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CIRCULARITY IN THE BUILT ENVIRONMENT IN EUROPE

Opportunities to drive implementation

METABOLIC

INDEX

INTRODUCTION

In 2018, the built environment was responsible for approximately 40% of the combined EU27 and UK final energy consumption and 36% of their CO_2 (direct and indirect) emissions[1]. Furthermore, the construction and demolition sector is the single largest consumer of materials on the planet and is responsible for 30% of Europe's total waste[2]. The associated immense ecological impacts and effects on human wellbeing make the built environment a key leverage point in achieving the goals put forward in the Paris Agreement, along with many other sustainability objectives. Getting there requires long-term change and a transformation of the entire sector.

The circular economy presents a viable path to secure resources, limit impact, and promote affordability.

There is clear momentum and increasing awareness about the circular economy among stakeholders in the sector, catalyzed by the European Green Deal and circular action plans developed by national, regional, and municipal governments. Furthermore, the built environment is one of the sectors with the highest potential to reach circularity, according to the World Economic Forum[3]. However, accelerating the implementation of circularity in the built environment requires bringing scalable innovation to the forefront and informing new ambitious rules and regulations. With multiple local and international organizations executing and developing parallel efforts to scale the circular economy in the built environment across Europe, there is also a risk of repetition, inefficiencies, and resource loss. A collective network approach can help to bridge the gaps and harmonize the efforts.

The urgency is clear, but the hard work starts now. Systemic transformation requires a consolidated approach with broad buy-in from all stakeholders that takes the entire life cycle of the built environment into account. We need to act now and drive implementation to scale across Europe. So, where do we start?

The Metabolic Institute, supported by the Laudes Foundation Built Environment Programme, set out to explore the state of circularity of the built environment in Europe:

- Which building blocks (growing awareness, ambitious policy shifts, and the amplification of successful local pilots) are already in place, and what is holding back implementation at scale?
- What opportunities and considerations for accelerating action and implementation do we see across the sector?

The resulting snapshot lays out these key challenges, needs, and opportunities regarding circularity in the built environment. It is meant as a resource for anyone active in the built environment. This exploration served as broader input in the process of shaping a new program starting in May 2022: "Accelerating the Circular Economy in the Built Environment."

Our Approach

Metabolic Institute composed this snapshot through desk research, workshops, and conversations with key organizations and initiatives active in the field of circular action in the built environment in Europe. These include Pan-European policy-driven stakeholders, alliances, and key impact-driven organizations across scale and geography (non-profit, commercial, academia, and pilot projects). The selected organizations consist of a mix of existing partners from the Laudes Foundation network and other key organizations that emerged from desk research and conversation.

The consulted organizations include:

- **Policy-driven organizations:** World Green Building Council (WGBC), Ellen MacArthur Foundation (EMF), World Business Council for Sustainable Development (WBCSD), World Resource Institute (WRI), EIT Climate-KIC
- **Impact-driven organizations:** Circle House Lab, PRICE, El Poblenou, Promprylad.Renovation, Space&Matter, German Sustainable Building Council (DGNB), Hungary Green Building Council (HuGBC)

[1] *Sufficiency And Circularity*

[2] *European environment agency*

[3] *Built Environment, WEF*

WHERE ARE WE NOW: ENABLING CIRCULARITY IN THE BUILT ENVIRONMENT

BUILDING BLOCKS FOR A CIRCULAR ECONOMY: THE FOUNDATION

Scaling circularity in the built environment requires a foundation of policy, physical structures, financial mechanisms, and platforms for broad collaboration. What can we build on? Where do we see momentum and existing efforts in the built environment sector in Europe?

Increased awareness:

The built environment industry increasingly recognizes the toll of human activity on climate change and the need for systemic change instigated by scientific insight. Recent reports published by industry associations, research institutes, and policy-driven organizations demonstrate a European-level approach. These include Circularity Gap Report 2021, Architecture 2030 by WGBC, Advancing Net Zero Whole Life Carbon by WorldGBC, WRI's Zero Carbon Building Accelerator, and others.

Furthermore, the past decade has seen an enormous increase in the bodies of work developing knowledge towards circular principles of construction (EC, 2015; EC, 2020; RVO, 2020) and optimal cascading use of building materials, as well as demonstrated case studies for circular buildings. These provide a good starting point for new initiatives.

