like Green Public Procurement (GPP)[7], and industry demand.

Historically, the CPR's main aim has never been to reduce emissions from **construction products alone, in fact the latter needs to be looked at as a part of a broader building-level policy framework.** Its approach has always been focussing on overlooking opportunities to cut emissions through alternative energy or material solutions, while maintaining equivalent functional performance, through product-level policy. More concretely, the CPR implementation process has been empowering national experts, with

[1] Construction Industrial Ecosystem Factsheet. European Commission, 2024.
[2] EN 15804 and EN 15978 detail the calculation methodology for the life cycle environmental impacts of construction products and buildings.
[3] Making our homes and buildings fit for a greener future. European Commission, 2021.
[4] Support study for the development of the roadmap for the reduction of WLC of buildings. Ramboll, BPIE and KU Leuven, 2024.
[5] https://ec.europa.eu/commission/presscorner/detail/en/qanda_24_1966
[6] Ibid.
[7] Nilsson Lewis, A., Kaaret, K., Torres Morales, E., Piirsalu, E., Axelsson, K. (2023). Green Public Procurement: a key to decarbonizing construction and road transport in the EU. Stockholm Environment Institute.

industry support, to decide what information must be included in the legally required *Declaration of Performance* (DoP) for each product category. This is based on *Basic Requirements for Construction Works* (BWR), covering areas like structural integrity, fire safety, energy efficiency, and lifecycle Global Warming Potential (GWP). After the legal and technical work is completed, the DoP and CE marking[8] has helped and continues helping products move freely across borders for construction or renovation use. Although continuing with the same approach, the recently revised CPR (whose revision started in 2022 and ended in 2024) reflects the new EU climate goals and the urgent need to address construction products' environmental impact more consistently, by introducing **more mandatory rules.**

On the other hand, the updated EPBD (whose revision started in 2021 and ended in 2024) provides a clearer direction for EU climate policies for buildings. The newly revised text integrates **mandatory common objectives and specific performance requirements for a better use of energy and reduced carbon emissions of both existing and new constructions**. For the first time ever, the EPBD introduces new requirements related to the calculation of "Global Warming Potential"[9] over new constructions' whole lifespan, which opens up to the accounting of embodied carbon emissions linked to construction material. National policymakers are now charged with transposing a greatly expanded number of requirements and evaluating the level of ambition needed to achieve the energy and climate objectives of the EPBD. Due to national differences, there is likely to be a wide range of outcomes, and consequently, a mixture of signals to the construction sector in terms of how quickly the EU will transition to a 'sustainable construction only' global region[10].

Main changes of the revised CPR and EPBD

CPR	EPBD
• Mandatory requirements for the legal declaration and disclosure of the carbon footprint of a product placed on the EU Single Market. • Various potential requirements on performance values with a lack of clarity on the likelihood of being implemented.	• By 2025, the establishment of a Union Framework for Whole lifecycle carbon (WLC) calculation methods which should guide national regulations and the establishment of Member States' WLC roadmaps. The latter should be ready by 2027, and detail the introduction of limit values on total cumulative life-cycle Global Warming Potential (GWP) of all new buildings and set targets for new buildings from 2030 towards climate neutrality by 2050. • Mandatory disclosure requirements for all new buildings as of 2030[11] of their lifecycle Global Warming Potential (GWP) (which will be communicated via Energy Performance Certificates (EPCs)) • Optional requirement to indicate WLC impact of implemented and planned measures as part of National Building Renovation Plans (NBRPs).

[8] CE marking indicates certification that a product meets relevant requirements under EU Single Market legislation, and does not indicate compliance with any commonly specified levels of safety, health and environmental protection as is often understood.

[9] From 2024 EPBD recast "Global Warming Potential" indicates "the building's overall contribution to emissions that lead to climate change. It brings together greenhouse gas emissions embodied in construction products with direct and indirect emissions from the use stage. A requirement to calculate the life-cycle GWP of new buildings therefore constitutes a first step towards increased consideration of the whole life-cycle performance of buildings and a circular economy".

