Circular Economy Act

The engineering perspective on a circular economy for the built environment
September 2026

The European Federation of Engineering Consultancy Associations (EFCA) has member associations in 27 countries, representing more than 10,000 companies from the European engineering consultancy industry and related fields. Based in Brussels, EFCA is committed to facilitating constructive dialogue with European Institutions on issues impacting our industry; and engaging with international stakeholders on shared interests.

EFCA's position in brief

- EFCA calls for a clear circularity hierarchy that prioritises reducing material use, extending asset life and promoting reuse before recycling. These priorities should be, supported by consistent and dependable EU legislation and standards.
- Infrastructure and housing account for around 50% of global material extraction, making circularity essential for Europe's resource security, competitiveness, resilience and climate objectives.
- Circularity in infrastructure must extend beyond recycling to prioritise material reduction, reuse, repair, refurbishment, adaptability and life extension. Recycling should be the solution only when higher-value options are not feasible.
- Despite an ambitious EU policy framework, implementation remains fragmented due to regulatory inconsistencies, limited market demand, insufficient data, fragmented value chains and procurement practices focused on lowest upfront cost.
- Infrastructure requires a whole life-cycle approach, integrating circularity into planning, design, construction, operation, maintenance and deconstruction. Decisions made at the design stage determine resource use and environmental performance for decades.
- Consulting engineers are key enablers of the transition, translating policy into practical solutions, integrating circularity principles into project delivery and supporting informed, long-term investment decisions.
- The EU should establish harmonised rules for reused and secondary materials, including quality, certification, liability and end-of-waste provisions, while promoting procurement based on life-cycle value, resilience and resource efficiency rather than lowest initial cost.
- Interoperable digital tools, including BIM, digital twins and material passports, together with common data standards and robust circularity indicators, are essential to improve traceability, measure progress and scale up circular solutions.
- By aligning regulation, market incentives and digital innovation, the EU can make circularity a driver of sustainable infrastructure, resilience, competitiveness and long-term resource security.

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1. Introduction

Infrastructure and housing account for 50% of all materials extracted worldwide[1]. The current use of natural resources is not sustainable and poses significant challenges for resource availability. For instance, sand, gravel and crushed rock are the most extracted materials, and urgent action is needed to avoid a "sand crisis", according to the United Nations Environment Programme (UNEP)[2]. In this context, circularity not only addresses global sustainability challenges, but also offers solutions for infrastructure delivery, resilience, cost stability, and long-term resource security. This position paper examines circularity within the built environment, with an emphasis on - infrastructure (transport, energy, water, etc.), in both urban and non-urban areas. The document, provides the point of view of consulting engineers.

Circularity is often understood narrowly as practices that optimise resource use and minimise waste. In infrastructure, we must move beyond waste management and recycling, towards a full life-cycle approach that prioritises material reduction, reuse, repair and life extension. EU policy should create the regulatory and market conditions needed to make this mitigation hierarchy operational in practice. Circular approaches, particularly reuse, repair, and design for adaptability, reduce reliance on virgin resources while preserving existing value.

Although the need for systemic change towards circularity has been identified, the implementation in practice remains constrained by fragmented regulatory frameworks, limited client demand, insufficient data and tools, and misalignment between policy objectives, legislation and real-world decision-making processes. Addressing these barriers is essential to achieving circularity at scale. Furthermore, policies should go further than the product level. They must address planning, design, asset management and systems with a long lifespan. Consulting engineers translate circular principles into design choices, data systems, risk management and scalable delivery. They also play a key role in overcoming practical barriers such as data gaps, risk allocation, and integration of circularity into existing project delivery models.