Ambitious policy pathways:

These policy pathways emerge across scale. To limit global warming to 1.5°C (Paris Agreement), the building sector needs to reduce its emissions by 77% by 2050 compared to today's level (IEA, 2021). According to UNEP, 2020, to stay in line with the Net Zero Emissions by 2050 Scenario, direct building CO_2 emissions need to fall by 50% by 2030, which equates to around 6% per year. At a European level, the European Commission's new Circular Economy Action Plan (EC, 2020) is positioned as a key pathway to achieving the EU's 2050 climate neutrality target. We see 54%more countries mention the building sector as part of the Nationally Determined Contributions (NDCs) (UNEP, 2020). Many suggested policy pathways towards decarbonization of the building sector have been developed to drive the transition forward (WRI, 2019).

Finance and innovative funding mechanisms:

To finance circularity, we see increased availability of green financing, innovative funding schemes, multisector carbon pricing, among other mechanisms (ENP FI, 2020; WEF, 2022). Green investments in the building sector have increased by nearly 40% since 2015 to $180 billion USD in 2020 (UNEP, 2020). This is aided by tools for change in value perception, such as the Building Value Framework developed by The World Economic Forum's Net Zero Carbon Cities program. This framework intends to shift how the value of investment in the built sector is perceived and defined, by considering the social, environmental, and system performance outcomes in addition to traditional financial measures.

Existing solutions and frontrunners:

Many innovative solutions to accelerate the circular economy in the built environment already exist. There is a massive opportunity in amplifying these proven solutions through efficient coordination and cross-fertilization between initiatives across geographies.

Circular economy business models for the built environment have existed since as early as 2016 (RoyalBAM, 2017). More recently, WBCSD has promoted the business case for circular buildings, exploring the economic, environmental, and social value of the proposition (WBCSD, 2021).

Building material and system innovations to reduce embodied carbon and other embedded environmental impacts on the life cycle of building materials have also seen a huge leap over the past decade. There are demonstrated efforts towards developing low-carbon concrete, bio-based alternatives, and green steel, as well as for mechanisms such as material reuse, urban mining, modularity in elements, design for disassembly, and more.

Local movement: Many local circular hubs and knowledge platforms exist (Annex II), which provide an opportunity to build a central platform that monitors their activities, ultimately tracing cumulative action. An initial mapping of solutions that address a circular built environment demonstrates:

- A high concentration in Northern Europe, with some initiatives and actors in France, Spain, Italy, and Slovenia.
- Initiatives in Southern Europe emerge from programs led by policy-driven organizations with EU funding.
- Global and local knowledge networks such as PRICE, the Fab City network, and CE Hub are already setting examples in collaborations for designing, developing innovative solutions, and building the local capacity to scale implementation.

BUILDING BLOCKS FOR A CIRCULAR ECONOMY: CHALLENGES

We see increased momentum in policy pathways, and a rich innovation ecosystem is in place in Europe. So, what is holding back broad adoption?

Key findings emerging from our exploration cover the following themes:

1. Coordinated efforts between key stakeholders and a shared understanding;
2. Shortage of scalable market-ready solutions;
3. Building capacity and necessary skills across the sector;
4. Shortfall of capital and financial capacity; and
5. A circular built environment requires new rules and regulatory frameworks.

Moreover, ***the main bottlenecks to implementing a circular economy were noted to have similar underlying roots for local, national, and European levels.*** Independently, these bottlenecks are being addressed by many global organizations, like Climate-KIC, WBCSD, WGBC, and local entities, such as the El Poblenou, Promprylad.Renovation, Space&Matter, and many others.

1. A need for coordinated efforts between key stakeholders and a shared baseline understanding of what circularity in the built environment entails

- City and national governments across the EU are looking towards the circular economy as a way to accelerate sustainability efforts, leading to a shared understanding of CE on a macro level. Yet the shared understanding of how circular economy solutions can work at a microeconomic, context-specific, and industry-specific level still needs further development. Different organizations are tackling different areas of the industry, and there is an opportunity to combine the learnings from these efforts.
- A transition to a circular built environment requires all stakeholders to take on different roles in the value chain (see fig.1). There is a need for long-term alliances that engage key stakeholders in the circular built environment. Key stakeholders, such as WBCSD and Green Building Council, can play a central role in empowering industry players to effectively adapt their operations to their new role in the value chain.[4]

Figure 1 *Key stakeholders in the built environment, derived from Scaling the Built Environment (2018)*

[4] *Scaling the Circular Built Environment, WBCSD*

2. Shortage of scalable market-level solutions

- Every geographical context is different. Local impact-driven organizations indicate that it is challenging to replicate solutions in other places or projects due to the specifics of each context and the **lack of shared infrastructure.**
- Standardization for the **physical performance of bio-based and secondary materials** has yet to be developed across the EU. This results in additional performance risks associated with using these materials in construction projects.
- Measurement requirements and standards regarding circular building design differ at the national, city, and material levels. This adds a considerable amount of **complexity to implement circular design principles** comprehensively across European projects. Templates of measuring methods and indicators enabling private sector certification should include CE principles (e.g. BREEAM).

