

Delivering Circular
Construction

Lessons from the Netherlands:
A Roadmap for UK Reform

Niall Miskelly
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GLOSSARY

Circular Economy

A circular economy is a systemic approach to economic development designed to benefit businesses, society, and the environment. In contrast to the 'take-make-waste' linear model, a circular economy is regenerative by design and aims to gradually decouple growth from the consumption of finite resources.

Embodied Carbon

Embodied carbon is the total greenhouse gas (GHG) emissions generated to produce a built asset. This includes emissions caused by extraction, manufacture/processing, transportation and assembly of every product and element in the asset.

Recycle

The process of turning waste into new materials. This process avoids waste disposal (landfill) and often includes waste incineration to create energy.

Regenerative design

A selection of strategies, methods and technologies which understand the inner workings of an ecosystem to yield a design that has a positive, rather than depleting, impact on the support systems and resources on which it is built.

Regenerative materials

Regenerative materials are those which can be extracted from cyclic processes of regrowth without reducing the capacity of that cycle to regenerate.

Remanufacturing

Somewhere between reuse and recycling, this takes a product's constituent part and replaces worn out and non-functioning parts with a combination of reused, recycled and new parts.

Repurpose

Repurposing is the use of a product or material for a different function than it was originally produced. Repurposed materials are often associated with architectural design features and art projects. However, identifying alternative uses for outdated assets may not only save disposal fees but also save material costs spent elsewhere.

Reuse

The process of taking an existing item and using it again for the same, or a different purpose, without breaking this item down. This is preferable to recycling as it reduces the amount of time, money, and energy required for this item and component materials to continue to be used. It will also minimise, if not eliminate, waste.

Sustainable

Actions which meet the needs of the present without compromising the ability of future generations to meet their own needs.

Whole Life-Cycle Carbon

Whole Life-Cycle Carbon (WLC) emissions are the carbon emissions resulting from the materials, construction and the use of a building over its entire life, including its demolition and disposal. A WLC assessment provides a true picture of a building's carbon impact on the environment

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I was fortunate to visit an extensive range of places throughout this Churchill Fellowship, each offering a unique perspective on the circular economy in policy and practice. These visits helped me build a broad, informed understanding of how circularity operates across different contexts. While this report does not describe every meeting or site in detail, the insight gained from each encounter has shaped the learning presented here. The lessons, whether from ministries, innovators, reuse hubs, or exemplary buildings are woven throughout the analysis and recommendations that follow.

During the Fellowship I visited: The European Parliament (Brussels); The European Sustainable Construction Conference 2025 (Brussels); Rotor DC (Brussels); Rotterdam Architecture Month; Buurman (Rotterdam); TU Delft Circular Summer School; Stadstuin Overtoom (Amsterdam); The Ministry of Infrastructure and Water Management (The Hague); The Natural Pavilion (Almere); Jonas' IJburg (Amsterdam); The Green House (Utrecht); Home for the City (Helmond); and Venlo Town Hall (Venlo). Each of these experiences contributed meaningfully to the understanding reflected in this report.

BIOGRAPHY

I am a UK-registered architect and project manager based within the Department of Health, Health Estates in Belfast, Northern Ireland, with over 30 years of experience across the architecture and construction sectors. My career spans a broad portfolio of commercial, healthcare, leisure, education, arts, and residential projects, including multiple award-winning schemes delivered across the UK and Ireland.

I began my professional journey working directly on construction sites, gaining hands-on technical experience that continues to inform my practical, design-led approach today. I hold architectural degrees from both Queen's University Belfast and The Mackintosh School of Architecture in Glasgow, alongside diplomas in Advanced Architectural Studies and Building.

I am a Chartered Architect, registered with the Architects Registration Board (ARB), and a member of the Royal Institute of British Architects (RIBA), the Royal Society of Ulster Architects (RSUA), and the Royal Incorporation of Architects in Scotland (RIAS).

One of the highlights of my architectural career was serving as Project Architect for the F.E. McWilliam Gallery & Studio in Banbridge, an acclaimed project recognised with both local and national awards for design excellence. The project was an early example of circular economy principles in practice through the repurposing of an existing building. My wider portfolio also includes large-scale sports, community, and public-sector developments.

Since 2022, I have served as a Project Manager within the Department of Health, Health Estates. In this role, I lead multidisciplinary teams to deliver high-value healthcare and public-sector construction projects. My responsibilities include overseeing procurement, ensuring statutory and legal compliance, developing new delivery strategies, and promoting best practice in public procurement policy.

I am dedicated, collaborative, and deeply passionate about architecture's role in shaping healthier, more sustainable communities, and I continue to contribute to the future of construction and public-sector design across Northern Ireland and beyond.

EXECUTIVE SUMMARY

This Churchill Fellowship examines how the Netherlands has translated circular economy ambition into system-wide delivery within its construction sector, and how these lessons could be applied in the UK. The research draws on direct engagement with Dutch ministries, procurement bodies, educators, policymakers, industry leaders, and site visits to nationally significant exemplar projects. Together, this provided first-hand insight into the governance structures, market mechanisms, and cultural conditions that have enabled circular construction to move from policy into practice.

Main findings

The central finding of this Fellowship is that circular construction only succeeds when it is treated as system reform, not a voluntary sustainability agenda.

In the Netherlands, progress is underpinned by a mature and institutionalised “Triple Helix” model, in which government, industry, and academia operate as a single delivery system rather than as parallel actors. This structure is formal, funded, and mandated. It aligns:

- clear national targets (50% reduction in raw material use by 2030; full circularity by 2050),
- binding policy and regulation,
- public procurement as a market-shaping tool, and
- industry capability, research, and skills development.

As a result, circular principles such as reuse, design for disassembly, modular construction, material passports, and deconstruction are embedded into procurement rules, performance metrics, supply chains, and everyday decision-making.

Belgium, through Rotor DC, demonstrates how circular construction becomes viable when reuse is professionalised. High-quality material recovery depends on logistics, storage, testing, certification, and market confidence. Italy's Venice Architecture Biennale further shows how circularity can be culturally compelling and design-led, helping shift perceptions and norms across the profession.

By contrast, the UK has strong policy intent and pockets of excellence, often driven by motivated individuals, progressive local authorities, or exemplary projects. However, the Fellowship finds that UK delivery remains:

- fragmented across departments and devolved administrations,
- overly dependent on voluntary adoption,
- constrained by procurement, and
- weakened by the absence of reuse infrastructure and coordinated supply chains.

The result is a gap between ambition and implementation. Circular construction in the UK remains inconsistent, and difficult to scale.

Top priority actions for the UK government.

The evidence from this Fellowship demonstrates that the UK can deliver a circular construction economy, but only if it acts decisively and in the correct order. The following priorities are critical.

1. Establish national coordination through a UK Triple Helix (immediate)

The UK should create a formal, government-mandated delivery body bringing together central government, devolved administrations, industry, academia, and standard-setting organisations. This body should set common standards, coordinate infrastructure, align research with market demand, and act as the delivery spine for circular construction.

Without this coordination, good practice will remain isolated, and industry will lack the confidence to invest.

2. Use public procurement to force market change (immediate–medium term)

Public clients must move beyond aspirational policy and use their purchasing power to:

- mandate reuse and refurbishment ahead of new build,
- require pre-demolition audits and material recovery,
- reward circular performance through functional specifications rather than prescriptive designs.

Procurement is the fastest lever available to government to make circular construction the default rather than the exception.

3. Build the infrastructure that makes reuse reliable (medium term)

Circular construction will only compete with the linear model if it matches it for speed, certainty, and insurability. This requires:

- regional reuse hubs for recovery, testing, storage, and resale,
- national testing and certification capacity for reclaimed materials,
- professionalised deconstruction supply chains, and
- digital platforms providing real-time visibility of available materials.

Without this infrastructure, circularity will remain marginal regardless of policy intent.

4. Adopt an “existing estate first” rule across public assets (immediate)

The lowest-carbon, lowest-cost building is the one that already exists. Government should mandate refurbishment, reuse, and adaptation as the default option across all public estates, with new build permitted only where reuse has been demonstrably exhausted. This single shift would deliver immediate carbon savings while creating sustained demand for reuse markets.

Conclusion

This Fellowship shows that a circular economy in construction will not emerge organically. It requires clear leadership, coordinated governance, market-shaping procurement, and investment in reuse infrastructure. The Netherlands provides a proven model for how to align these elements at scale; Belgium and Italy demonstrate how circularity becomes practical and reliable.

The UK must commit to coordinated delivery and make circular construction the norm. The evidence presented in this report provides a clear, implementable pathway.

CONTENTS

1. Introduction

- 1.1 Defining the Circular Economy in Construction
- 1.2 The R-Ladder: Prioritising Circular Economy Strategies

2. UK Policy and Governance as an Enabler of Systemic Change

- 2.1 How UK Governance Shapes Circular Economy Outcomes in Construction
- 2.2 Delivering Circular Economy Policy in Northern Ireland
- 2.3 UK vs The Netherlands Comparative Analysis

3. The Netherlands: A Model for Circular Economy Delivery in Construction

- 3.1 Dutch Historical Collaboration as a Foundation for Circular Construction
- 3.2 The Dutch 'Triple Helix' Model for Delivering Circular Construction
- 3.3 Case Study 1: The Natural Pavilion as a Scalable Model of Circular Construction
- 3.4 Case Study 2: Buurman as a Community-Scale Model for Circular Construction
- 3.5 Preparing the Dutch Construction Industry for Mandatory Circular Economy Requirements
- 3.6 Implementing Circular Economy Policy Through Construction Procurement
- 3.7 Key Implementation Lessons from the Dutch Circular Construction Transition

4. Belgium: Large-Scale Material Reuse in Practice – The Rotor DC Case

- 4.1 Case Study 3: Rotor DC - Professionalising Construction Material Reuse at Scale

5. Italy: The Venice Architecture Biennale as a Testbed for Circular and Sustainable Construction

- 5.1 Case Study 4: The Danish Pavilion as a Live Demonstrator of Circular Renovation
- 5.2 Case Study 5: The Serbian Pavilion as a Zero-Waste, Fully Reversible Circular Installation
- 5.3 Key Circular Construction Lessons from the 2025 Venice Architecture Biennale

6. Synthesis and Conclusions: Delivering a Circular Economy in Construction

7. Recommendations for Delivering Circular Construction in the UK

- 7.1 Immediate Priority: Establishing a National Triple Helix to Deliver Circular Construction in the UK
- 7.2 Immediate Priority: Making Existing Buildings the Default: An “Existing Estate First” Rule for the UK
- 7.3 Immediate–Medium Priority: Building a Scalable Circular Supply Chain That Can Compete with the Linear Model
- 7.4 Next Steps: From Fellowship Evidence to Government Action

8. Bibliography

INTRODUCTION

Climate change is the defining issue of our time. The building and construction sector is responsible for approximately 39% of global carbon emissions, making it one of the most significant contributors to climate change (International Energy Agency, 2019). Embodied carbon, the carbon emitted during the extraction, processing, transportation and assembly of construction materials accounts for over 25% of total building-related emissions, presenting a major opportunity for reduction through structural change rather than operational efficiency alone (World Green Building Council, 2017; Ellen MacArthur Foundation, 2019).

