

Circular Economy in Practice

Webinar 2/3 by fors.earth GmbH for XRGREEN.CON

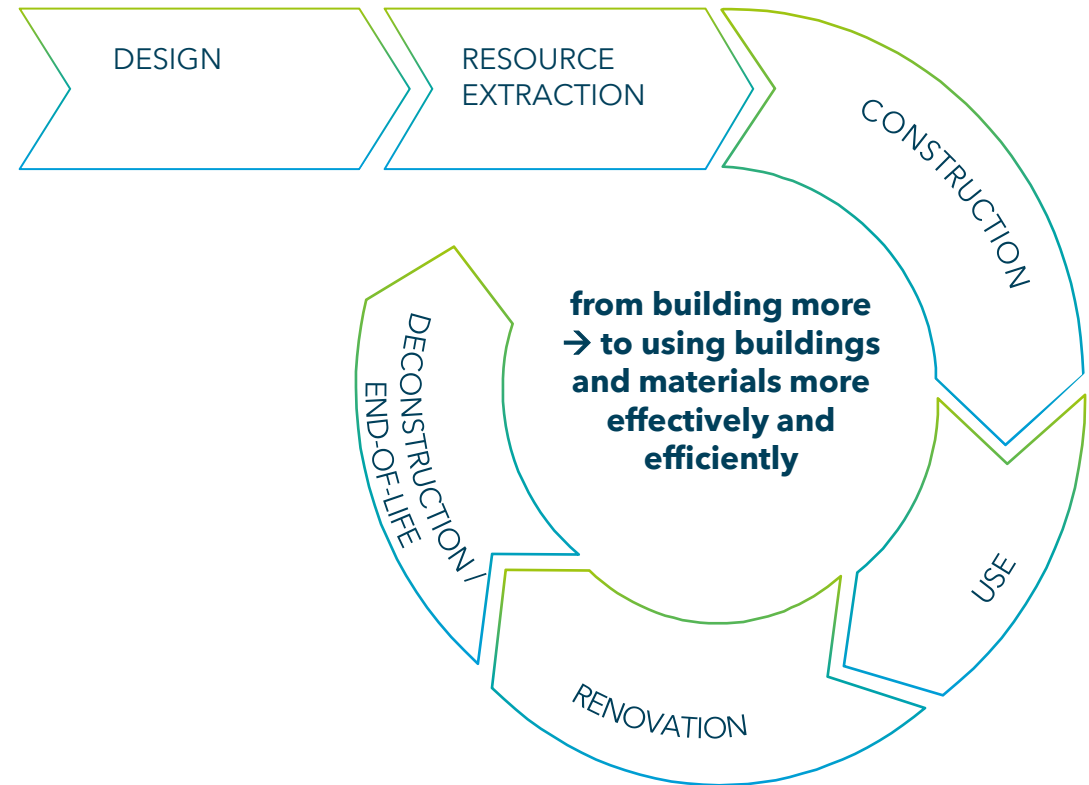
14.04.2026 | 10:00 - 11:30 a.m. | MS-Teams

In the last webinar, we explored why circular economy matters for the construction industry

Recap Webinar 1

1. We operate within physical - non-negotiable - planetary boundaries
2. The economy is embedded in society and the environment
3. Construction shapes long-term environmental, social and economic outcomes
4. Most lifecycle impacts are determined early (design phase)
5. Circular economy offers a systemic solution to these challenges
6. Given that the economy and its guardrails are the result of human intervention through regulation and action, we also have the capacity to address these challenges.