3. A need for building necessary skills and capacity along the value chain and among stakeholders

- Implementing the circular economy across the entire value chain requires new skills, knowledge, and expertise in upcycling, material management, and the reuse of construction elements. **Building the necessary capacity and accessible knowledge base** is a crucial factor in driving forward implementation of CE principles in a highly regulated, conservative, risk-averse industry.
- Having further insight on which **specific enabling mechanisms** the public and private sectors require to accelerate implementation of the circular economy in the built environment can help accelerate its adoption across Europe. These include innovative financing mechanisms, frameworks regarding rules and regulations, ownership models, and new materials.

4. Capital and financial capacity require further development

- Developing novel and sustainable ways of finance mechanisms and investment models for circular construction, transformation, and deconstruction projects is vital. These could include incentives, such as a direct correlation between the amount of secondary material used in the project and the built area that can be used, or the use of taxes and/or incentives for not having demolitions.
- The development of **green chemistry,** which e.g. supports circularity in materials and opportunities for desing for disassembly, requires funding and technical capacity.
- Despite emerging innovation in circularity across regions in Europe, we see a gap in long-term momentum around the funding of CE projects and local projects and initiatives. The success of these efforts is often inherent to long and tedious **non-standard processes** compared to the more market-ready projects that fit the linear economic system. Conversely, since innovation is a lengthy process that carries slow-moving product development cycles, it can drive the development of new mechanisms and business models into a system not yet fit to facilitate them.

5. A circular economy requires innovative rules and regulatory frameworks

- Bringing circular solutions to scale requires **new policy and regulatory frameworks**. Built environment decision-making and goalsetting, however, is typically spread across various public departments, whether on the national or city level. This presents challenges regarding the efficient development of the holistic regulatory frameworks needed to facilitate landing the circular economy in the built environment. In addition, it requires restricting rules and regulations to be terminated.
- Impact-driven organizations have been effective in collaborating with public institutions to develop regulatory frameworks. However, they often remain local to regional jurisdictions, limiting their potential for replication across geographies.

BUILDING BLOCKS FOR A CIRCULAR ECONOMY: OPPORTUNITIES

Based on the engagement of central organizations in the space of decarbonizing European buildings, we have found strong alignment on opportunities regarding aggregating efforts and aligning around a common understanding of the circular economy in the built environment. More specifically:

Collaboratively building a **Circular Economy strategy** that includes a holistic, systemic narrative together with Pan-European advocacy and membership organizations, market players, and local impact-driven organizations can be translated to scale on-the-ground actions. Facilitating this engagement can help increase advocacy and strengthen pressure on those macro barriers that are holding back scale. It can furthermore help **build capacity** within policy-driven organizations and **amplify success stories** from a local to a global platform.

This is also related to **redefining value** in the circular built environment. The value of assets and resources should be linked to demand and performance. Moreover, participation in circular value chains should be incentivized and taken into account through Environmental, Social and Governance (ESG) reporting and assessment of Scope 3 emissions.

Building **new partnerships** and strong **structures for collaboration** can allow for sharing of templates, assets, and knowledge resources across the value chain and geographies. For instance, WGBC is mobilizing and engaging the global GBC network and defining metrics that industry, investors, and companies align with for reporting.

The built environment plays an important role in aiding a fair society where space is affordable and accessible to citizens of different ages and incomes, as well as to companies of different sizes. Including **social equity** in CE solutions is vital to the success of CE actions and has the potential to create resilience and trust in the system, ensuring equitable access to common urban resources.

More opportunities revolve around the scaling of best practices:

Every context is different, and local markets across European regions are at different stages of maturity. Although some solutions provide great potential for scale, leveraging **local value chains** and **suppliers' value chains** to co-create innovative solutions tailored to local circumstances is necessary for successful implementation. This also presents an opportunity to incorporate procurement models at a system level, supplier level, and product level, creating a blueprint of a solution that can help accelerate its implementation.