[10] EU policymakers have already developed a Transition Pathway for the Construction Ecosystem here, but more is needed based on the EU WLC Roadmap study to chart an EU-wide buildings decarbonisation trajectory.

[11] According to the EPBD 2024, all new buildings with floor area larger than 1000 m² will need to adhere to the GWP disclosure earlier than 2030, exactly as of 2028

Interlinking CPR and EPBD: laying the foundations for climate action

While still mainly focusing on energy emissions from building use, the EU policy framework is now paying more attention to embodied carbon in construction products and processes. As we saw above, while the CPR sets requirements for all products used in construction and renovation, the EPBD targets WLC in new buildings and so far excludes standards for existing buildings (their life cycle emissions are ought to be addressed mainly by reducing operational emissions through deep energy renovations targets). To truly begin the regulation of embodied and lifecycle carbon emissions across the EU, the CPR and EPBD revisions have collectively begun by **overhauling legal data and information requirements**. Once implemented, the combined requirements of the two policies will help fill the data deficit and improve consideration of the full climate impacts of the sector by policymakers and industry decision-makers alike.

As part of the legally required DoP, the CPR mandates the disclosure of the lifecycle-GWP or carbon footprint of a product according to existing voluntary Environmental Product Declaration (EPD) and complementary Product Category Rules (PCR) standards. Requiring companies to disclose a product's carbon footprint will provide consistent information to policymakers and the value chain, unlike the current voluntary, market-driven disclosures. However, since many EPDs are not specific to individual products and cover different lifecycle scenarios, **the current flaws in carbon footprint information[12] will also affect legal compliance and policy making**. Moreover, implementing this system for every product placed on the market in Europe is set to take up to twenty years, which is far longer to implement than is necessary or that is seen under other EU regulations. Because climate information was not formally required until the revision, an **update to technical requirements is now needed for each product category before they can be regulated under the revised CPR**, until then, the existing CPR will continue to apply[13]. Meanwhile, some standards under the existing CPR will be revised to improve functioning of the market, without reflecting the updated regulation. Consequently, policymakers have set a deadline for 2045 for a full transition to the new CPR at which point the 2011 CPR will be officially repealed. While the transition process may increase the wider availability of voluntary information in anticipation of legal requirements, there are no guarantees that the necessary foundations and triggers established for climate action in the sector will be delivered soon enough.

Despite this bottleneck, the EPBD aims to accelerate the disclosure of embodied and operational carbon together for building level lifecycle-GWP, also often referred to as Whole Life Carbon (WLC). New WLC requirements[14] will ensure that the complete carbon footprint for all new buildings being constructed can be integrated and analysed within the design and development phases of a construction project as of 2030. These requirements mean that reporting the total climate impacts of construction will become the norm in just over five years. However, given the potential lack of product-specific information under the CPR, policymakers may opt for simplified estimation and reporting procedures in the early stages of the implementation of WLC disclosure requirements. This could lead to deficiencies in the quality of product data used and the resulting accuracy and completeness of WLC reporting.

Notwithstanding the tension between the two policies, there is potential for policymakers to partially remedy this situation. The European Commission is required to adopt a **Delegated Act for a**