Circular Economy: A systemic way to reduce negative impacts and create value

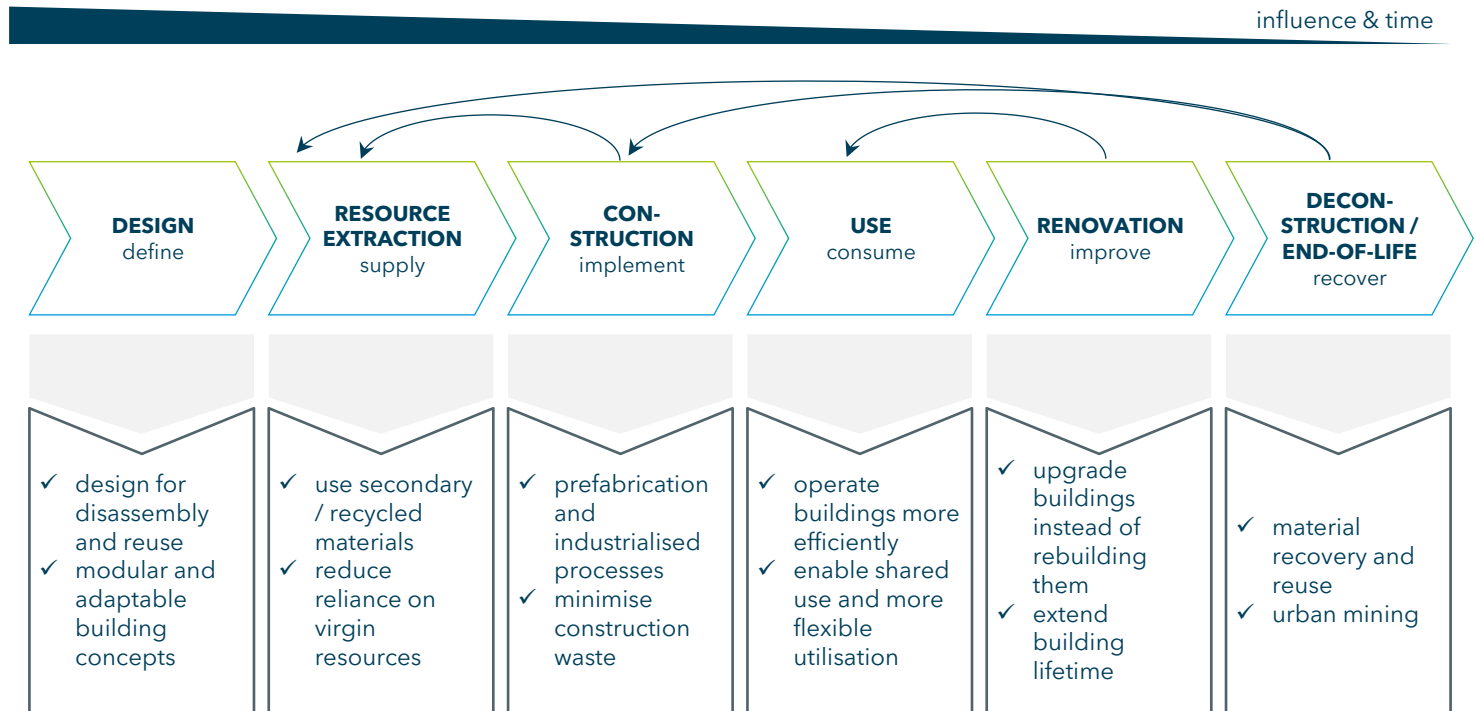


Circular economy works when we connect decisions across the value chain

The **three principles** for circularity are...


- 1 Design for circularity**
 - ✓ design for reuse, adaptability and disassembly
 - ✓ avoid locking in linear systems
 - ✓ design out waste & pollution
- 2 Keep materials and components in use**
 - ✓ reuse, repair, remanufacture
 - ✓ extend building and component lifetimes
- 3 Regenerate natural systems**
 - ✓ reduce environmental degradation
 - ✓ integrate nature-positive solutions

...and these can be implemented **throughout the value chain**




Today we will explore how circularity creates value in real-world construction cases

