



Practical how-to guide: Build Circular Economy Thinking Into Your Projects

Background

The UK Green Building Council (UK-GBC)

The UK Green Building Council (UK-GBC) is a membership organisation campaigning for a sustainable built environment – one that minimises negative environmental impacts while maximising benefits for people everywhere. Our mission is to radically improve the sustainability of the built environment, by transforming the way it is planned, designed, constructed, maintained and operated.

Learning and development at UK-GBC is viewed as an essential part of achieving our mission of market transformation. We deliver a range of courses and programmes designed to equip industry professionals with the green skills and knowledge required to deliver a sustainable built environment.

With thanks and contributions from:



Introduction

What is a circular economy?

“A circular economy is one that is restorative and regenerative by design, and which aims to keep products, components and materials at their highest utility and value at all times, distinguishing between technical and biological cycles” - Ellen MacArthur Foundation.

As the construction industry accounts for approximately 60% of UK materials use and one third of all waste arisings, there is a great opportunity for circular economy principles to reduce waste and increase reuse of materials.

There are benefits to the UK's economy as a whole from adopting circular economy principles, but for the built environment in particular this could mean:

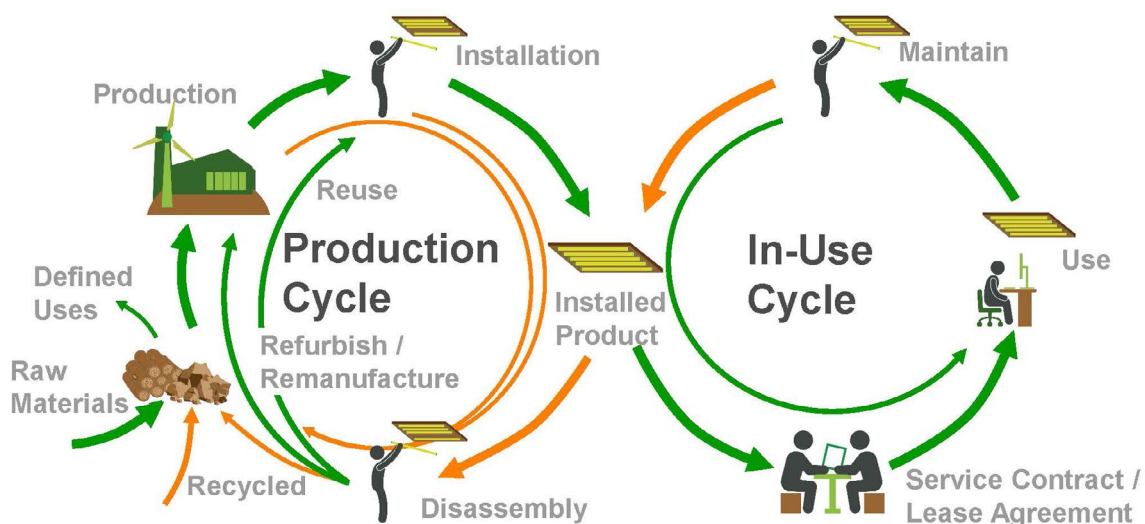
For product manufacturers:

- Developing resource efficient products that are easy to repair and disassemble
- Using delivery and return logistics to recover materials
- Responsible sourcing of raw materials
- Designing to minimise waste in product refurbishment and maximise re-use
- Moving to alternative business models e.g. product service systems

For design and construction:

- Designing out waste
- Designing for resource efficiency
- Designing for deconstruction and disassembly
- Using more renewable energy
- Reducing embodied carbon over a whole building lifecycle

Figure 1. Possible construction circular economy model



Courtesy of Sustainable Construction Solutions Ltd.

KEY TIPS BEFORE YOU GET STARTED

- ✓ The greatest opportunities for delivering a product that works within a circular economy exist at the concept stage and the strategy selected
- ✓ For buildings and construction products, this means thinking about what will happen to the building at the end of its life... at the design stage
- ✓ Starting discussions early in the design process will help the whole project team make choices that facilitate circular processes
- ✓ Success will depend on collaboration with the supply chain
- ✓ There isn't a 'One-Size-Fits-All' approach, so explore all options that could be relevant to your specific project

STEP 1: SET A VISION FOR YOUR PROJECTS

With your project team and stakeholders, decide on your overall vision and objectives for bringing circular economy principles into your project. This will help ensure everyone has the same understanding through the later steps.