Creating common and mutual agreements to **implement best practices** including business models. **Demonstrating business cases** with relevance for decision-makers (investors, developers, entrepreneurs) will enable greater access to investments. This includes showcasing well-performing buildings on circular criteria that have existed for a long time while promoting renovation and reuse projects. There is also a need for EU level blueprints for decentralized secondary materials hubs to facilitate. These will ensure better management and the availability of secondary materials that are required by matching customers. Business models that incentivize circularity for market players need to be codified and scaled.

Policy-driven organizations, together with municipalities, can scale action by **establishing local labs** that address the lack of infrastructure and flagship projects. These can catalyze new relationships between stakeholders and enable replication of these solutions. Moreover, there is a need to establish innovation labs that can delve deeper into green chemistry and align the best results with the construction sector.

Policy and regulatory frameworks are crucial to building the enabling context where circular solutions can land. Opportunities include:

There is a significant opportunity for the EU to consistently **integrate "whole-life carbon" in the policy framework**[5], by leveraging the Energy Performance of Buildings Directive (EPBD), the Energy Efficiency Directive (EED), and the Construction Products Regulation (CPR).

EU Policies, such as the CEAP[6], advocate for **maintaining materials in the economy** for as long as possible by creating initiatives across the life cycle of products. This requires maintaining the quality and value of the materials over a longer term, and reducing the number of hazardous substances in construction materials, allowing for reuse and recycling. For these initiatives to be successful for the built environment, **standardizations** need to be developed for material reuse, material recycling, material passports, and Building Information Modeling (BIM). Developing a regional database to act like a material inventory is required.

[5] *Whole-Life Carbon: Challenges And Solutions For Highly Efficient And Climate-Neutral Buildings*

[6] *Circular Economy Action Plan, 2020*

PATHWAYS FORWARD: ACCELERATING TOGETHER

It is clear that the main bottlenecks to implementing circularity in the built environment have similar underlying roots at local, national, and European levels. Separately, these challenges are being addressed by many global and local impact-driven organizations that are already leading the way on the ground. So, how do we move forward? To achieve circularity at scale in Europe, we need to **cultivate alliances, build a common understanding (narrative), and amplify proven solutions**.

Achieving scale requires innovators, frontrunners, and Pan-European organizations to develop a shared vision and narrative for what a circular built environment should look like. To drive broad adoption of the circular economy in the built environment, these organizations need a solid foundation and alignment to overcome systemic challenges regarding financing mechanisms, rules and regulations, linear market dynamics, and ownership models. Finally, we need to uncover evidence-based practices and projects put forward by frontrunners that are already addressing the systemic challenges and determine how their solutions can be captured in blueprint projects that allow these practices to scale across Europe.

We see true momentum to bridge the gaps between all of these efforts, creating a gateway to realizing circularity in the built environment. Let's get going.

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ANNEX 1: KEY POLICY DRIVEN ORGANIZATIONS

Organisation Name	Type of organisation	Expertise	Pre Existing programs (competitions, challenge funds etc)	Knowledge of the built environment	Capacity building/ Educational activities
WRI	Global research organization	Food, Forests, Water, Energy, Climate, the Ocean and Cities.	Cities: WRI Ross Center for Sustainable Cities helps turn cities into resilient, inclusive, low-carbon places that are better for people and the planet. Works with communities, businesses and governments to understand the new urban reality and navigate competing tensions so they can adapt and harness the benefits of change. **Main projects:** *Towards a more equal city report series* *Prize for Cities award* *Zero Carbon Building Accelerator* *Buildings Initiative*	Urban Development, Urban Efficiency and Climate	Lead partner of the Building Efficiency Accelerator, an effort of the United Nations' Sustainable Energy for All initiative. The public-private collaboration connects a global network of cities to technical expertise to accelerate local government implementation of building efficiency policies and programs.
WBCSD	WBCSD is a global, CEO-led organization of over 200 leading businesses working together to accelerate the transition to a sustainable world.	Sustainable businesses, maximum positive impact for shareholders, the environment and societies.	*Transforming the Built Environment* (within sustainable cities workstream) **Recent Reports:** *Digitalization of the built environment* *The Building System Carbon Framework* *Circular Biz Case Report*	**Workstreams:** Circular Built Environment Decarbonization Digitalization Finance Space & Urban Planning	Demonstrating leadership in international negotiations & processes around the SDGs agenda
Climate Kic	Knowledge and Innovation Community	Creating Networks of expertise	*Social innovation living lab in Milan:* The Merezzate+ project demonstrates how urban environments offer the potential for lifestyles with low environmental impact because high population densities are suited to sharing transport, energy and other resources. *Smart Sustainable District:* EIT Climate-KIC supports international collaborations in the area of infrastructure, transport, utilities and the built environment	Convening networks, Leveraging Grants, catalyzing innovation	EIT Climate-KIC runs a range of inspirational education programmes across Europe and online, for students, postgraduates and professionals. These programmes develop their participants' skills and capacities, empowering them with up-to-date knowledge and best practice.

