

EEB Position Paper on the Energy Performance of Buildings Directive 2010/31/EU proposal

The European Environmental Bureau (EEB) welcomes that reducing greenhouse gas emissions from buildings is part of the performance of buildings in the European Commission's proposal for the Energy Performance of Buildings Directive (EPBD). The building stock's impact on achieving a climate-neutral Europe by 2050 is crucial, and a clear roadmap should be defined toward its decarbonisation. However, the current proposal fails to this end as it does not establish a blueprint to reduce both 50% direct CO₂ emissions and 60% indirect power generation emissions generated by buildings by 2030¹, to achieve a reduction of net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels² and other intermediary milestones aligned with the Paris agreement. Moreover, the performance of buildings should include an effective reduction in both embodied and operational emissions. Still, the current proposal focuses on the operational phase of buildings and only sets targets for Whole Life Carbon (WLC) reporting. In order to halve buildings emissions by 2030, embodied carbon, which mainly comes from the material used in new construction and energy renovation processes, must be reduced by at least 40%³.

The EPBD is the main EU policy that could address the reduction of GHG emissions at the building level. Hence, the EPBD revision should integrate a WLC approach that could effectively decarbonise the building stock and, for this purpose, the EEB calls for EU institutions and Member States to:

- Establish a **regulatory framework** such as the revision of the Zero Emissions Buildings definition, buildings requirements and a timeline to guarantee that the **1.5 degrees are not exceeded**, including a low carbon implementation of the **Renovation Wave** via 'headline' targets across the lifecycle of buildings.
- Establish an **ambitious Whole Life Carbon (Lifecycle Global Warming Potential) roadmap**, requirements for setting targets, benchmarks, and limits to reduce embodied and operational emissions by 2030. **Reporting on WLC** should be mandatory for all new public and large non-residential buildings and major renovations by 2024 and for all buildings by 2027. **Setting benchmarks and limits on WLC** should be established by 2026, ensuring its implementation by 2028.
- Include a dedicated article for instruments and **strategies that contribute to reducing Whole Life Carbon emissions**, such as circularity, sufficiency and the use of low carbon and natural-based materials. The **circular economy and sufficiency approaches** should be integrated within the EPBD, setting targets and establishing requirements for their implementation by 2025.
- Ensure the decarbonisation of the operational phase of buildings, including a deadline to **phase out fossil fuels from heating and cooling** systems across the EU by 2025.

¹ UN Environment Programme. 2021 [Global Status Report for Buildings and Construction](#)

² European Green Deal: [Commission proposes transformation of EU economy and society to meet climate ambitions](#).

³ UN Environment Programme. 2021 [Global Status Report for Buildings and Construction](#)

Policy Roadmap

The EPBD revision should create clear synergies and a coordinated blueprint with other policies under revision and initiatives on which it has a crucial impact. The current proposal should consider the following policy framework:

- Align the WLC timeline with the **WLC roadmap** to be developed by the European Commission⁴ and expected to be ready by 2023. This roadmap will include a comprehensive vision of the EU embodied and operational emissions.
- Ensure the promotion of secondary materials and the provision of embodied emissions reporting on construction materials from the **Construction Product Regulation** to guarantee a proper WLC measurement of buildings.
- Promote circularity as part of the **Taxonomy** criteria for buildings and the **Circular Economy Action Plan** objective to double the current use of secondary materials by 2030⁵.

Timeline for Whole Life Carbon and Circularity.

Article 25 postpones the next revision of the EPBD to the end of 2027. That means that anything not included now to enhance the decarbonisation of buildings will be a 10-year delay in implementation. Therefore, the Commission's timeline for the WLC proposed does not guarantee a 55% reduction by 2030, nor an ambitious trajectory for EU buildings decarbonisation by 2050. Furthermore, the current EPBD proposal does not reflect the EPBD recast Impact Assessment requirements for WLC, failing to establish an effective timeline to address GHG emissions generated over the whole lifecycle of buildings⁶.

The EPBD should mandate a clear signal and a defined framework to ensure the decarbonisation of the building stock. This process requires a long-term plan that starts with short-term targets that are gradually reviewed on a continuous updating of data and a progressive increase of national and European requirements, allowing for revising WLC benchmarks, thresholds, and WLC limits for building typologies. In light of this, a clear roadmap and timeline should be defined for the WLC, including circularity and sufficiency measures as the main strategies to reduce embodied emissions:

- **2024 - WLC reporting:** Mandatory WLC measurement and reporting for all new public and large non-residential buildings and major renovations by 2024 and for all buildings by 2027.
- **2025 - Short-term European-level WLC targets:** Set short-term European-level targets for new buildings and all buildings and all major renovations by 2025. In addition to the data provided from the CPR and the DG ENVI WLC roadmap, a period of time to compile more WLC data through the EPBD will ensure proper measurement and assessment of the

⁴ BPIE. [Developing an EU-wide Whole-Life Carbon Roadmap for buildings](#)

⁵ European Commission. [Circular Economy Action Plan](#).

⁶ European Commission. [EPBD Inception Impact Assessment](#).

embodied emissions to set targets for the reduction of WLC emissions at the European level by 2025⁷.