COMPANY/PROJECT



Context & Goal



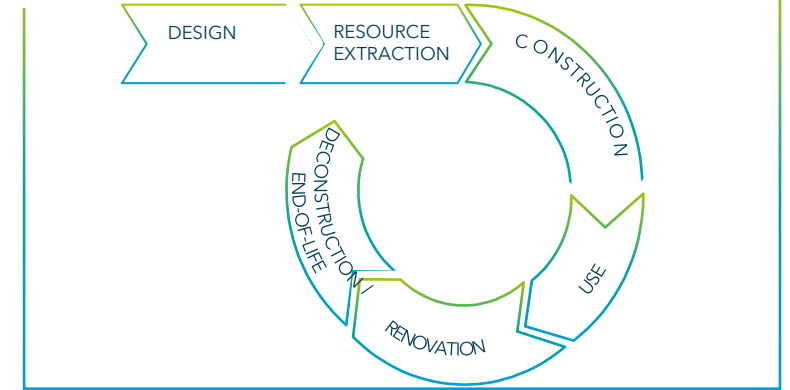
Circular Strategy & Execution



Outcomes



Value Chain Impact



Challenges



Success Factors



Industrialisation enables scalable circularity



Circular Strategy & Execution



Outcomes



Value Chain Impact



Challenges



Success Factors



Affordable living through modular construction: Gropyus | Ellen MacArthur Foundation
About Us | GROPYUS
GROPYUS Experten | Das GROPYUS Bausystem
Sustainability is part of our DNA | GROPYUS
Evaluating the Circular Economy Potential of Modular Construction in Developing Economies—A Life Cycle Assessment
Making a Case for Circular Economy Principles in Modular Construction: Identifying Key Determinant Factors | Springer Nature Link

Industrialisation enables scalable circularity



GROPYUS AG, AUT

Context & Goal

Addressing housing demand while reducing cost, time and environmental impact

- increasing demand for affordable housing
- pressure to reduce emissions and resource use
- need for scalable and efficient solutions

Circular Strategy & Execution

Industrialised modular construction as a circular system approach

- standardised, prefabricated building components
- design for modularity and adaptability
- integration of digital planning and production systems

Outcomes

ECOLOGICAL

- + reduced construction waste (up to ~30-50%) → prefabrication and controlled factory production
- + more efficient use of materials → standardised components
- + lower lifecycle emissions (potential) → material efficiency and industrialised processes

SOCIAL

- + faster delivery of housing (up to ~50%) → parallelised processes and off-site production
- + improved quality and consistency → controlled production environments
- + improved affordability (indirect) → reduced construction time and cost predictability

ECONOMIC

- + up to ~50% faster project delivery → industrialised processes
- + more predictable cost structures → standardisation and reduced on-site complexity
- + reduced project risk → repeatable processes and planning reliability

Value Chain Impact

- DESIGN: standardised modular design
- PRODUCTION: prefabrication in controlled environments
- CONSTRUCTION: streamlined assembly
- USE: adaptable layouts

Challenges

- ! higher upfront investment in industrialised systems
- ! coordination across design, production and construction
- ! balancing standardisation with user needs
- ! dependency on stable demand for scaling

Success Factors

- ✓ integration of design and production processes
- ✓ early alignment across the value chain
- ✓ use of digital tools (e.g. BIM) for planning and coordination
- ✓ industrialised processes to reduce variability and waste

The most sustainable building is the one that already exists



The most sustainable building is the one that already exists



Circular Strategy & Execution

Reuse and transformation instead of demolition

- conversion of existing buildings (e.g., offices → housing)
- extension of building lifetime
- preservation of structural elements

Outcomes

ECOLOGICAL

- + up to ~50-75% reduction in embodied carbon → reusing existing structures
- + reuse of up to ~50-80% of existing structure → preserving load-bearing elements
- + significant reduction in demolition waste → avoiding demolition and material disposal

SOCIAL

- + creation of housing in high-demand urban areas → converting underused buildings
- + revitalisation of vacant spaces → transforming existing assets into new uses
- + improved urban density and land use → reusing built environments instead of expanding

ECONOMIC

- + avoided demolition and material costs → reusing structures
- + shorter project timelines vs new builds → reduced construction scope
- + value creation from underused assets → unlocking use cases

Value Chain Impact

- DESIGN: redesign existing structures for new use
- USE: extend building lifetime significantly
- RENOVATION: transformation instead of replacement
- END-OF-LIFE: avoid demolition and waste generation

Challenges

- ! regulatory complexity (e. g., change of use)
- ! technical constraints of existing buildings
- ! alignment of stakeholders

Success Factors

- ✓ early assessment of building suitability
- ✓ integration of design and engineering
- ✓ collaboration with public authorities
- ✓ use of digital tools for planning and modelling

