CircBoost

Interim Circ-Boost policy brief

COOPERATION WITH AND RECOMMENDATIONS TO REGIONAL AND EUROPEAN POLICYMAKERS

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Table of Contents

1 Summary

Waste is generated in every industry, but the construction sector accounts for more than a third of all waste generated in the EU according to the European Commission data and to begin with, it also requires vast amounts of resources, about 50% of all extracted material. The fact that some of the materials that are disposed of have a very high resource value, meaning they can be recovered and reused, makes it a priority waste stream to focus on. Why waste it?

There is a great opportunity for regional policy makers to take the lead in driving a necessary and meaningful change in the traditional construction industry across Europe. Policymakers can do that by supporting innovative construction technologies and digital tools, embedding circular economy principles into public procurement standards, facilitating platforms for data sharing and best practice exchange, and enabling the development of infrastructure that supports the recycling and reuse of materials from selective demolition. These actions are critical for accelerating the transition to a circular built environment.

The New Circular Action Plan of the EU was adopted to pave the way for a cleaner and more competitive Europe, to promote the transition to a circular economy which will reduce pressure on natural resources, create sustainable growth and employment. The construction sector is a key target area, which will be under the radar for better material as well as energy efficiency. The CIRC-BOOST project aims to showcase circular solutions which are being tested and monitored, to help construction stakeholders with the adoption of new innovative technologies and processes.

CIRC-BOOST is a Horizon Europe funded initiative bringing together 27 partners across Europe to help boost the application of circular economy principles into the construction sector through innovative business models, pilot demonstrations and digital tools. CIRC-BOOST is a member of the Circular Cities and Regions Initiative (CCRI) and collaborates with its sister projects on achieving the shared goals on achieving circularity. The 2 sister projects are RECONSTRUCT and Woodcircles. RECONSTRUCT aims to develop circular, eco-friendly, and innovative solutions to reduce emissions from the construction industry by sourcing local alternatives to conventional steel and cement, applying reclaimed components and implementing design for disassembly and reuse. Woodcircles is a project that aims to turn wood waste into advanced building materials.

CIRC-BOOST´s key feature are 5 pilots deployed across 5 different European regions which demonstrate novel and integrated solutions for selective demolition, construction and demolition waste management and new product valorization.

2 Introduction – Empowering Regions and Cities for Circular Construction

Local governments and regional authorities are critical to driving the transition to circular construction. The CIRC-BOOST project serves as a practical innovation platform, supporting cities and regions in adopting digital and technical solutions - from urban material databanks and digital twins to advanced demolition, decontamination, and reuse methods. Through five real-world and exciting pilot projects across Europe, CIRC-BOOST showcases scalable approaches to circular demolition and circular construction. The project offers municipalities tools for better planning, resource mapping, and material recovery, while also providing training and business support to ensure local industry uptake. By linking regional stakeholders to broader European networks, CIRC-BOOST helps align local action with EU circular economy goals, positioning regions as leaders in sustainable urban development.

Pilot 1: Barcelona Eco-District Transformation

Barcelona is converting the former 90,000 m² of the decommissioned Mercedes-Benz manufacturing plant into the city's first eco-district. A new residential area will be built in its place, including university buildings and office buildings. To create this new modern district, it was necessary to find a solution to decontaminate the area from heavy pollutants from its intensive industrial past. To make it truly ecological, the project prioritizes circularity in all its phases, from demolition, to design, to the actual construction which should reuse or recycle a maximum of the disassembled structures from the original structures.

The key activities of the CIRC-BOOST project include the following steps:

- For the process of a careful selective demolition a novel Building Information Modelling (BIM) based Digital Twin method was used. This helped with decision making regarding disassembly and adhering to construction protocols thanks to its advanced features of multi-criterial decision making.
- Currently the work is progressing on an innovative soil decontamination technique. The goal is to achieve 90% material recovery.
- Using wireless sensors will help with the traceability of the materials from the deconstructed site and the recovered materials will then be repurposed into high-value applications. A prototype structure will be created from reused or recycled materials from the site, which will showcase a design for disassembly construction.