Construction and demolition activities generate almost two-thirds of global waste, a figure that rises sharply in regions experiencing rapid urban redevelopment (Ellen MacArthur Foundation, n.d.). The Ellen MacArthur Foundation estimates that applying circular-economy principles to the built environment could reduce embodied-carbon emissions by up to 38%, while also stimulating local economic activity, skills development, and green jobs (Ellen MacArthur Foundation, 2019).

1.1 Defining the Circular Economy in Construction

A circular economy decouples economic growth from the consumption of finite resources. In the context of construction, this means moving away from a linear model of resource use, in which materials are sourced, deployed in a building and removed at the end of their economic life. The circular approach is based on three core principles:

- to eliminate waste and pollution;
- circulate materials and keep assets in use (at their highest value);
- and regenerate natural systems.

A circular economic model creates new sectors of activity and opportunities for businesses and start-ups, while decreasing human-caused climate change and resource depletion.

Construction presents unique strategic advantages for a gateway into a circular model: it is currently a waste-intensive practice with opportunities to change at every scale, from reusing door handles to redesigning policy frameworks, supply chains, and commercial infrastructure. Currently, only 1% of construction materials disposed of as waste are repurposed, leaving considerable scope for improvement across the market and across all materials.

In what follows, I have conducted a review of the field, including the policy and commercial context, and have undertaken precedent and stakeholder studies.

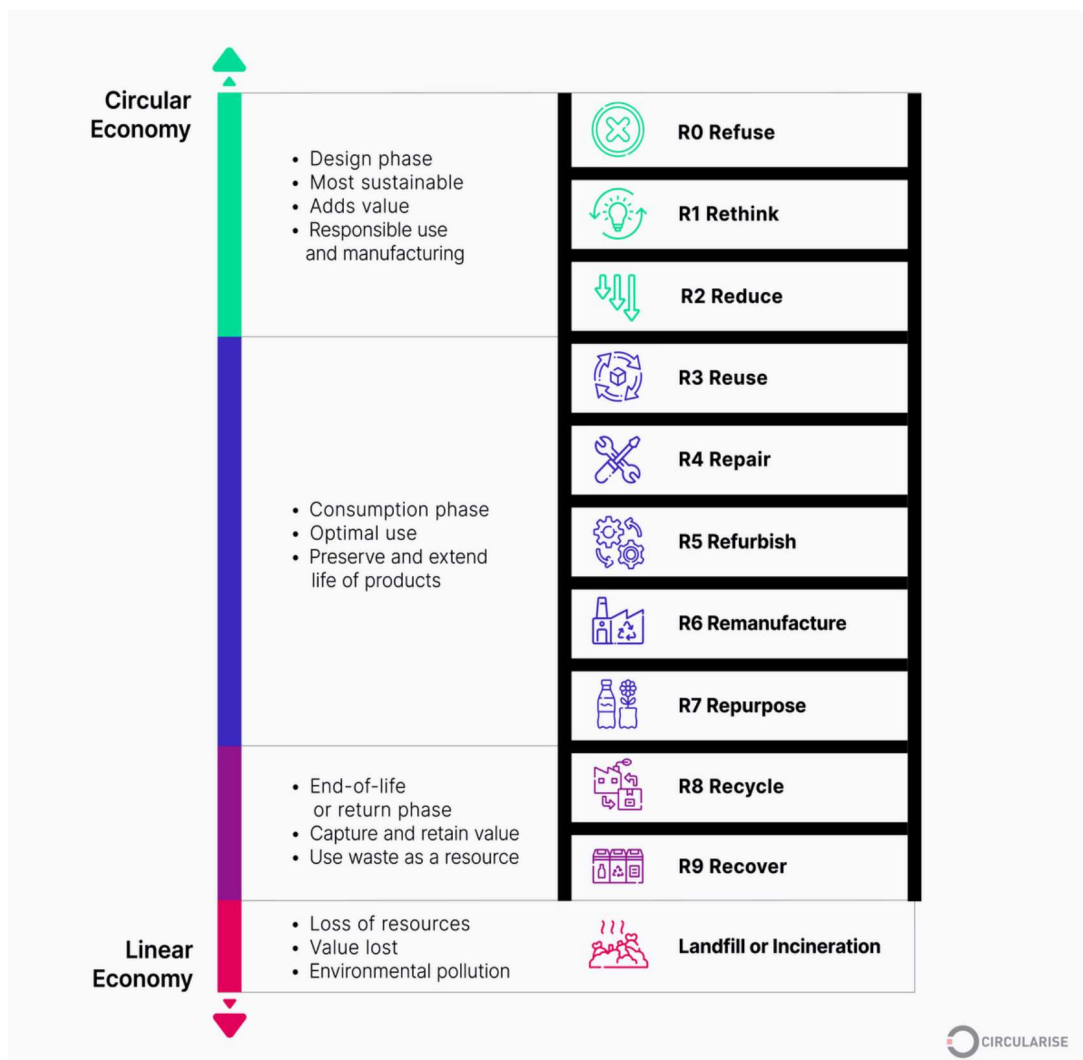
1.2 The R-Ladder: Prioritising Circular Economy Strategies

The R-ladder (also known as the R-hierarchy) orders circular strategies according to their effectiveness in reducing material extraction and waste generation, prioritising early-stage interventions that eliminate waste before it occurs (Ellen MacArthur Foundation, n.d.).

Higher-order strategies such as Refuse, Rethink, and Reduce deliver the greatest environmental benefit because they shorten material loops and reduce demand for virgin resources, whereas lower-order strategies such as recycling and recovery, while valuable, intervene later in the lifecycle (Ellen MacArthur Foundation, 2019).

Key R-Strategies

The ladder typically includes 10 strategies, ranging from the most circular to the least:



The R-ladder helps businesses and policymakers identify opportunities to increase circularity. By analysing products and materials, organisations can determine which strategies are applicable and prioritise actions that prevent waste early in the value chain.

2 UK Policy and Governance as an Enabler of Systemic Change

A country's ability to move confidently toward long-term social, economic, and environmental goals depends fundamentally on the strength of its policy and governance landscape. Policy provides the vision, the clear articulation of where a nation intends to go, while governance provides the architecture for getting there, defining roles, responsibilities, processes, and accountability. Together, they create the conditions in which coordinated, nation-wide progress becomes possible (UK Parliament Environmental Audit Committee, 2022).

A robust applied policy-governance environment also supports certainty and confidence. Businesses invest when rules are predictable; institutions innovate when expectations are clear; citizens participate when decisions are transparent and fair. In this sense, governance acts as the connective tissue linking ambition with implementation. It transforms high-level national goals into practical pathways, enabling sectors such as construction, energy, transport, and education to contribute meaningfully to shared outcomes.

In moments of transition, such as the shift to a circular economy, the importance of policy and governance becomes even more pronounced. Emerging practices require standards, incentives, testing frameworks, and collaborative structures to overcome market hesitation and to de-risk innovation. Policy creates the enabling environment; governance ensures it functions effectively on the ground and shifts culture.

Ultimately, a country's policy and governance landscape is not just administrative machinery, it is the foundation of national direction, setting the tone for ambition, shaping the pace of change, and ensuring that progress is both coordinated and equitable.

2.1 How UK Governance Shapes Circular Economy Outcomes in Construction

The governance of the circular economy within the UK construction sector operates through a multi-layered hierarchy, where responsibilities are divided between the UK Government in London, the devolved governments of Scotland, Wales, and Northern Ireland, and more locally to local planning authorities. Understanding this hierarchy is essential when examining the UK's ability to adopt, scale, and embed circular-economy principles, especially in areas such as material recovery, reuse, refurbishment, and existing-building retention.

1. UK Government: Strategic and High-Level Policy Direction

At the top of the hierarchy sits the UK Government, which sets overarching strategic direction, legislation, and national frameworks that influence the construction sector's transition toward circularity. For England in particular, these policies form the backbone for planning and construction-related decision-making.

While the UK Government sets national frameworks, the implementation of circular practices relies on effective interpretation and deployment at devolved and local government levels.

2. Devolved Governments: England, Scotland, Wales, and Northern Ireland

The UK Government has devolved administrations, each with its own powers over environmental policy, planning frameworks, waste regulation, and economic development. This means circular-economy progress varies across the UK.

Scotland

Scotland has established some of the most explicit circular-economy policies in the UK. Its Route Map to 2025 and Beyond, outlines an ambitious approach to embed circular construction practices, including:

- requirements in the National Planning Framework to reduce waste and carbon,
- incentives for refurbishment and reuse,
- support for innovation centres such as Construction Scotland Innovation Centre.

Scotland's strategic direction shows how devolved powers can directly shape construction-sector outcomes.

Wales

Wales works jointly with UK departments on circular-economy legislation but also sets its own goals and approaches across waste, recycling, and resource management. The Circular Economy Package statement outlines this collaboration and Wales's specific commitments to resource efficiency and waste reduction.

Northern Ireland

Northern Ireland's Circular Economy Policy is currently at the draft strategy stage, with the Department for the Economy having completed a full public consultation on the Draft Circular Economy Strategy in early 2023. It aligns closely with the Executive's wider '10X Economic Vision', which emphasises innovation, productivity, and low-carbon growth. The draft policy proposes a series of actions including behaviour-change programmes, the development of circular business clusters, embedding circularity in public procurement, creating material-reuse platforms, supporting new regulatory frameworks, and investing in skills, research, and monitoring.

England

English local authorities are increasingly shaped by authorities which are now being instructed to integrate circularity into their strategic development plans. This reflects the UK Government's push to scale circular-economy implementation but with regional flexibility. Across all nations, research finds that the UK currently employs fragmented approaches to circular-economy adoption, with differing regional priorities and strengths, highlighting the need for a more coordinated, interconnected framework across devolved governments.

3. Local Authorities and Councils: Critical Gatekeepers for Planning and Built-Environment Outcomes

At the most granular level of the hierarchy sit local councils, which hold statutory responsibility for planning permission, development control, and the interpretation of national and devolved planning frameworks.

Local authorities play a pivotal role in:

- enforcing planning policies that influence material recovery,
- determining whether existing buildings should be retained or demolished,
- setting local requirements for reuse, recycling, and waste minimisation,
- shaping circular-economy outcomes through development plans and local planning priorities.

Guidance for mayoral strategic authorities emphasises the role of local authorities in embedding circularity in spatial plans, supporting reuse services, influencing construction practices, and reducing waste at the community level.

Local authorities are responsible for 18% of national circular-economy actions, demonstrating their substantial influence. Their decisions on land use, materials, and development processes directly impact circularity within the built environment (UK Parliament Environmental Audit Committee, 2022).

2.2 Delivering Circular Economy Policy in Northern Ireland

The strategic imperative originates with the Department for the Economy (DfE) and is formalised in the draft Circular Economy Strategy (CES) for Northern Ireland. This strategy sets a definitive, quantitative objective: reducing the region's material footprint from its current 16.6 tonnes to a sustainable 8 tonnes per person by 2050. Achieving this mandate relies heavily on leveraging the public sector's significant procurement power, which exceeds £3 billion per annum, to shape markets towards responsible production and consumption.

Operationally, the implementation mechanism resides within the Department of Finance (DoF), executed primarily by Construction & Procurement Delivery (CPD), Health Estates (Department of Health) and the Centres of Procurement Expertise (CoPEs). CE principles are integrated by retrofitting modern resource efficiency objectives into the existing Sustainable Procurement policy theme (Theme 5) of the Construction Procurement Policy Framework (PGN 06/10). The most tangible delivery tool is the mandated incorporation of the Construction Industry Forum for Northern Ireland (CIFNI) Requirements for Sustainable Construction into new contracts.