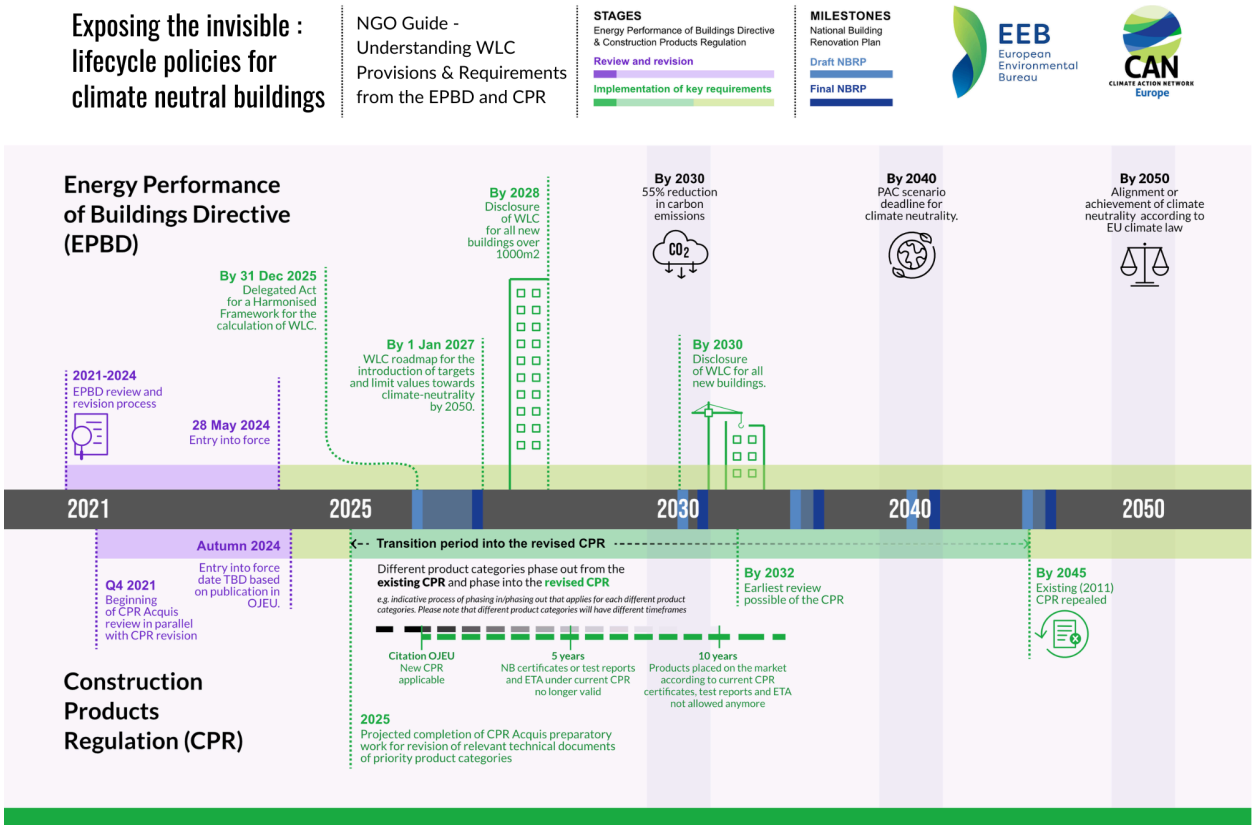
[12] EPD standards and complementary Product Category Rules (PCR) can allow the impact for many stages of the lifecycle to be omitted, except in the Production Stage which is mandatory. For further information, a complete briefing from BPIE on the use of EPDs to underpin life cycle analysis for Whole Life Carbon policies for buildings can be found here.

[13] The lengthy CPR implementation process involving revision of the CPR Acquis (underlying legal obligations of the CPR) followed by technical standardisation work to agree on technical methods for measuring and reporting against legally required parameters, will last 3-5 years for each product category, with up to 20 years allowed for this process to be completed.

[14] Article 7 EPBD 2024 requires the disclosure of GWP via the energy performance certificates of large new buildings over 1000m2 by 2028 and all new buildings by 2030

harmonised Union Framework for the calculation of WLC. **This presents an opportunity to ensure that all national policies send a regulatory signal that a robust and complete set of lifecycle data for embodied and operational emissions is necessary to fully understand and regulate the climate impacts of buildings**. This delegated procedure also offers the opportunity to further detail key steps for the calculation of WLC, possibly inspired by the EU LEVEL(S) guidance[15] which goes into more detail regarding project stages, modelling, key assumptions concerning the service life of building elements, and the reporting structure. Moreover, the Delegated Act could include voluntary guidance on the calculation of WLC for existing buildings following renovation, which is not regulated under the revised EPBD but will contribute a significant amount of carbon emissions.