- **2025 - Circular and sufficiency targets:** Set targets for the implementation of circular and sufficiency measures and minimum requirements for the use of secondary materials in both new buildings and renovations. Circularity is one of the most effective tools to reduce embodied emissions in buildings. They can be implemented without the need to establish benchmarks on WLC. Based on the current data of available secondary materials in the market⁸ and the background and European experiences on Circular Economy⁹, the EPBD should establish requirements for the Member States to set specific national targets for 2030 of at least 15% for reused & recycled contents in buildings by 2025 based upon current average levels in the construction sector. The EU recommendation should be delivered by 2024 at least, and be founded upon commitments to double the circular material use rate by 2030 under the CEAP¹⁰.
- **2025 - Fossil fuel heating and cooling (H&C) systems** are banned from the market for new constructions and renovations.
- **2026 - National WLC targets:** Members States set targets and establish thresholds and minimum requirements for different climatic zones and building typologies by 2026, ensuring its implementation by 2028 at the latest. Members States should set targets and establish thresholds and minimum requirements based on the European targets and the 1.5-degree compliant EU WLC roadmap scenario to decarbonise the built environment.
- **2030 - European targets and WLC limit values** (per sq metre) for different climatic zones and building typologies, implementing WLC requirements based on the Level(s) framework¹¹ and EN 15978-1. The EPBD includes European thresholds and direct limits on operational and embodied emissions to decarbonise the building stock, combining and improving the European and Member States' roadmap on carbon emissions for different climatic zones and building typologies.

National Building Renovations Plans

National Buildings Renovation Plans defined in **article 3** should support this process through the following points:

- Adjusting the implementation of the Renovation Wave with the deadline to submit the NBRPs. The current proposal to submit a draft of NBRPs by June 30 2024, and Final Plans by June 30, 2025 does not fit with the implementation of the Renovation Wave.

⁷ BPIE. [Roadmap to Climate-Proof Buildings and Construction. How to Embed Whole-Life Carbon in the EPBD.](#)

⁸ Eurostart.2020 [Circular material use rate by material type.](#)

⁹ Such as BAMB project <https://www.bamb2020.eu/> , CityLoops <https://cityloops.eu/>

¹⁰ European Commission. [Circular Economy Action Plan.](#)

¹¹ European Commission. [Level\(s\)](#)

- Setting targets for the implementation of circular measures and minimum requirements for the use of secondary materials in both new buildings and renovations by 2025, 2030 and 2040, including design for dismantling and reversibility of buildings and sufficiency measures.
- Including embodied and operational GHG emissions thresholds in the definition of Nearly Zero Energy Building
- Establishing requirements for phasing out fossil fuels from H&C systems and introducing renewables energy-based buildings systems.
- Revising NBRPs under the EU WLC roadmap and the National Energy and Climate targets. Linking the proposed local decarbonisation of H&C plans in EED and overall assessment of Heating & Cooling decarbonisation potentials in the NECPs
- Include indicators that ensure that article 22 of the EED recast is fulfilled, establishing concrete objectives for an amount of vulnerable households' homes renovations per year

Decarbonisation of the European building stock

Lifecycle thinking review: Whole Life Carbon of buildings

The current European Commission proposal should be revised to include a WLC approach effectively through the document, integrating the points mentioned above on targets and requirements. The main points to consider are the following ones:

Article 2 Definitions Include clear definitions to ensure the integration of the WLC in the directive: “Zero Emissions Buildings” should be modified to Zero Operational Emissions Buildings and a clear definition framework to include embodied emissions should be created, please see the EEB proposal in the *Definitions* chapter; the ‘digital building logbook” term should include a reference to the WLC data of the buildings; the “cost-optimal level” should include the cost of greenhouse gas allowances through the chain of the building, not just in the maintenance and operating costs; the “renovation passport” should define the improvement measures on energy efficiency and decarbonise buildings, including potential circular measures; “deep renovations’ should be defined as buildings that reach a high level of energy efficiency (class A) or reduce 60% of their primary energy demand; “staged deep renovations” should have a maximum of 3-4 steps to renovate collective residential buildings. See the comments made in the Definition Chapter.

Include overlooked definitions such as embodied emissions and one-step deep renovations.

Article 3 NBRP See the aforementioned comments (Timeline for Whole Life Carbon and Circularity chapter) made on NBRP

Article 7 New Buildings Include the timeline mentioned in previous points for assessing WLC and establishing thresholds and minimum requirements by 2025¹², to be implemented by 2028 at the latest in order to achieve a decarbonised built environment by 2050. Moreover, all new

¹² BPIE. [Roadmap to Climate-Proof Buildings and Construction. How to Embed Whole-Life Carbon in the EPBD.](#)

buildings should report life-cycle GWP as the requirement to report only those with a useful floor area of more than 2,000 square metres by 2027 is too late and does not cover a wider range of buildings.

Article 9 Establish energy-use caps to accompany MEPS implementation.
MEPS

Article 10 Include a WLC approach and measures to reduce GHG emissions in both operational and non-operational stages.
BRP

Article 16 Include a mandatory requirement to report on the WLC of buildings which is only optional in this revision
EPC

Annex I Include additional numeric indicators of greenhouse gas embodied emissions (production and/or construction of buildings) in the aspects to consider to assess the energy performance of buildings and the obligation to provide information on embodied emissions related to the use of construction products and materials.

Annex II See the aforementioned comments (Timeline for Whole Life Carbon and Circularity chapter) made on NBRP

Annex III **ZEB definition:** should be revised as presented in the Definition chapter below.

WLC benchmarks: Annex III should include guiding principles for carbon accounting and management, guidance to harmonise as much as possible the measurement of WLC across the EU and WLC benchmarks and limits for each building typology and different climatic zones.

Include WLC metrics to define potential thresholds on WLC within a harmonised framework across the EU. This should be based on the Level(s) framework and EN 15978 to reduce divergence on WLC measurement across the EU.