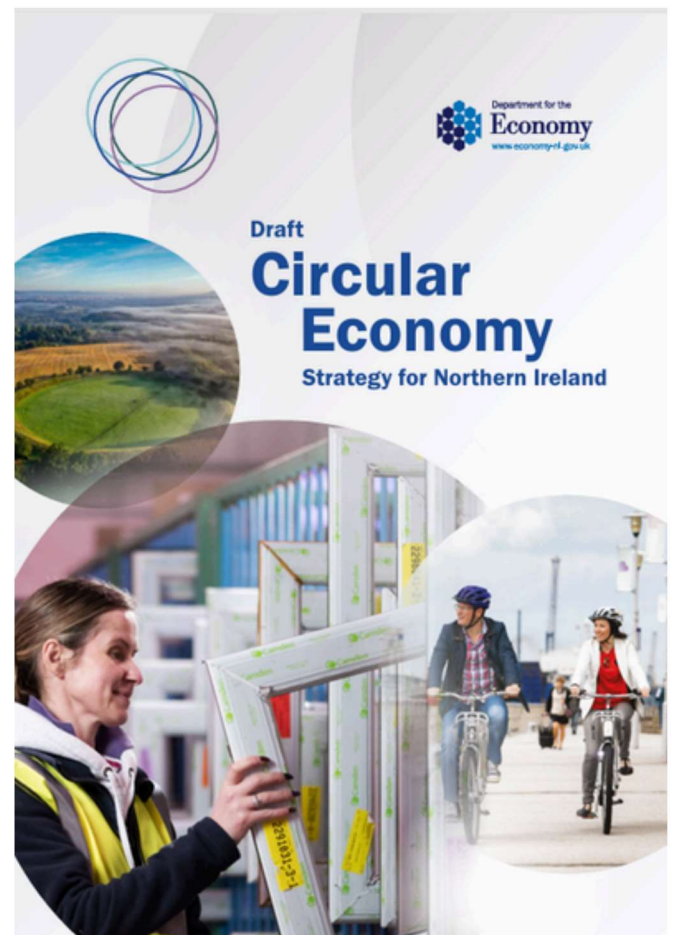


Figure 1 – Department for the Economy, Northern Ireland. Draft Circular Economy Strategy for Northern Ireland.

2.3 UK vs The Netherlands Comparative Analysis

Dimension	United Kingdom	Netherlands
Strategic ambition	Circular economy referenced in national and devolved policy documents, with varying levels of consistency and binding commitment. Policy emphasis is primarily on carbon reduction rather than material use.	National targets include a 50% reduction in primary raw material use by 2030 and a fully circular economy by 2050, with construction identified as a priority sector.
Policy status	Circular economy policy delivered largely through guidance, pilot programmes, and voluntary approaches, with limited mandatory material-reduction requirements.	Circular economy objectives implemented through national programmes, including the National Circular Economy Programme and the Circular Construction Transition Agenda, with compulsory requirements.
Governance model	Responsibilities distributed across central government, devolved administrations, and local authorities, with limited alignment and no single national delivery mechanism.	Multi-level governance structure with defined roles across ministries, regional authorities, and delivery agencies.
Triple Helix integration (government, industry, academia)	Collaboration occurs primarily through individual projects or informal networks, operating independently of one another.	Collaboration formalised and funded across policy development, procurement, research, innovation, and standards development.
Public procurement role	Circular requirements applied selectively and vary between projects and contracting authorities.	Public procurement used to influence market behaviour through functional specifications, circular tender requirements, material passports, and reuse targets.
Transition strategy	No consolidated national transition framework; progress driven through individual initiatives and project-level leadership.	Phased transition framework (Base Camp, Scaling, Full Circularity) with defined milestones and monitoring mechanisms.

2.3 UK vs The Netherlands Comparative Analysis

Market readiness	Circular construction activity operates alongside conventional delivery models, with differences in delivery speed, risk allocation, and insurance arrangements.	Markets shaped through incentives, penalties, and predictable public-sector demand, enabling industry investment planning.
Reuse infrastructure	Limited number of reuse hubs and pilot initiatives, with uneven geographic coverage.	National and regional reuse infrastructure established, including logistics networks and material processing facilities.
Deconstruction vs demolition	Demolition remains standard practice, with limited uptake of deconstruction approaches.	Deconstruction supported through policy, procurement requirements, and waste taxation measures.
Economic incentives and disincentives	Landfill tax levels and fiscal policy links to material outcomes are limited.	Fiscal framework includes high waste taxes, tax deductions for certified circular materials, and performance-linked penalties.
Material data and measurement	Data collection and management <u>varies</u> by project, with limited use of material passports or standardised testing for reclaimed materials.	Environmental performance metrics required, with increasing use of digital material passports and national material databases.
Existing estate strategy	New-build solutions frequently pursued despite under-utilisation of existing public assets.	Refurbishment and life-extension prioritised within policy, procurement, and asset-performance frameworks.
Cultural and industry mindset	Circular approaches often viewed as project-specific or dependent on organisational commitment.	Circular construction treated as a standard condition of professional practice, supported by shared standards and collaboration.
Results to date	Circular construction activity increasing, though adoption remains variable and non-systemic.	Circular construction increasingly embedded, with evidence of systemic adoption and scalability.

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Key Insight from the comparison

The core difference is not ambition, but policy backed up by action and a shift in culture.

- The Netherlands succeeds because circular construction is mandated, coordinated, and supported by infrastructure.
- The UK lags behind because circularity remains largely optional, fragmented, and insufficiently resourced.

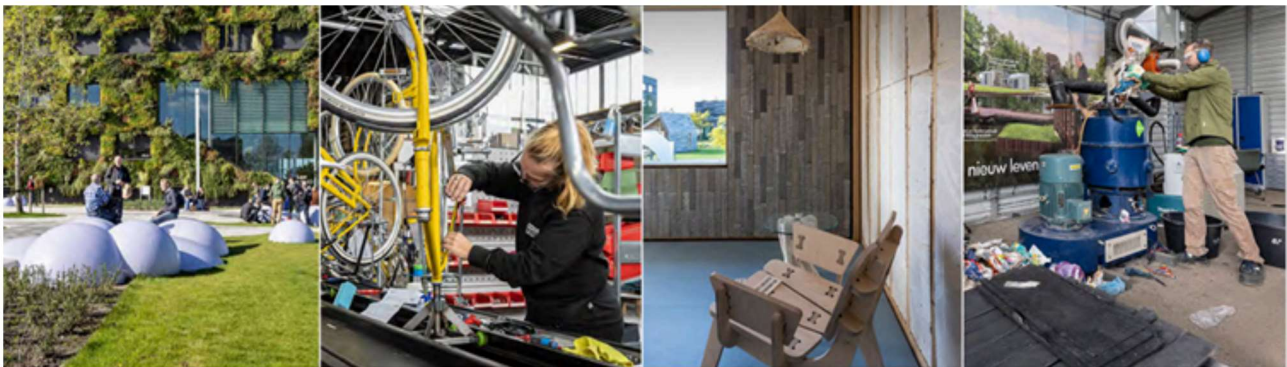
This comparison underpins the Fellowship's central conclusion: the UK needs circular economy system reform.

3. The Netherlands: A Model for Circular Economy Delivery in Construction

The Netherlands has positioned itself as one of the world's leading nations in developing and implementing circular-economy policy, with construction identified as a major priority due to its high material consumption and environmental impact.

National Ambition and Policy Framework

The Dutch government aims to achieve a 100% circular economy by 2050, with an interim goal of reducing primary raw-material use by 50% by 2030. This ambition is anchored in major government programmes such as the Government-Wide Programme for a Circular Economy and the National Circular Economy Programme 2023-2030, which outline high-level strategies to reduce raw-material use, substitute with renewable resources, extend product lifetimes, and improve high-grade material processing (Dutch Ministry of Infrastructure and Water Management, 2025).



National Circular Economy Programme 2023-2030



Figure 2 – Netherlands National Circular Economy Programme 2023-2030.

The 2023–2030 programme includes dedicated measures for construction, covering healthcare, housing, offices, infrastructure (bridges, viaducts, road surfaces), and the built-environment value chain (e.g., plastics in construction, capital equipment, climate-control systems). These policies integrate climate goals, requiring emission reduction across construction-sector supply chains and linking circular-economy measures directly to climate policy.

Construction-Sector Focus and Regulatory Measures

The Netherlands recognises construction as a priority sector because it consumes large volumes of materials and generates significant waste. Key themes include:

- Design for reuse, disassembly, and long-life building components, enabling materials to be recovered in multiple cycles.
- Improving environmental performance assessments, with Dutch law already requiring lifecycle-based environmental-impact evaluation of buildings.
- Strengthening collaboration between government, industry, and research bodies to accelerate circular construction.

To operationalise these aims, the government has established tools and initiatives such as Green Deals, which remove regulatory and market barriers and encourage innovation around circular building materials and sustainable civil engineering. These public–private agreements accelerate adoption by addressing challenges such as regulatory challenges, lack of incentives, and the need for market transformation.

Implementation in Practice: Circular Building Requirements

Recent policies introduce practical mechanisms for public-sector projects, including:

- Requirements that new public buildings meet strict reuse, recyclability, and low-carbon standards,
- Mandatory digital materials passports to track components and enable future reuse,
- Designs that allow buildings to be adapted, expanded, or repurposed rather than demolished,
- Prioritisation of recycled or recyclable materials at every project stage.

The Transition Team Circular Construction

The Dutch government established a multidisciplinary team to implement the circular construction transition agenda. The Transitieteam Circulaire Bouweconomie (Transition Team for a Circular Construction Economy) was established in 2018. The initial focus was on establishing a solid foundation and implementing the essential tools, methods, legislation, and knowledge required for a circular construction economy.

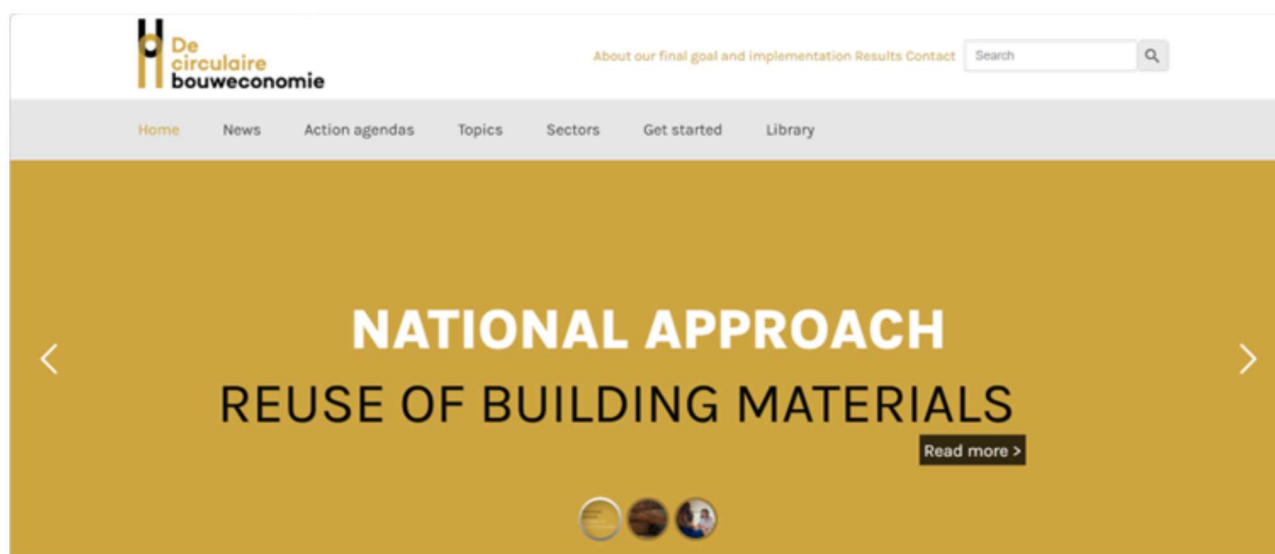


Figure 3 – De Circulaire Bouweconomie, National Approach, Reuse of Building Materials.

