FUTURE17
Sustainable Development Goals
Challenge Program

eit Climate-KIC
Co-funded by the European Union

Organization: EIT Climate-KIC

Project Title: Future value models to enable circular value chains for concrete, steel, and timber as construction materials.

Project objectives: Buildings and construction are significant contributors to climate change, accounting for 39% of global energy-related emissions and a major source of resource use and waste, with +/- 50% of materials extraction and 35% of EU total waste. By 2050, just the cement, steel, aluminium and plastic used for construction will result in emissions of 230 Mt CO2 in a baseline scenario where they are made with today's production processes.

To date, most discussions of the CO2 impact of buildings have focused on the use phase, especially on energy consumption. This is understandable: buildings account for 40% of final energy demand in the EU, and 36% of CO2 emissions. Still, around 15% of total lifecycle CO2 emissions from EU buildings today are attributable to materials and construction. As energy efficiency and low-carbon energy reduce energy emissions, the CO2 'embodied' in materials will become ever more important. In countries (e.g., Sweden) where electricity and heating systems are already low carbon, building materials already account for half of the total CO2 footprint of new buildings.

Furthermore, human-made objects have outweighed all of the living beings on Earth in 2020 and humans are modifying the planet to such an extent that we have created a new geologic epoch called the Anthropocene. About half of the world's current human-made mass is concrete, with aggregates such as gravel making up much of the rest. Buildings and infrastructure outweigh trees and shrubs. The world's plastics alone now weigh twice as much as the planet's marine and terrestrial animals. How we use construction materials therefore matters greatly for future climate and biodiversity targets.

With the current economic and financial model, the creation of circular construction value chains is challenged on the one hand side by diverging interests: the party making decisions is not the one who would benefit (similar to how landlords have little incentive to invest in energy efficiency if their tenants pay the energy bills). In other cases, the business case is not strong enough yet, but could improve through new collaboration models, new legislation, new incentives.

In a fully circular construction material scenario, the future value model would need to fully reconsider current practices in IPR (closed IP manufacturing), insurance, public procurement, financing, and legislation (eco-design, waste, recycling). We deliberately want to not focus on technological innovations, since our experience shows that main barriers are not technology related.

The aim of the project is to explore and design ideally for all three materials (concrete, steel, timber) completely new and disruptive value models, using a first principle approach, systems innovation or other transformational approaches.

We are interested in how a fully circular value chain could work economically and legally, what type of concrete collaboration models and ecosystems would the industry need, and what type of financial and tax incentives could speed up the transformation.

We are aware that currently concrete, steel and timber are global value chains, therefore we do not ask to apply a regional focus, but you may want to consider in your exploration if this is still sensible in a future value model.

Expected Outcomes:

- Representation of the current system based on the existing economic model
- Representation of the future system with a value chain with new indicators/a new value model aligned with SDGs or other ESG frameworks
- Recommendations for changing industry's short-term profit driven practices to long term sustainable impact driven mindset

Deliverables:

- Mapping of the future value chain (e.g., ideally for all three materials, or at least for one construction material)
- Canvas of future value model
- City Procurement Decision Making Tool for selection of construction materials based on future value model (If achievable in the available timeframe)
- Report on

o Future insurance models

o New IPR and collaboration models

o new policy proposals for concrete, steel, and timber (eco-design, waste, recycling)

Is this project reoccurring?

- yes and no. we are working on a portfolio of projects that aim at decarbonizing the construction materials sector and aim to further work on further innovations in this system in future, so we could possibly expand and dive deeper on parts of what you will be delivering

Would you like for this project to be delivered by more than one team?

Yes

Which sector is this project focused on?

- Construction materials

Which skills might be required for the successful delivery of your project?

- Business
- Law & Policy
- Environment and climate sciences
- Design
- Social Sciences
- Architecture
- Engineering
- Market Analysis

Can the project outcomes be shared with the public?

Yes

SDGs related to this project: #9, 11, 12, 13, 17

Resources available to the team:

- Knowledge from the EIT Climate-KIC Cities team

  Non exhaustive list:

- The Circular Economy - a Powerful Force for Climate Mitigation - Material Economics
- Understanding the Economic Case for Decarbonizing Cities - Material Economics
- Realising the value from circular economy in real estate - Arup
- Circular Business Models For The Built Environment | Shared by Business (thirdlight.com)
- BigBuyers | Circular construction - roads, infrastructure, public space
- It's time for construction to embrace the circular economy | Roland Berger
- What is circular construction? | Circuit (circuit-project.eu)
- Circular construction methods - Madaster
- Circular Economy: 8 actions to cut 60% CO2 in the buildings sector - Ramboll Group
- Human-Made Stuff Now Outweighs All Life on Earth - Scientific American
- The Anthropocene Project | Film