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Organisation Name	Type of organisation	Expertise	Pre Existing programs (competitions, challenge funds etc)	Knowledge of the built environment	Capacity building/ Educational activities
C40	Provides networks	Cities	*Climate Positive Development Program* (partnership with the Clinton Climate Initiative & the U.S. Green Building Council) - aims to create a model for large-scale urban communities and to support projects that serve as urban laboratories. *C40's Reinventing Cities initiative* - C40 and these cities invite architects, urban planners, designers, developers, entrepreneurs, environmentalists, start-uppers, neighbourhood collectives, innovators and artists to collaborate and compete for the opportunity to transform these sites into new beacons of sustainability and resiliency.	Climate Positive Development Program	Convenes networks and provides services (technical assistance, facilitation of peer-to-peer exchange, research, knowledge management, communications).
WorldGBC	Non-profit	Built environment standards	Advancing Net Zero - aims to promote and support the acceleration of net-zero carbon buildings to 100% by 2050 Better Places for People - supports GBCs and their members in increasing the demand and supply of green buildings which support the health, wellbeing and productivity of people within them. *Building Efficiency Accelerator* - speeds the development and implementation of building efficiency policies and practices in cities around the world. World Green Building Week - week involves special events promoting public awareness of sustainability and green building around a selected theme WorldGBC awards - presents two major annual awards recognising the contributions of individuals to the global green building movement.	Green buildings certifications and standardizations	

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Organisation Name	Type of organisation	Expertise	Pre Existing programs (competitions, challenge funds etc)	Knowledge of the built environment	Capacity building/ Educational activities
EMF	Foundation	Circular Economy	Circular Design Challenge - Calling designers, entrepreneurs, academics and scientists to rethink the plastics system and eliminate plastics packaging waste	Global view of the CE. Partners with *other organisations* (e.g. Arup, MAVA) when making reports about the built environment.	The Foundation emphasises interdisciplinary, project-based and participatory approaches, encompassing both formal education and informal learning. Higher Education programmes with universities in Europe, the US, India, China, and South America, international curriculum development with schools and colleges, and corporate capacity building.
ICLEI	International non-govern-mental	Sustainable urban development	*Cultural heritage start-up competition* (cultural heritage, adaptive reuse, inspired by CE principles) - The competition is being organised by the CLIC project, in which ICLEI Europe coordinates "Heritage Innovative Partnerships", which convene representatives from cities and regions with research partners. *CityLoops Project* - brings together seven European cities – Apeldoorn, Bodø, Mikkeli, Porto, Seville, Høje-Taastrup and Roskilde - to pilot a series of demonstrations actions to close the loop of two of the most important waste streams in Europe: Construction and Demolition Waste, and Biowaste. Their ultimate aim is to become circular cities in which no resource goes to waste, driving the transition to the circular economy.	*ICLEI has joined a coalition of 31 stakeholders* calling on the European Commission to deliver an ambitious EU strategy for a Sustainable Built Environment (SSBE) as part of its implementation of the Circular Economy Action Plan.	Good with educational activities and awareness-raising.

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Organisation Name	Type of organisation	Expertise	Pre Existing programs (competitions, challenge funds etc)	Knowledge of the built environment	Capacity building/ Educational activities
European Investment Bank (EIB)	Not for profit	Funding project on the areas of climate, environment, and SMEs. It primarily funds projects that 'cannot be entirely financed by the various means available in the individual Member States. The EIB is not funded through the EU budget. Instead, it raises money through the international capital markets by issuing bonds.	The Social Innovation Tournament recognises and supports the best European social entrepreneurs.		Invests in educational activities, but doesn't organise them.
European investment fund (EIF)	Financial institution (public-private)	Risk finance to benefit SMEs across Europe. Manufacturing is one of the primary industries where they invest.			
ABN Amro	Financial institution			"We want to finance real estate that retains its value for future generations and reduces carbon emissions. We are keen to play a pivotal role in making properties in the Netherlands more sustainable, which we do by supporting innovative developments, encouraging redevelopment and attempting to increase the energy efficiency of existing buildings."	Distributes funds