Progress has been made under the leadership of the Transition Team. Roadmaps and guidelines for circular construction have been developed, as well as practical tools such as the Circulaire Bouwcatalogus⁶³ (Circular Building Catalogue). Widespread knowledge-sharing has been fostered through podcasts, digital magazines, and events. Following one of the team's recommendations, a legislative process has also been initiated to make the MilieuKostenIndicator (Environmental Cost Indicator) a guiding instrument in public procurement and permitting procedures.

The current, second Transition Team has been active since mid-2024 and is focused on scaling up circular construction initiatives and building upon the achievements of its predecessor. Furthermore, the team focuses on supporting practical initiatives and bridging the gap between frontrunners and the broader industry.

Collaboration

Collaboration plays a central role in the Dutch transition toward a sustainable and circular built environment. The Netherlands consistently frames circularity not as a technical challenge alone, but as a collective endeavour, one that depends on the alignment of government, industry, knowledge institutions, and society. This collaborative ethos underpins the country's confidence that circular construction can unlock major environmental and economic opportunities, and is reflected in the strong, interconnected ecosystem it has built. It is striking how open the Dutch system is: international partners are actively invited to engage, learn, and help scale circular practices.

Several characteristics make the Dutch built-environment sector positioned to lead this transition. First, the Netherlands is a frontrunner in applying and measuring circularity, with mature legislative frameworks and national databases that embed circular metrics into real-world decision-making. Second, the country has made significant progress in decarbonising and retrofitting its built environment, investing heavily in climate-adaptive design, CO₂-neutral technologies, and greener urban spaces. Third, the Netherlands has developed a particularly ambitious vision for circular and biobased construction. Although biobased building has historic roots, the Dutch have modernised it at scale through coordinated value chains that link farmers, processors, designers, and public procurers, supported by companies capable of constructing multi-storey biobased buildings and of reusing existing structures.

A fourth distinctive feature is the Netherlands' investment in data-driven tools and technologies. Dutch companies provide advanced digital capabilities, such as materials passports, resource-tracking platforms, and impact-measurement systems that allow recyclers, developers, and urban miners to work confidently with reclaimed materials. Finally, the Netherlands is leading in effective material reuse, supported by policies that prioritise harvesting materials over demolition and by established practices that maximise the value of existing building components.

Overall, observing the Dutch model reveals a mature, highly coordinated, and innovation-driven approach to circularity, one that places collaboration at its core and provides valuable lessons for countries seeking to accelerate their own transition to a sustainable built environment.

3.1 Dutch Historical Collaboration as a Foundation for Circular Construction

The story of the Netherlands is, at its core, a story of people learning to survive by working together. Over more than a millennium, Dutch society has been repeatedly forced into collaboration by the realities of its geography, a nation in which one-third of the land lies below sea level and nearly 60% is highly susceptible to coastal or river flooding. This shared vulnerability forged a unique cultural and institutional capacity for cooperation, negotiation, and collective problem-solving that continues to define the Dutch today.

Collaboration as a National Identity

The need to protect land and livelihoods from water meant early Dutch communities had no choice but to organise themselves around shared risk. As early as the Middle Ages, they began forming collective bodies to build and maintain dikes and manage flooding. Over time, these evolved into the water boards, some of the world's oldest democratic institutions, tasked with managing drainage, dikes, and local flood protection. This long history of coordination reflects a deeply ingrained societal principle: the Dutch survive by acting together.

Major disasters reinforced this ethos. The 1953 North Sea Flood, which killed more than 1,800 people, catalysed national unity and led to the creation of the Delta Commission and subsequently the Delta Works, an unprecedented system of storm-surge barriers, dams, and reinforced dikes designed through close collaboration between government, engineers, scientists, and citizens. The event strengthened the Dutch conviction that collective challenges must be met with collective solutions.

Bringing Learned Skills into the Circular Economy

This historical legacy of cooperation has profoundly shaped how the Netherlands approaches its circular-economy transition, especially in the construction sector. The move toward circular construction is not simply a technical shift. It is a societal transition requiring coordination across government, industry, education, and citizens.

In many countries, the transition to a circular economy requires entirely new ways of thinking and organising. In the Netherlands, it draws on a familiar legacy. The same collective spirit that engineered dikes, survived catastrophic floods, and built world-leading resilience systems is now driving the transformation of the construction sector.

3.2 The Dutch 'Triple Helix' Model for Delivering Circular Construction

In the Netherlands, a unique 'triple helix' model enables the private sector, government and academia to develop new solutions together. The Netherlands has consistently ranked as a European leader in innovation due to a highly effective approach to collaboration known as the Dutch 'triple helix' model. This strategy, coined by Loet Leydesdorff, is a framework for forging partnerships between the private sector, government and academia. Each stakeholder plays a crucial role: knowledge institutions fuel research and expertise, the government supports with favourable policies and businesses bring commercial viability.

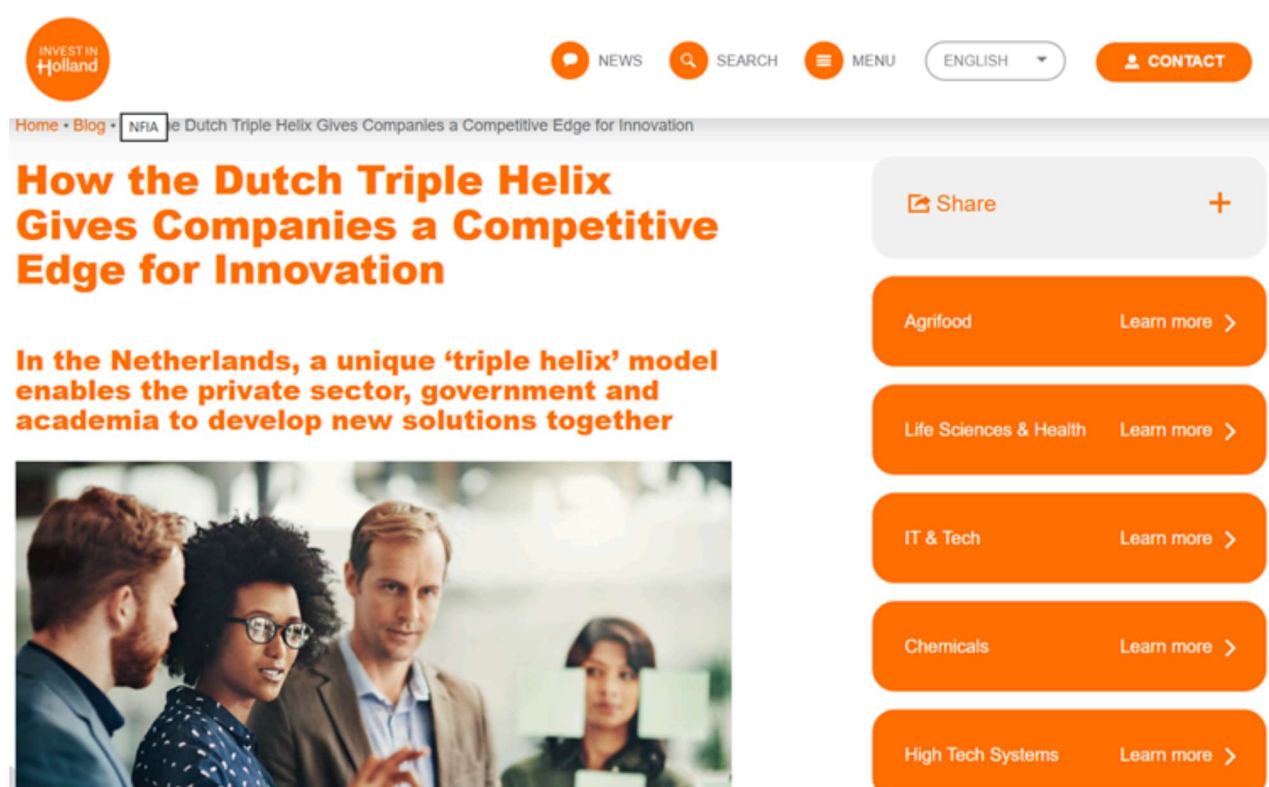


Figure 4 – Invest in Holland – Triple Helix.

In turn, companies benefit by gaining access to world-class knowledge clusters such as science and innovation parks, with R&D facilities, abundant talent and other industry leaders. Research institutions benefit when businesses help to test scientific knowledge and stimulate entrepreneurship on their campuses. Triple helix partnerships also enable the Dutch government to achieve broader policy goals focused on sustainability and economic growth. By strategically integrating these stakeholders, the Netherlands fosters an open, collaborative environment that enables companies across various industries to create innovative solutions to global challenges.

The model is particularly evident in the Amsterdam Circular program, which supports circular startups and aligns with long-term government policy to achieve a fully circular city by 2050. This program has already supported 50 circular startups and identified over 1500 co-financiers, ensuring they have the necessary support to thrive and contribute to the circular economy goals.

This comprehensive approach is executed through four interdependent pillars that ensure both strategic alignment and granular operational implementation:

1. Policy Mandate (Transition Agendas): Establishing ambitious, sector-specific goals and defining clear criteria for circularity.
2. Governance Structure (Transition Team and Platform CB'23): Creating formal, multi-stakeholder bodies for oversight, consensus building, and standardisation.
3. Demand-Side Action (Circular Procurement): Utilising the public sector's purchasing power, notably through Rijkswaterstaat (RWS), to stimulate market supply and drive organisational reform.
4. Knowledge Acceleration: Directing public-private research funding toward the technical and socio-economic challenges of scaling circular and biobased innovations.