2. The current circularity challenges in infrastructure

The European Union has made significant progress in advancing circular economy principles and concrete market applications through initiatives such as the Circular Economy Action Plan, the Construction Products Regulation revision, and policies addressing waste, critical raw materials, sustainable products, and sustainable buildings. However, circularity for infrastructure/construction remains rather fragmented. Regarding circular infrastructure, we see the following key challenges:

1. The absence of a clear and operational mitigation hierarchy for materials use in the infrastructure sector.

[1] https://www.stockholmresilience.org/research/research-stories/2026-02-19-finding-sand-solutions-for-desirable-futures.html
[2] https://www.unep.org/resources/report/sand-and-sustainability-10-strategic-recommendations-avert-crisis?utm_source=chatgpt.com

2. Current EU frameworks on circularity often focus strongly on recycling and waste management, while less attention is given to complementary practices such as, reduction, reuse, repair, and life extension of products. These can have an equal or even greater impact, and together ensure a holistic approach. Without a structured hierarchy that prioritises these strategies, policy could encourage solutions that only manage waste rather than avoiding resource use in the first place.
3. Existing policy frameworks often address circularity at the product or material level, while infrastructure systems require a broader life-cycle and systems perspective. Projects often involve assets with a long lifespan, complex supply chains, and significant upfront design decisions that determine material use for decades. EU policies should explicitly recognise the role of early design, asset management, and infrastructure planning in enabling circular outcomes.
4. Reducing the high environmental impact and supply chain risks of the key construction materials: asphalt, concrete, steel and other metals. This relates not only to how we build but also to how to make those industries much more sustainable. More EU incentives are needed to make them future-proof, given their long investment cycles.
5. The regulatory and market barriers to the recyclability and reuse of materials, products and components. Inconsistent rules across Member States regarding waste and product status, liability, quality standards, and certification create regulatory uncertainty and suppress investment in both recycling and reuse markets. These inconsistencies limit the development of secondary material markets and hinder cross-border reuse of materials and infrastructure components. In addition, unclear legal status of reused materials, insurance-related uncertainties, and rigid compliance requirements make it difficult for engineers and project owners to guarantee performance and integrate reused components into projects.
6. Fragmented value chain and misaligned incentives across stakeholders further hinder implementation. Limited client demand, lack of awareness and competence among procurers, and procurement practices focused on lowest upfront cost rather than life-cycle value reduce the uptake of circular solutions.
7. Insufficient availability of reliable data, lack of standardised methodologies, and limited interoperability of digital tools constrain the ability to assess, compare, and scale up circular solutions across projects and borders. Skills gaps in circular design, systems thinking, and new business models further slowdown adoption.

To fully realise the potential of circularity in the infrastructure sector, EU policy should therefore strengthen the hierarchical approach to resource use, provide clearer frameworks for safe and reliable reuse of materials and products, continue improving recycling legislation and support system-level circular strategies across the infrastructure life-cycle. The implementation of these circular strategies and practices requires adoption of digital tools and advanced information management systems, as well as the development of standardised methodologies for managing information related to circularity. Consulting engineers play a key role in translating these frameworks into practical solutions but require reliable regulation and supportive market conditions to do so effectively.

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3. Embedding sustainability in infrastructure through circularity

The infrastructure we need for our daily lives, like roads, railways, electricity grids, water pipes and telecom services is a major contributor to material use, energy consumption, emissions and land impact. Circularity links material efficiency with reduced energy demand, lower climate emissions, and decreased pressure on ecosystems. Reuse, refurbishment, and life-extension of assets reduce embodied carbon and limit biodiversity loss from raw material extraction, thereby supporting climate and nature objectives simultaneously.

The adoption of circularity principles can boost the physical resilience of infrastructure systems and strengthen the construction sector's competitiveness as a market. The EU’s dependence on imported materials exposes the infrastructure sector, as well as the entire economy, to supply risks and price volatility. Circularity strengthens resource security by reducing demand for virgin materials, subsequently enabling reuse and secondary material markets. This enhances EU competitiveness and positions European civil engineering as a leading sector in sustainable, resilient infrastructure.

Growing material demand and finite resources challenge traditional linear infrastructure models where assets are designed and built in isolation, without considering materials already in circulation. Circular approaches, particularly reuse, refurbishment, and design for adaptability, reduce reliance on virgin resources while preserving existing value. Enabling these practices through regulation and standards is essential for long-term resilience in the built environment.

