CEMBUREAU
The European Cement Association

POSITION PAPER

March 2023

A CREDIBLE AND EFFICIENT PATH FOR CARBON REMOVALS

CEMBUREAU Position on the EU Carbon Removal Framework

Executive Summary

Carbon removals in the cement and concrete value chain offer significant potential to support the EU's transition to carbon neutrality.

In CEMBUREAU's view, it is essential that the EU carbon removal framework is based on a science-based approach and clear definitions. The EU carbon removal framework should be strengthened to:

- **Recognise the significant carbon removals that can be made through the capture of biogenic emissions from sustainable sources in cement plants and other industries.**
- **Recognise the enhanced carbonation of concrete as a carbon removal.**
- **Recognise natural carbonation as a carbon removal when arising from the production of carbon neutral cement.**
- **Be based on sound science and not recognise short term storage in products as a carbon removal.**
- **Besides the Carbon Removal Regulation, a clear regulatory framework should be developed for CO2 utilisation, carbon accounting and the permanence of storage.**

CEMBUREAU (www.cembureau.eu), the European Cement Association, is based in Brussels and is the representative organisation of the cement industry in Europe.

The European cement industry has laid out its decarbonisation efforts in its 2050 Carbon Neutrality Roadmap published in May 2020. The Roadmap aligns the cement industry's decarbonisation pathway with the EU Green Deal objectives and spans the full value chain, from production of clinker and cement to the use of concrete in the built environment.

Carbon removals are particularly important for the cement sector, as they can occur at different stages of the cement and concrete value chain:

- Through the capture and storage of biogenic CO2 from sustainable sources (e.g. biomass waste) in cement plants;
- Through the enhanced carbonation of concrete, which can store vast amounts of CO2;
- Through natural carbonation, a chemical reaction by which concrete absorbs CO2 from the atmosphere.

An EU carbon removal framework offers a strong opportunity to develop such removals and support the EU's transition to carbon neutrality by 2050. However, it is essential that such framework is based on science and clear definition. CEMBUREAU also believes that CO2 emission reductions, and the fast deployment of breakthrough technologies like carbon capture, should remain the priority to reach the EU's net zero target. Carbon removals should be employed as a supplementary measure where needed to enable the EU to meet its ambitions.

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1. **Carbon Capture, Utilisation and Storage (CCUS) will allow for significant removals through the capture of biogenic CO2**

The capture and storage of CO2 of biogenic origin by the cement sector can contribute significantly to carbon removals. A large number of carbon capture pilot and demonstration projects have been launched by cement companies across Europe, with the first of them becoming operational as early as 2024. Recent ETS Innovation Fund calls also supported a great variety of CCUS projects, strengthening the EU's global leadership on the technology[1].

In conjunction with the cement sector's use of biomass waste, CCUS will allow for significant amounts of carbon removals in the medium term. Today, our sector indeed substitutes on average 52% of its fossil fuel consumption with non-recyclable waste derived fuels, 17% of which were biomass waste derived fuels, leading to a CO2 saving of approximately 3.7 million tonnes[2]. CEMBUREAU, as part of its carbon neutrality roadmap, aims to reach 60% alternative fuels by 2030, half of which (30%) will be biomass waste, and 90% by 2050, with more than half (50%) biomass waste. The biogenic CO2 captured in cement plants which is stored underground is to be considered a permanent carbon removal activity. Furthermore, captured biogenic CO2 used to (re)carbonate raw materials, aggregates and concrete, or stored in long-lasting products, should also be considered a carbon removal activity (please see below section on concrete carbonation).

CEMBUREAU supports the view that the capture and storage of biogenic CO2 from cement plants qualifies as carbon removal per Article 1(2) of the Proposal. Biogenic CO2 used to be stored in long-lasting products should also qualify as carbon removal as defined in Article 2(i) of the proposal. Furthermore, certificates under the EU carbon removal framework that arise from Emission Trading System (ETS) activities should be accountable and tradeable in the context of the EU ETS[3].

2. **Concrete carbonation should be recognised as a carbon removal**

Down the cement and concrete value chain, the CO2 removed from the atmosphere can be used to carbonate aggregates, precast and ready-mix concrete as well as many construction wastes and natural minerals through a process called "enhanced carbonation". Enhanced carbonation permanently stores carbon (contrary to short-term carbon storage), improves the quality of the concrete and enables a reduction of the cement content in concrete leading to a further reduction of CO2 in the built environment. This method is used in Europe and worldwide as a carbon removal activity for which certification is granted[4].