ANNEX 2: KEY ACTION/IMPACT DRIVEN ORGANIZATIONS

Organisation Name	Country	Type	Area of Expertise	Description	Network
AMS institute	Netherlands	Local academia	Circularity in Urban Regions	Analyze, design and engineer solutions towards making cities that are more sustainable, prosperous, resilient and just.	Network of Institutional partners and projects partners, mostly local.
Baker Brown studio	UK	Industry player	Net Zero Buildings	Experimenting with new designs, materials, and ways of working, our better-known work includes our circular economy-influenced design for London's Greenwich Millenium Village, designing The House That Kevin Built, the UK's first A* Energy Rated Building, and creating The Waste House, the world's first building made of waste.	Partnering with private clients, enlightened developers, and local authorities
Bamb	Belgium	Project	Circular Value Chains	In the Project BAMB – Buildings As Material Banks 15 partners from 7 European countries were working together with one mission-enabling a systemic shift in the building sector by creating circular solutions.	Producers/suppliers of building materials and installations; – construction and installation firms; developers/property owners/facility managers; architects/engineers/ advisers; logistics managers; real estate consultants and building owners; recycling and deconstruction companies; policymakers; policymakers; researchers.
Blue city Lab	Netherlands	Lab	Biodesign	BlueCity is an exemplary city for the circular economy where entrepreneurs exchange their residual flows, making waste valuable raw material. Collaboration, thinking and getting your hands dirty is essential here.	Network of education, renovation, programming, network & project partners
Bureau SLA	Netherlands	Industry player	Architecture	As an office, bureau SLA consists of a team of architects and builders, supported by architectural historians, landscape architects, and energy experts. The studio does not wait for commissions to be given but builds and develops in the city in an innovative way — from their own initiatives and with their own manpower.	
BUUR by SWECO	Belgium	Developers	Development	BUUR and Urban. Habitat constitutes BUUR Part of Sweco. By merging the activities of Sweco and BUUR we are strengthening our expertise in terms of strategic and spatial planning, urban design, mobility, environment and ecology and the realisation of public spaces and landscapes.	
CB23	Netherlands	Lab	Research & policy in the construction sector	Drafting agreements for the entire Dutch construction sector: both residential and non-residential construction and civil engineering.	

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Organisation Name	Country	Type	Area of Expertise	Description	Network
CC build	Sweden	On-ground actor	Circular Construction	The Center for Circular Construction (CCBuild) is led by IVL Swedish Environmental Institute and is developed in collaboration with other parties in innovation projects. Until September 2022, CCBuild will be developed within the framework of Vinnova's Challenge-Driven Innovation (UDI) program step 3.	
CE Hub	UK	Lab	Circular economy coordinators	The overarching vision of the programme is to accelerate interdisciplinary research, innovation and impact to scale up a UK Circular Economy.	Largest and most comprehensive UKRI Investment in CE to date. Mainly funded by the NICER Programme. Partners include Business school, University of Exeter, UK Research and Innovation.
Cinderela	Slovenia	Project	Business Models for Urban construction	The CINDERELA project aims to untap this potential by developing and demonstrating a new business model (CinderCEBM) to assist companies in setting up successful circular economy business cases based on waste-to-resource opportunities. The business model will be accompanied by a "one-stop-shop" (CinderOSS) service offering all that companies need to know for manufacturing and application of SRM-based construction materials in buildings and civil engineering works.	
Circle House Lab	Denmark	Lab	Circular economy accelerator	Circle House Lab aims to accelerate the transition towards a circular economy in the Danish building industry.	
Circulair vlaanderen	Belgium	On-ground actor	Circular Economy	Flanders Circular is the hub and the source of inspiration for the circular economy in Flanders.	Governments, companies, civil society, knowledge world
Circular Change	Slovenia	Networking platform	Engagement, co-creation, partnership	A private non-profit organisation with a strong international network serving as the best entry point for circular economy projects across Europe.	Huge Cross-sectoral Network.
Circular Construction Hub Finland	Finland	Project	Business in CE (partnerships, and cooperation)	The project's goal is to find new business activities and business models in the circular economy as well as new partnerships and a new kind of collaboration in the six largest metropolitan areas.	Universities, business organisations,
Circular economy initiative Deutschland	Germany	Industry player	Practical implementation (i.e. collaborative projects)	The Circular Economy Initiative Deutschland brings together economic, scientific and societal stakeholders. Its aim is to develop a joint target vision and a concrete plan for how the transformation towards a Circular Economy in Germany could be fostered.	Economic, scientific, and societal stakeholders, Federal Ministry of Education and Research, participating companies, national and international experts
Cirkelstad	Netherlands	Accelerator	Platform for partnerships	Circle City was created between public and private entrepreneurs who were looking for solutions.	