Infographic - Understanding WLC Provisions & Requirements from the EPBD and CPR



View and download the infographic

Setting a clear pathway to Paris-Agreement-aligned construction

Data and information on the lifecycle carbon emissions of products and buildings are just the beginning, charting a course to full climate neutrality is necessary. In other areas of the EPBD, measures targeting energy performance, renovations, and operational emissions in buildings have aimed to address this. However, they have overlooked embodied carbon and the trade-offs involved in achieving

[15] LEVEL(s) Indicator 1.2 - lifecycle-GWP - User manual: overview, instructions and guidance.

high energy performance on the path to climate neutrality. Data shows that 'advanced' standard buildings will have a far higher share of embodied carbon compared to operational[1617], typically frontloaded in its construction due to the high impact of structural materials like steel, cement, and ceramics (incl. bricks) among others.

So, **have policymakers been successful in introducing measures that build on our understanding to demand action in the sector? The answer is not straight forward**. Key mechanisms include aspirational targets for goals and incentives, plus limit-values to enforce market performance and penalise non-compliance. More specifically:

Under the CPR	Under the EPBD
Policymakers would argue that there are various means by which technical specifications or even Delegated Acts could be introduced to accelerate implementation and to specify additional performance-related requirements on carbon emissions and circularity[18]. Although, the probability and viability of this happening for all high-impact construction products soon is highly unlikely. This stems from the dogmatic belief that the climate impacts of construction products cannot be directly regulated. The latter, combined with the time needed for the implementation of the revised CPR, and the time for policymakers to sufficiently evaluate foreseen failings, stretch far beyond any deadline to achieve climate neutrality. Also the CPR sets no clear immediate intention to establish product-level performance requirements that limit the impacts of construction products. The onus has been placed fully on building-level policies to establish a Paris Agreement-compatible decarbonisation pathway for new construction	The EPBD does provide some solace, but it is far from a WLC roadmap for the decarbonisation of all EU buildings. It establishes requirements for Member States (MS) to deliver a roadmap by 2027 detailing the introduction of targets and limit values until our 2050 climate horizon. The roadmap outlines a basic framework for setting targets based on climate objectives, but leaves it up to MS to determine the trajectory and introduction of targets and limit values. Frontrunners like France and Denmark have already set such targets, but with varying levels of detail across building types. These differences extend to when values become mandatory and the ambition of targets, depending on each country's Paris Agreement alignment plans.[19] WLC frontrunner countries have taken a long time to reach this stage, and their outcomes show potential regulatory differences. While the Delegated Act may reduce divergence and help MS develop national policies, the two-year transposition period and three-year deadline for WLC reduction roadmaps raise concerns about the quality and ambition of future plans.

Without the intervention of EU policymakers or civil society, numerous Member States are not likely to recognise the full potential for a lifecycle perspective on building decarbonisation and therefore to prioritise capacity in delivering the roadmap. However, policymakers have left clues in the EPBD for national policymakers to follow in order to better consider and understand WLC. For instance, as part of the template for National Building Renovation Plans (NBRPs), there are optional indicators for WLC to be included as part of the overview of the building stock and regarding planned

[16] Röck, M., Saade, M.R.M., Balouktsi, M., Rasmussen, F.N., Birgisdottir, H., Frischknecht, R., Habert, G., Lützkendorf, T. and Passer, A., 2020. Embodied GHG emissions of buildings–The hidden challenge for effective climate change mitigation. Applied energy, 258, p.114107.

[17] With estimates stating two-thirds of a building's carbon emissions will be embodied in products and processes as stated in Support study for the development of the roadmap for the reduction of WLC of buildings (Available here).

[18] Possible CPR circularity requirements include durability, repairability, recyclability, and ease of remanufacturing, but are reliant upon industry demand or legal requirements.

[19] WLC models for the EU27 to bring down embodied carbon emissions from new buildings: Review of existing national legislative measures. Ramboll, 2022. Available here.

policies. If adopted, this would highlight the full impacts of new and existing buildings, and the benefits of adopting a holistic life cycle perspective to decarbonisation efforts[20].