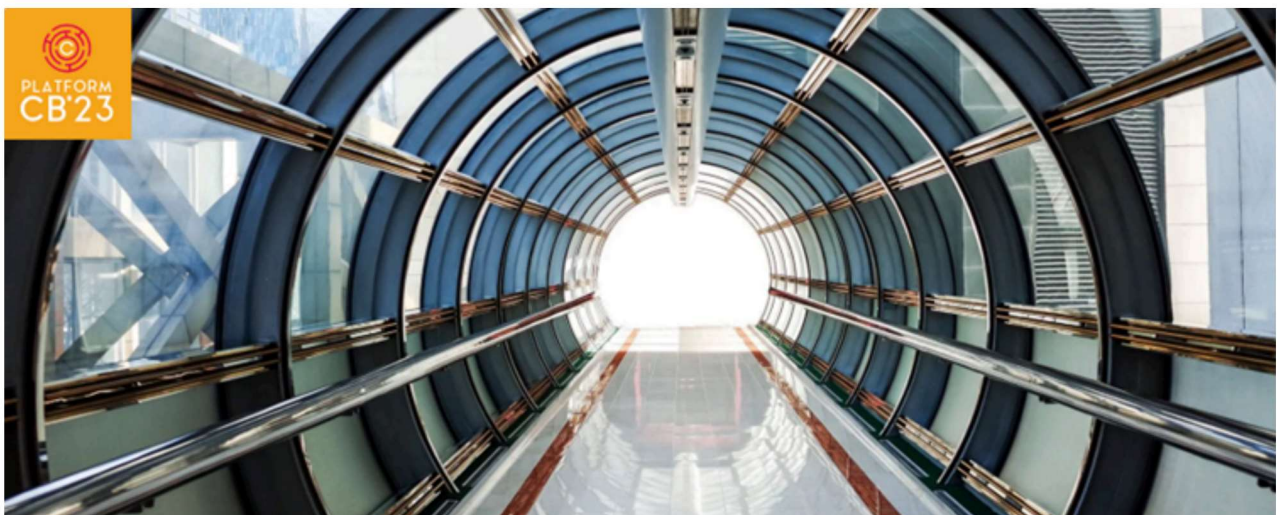


Figure 5 – Netherlands - Platform CB'23

3.3 Case Study 1: The Natural Pavilion as a Scalable Model of Circular Construction

The Natural Pavilion, designed by DP6 architectuurstudio for the Floriade Expo 2022 in Almere, stands as one of the most compelling and ambitious demonstrations of circular-economy principles within the Dutch construction sector. Developed as the Dutch National Government's pavilion, it embodies the core challenges the Netherlands is currently seeking to address, ranging from the transition to renewable materials, the climate-resilience agenda, biodiversity restoration, the housing crisis, and the shift away from raw-material dependency. Through its design, construction, and multi-life-cycle approach, the Natural Pavilion has become a tangible model of how circular construction can be scaled up.

A Fully Circular, Biobased, and Reconfigurable Building Concept

At its core, the Natural Pavilion is almost 100% biobased, circular, and fully demountable, built using dry connections that allow for complete disassembly and reconfiguration at new sites. This approach reflects the very essence of a circular economy, keeping materials in use at their highest value for as long as possible. The structural frame is constructed from indigenous Dutch timber, connected with universal steel joints, forming a standardised, modular system that can be adapted to a wide range of uses. Infill materials include bio-based walls, wooden floors, and windows made from reused glass salvaged from a government building in The Hague.



Figure 6 – Netherlands – The Natural Pavillion – March 2026

This flexible model demonstrates that an entire building, not just its components, can be designed for iterative reuse over multiple life cycles, dramatically reducing waste, carbon emissions, and demand for virgin materials.

A Living Showcase for Scalable Bio-Based Construction

The pavilion provided a national showcase for bio-based and circular construction solutions. It demonstrates, by example, that homes, health centre, schools, offices, and public buildings can be developed rapidly, at scale, using circular, bio-based, and energy-neutral methods. This aligns strongly with the Netherlands' national ambitions to accelerate the transition to sustainable building, reduce raw-material dependency, and meet climate-neutrality targets by 2050.

With its modular structure, diverse material palette, and highly adaptable internal spaces, the Natural Pavilion provides the construction sector with a replicable blueprint for how bio-based and circular building systems could be deployed.

Driving Cultural and Market Change in the Dutch Construction Industry

The Natural Pavilion performs a role in shifting the mindset of the Dutch construction industry. As a highly visible, government-backed, award-winning structure, it demonstrates what circular construction can look like today, not as a theoretical ambition, but as a fully realised, functional building delivered within one year.



Figure 7 – Netherlands – The Natural Pavillion – March 2026

Its influence is evident as policymakers, contractors, architects, and developers utilise it as a proof-of-concept for new circular construction standards. This aligns with national initiatives to reduce waste, foster bio-based supply chains, and adopt modular building approaches.

Government Procurement as a Strategic Tool

The procurement of the Natural Pavilion marks an important advancement in how the Dutch Government uses its commissioning power to shape the future of construction. By embedding circular criteria into the procurement process and insisting that the building physically embodied those principles the Netherlands demonstrated how public procurement can act as a catalyst for innovation, supply-chain development, and cultural change within the construction industry.

3.4 Case Study 2: Buurman as a Community-Scale Model for Circular Construction

Buurman Rotterdam has emerged as a practical and community-driven example of circular-economy innovation in the built environment. Operating as a circular hardware store, reclaimed-materials depot, and educational wood workshop, Buurman plays a role in reducing construction waste, strengthening local reuse supply chains, and enabling citizens and professionals alike to participate in circular building practices. The organisation is founded on a simple but transformative principle: urban areas already produce abundant usable materials, and these should be reused locally instead of being discarded.

Buurman's demonstrates commitment to local material reuse, sourcing secondary materials from demolition sites, construction projects, exhibitions, museums, festivals, and other temporary installations across the Rotterdam region. These materials, often in excellent condition range from structural timber and sheet materials to lighting fixtures, cables, insulation, doors, and even entire stage sets. By collecting, sorting, and reselling these reclaimed components, Buurman has diverted significant volumes of material from landfill, incineration, or low-grade recycling streams.

The store operates as a "circular building market," offering an ever-changing stock of reclaimed construction materials at accessible prices. This supports more sustainable DIY and professional building practices and normalises reuse as a mainstream alternative to purchasing new products.

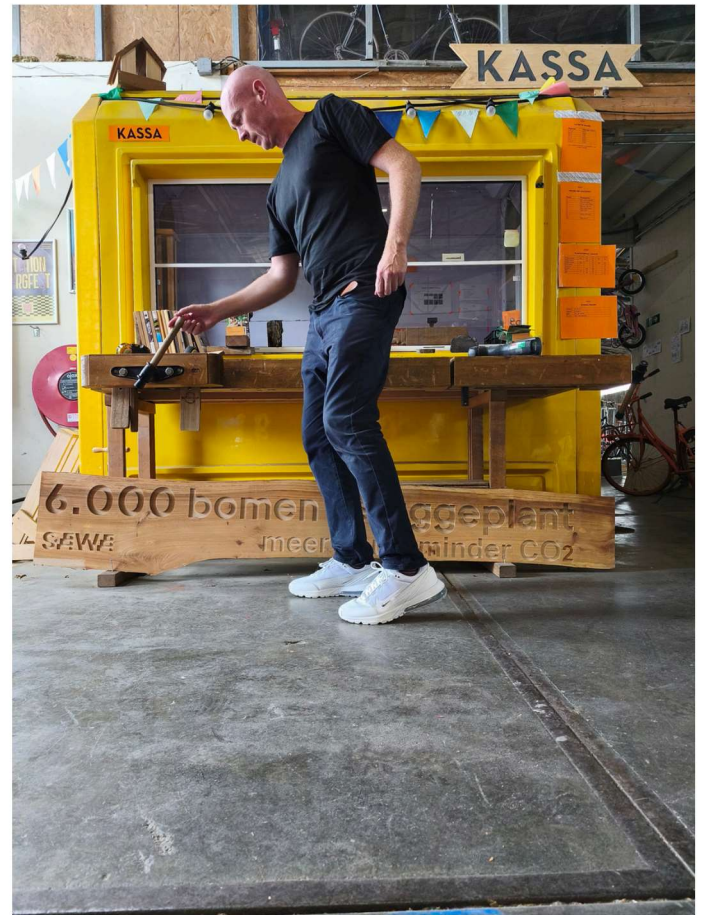


Figure 8 – Netherlands – Buurman – June 2025
Local Reuse as Core Mission

A Circular Hub for Makers, Builders, and Organisations

Buurman Rotterdam is a materials marketplace, it functions as a hub where individuals, craftspeople, and organisations can access tools, knowledge, and hands-on support for circular construction.

1. Wood workshop and maker education

Buurman operates an educational wood workshop where people can learn woodworking skills using reclaimed material. Participants can join courses, book group activities, or rent workspace and tools to build furniture or prototypes from second-hand wood. This emphasis on learning by doing strengthens practical skills needed for a circular economy and inspires more people to adopt reuse practices in daily life.

2. Circular skills for businesses and institutions

The organisation also supports corporate groups and public-sector teams to engage with circular construction through teambuilding workshops, reuse training, and circular-materials consultancy. This enables businesses to integrate reuse into their procurement and facilities strategies, helping move circularity beyond theory and into organisational behaviour.

3. Local materials partnerships

Buurman collaborates with contractors, demolition firms, cultural institutions, and urban-wood recovery initiatives to channel residual materials back into the local economy. Its work with neighbourhood cooperatives, such as providing reclaimed materials to circular workspaces at Utrecht's Hof van Cartesius demonstrates how reuse can support local development and reduce demand for virgin resources.



Figure 9 – Netherlands – Buurman – June 2025

Driving Change Through Urban Mining

Buurman explicitly positions its work as a form of urban mining: recognising the modern city as a resource reservoir and treating materials produced through demolition and renovation as valuable assets rather than waste. This operationalises circular-economy principles at the community scale:

- preventing waste,
- reducing emissions from new material production,
- shortening supply chains, and
- keeping materials in productive use for longer.

Because Buurman sources, processes, and recirculates material entirely within the region, it builds resilience into local material supply and reduces the environmental footprint associated with long-distance manufacturing and transport.

A Scalable Social Franchise Model

Buurman began in Rotterdam in 2014 and has since expanded to Utrecht, Antwerp, Nijmegen, Arnhem, Amsterdam, and soon Breda, operating as a social-impact franchise. This model demonstrates that community-based circular-materials hubs can be replicated across cities, expanding the reach and normalising the reuse economy.

Conclusion

Buurman Rotterdam is a practical, accessible, and community-driven engine of the circular economy in the construction sector. By recovering urban materials, educating makers, empowering organisations, and fostering hands-on circular skills, Buurman closes material loops and enables the construction industry toward a more sustainable, low-waste future.

3.5 Preparing the Dutch Construction Industry for Mandatory Circular Economy Requirements

The Dutch government has established a non-negotiable national trajectory toward achieving a fully circular economy by 2050, codified within the 'A Circular Economy in The Netherlands in 2050' programme ('Nederland Circulair in 2050'). Given that the construction sector accounts for approximately 50% of the nation's raw materials consumption, it is identified as the single most critical transition focus area. This transition is governed by the Circular Construction Economy Transition Agenda, which aims for a comprehensive circular-built environment by 2050.

Preparation for this mandatory shift is systematic, employing a coordinated "push" (regulation and penalties) and "pull" (incentives and procurement leverage) strategy. The measurable and immediate driver is the interim objective of achieving a 50% reduction in the use of primary raw materials (minerals, fossil, and metals) by 2030.

The industry is being conditioned for future mandates through three primary mechanisms:

- first, the mandatory calculation and continuous tightening of the Environmental Performance of Buildings (MPG) ;
- second, fiscal penalties imposed via high waste disposal taxes, which compel diversion from landfill and incineration ;
- and third, generous fiscal rewards, notably tax deductions, which are strictly contingent upon the use of certified circular materials.

3.6 Implementing Circular Economy Policy Through Construction Procurement

The "Transition Agenda for a Circular Construction Economy" previously noted, provides the overarching roadmap, distinguishing between infrastructure (civil engineering) and the built environment (building construction). This agenda recognises that the long lifespan of construction assets presents unique challenges for material tracking and high-quality reuse, necessitating a move toward modularity and design for disassembly.