Detailed requirements should be included, mainly on the scope of the assessment, background data and reference study period. Ensuring high quality and comparable data is essential to establishing WLC benchmarks and limits across the EU.

The possibility to use national methods should be removed. Recent IEC EBC Annex 72 research on Comparison of the greenhouse gas emissions of a high-rise residential building assessed with different national LCA approaches shows that results can vary by country, ranging between 10 and 71 kg CO₂ -eq per m² per year depending on the use of different LCA background data, the scope of the assessment and the reference time of the study. Nonetheless, national contexts need to be taken into account for quicker implementation of measures.

Annex III should also include data regarding embodied emissions on construction products to ensure a proper WLC assessment from the CPR revision.

Annex V EPCs should report on both embodied and operational CO₂ emissions figures. Suppose there is no available data at the national level; in that case, the MS can use data from other European countries to establish approximate calculations that will be corrected over time.
EPCs

The two overlooked decarbonisation strategies: Circular Economy and Sufficiency

Circularity and sufficiency strategies should also be part of this revision, creating a clear framework for their effective implementation. The following points should be considered to be revised in the current EPBD revision:

Article 2 Definitions	Include definitions of circularity and sufficiency in buildings.
Article 3 NBRP	See the aforementioned comments (Timeline for Whole Life Carbon and Circularity chapter) made on NBRP
Article 7 New Buildings	Set targets for minimum circular requirements on new buildings. Promote sufficiency measures in new buildings such as shared appliances and spaces
Article 10 BRP	Define potential measures on circularity for renovations to achieve minimum circular requirements, mainly on the use of reused and recycled materials.
Article 19 Data Base	Include data on secondary materials and other circular measures mobilised in both new buildings and renovations
Article 15 Financial incentives	Add financial incentives or measures to boost/implement circularity in order to overcome current market barriers. Add financial incentives or measures to support the behaviour change that could reduce energy consumption.
Article 16 EPC	Include recommendations to reduce the total GHG emissions of the building through circularity measures
Annex I	Expand the circular approach beyond secondary materials, including other aspects such as design for dismantling and reversibility of the buildings
Annex II	See the aforementioned comments (Timeline for Whole Life Carbon and Circularity chapter) made on NBRP
Annex V EPCs	Include circular requirements to be met, which will be defined in a new dedicated article on strategies for reducing Whole Life Carbon Add the measurement of impacts per occupant/user (utility) to look at building impacts, also cited in Level(s). Propose strategies and indicators to reduce the energy consumption per capita in the building.

Dedicated article for strategies to decarbonise the EU building stock

A dedicated article on strategies for reducing Whole Life Carbon, measured according to the requirement from Article 7 and Annex III, should also be included. This article shall compile the following points:

Circularity and Sufficiency

Circularity and sufficiency measures have been overlooked in the current proposal and should be included in the EPBD since they efficiently reduce operational and embodied emissions of buildings. Complementing the introduction of a circular/sufficiency approach across the EPBD proposal, this new article should include minimum requirements on WLC calculations, set targets and promote circular and sufficiency measures. The lack of sufficiency and increased population have offset the gains obtained through energy efficiency measures to reduce the total CO₂ emissions, as we can see in the following infographic:

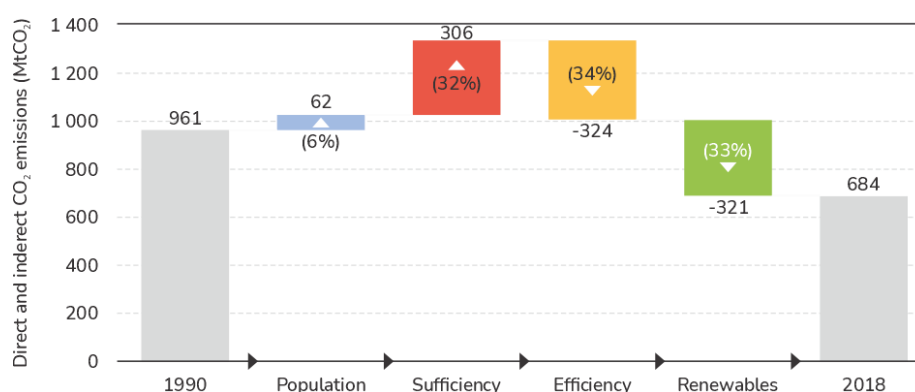


Figure 1. Sufficiency and circularity: the two overlooked decarbonisation strategies in the 'Fit For 55' Package. Author: Yamina Saheb. Edition: the European Environmental Bureau

Sufficiency policies are a set of measures and daily practices that avoid the demand for energy, materials, land, water, and other natural resources over the lifecycle of buildings and goods, while striving for delivering wellbeing for all within planetary boundaries. Circularity applies some of the sufficiency principles at the product and construction materials levels, aiming at reducing the need and extraction of virgin materials by reducing demand for new materials, by reusing, repurposing, and recycling used materials and by extending the lifetime of products.¹³

Sufficiency, reducing the need for generating new embodied emissions

Sufficiency measures should be part of this new article, supporting the reduction of the need of consumption of materials and appliances such as prioritising renovations rather than new buildings, reusing and redesigning empty buildings, increasing space and equipment sharing in buildings to reduce the number of unused buildings, stabilising the average size of new dwellings per inhabitant, promoting multi-family houses instead of detached houses and implementing measures that stabilise the average m² per inhabitant of households across the EU.

