23 August 2024

POSITION PAPER

Global Warming Potential for the EPBD: Parameters the Concrete & Cement Sector considers important for the development of GWP methodology

Background

The revised Energy Performance of Buildings Directive (EPBD) now requires that:

- By 2030 for all buildings (2028 for buildings larger than 1000 m^2), Member States must disclose the lifecycle Global Warming Potential (GWP) in Energy Performance Certificates (EPCs)[1].
- By 31 December 2025, the European Commission (EC) to come up (by Delegated Acts) with an EU framework for the national calculation of lifecycle GWP.[2]
- By 1 January 2027, Member States should publish a roadmap introducing limit values on the total cumulative lifecycle GWP[3] of all new buildings and setting targets for new buildings from 2030, considering a progressive downward trend, as well as maximum limit values for different climatic zones and building typologies.

State of play

The EC has hired Viegand Maagøe to support the implementation of the EPBD provisions relating to the building's whole life GWP. Timing:

- Q2 2024 - Q2 2025: study development, stakeholder involvement, publication.
- Q2-Q4 2025: EC Delegated Act based on the study.
- 31.12.25: EC EU framework for the national calculation of lifecycle GWP.

Concrete Europe supports the European Union in decarbonising the built environment and believes that the EPBD will be the key driver for decarbonisation towards 2050. That is why we are taking the opportunity of the implementation of the revised EPBD, which has just started, to provide the Commission services and Viegand Maagøe with some input on the EU framework for the national calculation of lifecycle GWP that they need to develop.

As a starting point, Concrete Europe believes that the EU framework should support solutions with the best whole life carbon profile regardless of their nature, thereby establishing a level playing field among technologies and construction materials. Innovation in all areas should be supported, and material- and technology-neutrality should be a guiding principle.

We believe that combining concrete with other construction materials is and will be key to enabling buildings to achieve the best sustainable performance (environmental, economic and social). And we have to keep in mind that the embodied emissions of the energy intensive construction materials are being reduced in a very fast way, resulting for example for cement

[1] 'Lifecycle Global Warming Potential (GWP)' means an indicator which quantifies the global warming potential contributions of a building throughout its full lifecycle.
[2] Scope of building elements and technical equipment is as defined in the Level(s) common EU framework for indicator 1.2: Lifecycle Global Warming Potential. Other calculation tools or methods may be used if they fulfil the minimum criteria established by the Level(s) common EU framework.
[3] The total lifecycle GWP is communicated as a numeric indicator for each life-cycle stage expressed as kg CO_2eq/(m2) (of useful floor area) calculated over a reference study period of 50 years.

Concrete Europe ASBL
Rue d'Arlon 55 - 1040 Brussels
concrete-europe.eu
info@concrete-europe.eu
EU Transparency Register N° 875740128184-88

in average net zero in 2050. That is why **we invite the Commission and its consultant to take the following five parameters into account when developing the EU framework for the national calculation of lifecycle GWP**, for the benefits of the users and future generations.

1. Jointly consider embodied and operational impacts in a Whole Life Carbon indicator

Carbon is carbon, regardless of it source. The goal is therefore to reduce its total emissions throughout the lifecycle of a construction work, including end-of-life and potential benefits. Both embodied and operational carbon have to be considered together in the EU framework. The manufacturing process of all construction materials and technical equipment today emits carbon, but their use in a building allows for a certain reduction in operational energy (e.g., insulation materials, concrete through its thermal mass, efficient heating and cooling systems, etc). That's why it is important that the embodied and operational carbon are considered together, additionally considering maintenance, repair and replacement operations (see next chapter). Concrete Europe would also like to ensure that the GWP indicator calculated (embodied and operational) is equivalent to the actual GWP indicator of the finished building (embodied and operational).

Assuredly, concrete's thermal mass property[4] helps regulate indoor temperatures by absorbing heat during the day and releasing it at night, thereby reducing energy requirements for heating and cooling systems. This leads to lower energy consumption and a reduced associated GWP over the building's lifecycle.

2. Include durability, service life and maintenance CO_2 costs

A reference study period of 50 years was set in the revised EPBD Annex III for the assessment of the life cycle. However, some components will have the same reference service life as the construction work, whereas for others it will be different (shorter or longer).

In case of components with shorter service life, their replacement shall be considered in the life cycle analysis. Ramboll, in its ongoing study for DG GROW "*Analysis of lifecycle greenhouse gas emissions of EU buildings and construction*"[5], has found that emissions from refurbishment, replacement, maintenance and repair represent 50% of embodied emissions while emissions from the production of construction materials represent 43% of embodied emissions.

Components with a longer service life, on the other hand, should be rewarded for their potential for re-use (either as individual elements or as part of a whole structure if the lifespan is expended). The re-use of existing building structures is a clear trend in many city centres and infrastructure. A longer lifespan means that a building will not need to be replaced or frequently undergo major renovations, significantly reducing the embodied emissions from refurbishment, replacement, maintenance and repair.