Implementation	Period	Strategic Objectives and Milestones
The Base Camp (complete)	2018– 2021	Establishing the foundational knowledge, tools, and pilot projects; removal of legislative barriers; fostering a string of innovative circular products.
The Ascent - Scaling (current phase)	2021– 2030	Achieving a 50% reduction in primary raw material use; halving CO2 emissions; making all public tenders circular by 2030.
The Summit (Full Circularity)	2030– 2050	Reaching a 100% circular industry where raw materials are used and reused efficiently with zero harmful emissions.

The National Circular Economy Programme (NPCE) 2023–2030 serves as the current operational document, shifting the policy focus from voluntary agreements toward binding measures and stricter norms. The Ministry has identified four primary mechanisms for accelerating this transition: reducing raw material usage through shared ownership and efficient production; substituting primary materials with sustainable, bio-based alternatives; extending product life through repair and refurbishment; and high-grade processing to ensure materials are recycled into high-value applications rather than downcycled into road foundations.

Transitioning to Functional Specifications

The Ministry has increasingly moved away from prescriptive technical specifications, which detail exactly how a project should be built toward functional specifications. Functional procurement defines the desired outcome or performance of an asset (e.g., "a waterway crossing with a 100-year lifespan and a minimum circular content of X") This approach grants contractors the creative freedom to propose innovative circular solutions, such as modular bridge decks or bio-based noise barriers, that the Ministry might not have envisioned.

For particularly complex or innovative challenges, the Ministry utilises "Rapid Circular Contracting" (RCC). This method selects a contractor early in the process based on their vision, expertise, and collaborative skills rather than a fixed design. The client and contractor then form a "construction team" to co-develop the final solution, sharing the risks and rewards of implementing unproven circular technologies. This collaborative model is essential for circularity, as it allows for the integration of product-as-a-service models and complex take-back agreements that require long-term trust between the public authority and the market.

3.7 Key Implementation Lessons from the Dutch Circular Construction Transition

The implementation process of the circular economy in the Dutch construction industry has provided the Ministry with essential, objective lessons, largely documented through the mandatory biennial monitoring conducted by the Netherlands Environmental Assessment Agency in its Integral Circular Economy Report.

These lessons highlight the necessary shift from focusing on incremental efficiency gains to mandating fundamental, structural dematerialisation and ensuring the long-term viability of the circular supply chain.

I. The Difficulty of Decoupling: Structural Consumption Persists

The most critical lesson learned is the inherent difficulty in achieving material decoupling, the process of reducing material consumption while the economy continues to grow.

Despite comprehensive policy interventions, including high waste-disposal taxes and strong financial incentives, objective monitoring indicates that physical trends in material consumption are "still not going in the right direction". The Ministry's ambition remains non-negotiable: a 50% reduction in primary raw materials by 2030 and a fully circular economy by 2050.

The key realisation is that policies aimed at optimising the existing linear system (such as maximising recycling and downcycling of waste) are insufficient to drive the structural dematerialisation required to meet the 2030 targets. The current regulatory mix, while detailed, is not yet leading to a structural decline in the sheer volume of material resources consumed. This realisation signals the need for the government to move toward more stringent, outcome-focused policy instruments, such as mandatory material quotas or absolute volume controls, to accelerate the transition.

II. Market Maturity Requires More Than Incentives

A second critical lesson centres on the limitations of current market-shaping tools in generating a robust, self-sustaining circular market.

While the Dutch policy successfully employs a "carrot and stick" approach using financial rewards (like tax deductions for certified circular products) and fiscal disincentives (high waste taxes), the Integral Circular Economy Report finds that there is still a persistent "lack of a robust, functioning, broad market for circular products".

The Ministry has learned that creating technical feasibility and financial incentives for circularity at the individual project level (for instance, through Environmental Performance of Buildings calculations) does not automatically translate into a fully industrialised, scalable supply chain. The preparation phase must, therefore, be sustained and accelerated with "concrete and ambitious policy" on both the national and European levels to drive the creation of these markets.

4. Belgium: Large-Scale Material Reuse in Practice – The Rotor DC Case

While my research and fieldwork focused primarily on exploring the circular-economy landscape within the Netherlands, I took the opportunity to visit one of the most compelling examples of the circular economy in action, located just beyond the Dutch border: Rotor DC, in Brussels, Belgium. The work of Rotor DC is deeply relevant to the Dutch context, both as a practical demonstration of large-scale material reuse and as a model of the systemic thinking required to make circular construction a mainstream reality.

Rotor DC work illustrates what becomes possible when salvage is approached systematically, professionally, and creatively. It offers valuable lessons for policymakers, architects, contractors, and researchers seeking to accelerate circular-economy practices in construction.

4.1 Case Study 3: Rotor DC - Professionalising Construction Material Reuse at Scale

Rotor DC is a Brussels-based cooperative founded in 2016, specialising in the dismantling, processing, and resale of reusable building materials, including doors, lighting fixtures, hardware, furniture, tiles, sanitary equipment, and other architectural components. Their mission is simple but transformative: to organise and professionalise the reuse of construction materials so that salvage becomes a practical, economically viable, and widely adopted alternative to demolition and disposal (Rotor DC, cited in Belgian field research, 2016–present).

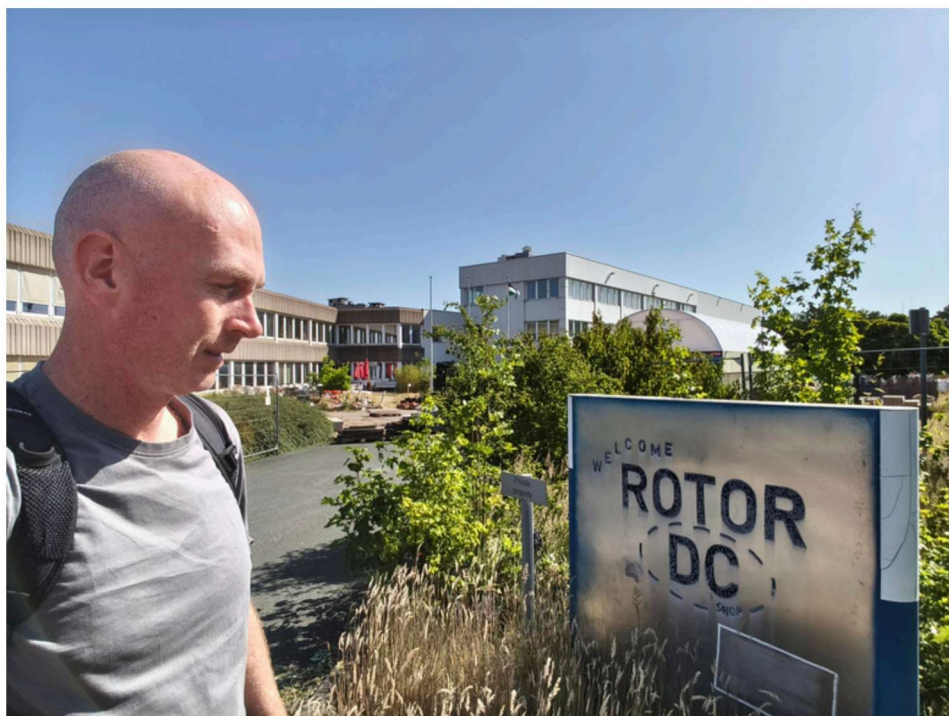


Figure 10 – Belgium – ROTOR DC – June 2025

Rotor DC grew out of years of research by the organisation Rotor, which had been studying material flows and opportunities for reuse within the built environment. Early experiments between 2013 and 2016 involved dismantling components from major demolition sites in Brussels, such as the interiors of the former Générale de Banque headquarters. These efforts matured into a fully operational cooperative capable of sourcing, storing, processing, and distributing salvaged materials at scale, becoming a major actor in Belgium's reuse economy.

The organisation has since become known for its innovative techniques in deconstruction, including specialist methods for removing mortar from ceramic tiles, repairing lighting components, and reprocessing urban timber. By designing logistical systems specifically tailored to modern construction materials and processes, Rotor DC addresses one of the central challenges facing circular construction: how to transform what would traditionally be waste into high-value resources ready for use in new or refurbished buildings.

Rotor DC's impact extends beyond technical innovation. It has played a pivotal role in shaping the cultural, economic, and aesthetic dimensions of reuse, demonstrating that salvaged materials are not only environmentally responsible but can also meet contemporary design standards. Their work has even earned recognition such as the Henry van de Velde Award, highlighting how their fusion of theory, practice, and design excellence contributes to a more resource-efficient architectural culture.

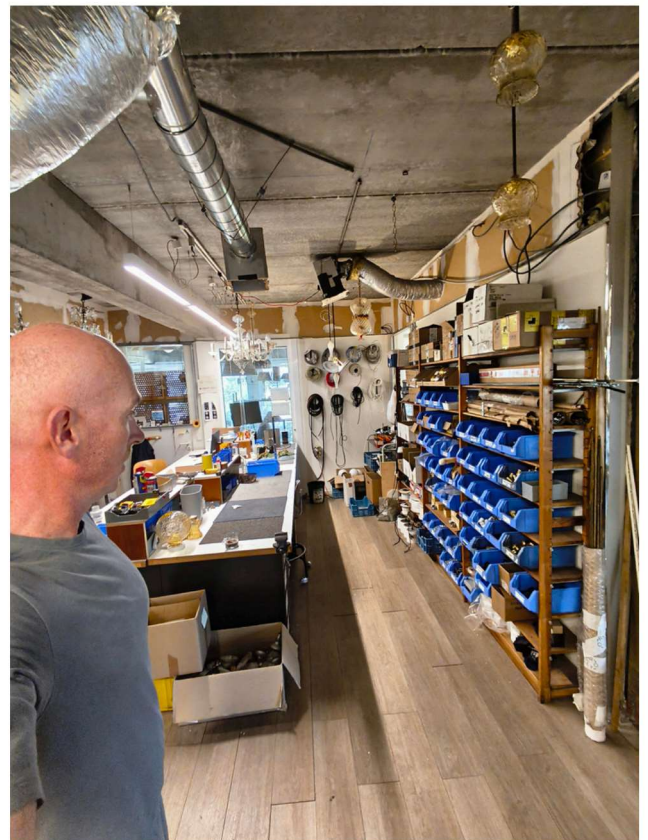


Figure 11 – Belgium – ROTOR DC – June 2025

Summary of Learnings from Rotor

1. Invest in Deconstruction rather than Demolition

Rotor proves that an organised approach to dismantling buildings yields high-value materials. The UK's demolition-heavy practices often waste these opportunities.

UK application:

- Encourage “deconstruction-first” guidelines in planning.
- Support contractors with training and equipment for selective dismantling.

2. Build the Infrastructure for Reuse Markets

Rotor DC's success comes from creating:

- Storage warehouses
- Cleaning and processing facilities
- Logistic networks
- Certification standards

UK application:

- Develop regional reuse centres and marketplaces.
- Support grading and certification to ensure quality and create buyer confidence.

3. Strengthen Industry Ecosystems

Rotor collaborates with contractors, designers, authorities, and property owners.

UK application:

- Nationally coordinated reuse networks
- Local authority partnerships with salvage operators
- Incorporation of reuse requirements in public procurement



Figure 12 – Belgium – ROTOR DC – June 2025

4. Provide Policy and Financial Support

Rotor DC benefitted from research grants, government partnerships, and EU funding.