¹³ Yamina Saheb, OpenExp. The European Environmental Bureau. [Sufficiency and circularity: the two overlooked decarbonisation strategies in the 'Fit For 55' Package](#)

Circularity, boosting resource efficiency to reduce embodied emissions

Circularity measures should be part of the EPBD, supporting the reuse and recycling of materials and the reduction of waste generated by the construction process. Circularity is a cross-cutting approach that impacts the whole lifecycle of the buildings with potential actions such as designing for dismantling and reversible buildings, promoting the use of reused and recycled materials and the cycling of materials from the dismantling process in renovations enhanced through pre-demolition audits. For that purpose, setting targets for the use of secondary materials and establishing minimum circular requirements in new buildings and renovations should be included in this article.

Secondary materials: the EPBD should establish requirements for the Member States to set specific national targets for 2030 of at least 15%¹⁴ for the use of circular materials in buildings by 2025 based upon current average levels in the construction sector. The EU recommendation should be delivered by 2024 at the latest, and be founded upon commitments to double the circular material use rate by 2030 under the Circular Economy Action Plan ¹⁵.

Low carbon and natural-based materials

Low carbon and natural-based materials should be supported in renovations and new buildings through the EPBD. Low carbon and natural-based materials have no priority in the market since the current requirements are thought for raw materials, and there are no minimum environmental requirements established in the current Construction Product Regulation. The EPBD could set minimum use of low carbon and natural-based materials, such as wood, in new buildings and renovations, avoiding the use of the most polluters such as cement, virgin steel and concrete. For instance, the financial support program for building renovation in Portugal funds thermal insulation with both natural-based materials¹⁶, of which 70% of its mass is made of materials of natural origin, and recycled materials, which more than 50% of its mass is made of recycled materials with information on their origin. These materials should also have a certificate based on ISO 14024 or ISO 14025.

Minimum Energy Performance Standards

The incorporation of Minimum Energy Performance Standards in the EPBD is welcome to increase the energy efficiency of buildings. However, the lack of definition in setting future requirements can cause serious problems in the process. Therefore, some issues on MEPS should be revised:

- The current requirements to reach at least class F for all buildings by 2030 will not ensure achieving the reduction of 55% of GHG emissions.
- MEPS will be reached through deep renovations, which should be defined as buildings that reach class A or reduce 60% of their primary energy demand. This could be done in one-step deep renovations or in stage deep renovations, which should be no more than two or three steps (see proposed definition of Staged Deep Renovations). Therefore, MEPS should be

¹⁴ 1) Eurostart.2020 [Circular material use rate by material type](#).

2) European Environment Agency. [The European environment — state and outlook 2020](#).

¹⁵ European Commission - [Circular Economy Action Plan](#)

¹⁶ Republica Portuguesa. [Ambiente e Acao Climatica. Edificios + sustentaveis](#). Programa 2021, fevrereiro 2022.

established considering a maximum of two or three steps to achieve the highest possible energy efficiency level through deep renovations.

- The implementation of these MEPS must take into account two factors. On the one hand, several technical and economic strategies should be put in place to ensure that households are not locked into a poverty loop as they cannot reach the required minimum. On the other hand, it will also be necessary to establish energy use limits accompanying the MEPS to ensure that the renewable energy system can cover the demand sustainably and cleanly.

Phase-out fossil fuels: Heating and Cooling systems

Decarbonising Heating and Cooling systems is crucial to ensure the decarbonisation of the building stock, and the EPBD should pave the way for the phase-out of fossil fuels used in H&C systems. **Article 09**, Financial incentives and market barriers, includes that fossil fuels cannot be funded by January 01 of 2027, which is too late to achieve the reduction of 55% emissions by 2030. The EEB advocates not financing fossil fuel systems with public money or being part of the Renovation Wave. MEPS and deep renovations should by default prohibit fossil fuel systems. Those **should be banned from the market for new constructions and renovations by 2025** as recommended by IEA¹⁷. Furthermore, the JRC report, EU Challenges of Reducing Fossil fuel Use in Buildings,¹⁸ claims that fossil fuel systems should be phased out from the market by 2024 if the EU wants to achieve the environmental objective of reducing 55% emissions by 2030. A wide replacement of fossil fuel heating systems for heat pumps¹⁹ should be the strategy to achieve this target, and the EPBD should define a mandatory replacement rate for heating and cooling systems for the Member States.

The EEB welcomes the provision on the building automation and control systems included in **article 14**, but we stress the need to integrate such systems with the grid to allow for smart demand management. This is a much-needed feature to employ heat pumps as peak savers and deliver further savings on bills for consumers.

Sustainable mobility

Requirements for recharging points are significantly strengthened in **article 12**, but it aims at installing e-charging points in all parking spaces. Sustainable mobility should reduce the use of private cars and promote other more environmental transport systems such as green public transport, cycling and walking. Assuming that everyone who has a car will change it for an electric car does not reflect a real shift towards sustainable mobility. Therefore, the EEB calls for changing the e-charging point by demand.

When it comes to parking spaces, the EEB welcomes the inclusion of minimum bicycle parking spaces for every car parking space. However, this rate should be increased to promote active travel and reduce the use of private cars. For instance, the proposed requirements for new buildings and renovations prioritise car parking spaces which do not reflect the utmost sustainable mobility. Bikes parking spaces should be prioritised and not considered secondary versus car parking spaces.

¹⁷ IEA. Net Zero by 2050. [A Roadmap for the Global Energy Sector](#).

¹⁸ JRC. [EU Challenges of Reducing Fossil fuel Use in Buildings](#)

¹⁹ CoolProducts. [Heat pumps perform successfully across Europe – New consumer analysis](#).

