

CIRCULAR ECONOMY PLAYBOOK FOR THE BUILT ENVIRONMENT SECTOR

CIRCULAR DESIGN PRINCIPLES BRIEF

Introduction

The Circular Built Environment Playbook for the Irish Construction Sector is an EPA-funded collaborative project between the Irish Green Building Council (IGBC), the Atlantic Technological University (ATU), Technological University Dublin (TU Dublin), and the University of Galway. It aims to support industry stakeholders in the transition towards a decarbonized and circular built environment.

The Circular Design Principles Brief sets out the following recommended steps in embedding circularity into the design process:

Client and Stakeholder Engagement



- Internally explore and assess opportunities to apply circular economy principles to the proposed project.
- Communicate these opportunities i.e., design for adaptability and flexibility, ease of maintenance and upgrade, design out waste, material efficiency etc. to clients.
- Host an initial workshop with clients and key stakeholders to introduce core circular economy principles and assess the feasibility of circularity opportunities. Early collaboration is key for the successful implementation of circular principles.
- Prepare a clear and detailed design brief with the client, setting specific circularity objectives, targets (quantitative or qualitative), and Key Performance Indicators (KPIs) for the project.
- Engage with local planning authority on proposed circularity strategies as part of the pre-planning application process.

Prioritize and Assess Existing Assets



- Identify and assess existing buildings or structures on site for potential retention, refurbishment, or partial reuse.
- Undertake a pre-development audit considering costs, potential reduced embodied carbon, minimisation of demolition waste, and design out waste strategies.
- Where demolition works will take place, undertake a pre-demolition audit to create an inventory of materials and to identify their quality for reuse, recovery or recycling on or off site.
- Evaluate the impacts of reuse and recovery opportunities on design, cost, and project programme.
- Examine the applicability of Building Information Modelling (BIM)/ Material Passports to the project considering digital delivery requirements.

Consider Local Resources and Procurement



- Prioritize locally sourced natural and renewable materials if feasible.
- Consider the design life in terms of building layers i.e. site, structure, skins, services, space plan, and stuff.
- Instigate early engagement with the potential supply chain to discuss the feasibility and viability of embracing circularity principles i.e., take-back schemes, product-as-a-service, use of reclaimed materials etc.
- Include circular performance-based criteria in the tendering and procurement documents.

Develop the Building End-of-Life Strategy



- Prepare a deconstruction plan considering how the building elements, components, and materials can remain in the value chain through reuse, recycling or recovery at the end of their service life.

Project Planning and Design



- Design for durability, flexibility and adaptability i.e., durable structural frames that allow for future building use change and loadings, clear spans, floor-to-ceiling heights, non-load-bearing partitions, and ease of maintenance.
- Design for standardization and modularization i.e., consider off-site manufactured products, reduce percentage of non-standardized components.
- Design for dematerialization to optimize the structural design to minimize the total input of materials while still ensuring quality and structural integrity.
- Design for disassembly by prioritizing mechanical, accessible and reversible fixings, avoiding toxic or composite materials and unnecessary finishes guided by ISO20887: 2020, with a deconstruction plan incorporated into the Resource & Waste Management Plan (RWMP).
- Specify low-impact and non-toxic circular materials i.e., local, natural and renewable materials; products with high remanufactured and recycled content and Environmental Product Declaration (EPDs). Stimulate circular material flows through the use of reclaimed over virgin materials, and manufacturer/supplier take-back schemes.
- Use digital tools where appropriate i.e., BIM and material passports to facilitate collaboration, track and monitor environmental impact, support material selection, and document material components.
- Use design reviews to assess how the design and specification has embedded circularity principles and demonstrated compliance with the project KPIs.

Construction and Handover



- Ensure that circular design intent is maintained throughout the construction phases through documentation, tendering, and procurement. Monitor and document any site-specific changes to design details.
- Continue collaboration with the full value chain to ensure implementation of circularity strategies during the construction phase.
- Ensuring monitoring of circularity implementation is continuous throughout the construction phase to develop an evidence base of realistic and effective practice.
- Ensure that material/building passport specifications are traceable through clear labelling and tagging during the construction process.
- Ensure the contractors' resource and waste management plans clearly translate design-phase circularity commitments and strategies throughout the construction phases.
- Conduct a workshop with client, maintenance team, and end-users on operating the building in a circular manner, including adaptability and deconstruction strategies.

Supporting Guidance Documents

[Circular Economy Guidance for Construction Clients \(UKGBC, 2019\)](#)

[Circular Economy RIBA Overlay \(ACAN, 2024\)](#)

[Greater London Authority Circular Economy Statement Excel Template \(Mayor of London, 2022\)](#)

[London Plan Guidance on Circular Economy Statements \(Mayor of London, 2022\)](#)

[The 'Circular-Ready' Built Environment Checklist \(World GBC, 2023\)](#)

AI Use Statement

Sixty international industry guidance documents related to circular design in the built environment were selected and inputted into Google Notebook-LM by the author for ideation and synthesis purposes, thereby creating a set of text summaries prompted by a range of author queries. All AI-generated outputs were subsequently reviewed, edited and verified by the author for clarity and accuracy. A full list of the original industry guidance follows.

LIST OF REFERENCES

The Circular Design Guidance: List of References supports the 'Circular Design Principles Brief' by provided the following list of guidance documents used in its preparation, which are all hyperlinked for ease of access.