4. Our future vision for a circular built environment

Europe’s transition to a circular, climate-neutral, smart and resilient built environment requires more than incremental adjustment. It calls for a clearer picture of the future we want to build and a structured path to get there.

In that future, circularity is not a separate ambition or pilot topic. It is embedded throughout the full life-cycle, in planning, design, engineering, construction, operation, renovation and deconstruction. Infrastructure is designed for adaptability, long service life and future change. Material flows are better documented, value is retained longer, and reuse is supported by clearer rules, better data and more predictable responsibilities for users.

This future is supported by harmonised European frameworks, interoperable digital systems, and aligned incentives that make circular solutions a competitive and standard choice rather than an exception. Decision making is based on life-cycle performance, supported by reliable data, common methodologies, and clear allocation of risks and responsibilities.

This future must also be resilient by design. Climate mitigation, adaptation, resource efficiency, ability to withstand (cyber)attacks, and long-term functionality need to be addressed together. The built environment must reduce emissions, use fewer virgin resources, withstand shocks and external stress, and remain functional and valuable over time.

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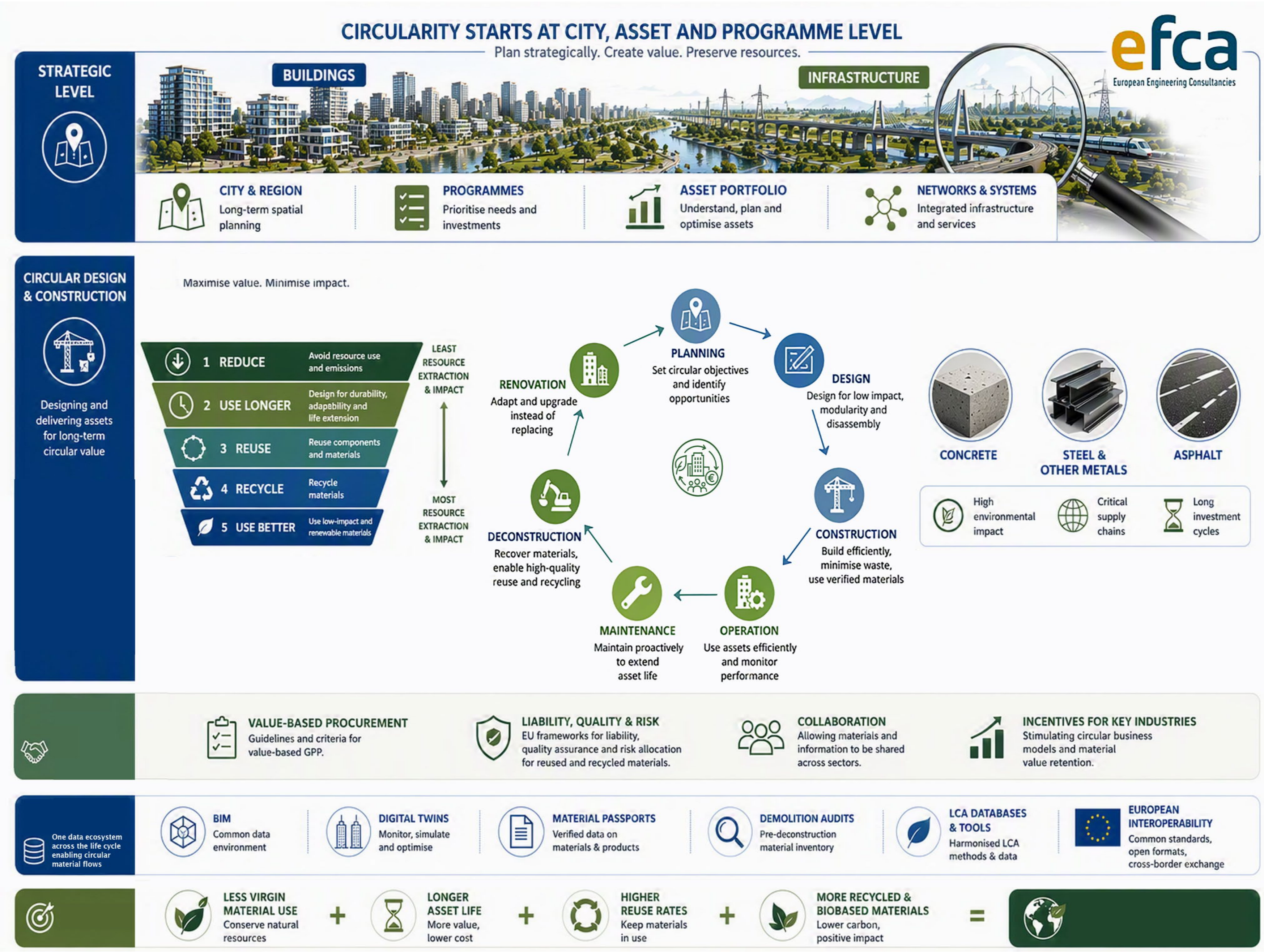