Definitions

Zero Emissions Buildings, thinking of a real blueprint for a decarbonised building stock

The current definition framework to define a decarbonised built environment in **article 2** does not include the embodied emissions, focusing solely on energy use in the operational phase, and 'in the lab' performance only. Even, the Nearly Zero Energy Buildings term just focuses on energy efficiency, not measured performance, and is still a vague definition that the Member States can define within their National Renovation Action plans, allowing for different energy consumption limits in each country.

The definitions included in the European Commission's EPBD revision proposal do not drive the decarbonisation of the built environment, nor do they ensure the implementation of the Renovation Wave as the trigger for this process. This is the main reason why those definitions should be revised. Achieving a fully decarbonised building stock by 2050 is very challenging as also encompassing embodied emissions in the measurement of the Whole Life Carbon (WLC), it is necessary to go towards a 'positive energy' or 'negative emissions' new building stock to offset and progressively replace the current 'negative energy' or 'positive emissions' building stock. A "positive energy building" is defined as a building that *the annual renewable energy production in the building site exceeds the energy demand of the building*²⁰. Based on this perspective and the European Commission's proposal, the EEB proposes the following definition framework that could pave the way for a decarbonised building stock. The EEB wants to open this discussion; therefore, frame titles can be changed, and new elements can be added to ensure a blueprint for the decarbonisation of buildings.

From Zero Emission Buildings to Zero Operational Emissions Buildings (ZOEB)

Article 2, of the EPBD proposal includes the definition of Zero Emissions Buildings, which only considers the energy consumption and energy emissions of the building in the operational phase. Although this definition is on the right track, as it stands, it does not include embodied emissions and therefore sends the message that the emissions of buildings can stay blind to the carbon impact of construction materials. Therefore, the current proposal is to be changed to be more precise and be named Zero Operational Emissions Buildings, maintaining the current table defined in Annex III. In order to achieve an effectively Zero Operational Emissions Buildings, the following changes should be included in the definition:

Validation of performance and support for voluntary behaviour change

Measured performance should be targeted from the outset and reconciled with in-use performance that ensures that renewable energy could cover the energy consumption of the building, phasing out of fossil fuels systems. Moreover, measures that support a voluntary behavioural change in the use of buildings should be included as part of the strategy to achieve a ZOEB.

²⁰ Mia Ala-Juusela *, Hassam ur Rehman, Mari Hukkalainen and Francesco Reda Positive Energy, 2021, *Building Definition with the Framework, Elements and Challenges of the Concept*.

Decarbonised district heating & cooling systems

The current definition of Zero Emission Buildings contemplates 'renewable district heating' as a possible H&C source (EPBD (recast) ANNEX III), which according to the EED recast, will not be fully GHG emissions-free until 2050 (EED (recast) Article 24 (1)). Therefore, the definition of 'renewable district heating' should be modified to ensure zero GHG emissions from the source.

Conditions for renewables generated off-site

The use of renewables generated off-site could be considered when the supply of renewable energy meets the criteria under Article 4 on Rules for counting electricity taken from the grid as fully renewable using requirements for a direct line or connection to be present, combined with the additionality principle²¹, following these criteria:

- Renewables used is for an amount that is at least equivalent to the amount of electricity that is claimed as fully renewable;
- Additional capacity is added to the grid as a direct result of the building using renewables. To qualify, this capacity shall be considered to have come into operation at the same time as the use of the fully renewable electricity consumed by the building;
- Under the purchase power agreement associated with the building, the installation generating renewable electricity is in the same bidding zone as the building itself and is connected via a direct line²² as defined in point (41) of Article 2 of Directive (2019/944).

Low Lifecycle Emissions Buildings (LLEB): including embodied emissions in the framework (new definition)

A low lifecycle emissions building (LLEB) is a new or renovated building that has reached a low level of total GHG emissions, including embodied emissions. On top of national thresholds, European thresholds for this low level of residual emissions should be defined as it was defined for energy efficiency in Annex III. These thresholds should be based on the European climate targets for achieving long-term climate neutrality and the goal of minimising depletion of the carbon budget. Low lifecycle emissions buildings should be promoted by carbon-efficient new constructions and deep renovations, ensuring the use of very-low carbon and secondary materials, among other strategies. Member States may set individual limit values which can not exceed the maximum WLC determined by the Commission.

“Low Lifecycle Emissions Buildings” for new buildings

WLC thresholds shall be introduced in a new Annex III B and decrease progressively to achieve the environmental objectives by 2030 and 2050. These thresholds should also consider climate zones and building categories, as presented in the following table:

²¹ Michael Gillenwater, *What is Additionality? Part 1: A long standing problem* https://ghginstitute.org/wp-content/uploads/2015/04/AdditionalityPaper_Part-1ver3FINAL.pdf

²² 'direct line' means either an electricity line linking an isolated generation site with an isolated customer or an electricity line linking a producer and an electricity supply undertaking to supply their own premises, subsidiaries and customers directly

EU climatic zone	Year	Residential	Office	Other non-residential buildings
Mediterranean	(2025)	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	(2030)	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
Oceanic	(2025)	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	(2030)	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
Continental	(2025)	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	(2030)	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
Nordic	(2025)	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	(2030)	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr

“Low lifecycle emissions buildings” for renovations

In order to evaluate renovations, operational carbon emissions following the renovation and embodied carbon in the materials mobilised for the renovation should be added to the total amount of CO₂ emissions generated by buildings across their lifecycle, ensuring the maximum decrease of carbon emissions over the lifecycle of the building. A renovation is considered a low lifecycle emissions building if the embodied emissions generated by the materials supplied does not exceed the WLC thresholds that shall be introduced in a new Annex III B defining the limit of new embodied emissions that a renovation can generate in the process to improve its energy performance. As it is considered that more materials are needed for the worst-performing buildings, the lower energy performance the building has, the higher the threshold should be to contribute to achieving the highest level of energy efficiency. These thresholds should consider climate zones, building categories and the energy improvement of the building, as presented in the following table:

EU climatic zone	Energy performance improvement*	Residential	Office	Other non-residential buildings
Mediterranean	B to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	C to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	D to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	E to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	F to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	G to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
Oceanic	B to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	C to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	D to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	E to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	F to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	G to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
Continental	B to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	C to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	D to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	E to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	F to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	G to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr

Nordic	B to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	C to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	D to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	E to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	F to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr
	G to A	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr	X kgCO _{2e} /m ² /yr

***Note:** some buildings would not be able to achieve level A on energy efficiency due to their material conditions. In order to reward low-carbon emissions renovations of these buildings up to the maximum level that they can achieve, further thresholds for achieving lower A-levels should be included in this table, at least for the worst-performing buildings.

In order to ensure the coherence of the process toward the decarbonisation of the building stock, **all buildings must be Zero Operation Emissions Buildings (ZOEb) and Low Lifecycle Emissions Buildings**".

Zero Emissions Buildings*(ZEB): compensating the residual embodied emissions producing renewable energy to the grid (new definition)

In order to compensate for the residual embodied emissions generated from construction materials to those generated in the operation phase, the new definition of Zero Emissions Building should be part of the definition framework. Handling new constructions or renovating without generating GHG emissions in the manufacturing or transporting phase of related materials is extremely challenging (if not impossible). For this reason, a new or renovated building could be considered a Zero Emissions Building when they self-produce more energy than consumed on-site, thus compensating for the emissions generated during the manufacturing process and transport of materials supplied.

A Zero Emissions Building (ZEB) is a building that is Zero Operational Emissions Building, a Low Lifecycle Emissions Building and also could generate an excess of energy compared to what they will use during their use stage operations. This excessive energy substitutes energy that does not need to be produced thus saving on related emissions and compensating the embodied (grey) emissions linked to the manufacturing and handling of used materials. Therefore, ZEBs are positive energy buildings that contribute more energy to the grid. The following image sum up the condition to be considered a Zero Emissions Building:

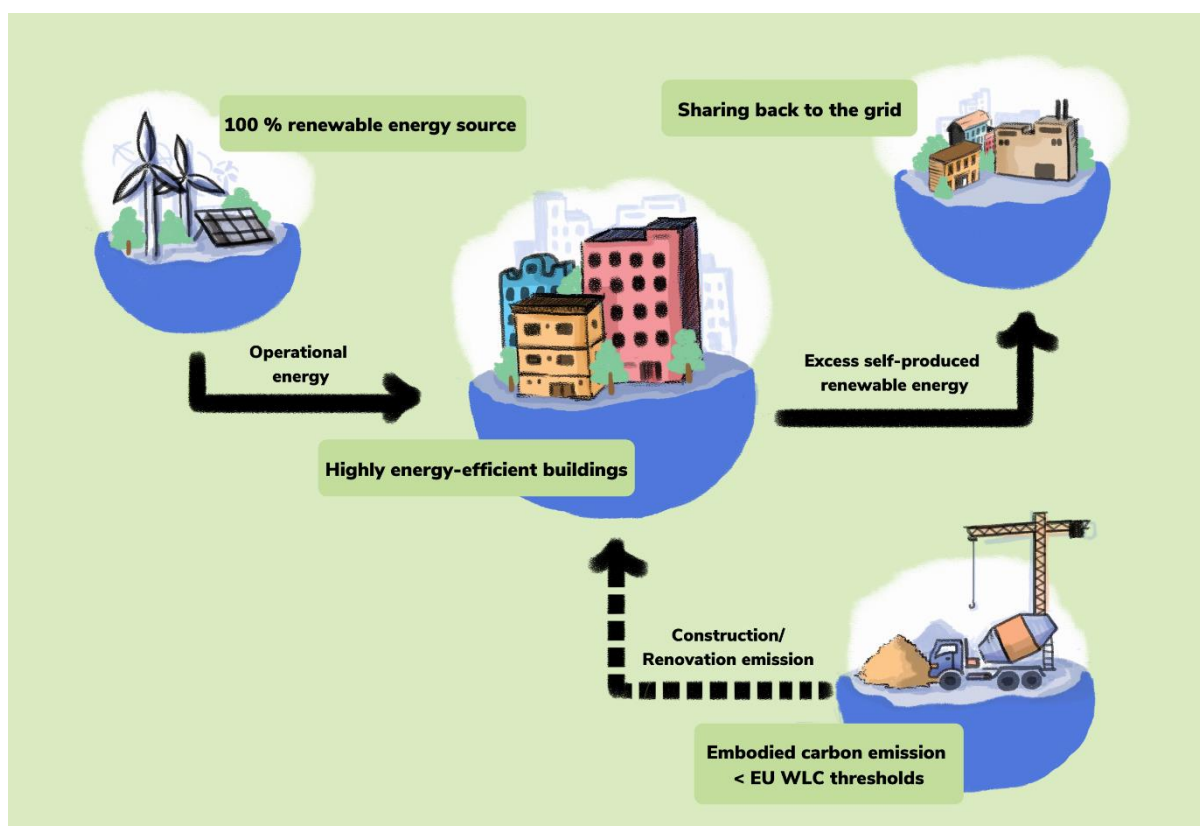


Figure 1: Conditions that determine a “Zero Emission Building”

“Zero Emissions Buildings” for new buildings, ZEB

A new building can be considered ZEB if they are ZOEB, LLEB and energy-positive building. They have to compensate for the embodied emissions generated during their construction process. All new buildings should be ZEB as soon as possible to compensate for the fact that some existing buildings could not be energy-positive after their renovations processes.

