

CO2NSTRUCT NEWS #2

FROM LINEAR TO CIRCULAR CONSTRUCTION – ADVANCING CLIMATE
MITIGATION MODELS

UPDATES FROM THE PROJECT COORDINATOR:



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– Project coordinator*

I'm thrilled to be a part of the CO2NSTRUCT universe.

Many things have seen the light of the day since the last newsletter. All work packages are going full speed ahead, and some publications are about to see the light of day.

This project is lucky to have many committed researchers within our consortium partners, who keep pushing us forward to deliver the best possible circular economy solutions that provide climate mitigation.

CO2NSTRUCT also has the privilege of interacting with many stakeholders who are willing to provide us with advice, tips, and data recommendations for achieving our goal: Provide policy advice on how to adopt circular economy practices for climate mitigation in the construction sector.

We are now halfway through our journey and would like to share what we have achieved so far.

This time, the newsletter will highlight most of the work packages and special events – both past and future events. I wish you a very happy reading!

WORK PACKAGES:

WP1 is setting the scene for the project by selecting the main sub-categories of the 6 construction materials (Steel, Cement, Brick, Glass, Insulation Materials, and Wood) to be studied in the project. The main output of this WP is a curated database where data for conventional manufacturing and CE-enhanced manufacturing of these materials are collected. A beta version is almost ready! In addition, the embodied energy, embodied carbon and water footprint data associated to the value chains of these materials have been collected.



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CO₂NSTRUCT

WHAT IS CO2NSTRUCT:

CO2NSTRUCT is an EU-funded research and innovation project that aims to identify, test, and quantify circular impacts for climate mitigation modelling for six key carbon-intensive materials: Cement, steel, brick, glass, wood, and insulation materials.

Project starting date: 1 June 2022

Project end date: 31 May 2026

In the context of **WP2**, a consumer behavior survey was conducted in nine European countries in December 2023 (4500 participants) to analyze their awareness and behavior towards circular economy aspects and practices in the construction sector. The results revealed that consumers' awareness of the circular economy is somewhat limited, with the most recognized circular economy practices being recycling, reusing and repairing. Consumers are more willing to use recycled materials than reused materials/components. The factors influencing consumers to select circular economy construction products were revealed, including benefits, risks, market strategies, social norms, attitudes, perceived behavioral control, and environmental concerns.

WP3 is conducting two macro-activities. The first, nearing completion, is the review and assessment of Circular Economy practices that could be applied to the construction materials under examination (Flat Glass, Clay-based materials, Steel, Insulation, Wood, and Cement) and in buildings and offshore facilities for renewable energy generation that use these materials. The second, which is at its peak, consists of mapping the European value chains of the mentioned construction materials and preliminarily evaluating the impacts that the most promising practices in terms of maturity and applicability may have on the structure of such value chains. Examples of impacts include costs and materials, energy, and water needs.

After the completion of a methodological review, which was published in the prestigious Journal of Cleaner Production, **WP4** has now been moving to the analysis of potential rebound effects in the identified materials' supply chains. Based on secondary data and on the interaction with experts, reports are being created, highlighting unintended consequences related to the implementation of Circular Economy actions that might hinder the achievement of environmental objectives. Results from this research will be shared in June 2024 at the conference of the European Society for Ecological Economics, which will be taking place in Pontevedra (Spain).

The main scope of **WP5** is to design a conceptual framework for integrating CE into climate mitigation models. It should combine the functionalities of current CE tools with the needs and functionalities of climate mitigation models to develop the proposed conceptual framework. The proposed framework is planned to combine the outputs of the previous work packages. A web survey was also conducted to review the recent and innovative CE tools in the industry.

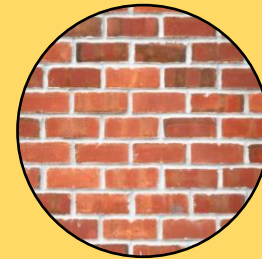
WP6 Circular Climate Mitigation Scenarios started in November 2023. The Task 6.1 "Define circular climate mitigation scenarios" is ongoing to specify which CE measures will be considered modelling EU circular climate mitigation pathways towards carbon neutrality. The scenarios will be developed along 2 axes: (a) referring to the scope of CE measures (i.e. which measures?) and (b) referring to their coverage (i.e. where and when are they implemented?). Some of the ideas for circular mitigation scenarios could be: smaller demand for building use due to sharing office spaces; assume that xx% of all cement produced from 2030 onwards is recycled; assume a 50% cost reduction in recycling glass technologies from 2040 onwards from 2020 cost values.



#Cement



#Steel



#Brick



#Wood



#Glass



#Insulation
Materials

WORKSHOP IN FEBRUARY 2024

The consortium is trying to come together from very different angles and scientific backgrounds. This requires interaction, brainstorming and alignment. In February 2024 we met in Lisbon, Portugal. Our host was Laboratório Nacional de Energia e Geologia (LNEG). This workshop entitled “CO2NSTRUCT In-person Workshop: CE and mitigation framework for construction materials” lasted a full week and was home to a lot of alignment of all work packages but in particular WP5 and 6, where our host has expertise.

We look forward to these meetings every year – they are always a major leap forward in the project.

The picture on the right is from the workshop.