Source: Arcadis & EFCA

5. Solutions and Recommendations

EFCA proposes the following approaches and recommendations to ensure the EU's raw material and resource security, enable the scaling up and positive development of circularity businesses, and bring supply and demand of circular solutions together in the infrastructure sector. The role of consulting engineers is vital in enabling and communicating the needs of the infrastructure sector to advance towards a circular model, where resources and materials are used in line with the circular hierarchy. The suggested approaches are focused on encouraging the reduction, reuse, repair, redesign, and recycling of materials, products, and resources within the infrastructure sector.

5.1 Transition towards a hierarchical and life-cycle approach

A hierarchical approach to mitigation and prevention is essential in civil engineering due to the sector's high material intensity and assets with a long lifespan. The hierarchy presents circular approaches in order of value retention, prioritising strategies that preserve the functionality and value of existing infrastructure assets before recovering material value through recycling. Emphasising reduction, reuse, and life extension before recycling or replacement ensures that environmental impacts are avoided at source, rather than managed after they occur. Early design decisions have a disproportionate influence on material use, emissions, and resource consumption over an asset's entire life cycle, making hierarchy-based strategies critical for effective circularity. Applying the circular hierarchy to key construction materials such as concrete, steel and other metals, and asphalt is essential. Priority should be given to reducing material use, extending service life, and maximising high-value reuse before recycling. Where possible, lower-impact and bio-based alternatives should be applied to reduce the pressure on virgin resources. A life-cycle perspective helps optimise whole-life value while reducing environmental impacts across the asset lifecycle.

The transition towards circular construction is inherently non-linear. Infrastructure systems, regulatory frameworks, and market conditions evolve in different geographical and socioeconomic contexts at different speeds, requiring iterative implementation, pilot projects, and adaptive solutions rather than sequential steps. A rigid, linear transition risks locking in suboptimal solutions, while flexible pathways allow learning, innovation, and scaling of best practices over time.

Consulting engineers play a central role in enabling this transition. They influence material and product choices, structural design, asset management, modernisation and end-of-life strategies, and are therefore key actors in applying mitigation hierarchies in practice. Consulting engineers translate policy goals into technical solutions, assess life-cycle impacts, manage risks, and ensure safety and performance while integrating circular principles. Their expertise is critical in bridging regulation, innovation, and real-world implementation of hierarchical mitigation strategies.

To evaluate and apply circularity effectively, broader, improved circularity targets and performance indicators must be developed. Well-defined indicators help guide market transformation and enable the monitoring of progress and timely intervention when needed. Furthermore, circularity indicators should capture circular practices across different

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infrastructure life cycle stages, from design through construction and the use phase. These indicators should be developed to meet the needs and characteristics of different infrastructure assets, while high-level indicators are also needed to track sector-wide progress. At the same time, as circularity is an evolving field, indicators should reflect ongoing developments and be updated as needed. The development of digital tools and standardisation systems supports the creation of effective and practical indicators and targets.