CEMBUREAU supports the view that the incorporation of atmospheric CO2 in long-lasting building products through concrete carbonation qualifies as carbon removal as defined in article 2(i) of the proposal.

[1] For instance, the latest ETS Innovation Fund call has provided over 500 million Euros of funding for CCUS projects in the cement sector.
[2] https://cembureau.eu/media/nqpnsbkh/biomass-waste-leaflet.pdf
[3] As part of the updated ETS Directive, the European Commission is due to present by 31st July 2026 a report and possible legislative proposals on the inclusion of negative emissions in the EU ETS.
[4] https://blogs.microsoft.com/eupolicy/2022/07/07/how-locking-carbon-in-concrete-can-help-the-eu-reach-its-green-goals/

3. Concrete naturally absorbs carbon from the atmosphere during its lifetime

Furthermore, concrete also absorbs CO2 from the atmosphere during its lifetime, through a process called natural carbonation or (re)carbonation. (Re)carbonation is a natural phenomenon which results from the manufacturing of cement and concrete and occurs in all concrete structures – buildings, pavements, tunnels, dams, bridges – throughout their life.

A recent international review showed that, as a first approximation, around 23% of the annual calcination emissions (*process emissions*) from cement consumed in the year would be taken up by existing concrete structures, and the science of (re)carbonation is well established and already included in standards[5]. The absorption of CO2 turns the built environment into carbon sinks and this natural carbonation effect has been recognized in the Working Group I contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)[6].

As such, (re)carbonation arises from the production of cement, in the sense that the effect would not happen without the original production of cement. However, where carbon neutral cement is produced through the use of CCUS, it will amount to carbon removal.

CEMBUREAU therefore recommends that:

- **The CO2 absorbed from the atmosphere through natural carbonation is considered as carbon removal when it arises from carbon-neutral cement production;**
- **Beyond the carbon removal framework, natural carbonation should be recognised in UNFCC and national greenhouse gas inventories (as already done in some EU Member States) and other EU policies, such as the upcoming EU Whole Life Carbon Roadmap that the Commission is foreseen to publish in 2023, and relevant cement standards.**

4. Carbon removals should be based on a sound scientific approach

CEMBUREAU strongly believes that the carbon removal framework necessitates a credible approach to carbon removal activities. As expressed above, long-lasting products may store CO2 and, as such, support the carbon removal framework. However, a clear distinction must be made between:

- Short-term carbon storage (for instance in wood products and timber) which may help mitigate climate change but eventually results in CO2 being re-emitted into the atmosphere when the product is used or reaches its end-of-life.
- Long-lasting storage, for instance through the storage of CO2 in the form of carbonation or mineralisation, where CO2 is permanently stored and will not be re-emitted.

To maintain the environmental integrity of the carbon removal framework, CEMBUREAU therefore recommends that short-term CO2 storage in products is not recognised as a carbon removal. For that purpose, “long lasting products” should be clearly defined and based on sound science, such as reports from the Intergovernmental Panel on Climate Change (IPCC).

[5] Please see CEMBUREAU note on recarbonation, July 2020
[6] Please see IPCC report

CEMBUREAU recommends that the carbon removal framework to be based on clear definition and sound science. Short-term storage in products should not be considered as a carbon removal.

5. Besides carbon removals, the EU needs a proper framework on CO2 utilisation from industrial sources, carbon accounting and the permanence of storage

Finally, CEMBUREAU wants to remind policy makers that, besides the EU carbon removal framework, the industry needs coherence between the different EU policies (2050 climate targets, EU Emission Trading Scheme, CCUS) to successfully capture carbon emissions from the sector and remove CO2 from the atmosphere. Today, the EU regulatory framework for carbon capture and utilisation (CCU) is fragmented and incomplete. It is important to:

- **Ensure that policy decisions are based on proper estimates of the EU's need for CO2 – from carbon removals or carbon capture – at a 2030, 2040 and 2050 horizon**. In this respect, the recent draft Delegated Act on renewable liquid and gaseous fuels of non-biological origin (RFNBOs) published by the European Commission prohibits the use of CO2 captured from industrial sites like cement kilns as of 2041. CEMBUREAU strongly challenges such approach, which is not based on an actual assessment of CO2 needs in the medium term, and risks impacting carbon capture investments in the cement sector[7].
- **Organise a healthy debate on carbon accounting in CCU**. Some CCU applications, typically the use of CO2 to produce synthetic fuels for aviation (RFNBO), will result in an emission into the atmosphere from the CO2 that was previously captured by industrial installations (by the airplane, in case of an RFNBO). However, such CCU applications still have an enormous potential for CO2 mitigation as the captured CO2 replaces the fossil carbon source in fuel production. In CEMBUREAU's view, the CO2, when re-utilised, must be accounted for at the point in time where the CO2 is released into the atmosphere.
- **Clearly define permanent and non-permanent storage of CO2 in products**. According to the reviewed EU Emission Trading Scheme (ETS) Directive, CO2 emission allowances should be surrendered for emissions unless they are permanently stored in a storage site or are "*permanently chemically bound in a product so that they do not enter the atmosphere under normal use and any normal activity taking place after the end of the life of the product.*" It is urgent to the EU further defines what is meant by "*permanently chemically bound in a product*" to provide clarity to industries with regards to potential CCU applications[8].

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[7] Please see CEMBUREAU Position Paper on the draft Delegated Act on RFNBOs, March 2023

[8] The European Commission is to draft a Delegated Act on this topic, according to the updated EU ETS Directive.

CARBON REMOVALS CLASSIFICATION

CO2 arising from industrial / ETS activities

Biogenic CO2
(e.g. from combustion of biomass waste in cement production)

Direct Air capture

Atmospheric CO2

	Origin of the CO2	Permanence of CO2 storage	Carbon Removal (yes / no)
Carbon Capture and Storage (CCS) or storage in long-lasting products		Permanent	●
		Permanent	●
Storage of CO2 in concrete (*Enhanced Carbonation of concrete/carbon curing)*		Permanent	●
		Permanent	●
Natural Concrete carbonation		Permanent	●
Natural Concrete carbonation *(if arising from carbon neutral cement)*		Permanent	●
Production of RFNBOs/synthetic fuels utilising CO2 (CCU)		Non-permanent	●
		Non-permanent	●
Carbon storage in timber		Short-term	●

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	Origin of the CO2	Permanence of CO2 storage	Carbon Removal (yes/no)	Regulatory treatment	Remarks
Carbon Capture and Storage (CCS) or storage in long-lasting products	CO2 arising from industrial/ETS activities	Permanent	No	EU ETS	The CO2 originates from an industrial activity - therefore, not a carbon removal
	Biogenic CO2 (e.g. from combustion of biomass waste in cement production)	Permanent	Yes	Carbon Removal Framework + EU ETS	Storing the biogenic part of the CO2 emissions effectively removes CO2 from the atmosphere - therefore, the biogenic part it is a carbon removal
Storage of CO2 in concrete (Enhanced Carbonation of concrete/carbon curing)	CO2 arising from industrial/ETS activities	Permanent	No	EU ETS	The CO2 originates from an industrial activity - therefore not a carbon removal
	Biogenic CO2/Direct Air capture	Permanent	Yes	Carbon Removal Framework	Storing the biogenic part of the CO2 emissions effectively removes CO2 from the atmosphere - therefore, it is a carbon removal
Natural Concrete carbonation	Atmospheric CO2	Permanent	No	UNFCC/CO2 accounting at Member State level + Whole life cycle assessment of building materials	Concrete recarbonation would not happen if cement was not produced in the first place, leading to CO2 emissions. Therefore, not a carbon removal
Natural Concrete carbonation (if arising from carbon neutral cement)	Atmospheric CO2	Permanent	Yes	Carbon Removal Framework + UNFCC/CO2 accounting at Member State level + Whole life cycle assessment of building materials	As the production of cement was carbon-neutral, recarbonation is a carbon removal
Production of RFNBOs/synthetic fuels utilising CO2	CO2 arising from industrial/ETS activities	Non-permanent	No	Renewable Energy Directive & related Delegated Acts / ETS	The CO2 is eventually re-emitted into the atmosphere when the fuel is used - therefore not a carbon removal
	Biogenic CO2/Direct Air capture	Non-permanent	No	Renewable Energy Directive & related Delegated Acts	The CO2 is eventually re-emitted into the atmosphere when the fuel is used - therefore not a carbon removal
Carbon storage in timber	Biogenic CO2	Short-term	No	Whole life cycle assessment of building materials	The CO2 is eventually re-emitted into the atmosphere when the timber reaches its end of life - therefore not a carbon removal

CARBON REMOVALS – CEMBUREAU CLASSIFICATION