JOINING FORCES WITH A SISTER PROJECT

The in-person Workshop “CE and mitigation framework for construction materials” was held in the last week of February 2024. This workshop provided the perfect breeding ground for knowledge sharing among the consortium and the right atmosphere to meet with our sister project CIRCOMOD. The CIRCOMOD project researches how Circular Economy principles can help achieve climate goals. The joint session concerned buildings where the highlights from the session were the following:

- Meeting our colleagues and fellow scientists from CIRCOMOD
- Setting up of data sharing strategies and
- Establishing joint-publication goals and strategies.

It was an amazing day, and the collaboration between the two projects is maintained so they can utilize each other’s strengths and raise the level further together.

The picture on the right is from the joint session.

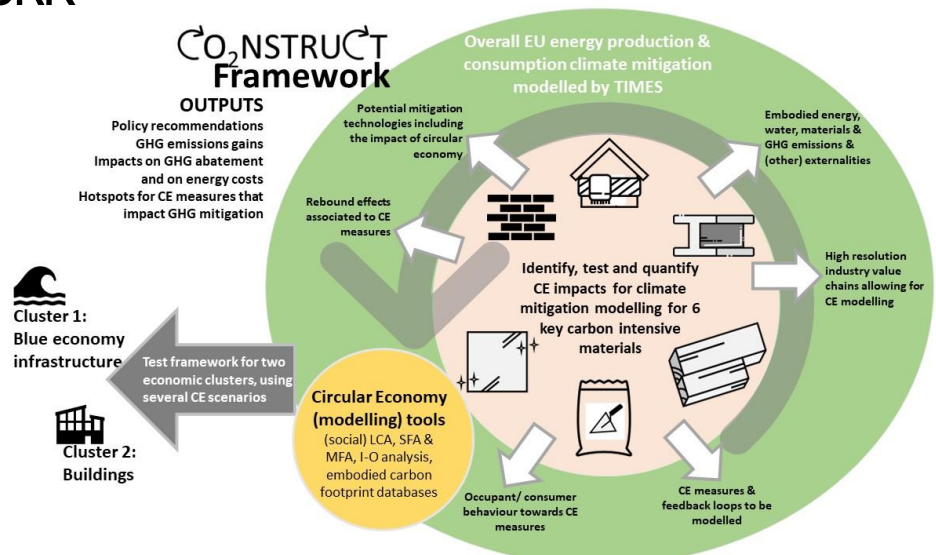


CO2NSTRUCT FRAMEWORK

The main output of CO2NSTRUCT is what we call the CO2NSTRUCT framework.

CO2NSTRUCT is working on shifting the current paradigm of climate mitigation models from linear to circular with the framework.

One of the climate mitigation models is TIMES. The ultimate objective of the TIMES model is to satisfy the demand for energy services at minimum system cost, resource use, and greenhouse gas emissions.



Will continue on the next page.

The CO2NSTRUCT framework will drive the TIMES model from linear to circular climate mitigation. The augmented model will be used to simulate different pathways to meet the carbon neutrality goals of the EU for near/long term.

Different scenarios are under development with industry and policymakers considering different degrees of circular economy adoption across the six construction materials value chains.

The framework results will be translated into policy recommendations to integrate circular economy into climate, energy, environmental, and economic policies towards carbon neutrality.

UPCOMING EVENTS WITH CO2NSTRUCT:

- Annual meeting in Brussels, the 26 – 28th of June 2024.
- IGC 2024: “35th International Geographical Congress in Ireland 2024, the 24-30th of August 2024.
- ICBBM 2024: 18. International Conference on Biobased Building Materials, the 17-18th of October, United Kingdom.

PAST EVENTS WITH CO2NSTRUCT:

- Royal Geographical Society (RGS) - Institute of British.
- Geographers (IBG) Annual International Conference 2023, United Kingdom, 30th August to 1st of September 2023.
- Applying Circular Economy Principles to the Construction Sector – sharing some results in Portugal 19th October 2023.
- Sustainability Week, Germany, 16th-20th of October 2023.
- TO DESIGN CIRCULARITY new challenges for cities: Waste, common goods, norms, culture, Italy, 21st-23rd of October 2023.
- Under construction: Circularity in the built environment, Norway, 27th-28th of November 2023.
- 7th European Conference on Behavior Change and Energy Efficiency in Netherlands – 28-29th of November 2023.
- 28th United Nations Climate Change Conference 2023 (COP28) in Dubai, 30 November to 12 December 2023.
- 1st Open-Air Cities International Conference in Athens, 16-18 February 2024.
- In-person Workshop in Portugal, 26th of February to 1st of March 2024.
- Workshop with sister project CIRCOMOD in Portugal - 27th of February 2024.
- International Congress of Technical Innovation in the Building Sector (CITE 2024), Spain, 13th to 15th of March, 2024.



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CO2NSTRUCT CONSORTIUM:

- Technical University of Denmark (DTU)
- Centre for Renewable Energy Sources and Saving (CRES)
- Ruhr-University Bochum (RUB)
- Laboratorio Nacional de Energia e Geologia I.P. (LNEG)
- Centro De Investigaciones Energeticas, Medioambientales Y Technologicas (CIEMAT)
- University of Pisa (UNIFI)
- The University of Sheffield (USFD)