UK application:

- Grants for reuse technology (tile cleaning, lighting refurbishment, etc.)
- VAT reductions or incentives for reclaimed materials
- Mandatory reuse assessments for large projects

5. Shift Cultural Perception of Reused Materials

Rotor's design-focused approach helped overcome the "second-hand = inferior" stigma.

UK application:

- Promote design awards such as the recent RIBA Reinvention Award and case studies featuring reused materials
- Integrate reuse in architecture school curricula
- Encourage major developers to demonstrate reuse in flagship projects

6. Use Evidence and Research to Inform Policy

Rotor's early research mapped existing reuse market actors and demonstrated the hidden potential of reuse economies.

UK application:

- Commission national and regional reuse mapping
- Identify immediate "quick win" materials (doors, lighting, façade elements, etc.)
- Tailor local circular strategies to actual material flows

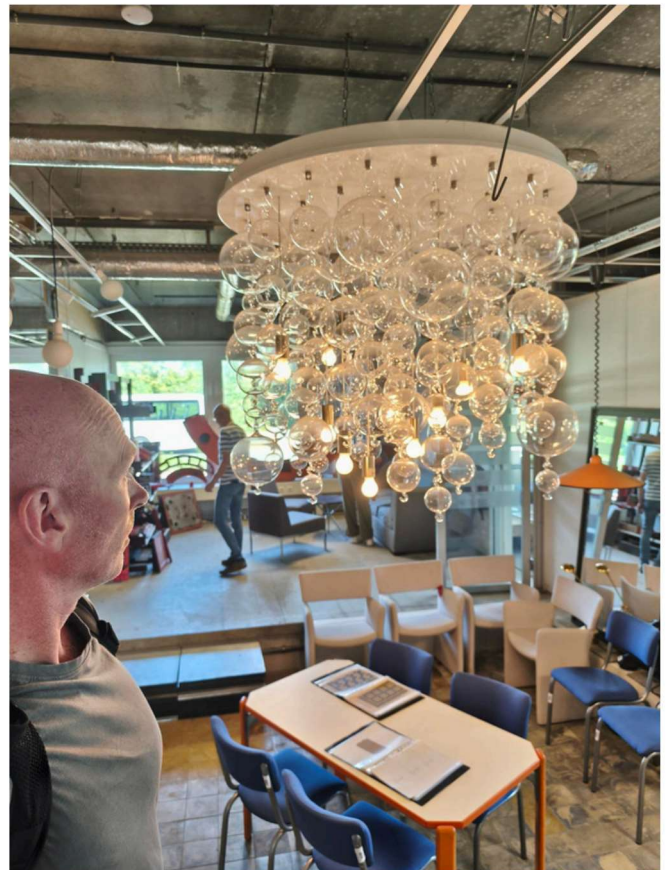


Figure 13 – Belgium – ROTOR DC – June 2025

5. Italy: The Venice Architecture Biennale as a Testbed for Circular and Sustainable Construction

In September 2025, I travelled to Italy to learn from the 19th International Architecture Exhibition, La Biennale di Venezia, an event that has long stood at the forefront of global architectural discourse. Held across the Giardini, Arsenale, and various sites throughout Venice, the Biennale brought together over 700 contributors from diverse disciplines, all responding to the central theme “Intelligens. Natural. Artificial. Collective.” curated by Carlo Ratti. This edition transformed Venice into what Ratti described as a “living laboratory,” inviting architects, scientists, environmentalists, and designers to propose new ways of thinking about the built environment amid rapidly escalating climate pressures.

A Biennale Defined by Sustainability and Circularity

What distinguished the 2025 Biennale from previous editions was its unprecedented commitment to circular economy principles and environmental responsibility. The organisers introduced a landmark Circular Economy Manifesto, developed with guidance from Arup and input from the Ellen MacArthur Foundation, urging all participating countries and exhibitors to rethink how they design, build, and present their installations. The Manifesto set out ambitions to eliminate waste, circulate materials, and regenerate natural systems, positioning the Biennale as a platform not just for displaying ideas but for modelling sustainable ways of operating major cultural events (Ellen MacArthur Foundation, 2019).

This shift was visible across the Biennale’s infrastructure. Exhibitions and pavilions were encouraged to minimise new material consumption, prioritise reclaimed resources, and adopt construction strategies that allowed dismantled components to be reused after the event. The Biennale implemented an environmental framework involving waste optimisation, emissions reduction, and real-time environmental monitoring, signalling its intention to move beyond theory towards measurable circular economy climate action.

5.1 Case Study 4: The Danish Pavilion as a Live Demonstrator of Circular Renovation

The Danish Pavilion at the 2025 Venice Architecture Biennale, curated by architect Søren Pihlmann and commissioned by the Danish Architecture Centre, presents a pioneering case study in the application of circular economy principles within architectural practice. Under the title *Build of Site*, the pavilion shifts from the traditional format of a temporary exhibition toward an active, full-scale process of renovation and material reuse, positioning the exhibition itself as a living demonstration of circular construction methods. The project directs time, labour, and funding toward improving the pavilion's long-term performance while showcasing strategies for rethinking material value, resource efficiency, and sustainable building practices.

Reuse as Architectural Strategy

Central to the Danish contribution is the proposition that existing buildings already contain the resources needed for their own renewal. Pihlmann adopts a hyper-local approach, reclaiming materials directly from the pavilion, including gravel, metal plates, timber, tiles, and excavated floor materials and reintegrating them into the ongoing renovation. These reused components form not only the physical upgrades but also the exhibition elements such as benches, ramps, and display surfaces. The result is an architectural practice that reconfigures surplus materials once considered waste as productive, structurally viable components.

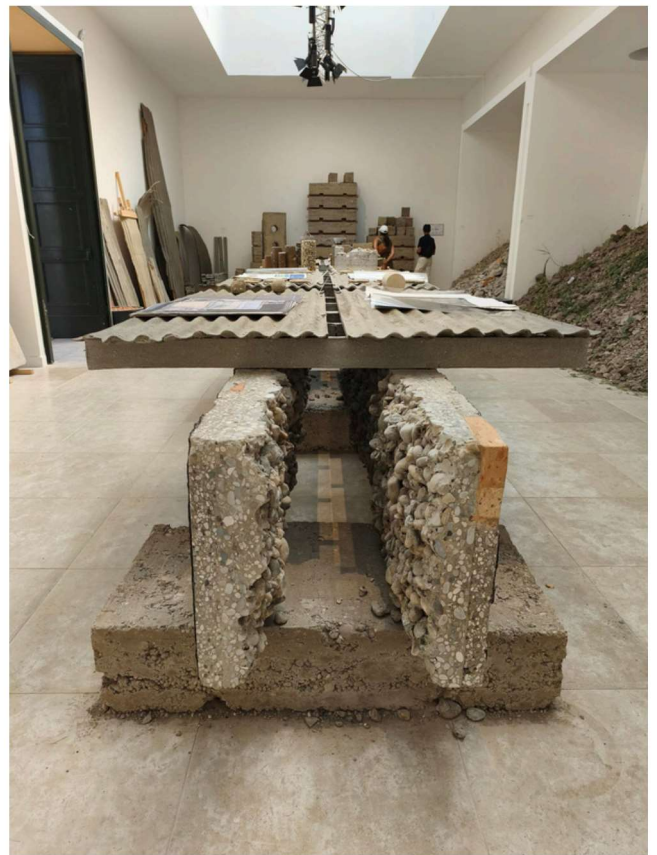


Figure 14 – Venice Biennale – Danish Pavillion – September 2025

This approach highlights a core principle of the circular economy: keeping materials at their highest value for as long as possible. By prioritising site-sourced resources, the pavilion reduces material transport, minimises waste streams, and demonstrates the viability of reuse even in a context as logistically complex as an international exhibition.

Summary

The Danish Pavilion at the Venice Architecture Biennale 2025 offers a compelling prototype for circular construction in practice. Through hyper-local reuse, transparent renovation, incorporation of bio-based materials, and interdisciplinary collaboration, Build of Site transcends the traditional exhibition model to become a tangible demonstration of how the built environment can evolve within planetary limits. It highlights that circularity is not merely a matter of recycling, but a holistic design philosophy rooted in resource awareness, material literacy, and long-term stewardship of existing buildings. This case study provides a rich source of insight for broader architectural and policy discussions, particularly for nations seeking to operationalise circular economy principles at scale.

5.2 Case Study 5: The Serbian Pavilion as a Zero-Waste, Fully Reversible Circular Installation

This pavilion distinguished itself through its conceptual clarity, material sensitivity, and profound engagement with the principles of circular design. It was, without question, the most striking and memorable intervention I encountered during my fellowship.



Figure 15 – Venice Biennale –Serbian Pavillion – September 2025

A Sculptural Manifestation of Circularity

The Serbian Pavilion presented an immersive installation composed entirely of knitted wool, suspended from the pavilion's ceiling in a series of large, flowing catenary curves. This woven environment was designed as a kinetic and ephemeral structure, programmed to gradually unknit itself over the six-month duration of the Biennale through a system of motors powered by renewable solar energy. By the end of the exhibition, the entire installation would return to its original state, a single continuous thread of yarn rendering the pavilion a complete, zero-waste circular system.

This commitment to circularity extended beyond symbolic intent. The project ensured that all materials could be reused, thereby producing no residual waste and fully embodying the principles of resource conservation, reversibility, and material stewardship emphasised by the Biennale's broader sustainability agenda. The wool itself, a material rarely associated with architecture was recontextualised as an architectural medium capable of producing space, atmosphere, and structure through its tactility and light-responsive qualities.

Professional Reflections and Lessons for the Construction Industry

The Serbian Pavilion at the Venice Architecture Biennale 2025 was a powerful demonstration of how circularity can be articulated through architectural form, material behaviour, and experiential design. Its sublime and constantly evolving spatial composition challenged conventional expectations of sustainable architecture and reaffirmed that circular principles can generate work that is both technically rigorous and visually compelling. The installation stands as an exemplar of how the construction industry might reconceive the aesthetics of reuse, demonstrating that circularity can be not merely efficient, but profoundly beautiful.

5.3 Key Circular Construction Lessons from the 2025 Venice Architecture Biennale

Attending the 19th International Architecture Exhibition, La Biennale di Venezia in 2025 provided an opportunity to observe how global architectural practice is evolving in response to pressing environmental challenges. Curated under the theme “Intelligens. Natural. Artificial. Collective.”, the Biennale positioned architecture as a field that must harness multiple forms of intelligence, natural, digital, and collective to address climate change and material scarcity.

Overall, the Biennale illustrated several critical lessons for the construction industry:

- Circularity must be embedded from the outset, not added as an afterthought; the Manifesto demonstrated how policy frameworks can elevate industry expectations.
- Reuse and reversibility can enrich design, offering new formal, spatial, and experiential possibilities.
- Material intelligence, understanding origins, lifecycles, and reusability should guide decision-making, supported by monitoring and data-driven tools.
- Cultural narratives and craftsmanship can play meaningful roles in accelerating acceptance of circular practices, helping to dispel stigma around reused materials.

The 2025 Biennale demonstrated that the circular economy is feasible in construction and when thoughtfully implemented, it produces architecture that is environmentally responsible, technically resilient, and accomplished.