“Zero Emissions Buildings” for renovations, ZER

In order for a renovation to be considered as a Zero Emissions Renovation, hence a Zero Emissions Buildings, a renovation only need to compensate for the emissions linked to materials used for the process, not including the whole embodied emissions in the unchanged building materials. Renovations that cannot be converted into positive energy buildings will be able to compensate for their embodied emissions through the ZEB net, ensuring that the savings generated by the positive energy buildings are not double-counted**.

It is to be noted that such positive energy new buildings or renovations - defined as ZEB or ZER - may likely be much more flexible, decentralised and integrable in urban plans than the capacity investment of carbon removal technologies.

***Note:** ZEB would entitle to be ‘practical’ if the CO₂ emissions to cover through positive energy buildings to compensate the carbon footprint of construction products are clearly established and the time to compensate it is defined. In addition, only the CO₂ savings linked to excess energy produced and reused outside of the building boundaries could be taken into account to verify the compensation of the CO₂ emissions generated by the material supplied. The excess energy produced by the building will ‘substitute’ for energy to be produced in the given territory, and the emissions saved should be

dependent on the energy mix in this territory to produce the equivalent energy. This excess energy production will compensate for the embodied emissions generated for renovated buildings that cannot be converted into positive energy buildings due to their technical or heritage characteristics. Note that these savings could be electricity in the case of residential buildings but could also be heat for commercial/industrial buildings (e.g. heat recovery of an industrial laundry plant for district heating).

**** Note:** In no case may energy supplied to the grid be double-counted when consumed by another building/infrastructure.

Whole Life Carbon definitions

The EEB welcomes the new definitions of operational greenhouse gas emissions, whole life-cycle greenhouse gas emissions, and Life-cycle Global Warming Potential. However, crucial definitions were overlooked:

Embodied Emissions

The EPBD should include a definition for the **embodied emissions**, which are essential for a proper framework for the WLC of buildings. It is the first step to establishing a legal basis to regulate the environmental impact generated by the use of construction materials. As mentioned before, embodied emissions are one of the main contributors to the Lifecycle Global Warming Potential in buildings, even more so when it comes to the highest energy-efficient buildings. This definition should follow the framework defined in the prEN 15978-1 (Assessment of environmental performance of buildings – Calculation method) and the one defined in the report of the World Green Building Council, 2019²³: *embodied carbon is carbon emissions associated with materials and construction processes throughout the whole lifecycle of a building. Embodied carbon, therefore, includes: material extraction (module A1), transport to manufacturer (A2), manufacturing (A3), transport to site (A4), construction (A5), use phase (B1, eg concrete carbonation but excluding operational carbon), maintenance (B2), repair (B3), replacement (B4), refurbishment (B5), deconstruction (C1), transport to end of life facilities (C2), processing (C3), disposal (C4).*

Circularity and Sufficiency

The EPBD should include a definition of **circularity and sufficiency**, as the most effective strategies and instruments to reduce embodied emissions in buildings. Please, see the chapter Circularity and Sufficiency proposal and the EEB report²⁴.

WLC approach in existing definitions

Crucial aspects to promote a WLC approach were not included in some definitions:

- The “**digital building logbook**” should include the WLC data of the building, both operational and embodied emissions.
- The renovation's tailored roadmap in the “**Renovation Passport**” term should include improving energy efficiency and decarbonising the building, mainly during the renovation process. The building passport should also focus on deep renovations, which should be the

²³ World Green Building Council. [Bringing embodied carbon upfront Coordinated action for the building and construction sector to tackle embodied carbon.](#)

²⁴ Yamina Sahed, OpenExp. The European Environmental Bureau. [Sufficiency and circularity: the two overlooked decarbonisation strategies in the 'Fit For 55' Package](#)

main objective for both energy efficiency and WLC, including potential circular measures to reduce CO2 emissions in the process.

- The “**cost-optimal level**” term should also include the cost of greenhouse gas allowances through the value chain of the building, not just in the maintenance and operating costs.

Renovation definitions

Renovation terms that the EPBD plays a key role to create the framework for implementing the Renovation Wave. The current definitions do not include a strong commitment to low carbon and high energy efficiency renovations. Therefore, the EEB considers necessary their revision in order to go towards a decarbonised built environment:

Deep Renovations

The EEB welcomes the aim of “**Deep Renovations**” to reach the highest level of energy efficiency. However, the reduction of Primary Energy Demand was ignored. Deep renovations should be defined as buildings that reach a high level of energy efficiency (class A) or reduce 60% of their primary energy demand reached for a standard deep renovation, following the next arguments:

- Defining deep renovations (Annex III, ZEB definition, EPBD proposal 2021) based on the Nearly Zero-energy Buildings term does not create a clear framework as these criteria are not harmonised across the EU. A common 60% threshold is a clearer framework that ensures the benefits of the investments.
- Article 15 establishes a minimum of 30% of primary energy demand to be granted. This measure would disincentive deep renovations with higher energy performance, locking buildings in an inadequate energy performance status.