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Organisation Name	Country	Type	Area of Expertise	Description	Network
CRAterre	France	Industry player	Earthen architecture and materials	CRAterre's three main objectives are centred on optimizing the use of local resources, human and natural, Improving housing and living conditions, Valorising and promoting cultural diversity	
Cultural and Creative Spaces and Cities (CCSC)	Finland	Project	CCSC is a policy project co-funded by the Creative Europe Programme of the European Union.	They have already explored new and groundbreaking methodologies of co-creation and participatory policy development.	Seven organisations and institutions are responsible for leading and organising seven Urban Labs in partnership with a number of selected organisations,
Dark Matter Labs	UK, Netherlands, Sweden	Industry player	Multidisciplinary design team working with partners, clients, and collaborators	Based around collaborative, strategic experiments to learn about the 'dark matter' of systems; from policy and regulation, finance and data, governance and organisational culture, to identity and democratic participation.	Global Network
De Architekten Cie	Netherlands	Architects	Architecture	We have the ambition to create sustainable environments for clients and users, and for the community and culture in which our designs are realized.	Partnership with more than 50 countries.
DGBC	Netherlands	Local GBC's	Green Building	DGBC is the national social organization that is committed to making the built environment future-proof at a rapid pace.	
DGNB: German Green Building Council	Germany	Local GBC's	Green Building	Committed to demonstrably good buildings and urban districts that are worth living in. In straightforward terms, this means building an environment around ourselves with foresight	1200 members, making it Europe's biggest network for sustainable building.
El Poblenou living lab in Barcelona	Barcelona	Lab	Cities and local labs engagement with SMEs	Connected to Institute for Advanced Architecture of Catalonia and Fab Lab Barcelona, Urban Lab "is a tool to facilitate the use of public spaces in the city of Barcelona, to carry out tests and pilot programmes on products and services with an urban impact. The idea is to use the city as an urban laboratory".	
European Network of Living Labs	Global	Lab	Living labs and value proposition	The European Network of Living Labs (ENoLL) is an international non-profit association that aims to promote and enhance user-driven innovation ecosystems,	
Global Building Performance Network	France	On-ground actor	Decarbonizing Building sector	"We choose our projects very selectively to ensure we work only where we can have the greatest impact."	Network of living partners, Innovation partners and strategic partners (World bank, FAO etc.)
Houseful	Austria	On-ground actor	Innovative circular solutions and services for the housing sector	HOUSEFUL will design innovative interventions for efficient management of materials, waste, water and energy along the entire housing value chain. This will be done by demonstrating the feasibility of an integrated systemic service composed of 11 circular solutions, which will be demonstrated in four different buildings located in Vienna and nearby Barcelona.	Stakeholder Map

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Organisation Name	Country	Type	Area of Expertise	Description	Network
HPP Architects	Germany/ International	Industry player	Urban design and management	"We are an international partnership composed of 450 architects, interior designers, town planners, lead consultants and project managers."	
HuGBC	Hungary	Local GBC's	Architectural regulation, green rating systems (LEED, BREEAM, DGNB)	HuGBC strength is the market stakeholders; policy decisions are made without knowing what is happening in the market.	Stakeholder Map
European Circular Economy Stakeholder Platform	Italy	Networking platform	European CE Stakeholder platform	A platform for Circular Economy discussion and knowledge sharing.	Large cross-sectoral Network. supported by ENEA and ENESP
Insert	Netherlands	On-ground actor	Collaboration	Insert is committed to creating a better tomorrow by combating raw material waste today. We do this for various sectors, such as the construction, green and civil sector. By connecting and providing insight, we contribute to the highest possible reuse of materials and green objects.	Circular and green actors in the NL
Kodasema	Estonia	Industry player	Architecture, design and engineering	Creates innovative living and housing solutions. Simplicity and freedom – are the values that a KODA house offers creating more energy and time in many ways.	
Madaster	Netherlands	Digital Platform	Digital Platform for online registry for materials and products	Madaster automatically generates secure, web-based passports for registered buildings and construction objects. These passports contain information about the quality, origins and location of materials and products used in the construction of buildings and other construction objects and provide insight into the material, circular and financial (salvage) value of these properties.	
Mae architects	UK	Industry player	Social, sustainable and spatial design	Specialists at the forefront of housing, health & care and social infrastructure we design at all scales. From the city to the living room, we apply integrated thinking to deliver resilient architecture for the long term.	
MIT city science lab	Hamburg, Germany	Local academia	Stakeholder engagement tool that serves as a platform	Interactive stakeholder engagement tool that also serves as the platform for joint research of modules for city simulation	
Net positive solutions	UK	Industry player	Research, Innovation & Business models	They support horizontal and collaborative approaches over hierarchical organizational structures	Handshake Partners: In total, 37 organisations in 21 European countries are part of the Urban Labs.
Noordelijk Innovatielab Circulaire Economie (NICE)	Netherlands	Networking platform	Cities & Regions	The main goal is to accelerate the transition to the circular economy	18 organisations partnered to include students who, in their projects work on different social issues.