Circularity must be designed from the start



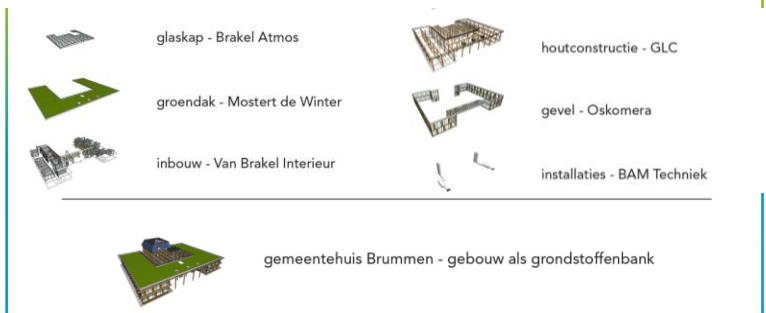
Circular Strategy & Execution



Outcomes



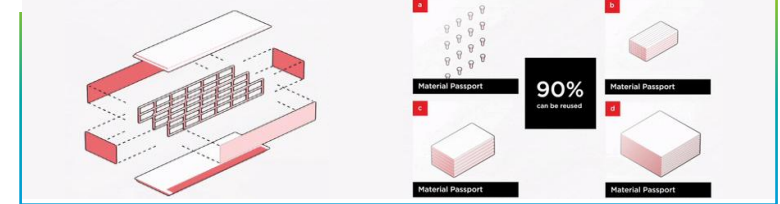
Value Chain Impact



Challenges



Success Factors



Circularity must be designed from the start



BRUMMEN TOWN HALL, NL

Context & Goal

Designing a public building fully aligned with circular principles

- need to reduce material waste
- long-term resource efficiency
- public sector as innovation driver

Circular Strategy & Execution

Design for disassembly and material reuse

- modular construction system
- reversible connections
- integration of material passports

Outcomes

ECOLOGICAL

- + ~90% of materials reusable or recyclable → reversible connections and modular design
- + minimised waste generation → selective material use and avoiding composites
- + preservation of material value → keeping materials identifiable and separable (material passports)

SOCIAL

- + public awareness for circular construction → through transparent design and use as a municipal showcase
- + role model for municipalities → real project feasibility
- + improved building transparency → through documented materials and construction methods

ECONOMIC

- + avoided demolition and construction costs → reuse and future disassembly
- + reduced end-of-life costs → disassembly instead of demolition
- + retained material value over time (20% residual value at end-of-life as per contractor) → as components can be reused rather than discarded

Value Chain Impact

- DESIGN: circularity embedded from the start
- CONSTRUCTION: reversible assembly methods
- USE: adaptable structure
- END-OF-LIFE: full disassembly and material reuse

Challenges

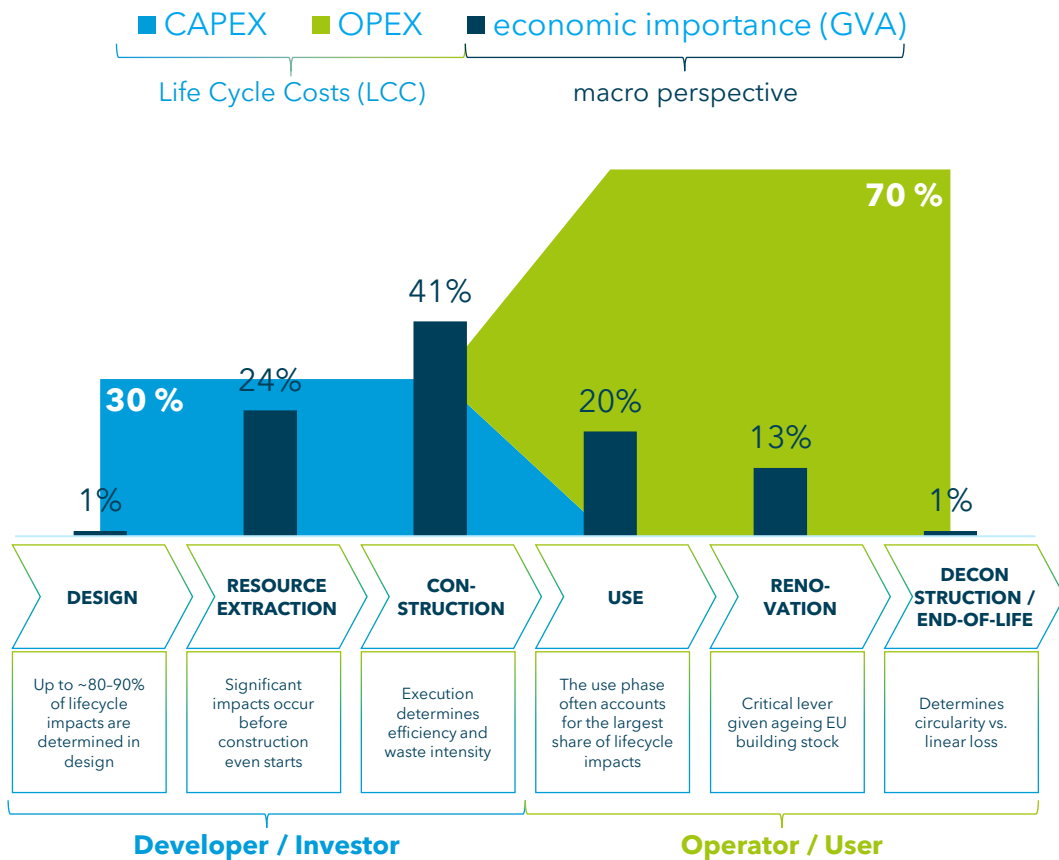
- ! higher upfront planning effort
- ! need for new design and construction methods
- ! limited standardisation