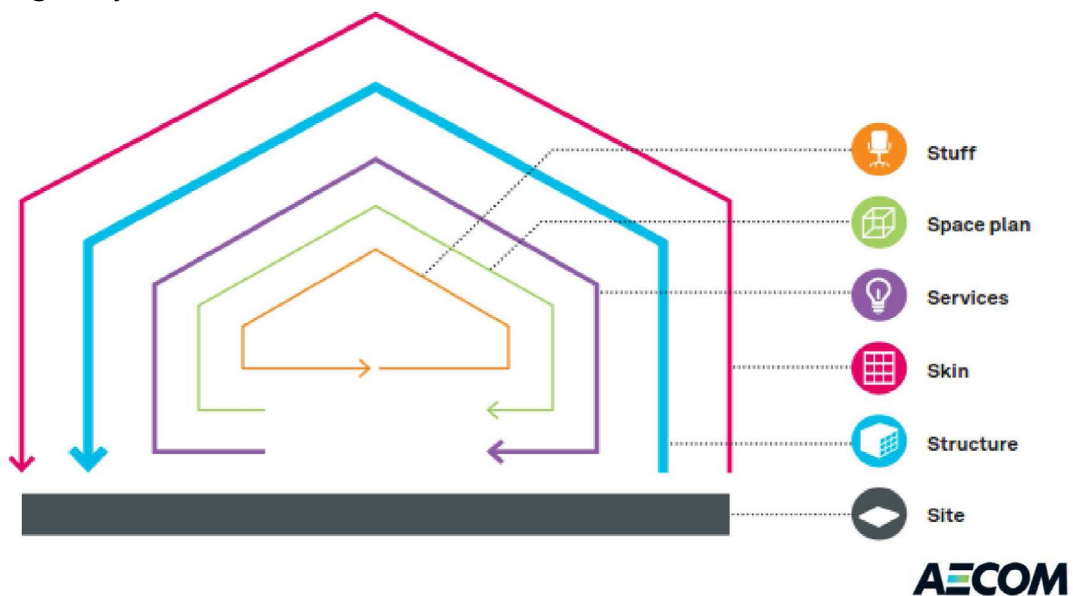
STEP 2: IDENTIFY KEY INTERVENTION POINTS

Product manufacturers may have the opportunity to bring circular economy principles to their business strategy, and enable them to operate in a more cost effective and resource efficient way, e.g. adopting a 'product as a service' model such as Xerox contracting 'print services' rather than selling printers

The intervention opportunities through design and construction will depend on what stage the project is at when you get involved, but there are opportunities to apply circular economy principles at every stage of the building lifecycle.

Designing in layers will help you consider intervention points for the structure and skin, services, interior spaces and settings/furniture.

Figure 2. Building in Layers



Courtesy of AECOM

STEP 3: DECIDE WHAT STRATEGY WILL WORK BEST FOR YOUR PROJECT

Once you have identified the opportunities available for intervention, consider addressing them through the following strategies:

- Designing out waste from the start of the project
- Designing for resource efficiency by considering where you can reduce material use
- Designing for deconstruction and disassembly e.g. improving the ease with which buildings can be deconstructed by considering bolted rather than welded connections, screws rather than glue and nails, and easily separable composites
- Ensuring responsible sourcing of materials, including eliminating hazardous substances and increasing recycled content
- Utilising delivery and return logistics options with material suppliers
- Using suppliers' incentivised return options e.g. Desso offer a carpet take-back programme
- Using 'product as service' systems rather than outright purchase, e.g. Philips Pay-per-Lux lighting solution

STEP 4: IMPLEMENT YOUR STRATEGY

Supply chain

Talk to your supply chain, and explore what they can provide. Products may be available to meet your needs in an alternative way if the specification is more flexible. Talk to customers and clients, and explain what possibilities exist to deliver their project whilst meeting the principles of a circular economy.