[A short guide to reusing foundations \(Taylor, 2020\)](#)

[Achieving Good Practice Waste Minimisation and Management: Guidance for Construction Clients, Design Teams, and Contractors \(WRAP UK\)](#)

[Best Practice Guidance for the Preparation of Resource and Waste Management Plans for Construction and Demolition Projects \(EPA, 2021\)](#)

[Build Circular Economy Thinking into your Projects: Practical how-to guide \(UKGBC\)](#)

[Building a Circular Economy: Buildings, a Dynamic Environment \(VUB Architectural Engineering, 2019\)](#)

[Buildings that last: Design for adaptability, deconstruction, and reuse \(AIA\)](#)

[Circular Building Design: Strategies and Tools \(Pešta, J. et al., 2023\)](#)

[Circular Built Environment Playbook \(World GBC, 2023\)](#)

[Circular design guidelines for the built environment \(Office of Energy and Climate Change, NSW Treasury, 2023\)](#)

[Circular Economy and Reuse: Guidance for Designers \(Gowler et al., 2023\)](#)

[Circular Economy Checklist for Construction Designers \(Southern Waste Region\)](#)

[Circular Economy Guidance for Construction Clients \(UKGBC, 2019\)](#)

[Circular Economy How-to Guide: Implementing Light as a Service \(LaaS\) in built assets \(UKGBC, 2020\)](#)

[Circular Economy How-to Guide: Reusing products and materials in built assets \(UKGBC, 2020\)](#)

[Circular Economy Implementation Packs for Products as a Service and Reuse](#)

[Circular Economy Innovation Insights: Reuse and Products as a Service \(UKGBC, 2020\)](#)

[Circular Economy in Roads Projects \(TII\)](#)

[Circular Economy in the Built Environment \(ACAN, 2024\)](#)

[Circular Economy Principles for Building Design \(EC, 2020\)](#)

[Circular Economy RIBA Overlay \(ACAN, 2024\)](#)

[Circular Economy Top Tips for Designers \(UK Green Construction Board, 2017\)](#)

[Clean and Circular: Design and Construction Guidelines \(NYC EDC, 2024\)](#)

[Code of Practice on Pre-Development Audits \(BRE, 2017\)](#)

[Cradle-to-Cradle Criteria for the Built Environment \(Mulhall and Braungart, 2010\)](#)

[Design for a Circular Economy Primer \(Mayor of London, 2022\)](#)

[Design for Deconstruction: SEDA Design Guides for Scotland: No. 1 \(SEDA, 2015\)](#)

[Design for Materials Reuse: How Architecture can respond to the Climate Emergency \(HETA Architects\)](#)

[Designing Out Construction Waste: A guide for project design teams \(Zero Waste Scotland\)](#)

[Designing out Waste: A design team guide for buildings \(WRAP UK\)](#)

[Designing out Waste: A design team guide for civil engineering \(WRAP UK\)](#)

[Design out Waste Factsheets \(EPA, 2017\)](#)

[Designing out Waste process: Implementing Designing out Waste in construction projects \(WRAP UK\)](#)

[Design Strategies for Reversible Buildings \(Durmisevic, 2019\)](#)

[EU Construction & Demolition Waste Management Protocol \(including guidelines for pre-demolition and pre-renovation audits of construction works\) \(EC, 2024\)](#)

[Explorations for Reversible Buildings \(Durmisevic, 2019\)](#)

[Guide to Circular Design 2.0: Working agreements for circular construction \(Platform, CB'23, 2023\)](#)

[How Circular Economy Principles can impact carbon and value \(UKGBC, 2022\)](#)

[LETI Climate Emergency Design Guide \(LETI, 2020\)](#)

[LETI Embodied Carbon Primer: Supplementary guidance to the Climate Emergency Design Guide \(LETI, 2020\)](#)

[LEVEL\(S\): Putting Circularity into practice \(EC, 2021\)](#)

[London Plan Guidance on Circular Economy Statements \(Mayor of London, 2022\)](#)

[Pushing Reuse: Towards a low-carbon construction industry \(Bioregional/SALVO\)](#)

[Re-use of structural elements: Environmentally efficient recovery of building components \(VTT, 2014\)](#)

[Reversible Building Design Guidelines \(Durmisevic, 2018\)](#)

[RIBA 2030 Climate Challenge Version 2 \(RIBA, 2021\)](#)

[Study on Circular Economy Principles for Buildings' Design \(EC, 2021\)](#)

[System Enablers for a Circular Economy \(UKGBC, 2023\)](#)

[The 'Circular-Ready' Built Environment Checklist \(World GBC, 2023\)](#)

[The Circular Toolbox: Biobased renovation \(Metabolic, 2022\)](#)

[The Circular Toolbox: Building with recycled materials \(Metabolic, 2022\)](#)

[The Circular Toolbox: Circular building hubs \(Metabolic, 2022\)](#)

[The Circular Toolbox: Circular demolition \(Metabolic, 2022\)](#)

[The Circular Toolbox: Circular revenue models \(Metabolic, 2022\)](#)

[The Circular Toolbox: Digitization within the circular built environment \(Metabolic, 2022\)](#)

[The Circular Toolbox: Materials passports \(Metabolic, 2022\)](#)

[The Circular Toolbox: The circular design of buildings \(Metabolic, 2022\)](#)

[The Circular Toolbox: The environmental impact of building materials \(Metabolic, 2022\)](#)

[The Circular Toolbox: Using timber in construction \(Metabolic, 2022\)](#)

[Towards a Circular Built Environment \(Stride Treglown, 2024\)](#)

[Zero Avoidable Waste in Construction \(UK Green Construction Board, 2020\)](#)



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