6 Synthesis and Conclusions: Delivering a Circular Economy in Construction

The implementation of a circular economy in construction is critical to support the transition to net zero. Despite recognition that a circular economy approach is a critical element in managing the climate crisis, it is unlikely that market forces will intervene to establish one without action from the public sector. The private sector's responsibilities towards shareholders do not incentivise the private sector to act as a first mover in this space. The public sector has the power to act as a first mover.

My Fellowship demonstrates that a circular economy in construction is environmentally necessary and structurally achievable, if policy, procurement, industry, and culture are aligned. The following summary distils the insights from each section of this report and explains how they collectively underpin my final conclusions and recommendations.

1. Introduction & R-Ladder (Section 1)

The opening sections establish why circularity in construction is essential. With 39% of global emissions attributable to buildings and construction, and 25% from embodied carbon, the sector represents the single biggest opportunity to reduce environmental impacts. Circularity offers a pathway to decouple growth from resource use by eliminating waste, circulating materials, and regenerating natural systems.

The R-Ladder (Refuse → Rethink → Reduce → Reuse → Refurbish → Remanufacture → Repurpose → Recycle → Recover) provides the conceptual foundation for later findings: the highest value interventions occur long before recycling, through design, reuse and adaptability.

These principles inform every subsequent insight in my report, particularly the need to prioritise reuse and design for deconstruction (Section 3).

2. UK Policy & Governance Landscape (Section 2)

My analysis of the UK governance model shows why circularity remains fragmented:

- Policy ambition exists, but delivery varies across devolved nations.
- Local authorities hold critical influence over demolition vs. reuse decisions.
- The policy-to-practice gap is wide due to inconsistent procurement rules, testing barriers, and weak reuse markets.

This section underpins my conclusion that the UK requires a more integrated Triple-Helix structure (government–industry–academia) similar to the Netherlands (Section 3), and that market change will not occur without strong public-sector leadership.

3. The Netherlands (Section 3)

My strongest learning comes from the Dutch model, where circularity has been embedded through coordinated national programmes, structural incentives, and long-term planning.

Key insights include:

3.1. A Model for Circular Economy Delivery in Construction

- The Netherlands set clear national targets, including a 50% reduction in raw material use by 2030 and a fully circular economy by 2050.
- A long cultural tradition of cooperation (water boards, Delta Works) laid the groundwork for collaborative circular governance today.

This demonstrates the importance of clarity, ambition, and cultural alignment, informing my recommendation that the UK must strengthen its own collaborative infrastructure (Section 7).

3.2 Triple-Helix Collaboration

The Dutch success is rooted in the institutionalised Triple Helix:

- Government sets the mandate.
- Academia provides research and data.
- Industry delivers innovation and capacity.
- Standardisation bodies ensure unified methods and terminology.

I suggest that the UK could move toward a coordinated national ecosystem.

3.3–3.4 Case Studies: The Natural Pavilion & Buurman

These illustrate that circularity is practical and scalable:

- Natural Pavilion: A fully demountable, biobased, reusable building proving the feasibility of circular construction at scale.
- Buurman: Local reuse hubs enabling material recovery, community skills, and decentralised reuse markets.

These examples reinforce the need for reuse infrastructure, skills development, and procurement reform in the UK (Sections 7).

3.5–3.7 Dutch Ministry Implementation Mechanisms

The Netherlands prepared industry through:

- Mandatory Environmental Performance metrics
- Material Passports
- High landfill taxes
- Fiscal incentives
- Circular procurement requirements
- Regional buyer groups and market stimulation

These mechanisms inform my recommendation that the UK should adopt stronger incentives, disincentives, and data tools to shift the market (Section 7).

3.8 Lessons Learned by Dutch Ministry

The Dutch experience reveals:

- Efficiency alone is not enough, dematerialisation is required.
- Reuse markets must be actively stimulated, not assumed.
- Standardisation and digitalisation (material passports) are essential.
- Reverse logistics and deconstruction require coordinated supply chains.

These lessons directly support my proposals around reuse hubs, national testing capacity, and integrated supply chains (Section 7).

4. Belgium: Rotor DC (Section 4.1)

Rotor DC shows what circularity looks like when dismantling is professionalised:

- High-quality salvage requires logistics, storage, grading, and certification.
- Strong relationships with contractors and clients create material flows and confidence.
- Cultural perception of reused materials can be transformed through design excellence.

These lessons support my recommendations for UK reuse markets, deconstruction-first policy, and cultural transformation (Section 7).

5. Italy: Learning from the Venice Architecture Biennale (Section 5)

The Biennale revealed global consensus that circularity is central to architecture's future. Key insights:

- Circularity can be spatially rich, and expressive (Serbian Pavilion).
- Reuse and adaptation can form the very basis of an architectural exhibition (Danish Pavilion).
- International frameworks such as the Circular Economy Manifesto demonstrate how major institutions can drive change.

My report demonstrates that achieving a circular construction economy is possible, when policy, governance, procurement and industry capability are aligned. The Netherlands shows how to build such a system; Belgium and Italy show how to make it practical and scale-able. This report sets out a clear road-map from which the UK could benefit, and my research supports evidence-based recommendations that provide a practical and implementable way forward for the UK.

7. Recommendations for Delivering Circular Construction in the UK

A circular economy in UK construction will happen through coordinated leadership, procurement reform, purpose-built reuse infrastructure, and a decisive existing-estate-first mindset.

Evidence from the Netherlands and Belgium demonstrates that the countries making progress are those treating circular construction as system reform, not a niche sustainability agenda. Their success is driven by alignment between policy, procurement, industry capability, logistics and design.

The UK, by contrast, has policy intent and pockets of excellence, but progress remains fragmented, uneven and optional. Circularity depends on motivated individuals rather than embedded systems. Without intervention, it risks remaining marginal.

The recommendations below are therefore structured to enable a shift from aspiration to implementation, prioritised to enable circular construction to scale.

Order of Action

Immediate priorities (0–2 years): unlock demand and coordination

- Create national coordination (Triple Helix)
- Reform public procurement to favour reuse
- Adopt an “existing estate first” rule across public assets

Medium-term priorities (2–5 years): build market infrastructure

- Scale reuse infrastructure, testing, and logistics
- Professionalise deconstruction and reuse supply chains

Long-term priorities (5–10 years): normalise circular construction

- Fully integrated material data, passports, and planning policy
- A mature secondary materials market matching linear performance

ROADMAP FOR A CIRCULAR CONSTRUCTION ECONOMY IN THE UK

IMMEDIATE 0-2 YEARS

CREATE NATIONAL
COORDINATION
(TRIPLE HELIX)

REFORM PUBLIC
PROCUREMENT TO
FAVOUR REUSE

ADOPT AN 'EXISTING
ESTATE FIRST' RULE

MEDIUM 2-5 YEARS

SCALE REUSE
INFRASTRUCTURE,
TESTING, AND
LOGISTICS

PROFESSIONALISE
DECONSTRUCTION
AND REUSE SUPPLY
CHAINS

LONG-TERM 5-10 YEARS

FULLY INTEGRATED
MATERIAL DATA,
PASSPORTS, AND
PLANNING POLICY

A MATURE
SECONDARY
MATERIALS MARKET
MATCHING LINEAR
PERFORMANCE

Figure 16 – UK Recommendations – Roadmap

7.1 Immediate Priority: Establishing a National Triple Helix to Deliver Circular Construction in the UK

Circular construction only advances where government, industry, and academia operate as a single system, not as parallel actors. In the Netherlands, this “Triple Helix” is formal, funded, and embedded across policy, procurement, research, and market development. It is central to delivering their national targets of 50% raw material reduction by 2030 and full circularity by 2050.

The UK currently lacks any equivalent national mechanism. Valuable initiatives exist, particularly within devolved administrations, but without coordination they do not scale.

Recommendation (Immediate): Establish a National Circular Economy in Construction Network (NCECN)

Government-mandated, industry-co-led, academically anchored

This network would act as the UK’s delivery spine for circular construction.

Core functions:

- National standards for circularity, reuse, testing, and material data
- Coordinated development of reuse infrastructure and logistics
- Demand-led research and innovation
- Skills pathways for deconstruction, testing, repair, and design for disassembly
- Co-created policy and procurement reform

Without national coordination:

- Good practice remains isolated
- Standards remain inconsistent
- Industry lacks confidence to invest
- Public procurement continues to default to linear solutions

Outcome:

A single, authoritative mechanism capable of moving the UK from pilots to systems.

7.2 Immediate Priority: Making Existing Buildings the Default: An “Existing Estate First” Rule for the UK

The lowest-carbon building is the one that already exists. Existing public assets are under utilised. This has been accelerated by hybrid working and service reform.

Recommendation (Immediate): Make New Build the Last Resort

Across all public-sector estates, government should require:

- An “existing estate first” policy for all capital programmes
- Cross-organisation estate planning, treating public buildings as a shared resource
- Asset rationalisation teams across departments and regions
- Planning policy that mandates refurbishment before new build
- Business cases to prove reuse options are exhausted before approval
- Reuse of components as standard in refurbishments

Outcome:

- Immediate carbon savings
- Reduced capital spend
- Strong demand signal for reuse markets
- Cultural shift from disposable buildings to long-term assets

7.3 Immediate–Medium Priority: Building a Scalable Circular Supply Chain That Can Compete with the Linear Model

Circular construction can succeed if it can match the speed, certainty, and reliability of the linear “just-in-time” system that has evolved over 150 years.

Belgium’s Rotor DC demonstrates how scaling can be achieved: Infrastructure. Professional dismantling teams. Central depots. Testing and certification. Warehousing. Digital stock visibility. Warranties. Predictable supply.

The UK has limited early signals of progress.

Recommendation (Immediate–Medium): Build the UK’s Circular Supply Chain at Scale

Priority actions:

Fund and mandate regional reuse hubs

- Rotor-style depots for recovery, testing, storage, and resale
- Anchored by public-sector demand

Create national testing and certification capacity

- Fast, insurance-ready approval of reclaimed materials
- Delivered with universities, BRE, and UKAS labs

Guarantee demand through procurement

- Minimum reuse requirements on public projects
- Mandatory pre-demolition audits feeding local hubs

Launch a UK-wide digital material exchange

- National visibility of available reclaimed materials
- Integrated with planning and procurement

Outcome:

A circular supply chain that is predictable and competitive.

7.4 Next Steps: From Fellowship Evidence to Government Action

I have presented my evidence in this report. Having considered the evidence the next steps are:

- Formalise cross-departmental circular construction groups
- Champion creation of the National Circular Economy in Construction Network (NCECN)
- Advance live pilot projects with mandatory reuse and reporting
- Advance procurement reform at Cabinet Office and devolved levels

What should follow:

- Nationwide rollout of reuse hubs and testing capacity
- Full integration of material passports and data standards
- Skills reform across education and professional training

What success looks like.

A construction sector where:

- Reuse is normal, not exceptional
- Public estates are optimised, not replaced
- Circular supply chains are competitive and insurable
- Carbon and material efficiency are included in everyday decisions

A circular construction economy in the UK will happen if government uses its authority, procurement power, and estate leadership to create alignment across the system.

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Figure 17 – Netherlands Dutch Ministry of Infrastructure & Water Management – March 2026

L-R Niall Miskelly – Health Estates, Rachel Lombardi – International Synergies, Merlan Van Holten – Dutch Ministry of Infrastructure & Water Management