As we move into a new era of sustainability, policymakers must urgently **adopt a lifecycle approach and require construction products to reduce their impact.** With all new buildings expected to be zero-emission as of 2030, energy-efficient strategies will demand higher resource investment. Sustainable construction products are essential to support decarbonisation and maximise climate benefits. Additionally, **with some voices in the EU calling for mass home building and renovation, addressing WLC is crucial to prevent a carbon spike in the early 2030s from zero-emission buildings and the Renovation Wave**.

To fully realise the sector's decarbonisation potential, a long-term lifecycle view is needed, focusing on transitioning to a **predominantly retrofit and renovation-based approach**.[21] This shift must ensure high energy efficiency, low emissions, while also almost completely mitigating the WLC emissions of any necessary new construction. **Ultimately, renovation and retrofit efforts must also align with climate neutrality, but this goal will be missed if the embodied impacts of building materials are ignored.**

Conclusions and recommendations

The positive news is that the revised CPR and EPBD policy framework will deliver a more sustainable construction sector and less carbon-intensive buildings. The extent of their impact will now be contingent on the choices to be made by national policymakers, market actors and experts. The latter are the ultimate decision makers when it comes to whether or not to go above and beyond the baseline established by the two policies. Maximising the ambition and impact of national policymakers will require the support of civil society, but also from frontrunners supplying sustainable construction products, and those focusing on more climate-friendly investment and development in construction and renovations projects from the side of the implementers[22]. Further pressure is needed to ensure all the above-mentioned groups maximise the potential of data, information, and regulatory levers to drive change and rapid decarbonisation compatible with our Paris Agreement goals. To this end, there are five key recommended actions for NGOs to take to maximise the impact of the current policy framework:

- Put pressure on policymakers to align the ambition of overarching WLC requirements with a truly Paris-Agreement Compatible scenario and by minimising exemptions and delays in implementation.
- Make the case and push for a 'renovation first' approach to decarbonisation of the building stock based on evaluation and assessment of the WLC performance and associated climate and socio-economic benefits of renovation over construction.
- Call on national building policymakers to introduce building-level requirements on circularity and other environmental performance indicators to ensure that the CPR implementation integrates more ambitious legal requirements for product-level information against relevant indicators.
- Campaign for the introduction of ambitious incentives to reward new public and private constructions and renovations that are highly sustainable and set the standard for Paris-aligned lifecycle carbon activities.

[20] This could aid efforts to consider the climate impacts of buildings holistically longer-term as NBRP become increasingly aligned with National Energy and Climate Plans (NECP) due to EPBD requirements on Member States to ensure this takes place.
[21] EEA - Building renovation: where circular economy and climate meet (2022).
[22] Implementers are those practically involved in the sector such as those financing, designing, and developing construction and renovation projects.

- Engage with national construction product policymakers and experts assigned to the CPR process to create the connection between ambitious national policies in EU countries and elsewhere, which will need to be reflected in technical requirements under the CPR.

Glossary

Acquis	Legal term referring to the collection of common rights and obligations that constitute the body of EU law. In the case of the CPR, it represents harmonised standards, European assessment documents, and legal acts of the European Commission.
BWR	Basic Requirements for Construction Works
CE	“Conformité Européenne" in french meaning "European conformity"
CPR	Construction Product Regulation
DoP	Declaration of Performance
EED	Energy Efficiency Directive
EPBD	Energy Performance of Buildings Directive
EPD	Environmental Product Declaration
ETA	European technical assessment
GHG	Greenhouse Gases
GWP	Global Warming Potential
NB certificates	Notified Bodies certificates
NBRP	National Building Renovation Plan
NECP	National Energy and Climate Plans
OJEU	Official Journal of the European Union
PAC	Paris Agreement Compatible
PCR	Product Category Rules
RED	Renewable Energy Directive
WLC	Whole Life Carbon