Pilot 2: Circular Construction in Grand Paris Express

Amid the Grand Paris Express, the largest infrastructure project in Europe, seven stakeholders (including local authorities, construction corporations, a digital startup, a research institute, a technical research center, and a business cluster) are piloting a circular construction ecosystem in the region in order to recover deconstruction materials to reduce emissions and address fragmented information and a loosely structured sector which hinders systematic material recovery. To centralize the flow of materials in the Paris region a digital marketplace for material reuse as well as a physical resource hub will be developed. This will help with matching supply and demand and better construction waste management and also to explore innovative construction processes.

The key activities of the CIRC-BOOST project include the following steps:

- Developing a digital tool to monitor the flow of construction waste and materials which will function as a single-entry point to sell and acquire these valuable resources. This pilot will directly integrate with France's already existing national platform called PEMD for pre-demolition diagnostics, acting as a key source of information on available materials and very importantly also trust-worthy materials thanks to traceability features.

- Creating a physical platform for the materials from deconstructions.
- Exploration of innovative construction processes of these materials from deconstructions.

Pilot 3: Modular Green Housing in the Balkans – The 3R House in Belgrade

Serbia's pilot aims to disrupt the region´s traditional construction industry by demonstrating circular housing opportunities, specifically by using local waste and industrial by-product materials as well as showcasing innovative construction designs – a house that can be easily assembled and disassembled. For that purpose, a 3R house will be constructed. 3R stands for the circular economy´s principle of reduce, reuse and recycle.

The pilot also introduces two green concretes, which means they contain recycled materials or by-product materials instead of primary resources. The Recycled Aggregate Concrete and Fly Ash Concrete will be used in foundations, walls and slabs with innovative connection techniques enabling easy assembly and disassembly for reuse as well as earthquake resistance measures included in the construction.

As there is a lack of practical experience in sustainable construction or guidelines for using circular design in construction in the region, this pilot project is an important step in the development of new standards for circular construction and will serve as a practical example of the opportunities within the sector.

The key activities of the CIRC-BOOST project include the following steps:

- Design of the construction ensuring safety, serviceability, durability, easy disassembly features and a focus on energy efficiency and space efficiency.
- Building of a pilot house with innovative construction techniques and local waste materials. These materials include thermal power plant fly ash to replace cement, construction and demolition waste (reused steel and bricks) and recycled tire rubber.
- Testing of the durability of the house elements under local natural environmental conditions.

Pilot 4: Arctic Circular Construction – Norway

In the Arctic Norway, the Gaia Vesterålen Museum will be built with an impressive 95% of local waste materials. The project uses modular, demountable structures and will use recycled concrete aggregates from two local demolished buildings, demonstrating full circularity in the harsh Arctic environment not only in the constructed building itself but also through the intended Art High Tech exhibition educating about sustainable choices across generations.

The key activities of the CIRC-BOOST project include the following steps:

- Assessing the recyclability and properties of the demolition materials (predominantly concrete), checking for contamination and selecting a suitable production method for the production of repurposed materials for the new building, bearing in mind the high demands on material performance due to the harsh weather conditions.
- Upcycling of the produced recycled concrete aggregate and other materials from various waste streams to be utilized in the new building of the museum.

Pilot 5: Adaptive Reuse in Prague's Modřanský Cukrovar

This pilot converts a historic sugar refinery into a sustainable mixed-use residential community using Rebetong® - a patented 100% recycled aggregate concrete to showcase innovative technologies advancing circular construction. A brownfield will be reconstructed into new buildings by using less of the primary resources, more recycled materials and thus ensuring a much lower carbon footprint. The objective is to showcase the possibility of using recycled aggregate concrete for structural elements, which is still not a

common practice but also the design will visibly incorporate recycled elements in the building façade, serving as both a functional and awareness tool.

The key activities of the CIRC-BOOST project include the following steps:

- Design of the concrete mix using recycled materials and evaluation of its properties to ensure safety and durability.
- Using a Building Information Modelling (BIM)-based Digital Twin of the building, which will allow traceability of the used recycled materials supporting their trustworthiness.