Success Factors

- ✓ strong integration of design, material and lifecycle thinking
- ✓ use of material passports and digital documentation
- ✓ commitment from public client

Circular economy is often limited by misaligned incentives across the value chain

Status-quo: We decide early - but we pay later



Key barriers...

1 CAPEX vs OPEX split

- different stakeholders involved since value chain
- Uneven risk and benefit distribution:
 - higher upfront investment
 - benefits occur during operation

...and how to address

- ✓ integrate **lifecycle cost analysis** (LCC) in early design
- ✓ shift from upfront cost to **total cost of ownership** (TCO)
- ✓ involve **operational stakeholders early**

2 Fragmentation across stakeholders

- siloed decision-making
- disconnected actors
- limited shared incentives

- ✓ enable **cross-value-chain collaboration** (and incentives) early
- ✓ use **integrated project delivery** (IPD) models
- ✓ define **shared lifecycle performance targets** (KPIs)
- ✓ **XR-supported shared visualisation** of design and lifecycle decisions

Additional barriers require practical and systemic responses as well

Key barriers...

... and how to address

3

Regulatory complexity

- unclear or slow approval processes
- regulations not aligned with circular approaches

- ✓ integrate **circular criteria early** in planning
- ✓ **engage proactively with regulators** and certification bodies
- ✓ use **pilot projects** to test and validate approaches

4

Lack of standardization

- no consistent metrics
- difficult to compare and scale solutions

- ✓ adopt **existing frameworks** (EU taxonomy, ISO 21930, BREEAM)
- ✓ use **standardised indicators** (lifecycle carbon, reuse rates)
- ✓ align internal processes with external standards

5

Limited data transparency

- lack of reliable data on materials and buildings
- difficult to enable reuse

- ✓ implement **digital product passports** (DPP)
- ✓ use **BIM** (Building Information Modeling) **and material databases**
- ✓ enable **data sharing** across stakeholders (e. g., via XR interfaces)

6

Lack of practical skills and experiential learning environments

- limited hands-on experience with circular approaches
- gap between theory and real-world application
- lack of training environments for new methods and technologies

- ✓ develop **practice-based learning** formats (e.g. real-world projects, simulations)
- ✓ use immersive **technologies (XR/VR) for training and collaboration**
- ✓ **simulation of circular workflows** before real-world implementation
- ✓ enable **lifelong learning** across roles and disciplines

Circular economy becomes actionable when we connect roles, decisions and skills



We have the knowledge - now we need to act across the system

What have we learned?

Circular economy is a system challenge across the entire value chain

1. decisions, costs and impacts are interconnected
2. value is created (or lost) across lifecycle stages
3. no single solution - but systemic optimisation

What this means:

Circular economy requires connecting decisions, actors and value across the lifecycle

- move from siloed optimization to lifecycle thinking
- align incentives across stakeholders
- combine environmental, social and economic value

What this means for you:

Progress beats perfection: You can actively contribute within your role!

- apply circular thinking in everyday decisions
- collaborate beyond your immediate scope
- start with practical steps - not perfect solutions

Looking ahead:

(towards Webinar 3)

From understanding to application

- ✓ explore XR/VR as enablers for circular construction
- ✓ experience real-world scenarios and simulations
- ✓ develop practical skills for implementation

**Thank you for your
interest!**
Webinar 3 will be
announced soon.



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