Moreover, the WLC approach is not part of this definition. Until establishing a benchmark on WLC for renovations is possible, the definition would include, at least, reporting and considering the GHG emissions generated by the renovation.

Staged Deep Renovations

The term “**Staged Deep Renovation**” should include a WLC approach as explained in the framework for Low Lifecycle Emissions Buildings (reporting GHG emissions and complaining GHG emissions thresholds for each kind of renovation), a proper progressive project and a deadline that ensures coherence renovation across the steps. This project must include a detailed plan and documentation in which all measures are explained in coordination with the information provided by Building Renovation Passports and Energy Performance Certificates. Furthermore, due to the fact that addressing a deep renovation in residential buildings entails complicated logistic actions to manage where the inhabitants could live during the renovation period and the fact that the logistic movement to transport staff and materials on the construction site is much more expensive if this renovation is done in several steps. **Staged deep renovations should comply with the following criteria**, at least for collective residential buildings:

- Inhabitants can be mobilised for the execution of the renovation works only during one of the steps of the renovation process to avoid duplication of agreement processes among the community, simplify the management of works and reduce the discomfort of the inhabitants.
- Heavy machinery (cranes, etc.) and additional structures (scaffolding, etc.) necessary for the renovation can only be installed on-site in one of the steps, avoiding duplication of administrative procedures and higher cost of movement of machinery and staff.

European Environmental Bureau

- Passive building improvement interventions should be carried out in the first step to assess the building's performance and subsequent consumption patterns, which should be the basis to choose the most appropriate solution for heating and cooling systems, eliminating fossil fuel systems and limiting the energy source to renewable energy.
- A maximum of 3 steps is recommended to renovate collective residential buildings.

One-step Deep Renovations

“**One-step deep renovations**” is not included in the proposal. This term should be defined as it is the cheaper option for inhabitants in residential buildings in the long term²⁵ and ensures the efficient investment in renovations, which should be the most appealing for investors.

Economic Incentives and Social Impacts:

Financial incentives to decarbonise the building stock

The renovation of the building stock across the EU will need the engagement of the private sector to finance it and more support for the low-income households. The EEB welcomes the extensive **article 15** on financial incentives. However, some issues should be included in the current proposal:

- The EEB welcomes MS to stimulate the necessary investment in energy renovations to achieve a Zero (Operational) Emissions Building stock by 2050, but this should also include GHG emissions. While the thresholds for the WLC of buildings are set, those renovations that can demonstrate **a reduction of CO2 over the life cycle of the building** should have a higher priority and benefits.
- The proposal includes that **fossil fuels systems** cannot be funded by January 01 of 2027, which is too late. No fossil fuel systems should be financed with public money from today onward, and they should be banned from the market as soon as possible.²⁶ Furthermore, the JRC report, *EU Challenges of Reducing Fossil fuel Use in Buildings*²⁷, claims that fossil fuel systems should be phased out from the market by 2024 if the EU wants to achieve the environmental objective of reducing 55% emissions by 2030. In 2026, the installation of new gas boilers should be already banned by default .
- Incentives for deep renovations are welcome, but one-step renovations are not included and the only requirement for financing staged renovations is based on a building renovation passport. This does not ensure a coherent renovation that grants a decarbonised renovation and a cost-effective renovation. A detailed project should be included in which the renovations activities for collective residential buildings are defined to be implemented in 2-3 steps. Moreover, the fact that deep renovations reduce at least 30 % of primary energy demand is a far cry from the current 60% primary demand reduction of deep renovations. Please, see the definition of deep renovations.
- Some crucial issues to promote the decarbonisation of the built environment are not part of this list and should be included:

²⁵ Yaminha Saheb. OpenExp [Deep Energy Renovation. Trapped in Overestimated Costs and Staged Approach](#).

²⁶ CoolProducts. [Out of gas: EU is €70 billion away from making renewable heating affordable for all – New analysis](#)

²⁷ JRC. [EU Challenges of Reducing Fossil fuel Use in Buildings](#)

- There are no economic instruments to **boost/implement circular measures to overcome market barriers**.
- There are no financial incentives to **support the behaviour change** that could reduce energy consumption based on measures such as sharing spaces and appliances and reducing owned private cars. Targeted and customised campaigns and information offices that can contact directly with households to advise and follow the process should be put in place.
- There are no measures to **avoid renoviction** linked to the renovation processes. For example, measures could be put in place to prohibit rent increases for a certain time after the renovation.

Energy poverty and worst-performing buildings

The EEB welcomes to prioritise vulnerable customers, people affected by energy poverty and people living in social housing. However, **energy poverty and homeownership are gendered**, and women are the most disadvantaged. Gendered differences/impacts need to be considered. Specific criteria could increase the share of women benefitting.

The **National Building Renovation Plans** template should have indicators that ensure that article 22 of the EED recast is fulfilled, establishing concrete objectives for an amount of vulnerable households' homes renovations per year.

The **'cost-optimal' definition** also considers the social externalities that can come from energy consumption and renovation processes to ensure the implementation of specific measures like rental prices increases caps during these processes.

Another potential risk is the fact that adjusting the validity of **EPCs, article 16**, to the energy performance class could put more pressure on the worst-performing buildings if financial support and economic incentives are not effectively put in place. EPCs from the worst-performing buildings will have just 5 years of validity, increasing the economic pressure. If households cannot achieve this target, they will be locked into a cycle of energy poverty.