3 Identified Barriers to implementing Circular Economy Principles in the Construction Sector

The implementation of circular economy principles in the construction sector faces a wide array of challenges across economic, technical, cultural, political, and informational domains. Through collaboration among all the stakeholders, data sharing and the right mindset (considering construction and demolition materials not as waste but as valuable resources that should be reused or recycled), these barriers can be addressed. Here is an overview of the most often encountered barriers to adopting circularity in construction:

Economic Challenges

One of the main barriers is the lack of financial incentives and uncertain economic viability of circular solutions. High initial investment costs, the low price of primary raw materials compared to recycled alternatives, and the higher costs of deconstruction or selective demolition versus a traditional demolition further discourage circular practices.

Technical Barriers

The construction industry suffers from a lack of standardization and complexity in building systems, making the disassembly, recycling and reuse of materials difficult. The integration of innovative processes, tools, and methods supporting circularity remains inadequate, and there is a widespread lack of accessible material data.

Cultural and Behavioral Issues

There is limited awareness and understanding of circular economy principles among stakeholders. The sector often takes a conservative stance, with resistance to change and skepticism toward recycled materials, leading to a preference for primary resources. The different approach to the general workflow of construction projects or demolition projects when considering circular economy principles also leads to stakeholders viewing circular construction as too complex, slow and costly.

Political and Regulatory Obstacles

The lack of regulatory tools, tax incentives, and governmental support impedes progress. Existing construction codes and standards are not adapted to building disassembly practices, and there is no long-term vision or political strategy for adopting circular economy. Furthermore, enforcement of regulations is weak due to unclear responsibilities, and there is a shortage of standardized certification processes for recycled materials. The absence of unified methodologies for calculating environmental impacts of building projects makes it difficult to compare and assess circularity objectively. Innovation is also hindered by insufficient funding for research and development, and public procurement policies often lack clear criteria for green construction.

Specific regional challenges include the lack of documentation or government strategies regarding circular construction, poor data on the construction of the buildings (materials used, maintenance works done, etc.), and low institutional readiness. In general, lobbying and the influence of special interests also obstruct the adoption of circular practices.

Informational Gaps

There is a lack of awareness of what the benefits of circular construction are and what the potential is as

there is still not enough research, education, and accessible case studies that showcase good practices in circular construction. Without solid data and demonstrable success, the sector struggles to build trust in circular approaches as well as trust in secondary material quality.

Organizational and Structural Challenges

There are many steps that need to fit into each other when planning a construction project and it requires the cooperation of several stakeholders, each of which influence the project to fulfill their requirements as much as possible. Adopting circular principles into construction should start in the planning phase, however, due to poor cooperation, fragmented supply chains or the involved parties´ own benefits, circularity is often considered too late which hinders the actual implementation. Circular construction may mean new forms of business cooperation, business models and for that a necessity for a new way of long-term thinking.

Material and Product-Specific Barriers

There is generally low trust in recycled products, which must meet the same standards as those made from virgin materials. Some of the materials used as substitutes for primary resources may also cause concern due to technical issues as they have different characteristics than those of the primary resource, e.g. slag (prone to disintegration) or are considered harmful to health e.g. fly ash. What is often cited as an economic barrier linked to materials is the extra cost for the labor or the new technologies required for sorting of materials during deconstruction and then processing of the sorted waste as it takes more time and requires more space for maneuvering and processing on site. With some materials, such as wood for example, the challenge may also be in contamination risks and the necessity to test the material before deciding on how to use it. One other challenge is the lack of information about what materials are hidden in buildings that are flagged for demolition or renovation. This creates a problem for planning an optimal process for waste management as well as recycling or reuse of the materials with high resource value. Without the knowledge of what materials are in these structures, selective demolition or renovation processes will not be as efficient, and it can hinder the correct management of the sorted materials.

4 Survey to be conducted

The results of a survey on circular economy in construction, material reuse and pre-demolition audits will be presented in the Final policy brief of the CIRCBOOST project as it is still in progress. The objective of the survey is to collect data from policy makers and stakeholders from the regions where the pilot projects are conducted and to assess the readiness and awareness of the circular construction principles in the regions and gather more significant data on issues such as support for pre-demolition audits and selective deconstructions, support for material reuse or the acceptance or demand for recycled materials in the construction sector. The Final policy brief is to be delivered in the final phase of the CIRCBOOST project in 2027.