---

[4] https://www.concrete-europe.eu/images/Concrete_Europe_-_PositionPaper_-_3E_-_2016-10-25-light.pdf

[5] https://c.ramboll.com/life-cycle-emissions-of-eu-building-and-construction#:~:text=Over%20their%20whole%20life%20cycle,of%20the%20building%20stock%20indicate

Actually, building for 100 years[6] with long lasting materials and components reduces the GWP associated with refurbishment, replacement, maintenance and repair during the lifetime of the building and that aspect should be covered by the coming EU framework by:

- Recognising the benefits of long service life in amortising environmental and economic construction costs, such as in Whole-Life Carbon (WLC) calculation.
- Considering the impact of substitution, maintenance, repair, and refurbishment of functional units during the reference service life.
- Distinguishing between short-term (replaced during the service life) and long-term elements of a construction work.
- Rewarding products with longer service life, considering their potential for "re-use" (both entire structures and single elements).
- Considering the benefits of building with materials specified to last for 100 years, even if calculations are based on 50 years (CO_2 contribution divided by 2).
- Ensuring that the GWP indicator calculated is equivalent to the actual GWP indicator of finished building.
- Recognising that building design, construction and WLC calculation and assessment techniques will become increasingly sophisticated, thus enabling the points mentioned above.

3. Promote permanent carbon storage and set strict conditions for temporary carbon storage

Permanently stored carbon is removed from the atmosphere for indefinite time, thus avoiding the burden being shifted to future generations who will have to deal with the temporary stored carbon in the medium term.

Carbon can be permanently stored in construction materials through mineralisation, a chemical reaction between suitable minerals contained in construction products and the greenhouse gas carbon dioxide. The CO_2 is effectively sequestered as a carbonate, which is stable on geological timescales. In the case of concrete, this process is known as carbonation – either natural or enhanced[7]. It enables the building to naturally absorb CO_2 throughout the building's lifetime and at its end-of-life. During the manufacturing stage of both cement and concrete, a process to enhance carbonation can also be applied. This phenomenon is already recognised in standardisation[8], the Delegated Act on permanence in the EU ETS[9] and the Carbon Removals Certification Framework (CRCF)[10]. The EU framework should reference these existing tools and ensure coherence with current EU legislation.
On the other hand, there is no scientific consensus on the benefits of temporary carbon storage, nor on the correct way to assess it[11]. Its application should therefore be limited and based on a conservative approach because the CO_2 will be released at one point in time.

4. Ponder circularity, material efficiency and local availability

Circularity should be taken into account when assessing whole life carbon. Both re-use and recycling can have positive effects from a GWP perspective and their benefits should be

[6] The new Eurocode (EN 1992-1-1:2023) permits a design working life of 100 years
[7] https://www.concrete-europe.eu/newsroom/publications/266-concrete-contribution-to-carbon-removal
[8] EN 15804+A2 and EN 16757 - cPCR for concrete
[9] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14135-Emissions-trading-system-ETS-permanent-emissions-storage-through-carbon-capture-and-utilisation_en
[10] DG CLIMA in the Commission Expert Group on Carbon Removal is developing methodologies for carbon removal in concrete through enhanced carbonation.
[11] https://www.ca4bm.eu/CA4BM_Final_Report.pdf (June 2022)

considered (see also point 2.) Concrete is a 100% recyclable material[12], which makes its use after the lifetime of the primary building a key mitigation measure for new construction, as it reduces the production of primary raw materials. Our industry is increasing the production and use of recycled aggregates for concrete mix and using the remaining dust from the crushing process as an additive in cement production. Additionally, end-of-life aspects should be covered by the EU framework because they can have both positive and negative effects. For instance, prefabrication allows new buildings to be designed for deconstruction, dismantling and reuse of elements.

Furthermore, the EU framework should reward material efficiency and consider the ability of concrete to enable structural efficiency with a reduced volume of material, thus reducing the GWP.

Concrete Europe also believes that environmental impacts due to (long) transport distances should be internalised. The framework should reward the use of local materials by considering the origin of intermediate products and the location where the construction product is made, in order to account for CO_2 emissions from long-distance transport.

5. Assess the rebuilding option

Concrete Europe stresses that, when assessing whether a construction work requires extensive renovation, the EU framework should mandate a full life-cycle assessment (cradle-to-grave/cradle-to-cradle) for both renovation and rebuilding, including the WLC profile.

Concrete Europe remains at the disposal of the European Commission services and its consultant Viegand Maagøe to assist in the development of the EU framework for the national calculation of lifecycle GWP in the coming months. We look forward to collaborating further to ensure that the framework supports sustainable and efficient construction practices across Europe.

[12] https://www.concrete-europe.eu/images/Newsroom/Publications/240513_CE_Circular_Economy_position_paper.pdf