ANNEXES

Organisation Name	Country	Type	Area of Expertise	Description	Network
Overtreders W	Netherlands	Architects	Architecture	"We make the designs, for a successful implementation we work with the specialists from our network - from builders to image-makers, from constructors to curators."	
PRICE almere	Netherlands	Lab	Research, Innovation, and materials	Research, Innovation, and materials	
Promprylad Renovation	Ukraine	Developers	Stakeholder engagement	Stakeholder engagement	International government (i.e. Gov. Canada, British Council), investors, businesses, foundations, schools, impact hubs. The Project is implemented by the consortium of the strategic partners: Teple Misto, Insha Osvita, Beetroot Academy, Pact Ukraine and LvBS.
ReLondon	UK	On-ground actor	Waste management	Waste management	
Saint Gobain	Global	Industry player	Sustainable Construction	They are both an international and multi-local company, fully integrated into the territories where they operate to support their vitality and help build a fairer and more sustainable, open and engaging world.	
Samso - sustainable island (Samso Energy Academy)	DK	Local academia	Phasing out fossil fuels for renewables, sustainable management, energy accounting	Samsø Energy Academy's ambition is to provide a broader sustainable perspective based on the United Nation's 17 Sustainable Development Goals. Our ambition and intention at the Energy Academy are to lead the way, with Samsø as a practical example of sustainable transition. The location and size of the island, with its 3,700 year-round residents, is not a limitation. Instead, Samsø provides clarity that furthers the understanding of common sense, so the sustainable transition can be used and applied regionally, nationally and internationally.	Government visitors, ~5000 annual visitors
Skanska	Global	Industry player	Construction and project development	Skanska is a world-leading project development and construction group, building for a better society.	
Space&Matter	Netherlands	Industry player	Urban Design, Architecture	Their aim is to discover, design and develop strategies that support a more democratic, distributed and sustainable city.	
Space10	Denmark	Lab	Research and Design	Space10 works with a global network of specialists, research partners and creatives and shares all research and ideas publicly. They are external and independent of IKEA but are supported by them.	

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Organisation Name	Country	Type	Area of Expertise	Description	Network
Turntoo/RAU Architects	Netherlands	Architects	Circular Economy	Turntoo assists companies and institutions in the development and implementation of circular business models and strategies and facilitates the transition to a circular economy.	
UK Green Building Council	UK	Local GBC's	Sustainable built environment	Collaborate, enable, advocate, inspire	500 member organisations spanning the entire sector. Global network with the WorldGBC (+70 national GBC)
Vereniging Circulair Friesland	Netherlands	Networking platform	Circular Economy	Friesland Cleverly Anticipates What Is To Come And Makes Products From Green Raw Materials, Extracts More From Water And Sludge, Grows Delicious Products On Saline Soil And Surprises With Creative Solutions That Fit The Economy Of The Future.	Active and open network of circular precursors, including all Frisian governments and large knowledge institutions
Videnscenter for cirkulaer oekonomi I byggeriet	Denmark	Local academia	Knowledge Centre for Circular construction and demolition	The Knowledge Center for Circular Economy in Construction - VCØB - gathers, develops and disseminates impartial and concrete knowledge about the circular economy in the construction industry.	
WasteBuild	UK	Digital Platform	Building partnerships and collaborations	WasteBuild is a year-round platform for showcasing the latest materials, techniques, solutions and innovators themselves that are helping to deliver circular construction schemes today.	
WhatDesign-CanDo	*Netherlands*	*Local academia*	*Use Design as a tool & are impact focus*	They focus on using design as a solution	
Zero Waste Scotland	*Scotland*	*On-ground actor*	*Zero Waste*	Will lead Scotland to use products and resources responsibly. Making Scotland a pioneer of the Circular Economy, just as we were a pioneer of the industrial revolution.	

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