5 Strategic policy recommendations

Adopting circular economy principles in the construction sector will lead to minimizing waste and maximizing material and energy efficiency. It helps keep valuable resources in use as long as possible thus saving primary resources. To achieve these targets and overcome the identified barriers, we have outlined strategic recommendations to help policymakers promote a widespread adoption of circular practices in construction.

Regulatory Framework and Standards

To embed circular principles into mainstream construction practices, a supportive regulatory foundation is essential. First, mandating pre-demolition audits for buildings flagged for demolition will ensure that valuable materials are identified and salvaged through selective deconstruction. Second, building codes should be revised to accommodate circular designs (such as design for disassembly, design for durability or design for adaptability) and also to support the use of secondary materials, allowing flexibility in innovative construction methods. Third, mandating the use of building information modelling (BIM) to stimulate an efficient construction and management process by creating and analyzing a digital twin model first, thus optimizing the construction process and reducing waste and saving costs.

- ✓ **Pre-Demolition Audits**: Mandate pre-demolition audits to identify and salvage reusable and recyclable materials before demolition.
- ✓ **Revised Building Codes**: Update codes to support circular designs and the use of secondary materials.
- ✓ **BIM**: Mandate BIM-digital twin models to analyze the construction processes before construction itself and to later be able to easily plan maintenance and renovations.

Green Public Procurement and Planning

Public authorities must lead by example by transforming procurement and planning procedures. One major step is to adjust conventional procurement processes into Green Public Procurement (GPP) criteria that prioritize circularity throughout the supply chain. Next, requiring early-phase integration of circular economy (CE) principles in permitting and planning will ensure that projects account for reuse and recycling from the outset. Finally, extending CE competencies into professional licensing and public tenders will drive demand for professionals trained in sustainable and circular methods.

- ✓ **Green Public Procurement (GPP)**: Enforce GPP criteria that prioritize circularity in construction projects.
- ✓ **Early-Phase CE Integration**: Require circular economy principles to be integrated during the planning and permitting stages.
- ✓ **Professional Licensing**: Include CE competencies in licensing and tender requirements.

Supply Chain and Market Development

An effective circular construction sector requires a supportive market and efficient material flow. To facilitate this, regional digital marketplaces for reusable construction materials should be established and supported, connecting suppliers and buyers across Europe and ensuring traceability. Expanding support for digital material reuse platforms and aligning them with regulatory requirements will formalize and structure circular supply chains in urban redevelopment. Furthermore, developing regional standards and funding incentives for circular construction using recycled or secondary materials will help mainstream climate-neutral buildings.

- ✓ **Digital Marketplace**: Establish regional platforms for trading reusable construction materials.
- ✓ **Circular Construction Incentives**: Develop regional standards and provide funding for modular construction using recycled materials.

Innovation & Research

Accelerating circularity also depends on innovation and technical breakthroughs. First, funding research and development in material recovery technologies will help overcome existing technical barriers and enable scalable recovery processes. Second, supporting cross-sector innovation hubs in remote or

extreme environments will allow the testing of ambitious reuse models and construction techniques in challenging contexts. Third, developing technical guides that compare the performance and characteristics of virgin and recycled materials will empower stakeholders to make informed decisions and trust secondary resources. Fourth, gathering data on buildings and cooperating with local urban planning authorities on creating material cadasters to serve as maps of what materials are stored in buildings in the selected region can help better plan construction projects to use local resources from demolitions, as seen in Pilot 4 for example.

- ✓ **Material Recovery R&D**: Fund research into technologies for recovering materials from construction waste.
- ✓ **Innovation Hubs**: Support hubs that test scalable circular construction solutions in diverse environments.
- ✓ **Technical Guides**: Create resources comparing virgin and recycled materials to inform stakeholders.
- ✓ **Material Cadasters:** Gather building materials data to build regional material cadasters to better assess the availability of resources and support construction with materials from logistically optimal demolitions.

Awareness, Education, and Culture Change

Widespread adoption of circular practices hinges on informed stakeholders and public support. First, launching awareness campaigns supported by compelling case studies will showcase the tangible benefits of circular design, reducing skepticism. Second, integrating circular economy principles into professional education and certification programs will ensure that future architects, engineers, and builders are equipped to lead the transition. Third, creating an open-access EU circular construction database and promoting knowledge-sharing platforms will foster transparency and collaboration across regions and sectors.