Gather Information and Analyse the project

Differentiate between components that are 'consumable' and those that are 'durable', then aim to extend the life of the durable components (e.g. building services) and ensure that the consumables (e.g. carpets) can be readily recycled into new products.

Consider the lifetime of each element of a building project separately by thinking in layers, and aim to optimise durability, resilience and lifespan by considering the following points:

- **Building Shell (e.g. 50-75 years lifespan):** generous floor to ceiling heights allow flexibility; Spacious cores and risers enable flexibility to adapt to changing expectations; Use bolted rather than welded connections
- **Services (e.g. 15-20 years lifespan):** ensure services are accessible and demountable for ease of repair or replacement; Look at modular systems that will allow simple upgrade to services without the whole system becoming obsolete; Consider leasing arrangements rather than outright purchase, as this passes responsibility onto the manufacturer for upgrades and changes
- **Interiors (e.g. 5-10 years lifespan):** Look for modular designs that enable partitions to be dismantled and relocated into different configurations, allowing a space to be easily modified to create new spaces
- **Settings and Furniture:** Think how consumables will be replaced e.g. carpet tiles can be replaced individually when damaged, instead of replacing a wall-to-wall carpet; Select products that can easily be recycled or broken down at the end of life

STEP 5: CARRY OUT ON-GOING REVIEW

If the project or material specifications have altered, explain the differences (and benefits) to your stakeholders. You may need to manage relationships with suppliers, and ensure your clients happy with the amendments. This is a circular process that is likely to be repeated throughout a project as new designs, materials and service models are incorporated.

STEP 6: LESSONS LEARNED AND MEASURING SUCCESS

Be sure to capture lessons learnt about challenges and how you overcame them. Calculate and quantify the total benefits applying circular economy principles has brought to the project, e.g. tonnes of waste avoided compared to a standard approach, and estimate disposal costs saved. This evidence will help you create the business case for future projects.

REPORTS

- › Economic impacts of Resource Efficient Business Models, [WRAP](#)
- › EU Horizon 2020 Project: Buildings as Material Banks: Integrating Materials Passports with Reversible Building Design to Optimise Circular Industrial Value Chains, [Community Research and Development Information Service \(CORDIS\)](#)
- › UK-GBC Tackling Embodied Carbon in Buildings, [UKGBC](#)
- › Façade design for the circular economy, [ARUP](#)
- › Growth Within: A circular economy vision for a competitive Europe, [McKinsey & Company](#)
- › Product Life Factor (1982) [The Product Life Institute](#)



GUIDANCE

- › Innovative Business Models, [WRAP](#)
- › Optimising Durability and Lifespan of Construction Products and Assets, [WRAP](#)
- › The Great Recovery: Investigating the role of design in the circular economy, [Royal Society for the encouragement of Arts, Manufactures and Commerce \(RSA\)](#)
- › [Supply Chain Sustainability School](#)
- › Cradle-to-Cradle Product Standard, [McDonough Braungart Design Chemistry, LLC](#)
- › Rebus Project, [WRAP](#)
- › Specification for the assessment of the life cycle greenhouse gas emissions of goods and services, [PAS 2050:2008](#)
- › [RICS SKA Rating](#)
- › [NaturePlus](#)

CASE STUDY EXAMPLES

- › Pay per Lux Project, [Philips and Turntoo](#)
- › [Desso](#)
- › [Interface Net-Works](#)
- › Case study of a demountable steel structure, [Chobham Manor Marketing Suite](#) and [video](#)
- › [Herman Millar Furniture](#)
- › UK-GBC Future Leaders Project LOOP, [UK-GBC](#)
- › [Re-Fab: Realising the Benefits of a Circular Economy in Building](#)
- › National Union of Students: Cradle to Cradle lighting, [Philips](#)
- › [Park 2020 Amsterdam](#)

BOOKS

- › A New Dynamic: Effective Business in a Circular Economy. Amory Lovins, Michael Braungart, Ellen MacArthur Foundation Publishing
- › Pending: Building Revolutions (RIBA), David Cheshire - Available to pre-order end of November from the RIBA website
- › Cradle to Cradle: remaking the way we make things, [McDonough & Braungart](#)