5.2 Towards circular economy-based business model in infrastructure

Effective implementation of circular economy principles in infrastructure necessitates balancing the supply and demand of recycled materials and reused products, thereby facilitating the expansion of circular business models. Developing common circular guidelines and criteria for public procurement and infrastructure investment facilitates confidence in circular business models. A shift towards value-based procurement and financing models is needed, where life-cycle value, resilience, and resource efficiency are prioritised over lowest upfront cost. This includes aligning financial incentives, risk assessment, and valuation practices with circular economy objectives.

Establishing clear regulatory and insurance frameworks to define liability, performance requirements, and risk allocation for recycled materials and reused components further supports the transition. At the same time, it is necessary to avoid conflicting requirements between circular economy policies and other regulatory areas, including building codes, energy performance rules, and planning frameworks. This can be further supported through the development of standardised testing, certification and documentation procedures for reused and secondary materials, through to end-of-waste.

Balancing supply and demand requires collaboration at all levels. Collaboration allows materials, products and by-products, energy and information to be shared across sectors and projects. In civil engineering, this includes the coordinated reuse of excavated soils, construction and demolition materials, and surplus energy, thereby increasing overall resource efficiency and reducing waste and emissions. To realise this potential, policy must enable collaboration beyond individual projects. A collaboration strategy can be applied in industrial symbiosis and reuse markets to support the scale-up of businesses. Aligned EU regulations and standards for secondary materials and reused components, aligned regulatory frameworks across waste, product, and construction legislation, and clear quality and liability rules are essential to reduce uncertainty and enable cross-border reuse. Similarly, clear definition of roles and responsibilities across the value chain is essential to facilitate collaboration, reduce risk, and ensure accountability in circular projects. Regional coordination platforms, supported by digital tools such as material passports and marketplaces, can further facilitate matching supply and demand in real time.

5.3 Harnessing data engineering for circularity

Leveraging digital solutions is essential for implementing the circular hierarchy and managing the complexity of infrastructure systems. Circularity in infrastructure requires systematic and standardised management of material information throughout the asset lifecycle at EU level,

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including material characteristics, quantities, and geographical location. Digital tools such as Building Information Modelling (BIM), digital twins and emerging digital material & product passports can improve their traceability and enable more efficient identification and recovery of reusable components. To support circular practices in the construction sector, material and product information must remain accessible across long infrastructure life-cycles. Interoperable digital frameworks and common data standards are therefore needed to improve transparency, collaboration and the reuse of materials.

A systems-thinking approach is needed to identify and remove structural barriers while strengthening key enablers such as data availability and information management, logistics, and early stakeholder coordination. Consulting engineers play a central role as system integrators, translating regulatory frameworks into practical solutions and identifying opportunities for symbiosis across the infrastructure life-cycle. Public infrastructure projects should be used to demonstrate and scale industrial symbiosis models, accelerating their uptake across the sector.

6. Conclusions

EFCA calls on the EU to move from fragmented circularity measures towards a coherent framework for the built environment that gives greater priority to reduction, reuse, refurbishment and life extension. This framework should be based on harmonised definitions, aligned methodologies, interoperable digital systems, and clear allocation of responsibilities across the value chain. It should also address market barriers by strengthening demand through public procurement, improving client awareness, and ensuring that circular solutions are economically viable and competitive.

This requires clearer and more consistent conditions for reused and secondary materials, stronger support for interoperable digital information systems, and policies that recognise the importance of system-level thinking across the full infrastructure life-cycle. A successful transition will depend on aligning regulation, market conditions, and industry practices to support informed decision-making, reduce uncertainty, and enable investment and scale up in circular solutions.

Attention should be given to the early stages of planning and design, where the most important decisions on material use, adaptability, lifetime and future reuse are made. Consulting engineers have a central role in this transition. They translate policy objectives into practical solutions, integrate circular principles into design and asset management, and help clients make informed choices that balance safety, performance, sustainability and long-term value.

With the right regulatory signals and market conditions, circularity can become a driver of resilience, competitiveness and resource security across Europe.

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