- ✓ **Awareness Campaigns**: Launch EU-wide campaigns showcasing the benefits of circular construction.
- ✓ **Education Integration**: Incorporate CE principles into construction education and certification programs.
- ✓ **Knowledge-Sharing Platforms**: Develop databases and platforms for sharing best practices and case studies.

6 Conclusion

Despite all the challenges outlined, technologies are advancing, and circularity is gaining traction in mainstream discourse. International collaboration and shared learning offer key opportunities for growth and resilience in the transition toward circular construction.

The application of circular construction principles in Europe, as demonstrated by the ongoing CIRC-BOOST pilot projects, brings a wide array of environmental, economic, and social benefits. These initiatives can significantly reduce resource demand and carbon emissions by promoting the reuse and recycling of construction materials, while also lowering the need for transporting raw materials by using locally sourced materials and recycled aggregates. This shift not only contributes to the circular economy but also opens new value chains, creating job opportunities and innovative business models.

The pilot projects offer a demonstration of sustainable solutions through the development of safer, more durable, and energy-efficient buildings. Moreover, they enhance industry-wide knowledge by integrating theoretical and practical insights on circular construction, raising awareness among all stakeholders - from developers to local communities. Digital platforms ensure traceability and transparency, increasing trust in reused materials. Beyond environmental benefits, these projects foster community engagement as well as preserve cultural heritage through adaptive reuse.

The acceleration of adopting circular construction principles as showcased in the pilot projects is largely in the hands of regional policy makers. However, scaling of the presented solutions requires enabling policies as well as support in addressing the presented barriers.

Key next steps

The key next step for regional policy makers is to **review and update local regulations** to mandate circular construction principles such as pre-demolition audits and selective deconstruction or support the use of secondary materials from demolitions. It is important to **lead by example** to set these standards as a common practice, for example by applying the green public procurement requirement for future tenders.

Another important step is to **develop regional marketplace-like platforms and databases** (both digital and physical) to enable easier reuse of materials which would otherwise end up in landfills.

Last but not least, **investing in R&D of material recycling and reuse** as well as **raising awareness and supporting training programs** in the region should be an integral part of all these efforts to adopt circular construction practices.

References

- Circboostproject.eu, 2023. Pilots. Available at: https://circboostproject.eu/
- EUR-Lex, 2020. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A new Circular Economy Action Plan For a cleaner and more competitive Europe. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN
- Reconstruct-project.eu, 2020. Reconstruct. Available at: https://reconstruct-project.eu/
- Woodcircles, Available at: https://woodcircles.eu/
- Pavlů, T., Pešta, J., Volf, M., Lupíšek, A., 2022. Catalogue of Construction Products Containing Secondary Raw Materials from Different Industries and Municipal Waste. ResearchGate (online). Available at: https://www.researchgate.net/publication/370356415_Catalogue_of_construction_products_containing_secondary_raw_materials_from_different_industries_and_municipal_waste
- ICC & EY, 2024. Putting the circular economy into motion: From barriers to opportunities. Available at: https://iccwbo.org/wp-content/uploads/sites/3/2024/10/2024_ICC-x-EY-Report_05-1.pdf
- Kirchherr, J., Hekkert,M., Bour,R., Huijbrechtse-Truijens, A., Kostense-Smit,E., Muller, J., 2017. Breaking the Barriers to the Circular Economy. (Online) Available at: https://circulareconomy.europa.eu/platform/sites/default/files/171106_white_paper_breaking_the_barriers_to_the_circular_economy_white_paper_vweb-14021.pdf
- Bragança, L., Griffiths, P., Askar, R., Salles, A., Ungureanu, V., Tsikaloudaki, K., Bajare, D., Zsembinszki, G., Cvetkovska, M., 2024. Circular Economy Design and Management in the Built Environment, A Critical Review of the State of the Art. Springer Tracts in Civil Engineering (Online), Available at: https://circularb.eu/wp-content/uploads/2025/01/978-3-031-73490-8-1.pdf

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