

GROWTH POTENTIAL: ENGINEERING AND CONSTRUCTION



Key circular economy strategies

- Offer existing, underutilised building spaces for short-term use on online platforms to maximise the utilisation of existing assets
- Retrofit existing buildings for alternative uses and design new buildings to be adaptable to extend useful life
- Deploy and operate a portfolio of relocatable buildings – which are modular, designed for deconstruction and made of durable, high-quality materials – on unused sites to create short-term, or interim, spaces
- Create futures contracts, in which value is tied to the estimated future value of materials in a building when deconstructed, which can be traded on a centralised exchange to enable recovery and reuse of construction materials.
- Complement the reuse of deconstruction materials by using materials that are renewable, non-toxic, have a high recycled content, and/or are sourced locally
- Pay for performance through product-as-a-service subscriptions for building fixtures and fittings (e.g. heating-, cooling- or lighting-as-a-service)

Drivers of circular economy growth potential

- **High** potential for growth in the short-medium term
- **Increasing** potential for growth in the short-medium term
- **Emerging or limited** potential for growth in the short-medium term

Innovation and corporate action	
Demand for finite resources	<ul style="list-style-type: none"> • Rapid urbanisation is projected to double demand for steel and nearly double demand for cement by 2050 • Unmet housing needs mean 1 billion new homes will be required worldwide by 2025²⁶⁵
Industry action	<ul style="list-style-type: none"> • Growing awareness among leading clients and investors of the positive business case for adopting circular models and increasing body of research and knowledge and papers published on the topic • Large demonstration development projects have been designed and constructed using circular principles (e.g. Triodos Bank HQ and Park 20 20 in Amsterdam)

Innovation and corporate action

Innovation	<ul style="list-style-type: none"> • Ongoing innovation in business models (e.g. Madaster's platform creates material passports for buildings and tracks the value of materials over time),²⁶⁶ and building materials and design (e.g. hemp fibre cladding on Flat House by Practice Architecture)²⁶⁷
Cost benefit	<ul style="list-style-type: none"> • In 2019 solar, wind, and hydropower projects were being deployed at their fastest rate in four years and renewable power capacity is expected to expand by 50% between 2019 and 2024.²⁶⁸ According to BNEF analysis, utility-scale solar PV and onshore wind are now the cheapest forms of new-build energy generation across two-thirds of the global population²⁶⁹

Policies and regulation

Increasing policies and regulation	<ul style="list-style-type: none"> • Focus area of the new EU circular economy Action Plan, e.g. material recovery targets for construction and demolition waste and its material-specific fractions • European Waste Framework Directive (2008/98/EC) has set a target for 70% of non-hazardous construction and demolition waste to be reused, recycled or recovered by 2020 • Increased policy focus at the city-level, e.g. The New London Plan requires all new developments of a certain size to submit a Circular Economy Statement to help architects embed circular economy principles,²⁷⁰ and Victoria State government's 'Recycled First' programme for infrastructure requires the prioritisation of recycled and reused materials²⁷¹
Incentives	<ul style="list-style-type: none"> • Decarbonisation of the energy sector is still high on the political agenda (e.g. EU Green Deal), with incentive schemes varying and evolving across geographies (e.g. solar panels vs home batteries)

Customer preferences and macro trends

Changing demographics	<ul style="list-style-type: none">• Demographic evolution across regions requires different and changing housing needs• Shifting working patterns require flexible spaces, accelerated by Covid-19 crisis
Climate change and global challenges	<ul style="list-style-type: none">• Increasing awareness that the construction sector accounts for over one-third of global resource demand and is a major contributor to climate change (a circular scenario could reduce global CO₂ emissions from building materials by 38% or 2 billion tonnes CO₂ in 2050, due to a reduced demand for steel, aluminium, cement, and plastic)²⁷²
Changing preferences and behaviour	<ul style="list-style-type: none">• In 2019, over 40% of customers expressed a preference for renewable utility generation (25% in 2018), and 45% said they would be willing to pay more for 100% renewable energy²⁷³• Growing interest in decentralised, off-the-grid energy production and storage, driven by e.g. growth in the global EV market (forecasted CAGR of 21% between 2019 and 2030)²⁷⁴

Types of circular economy opportunity areas



Circular design and innovation



Circular business models



Reuse, repurpose, and redistribute



Repair, remanufacture, and refurbish



Collect, sort, and recycle



Regenerative and renewable practices and materials



Enabling digital technologies

Current circular economy opportunity areas



Digital technologies which enable circular economy business models in engineering and construction, including material passports and predictive maintenance



Infrastructure- and product-as-a-service business models for infrastructure assets, fixtures, fittings, and furniture

(e.g. solar panels offered as a service to individuals and businesses)



Buildings as material banks

Note:

Commercial-scale pilots are needed to demonstrate proof-of-concept of emerging real estate and infrastructure circular business models

Examples: Large corporates

Steelcase

adopted product-as-a-service systems enabling recovery and redeployment of furniture, and pay-for-use models

BAM

constructed Circl, ABN Amro's circular pavilion in Amsterdam, with architects CIE

The Crown Estate

updated Development Sustainability Principles require design teams to incorporate circular principles into real estate development projects²⁷⁵

Arup

apply circular design principles to projects with clients and partners (e.g. The Circular Building, London, with Frener & Reifer, the Built Environment Trust and BAM, HAUT, Amsterdam, Transport Infrastructure Ireland, 1 Triton Square with British Land, and the Quay Quarter Tower in Sydney with AMP Capital and 3XN/GXN)

Interface and Tarkett

design and manufacture modular carpet tiles using recycled materials which can be disassembled and recycled after use

Schneider Electric

offers an Uninterruptible Power Supply rental service in Spain, with remote asset management and predictive maintenance to extend asset life

GE

offers digital and service solutions to monitor, predict, and optimise wind turbine performance and maintenance, and have a repair and refurbishment centre for spare parts²⁷⁶

Enel's

Futur-e project is redeveloping the sites of 23 thermal power stations using circular economy principles

Examples: Innovators

GlobeChain

is a digitally enabled reuse marketplace for construction material, while collating data

Kaer

offers air-conditioning as a service, taking responsibility for the design, installation, and operation of the AC system

Oxara

facilitates the reuse of construction waste (excavation material) and produces low cost secondary building materials

Strukton

has developed a mobile concrete recycling plant, Circuton, which recycles demolished concrete on-site into materials that can be reused to produce new concrete

Enlighted

provides an IoT-based energy service system, claiming it saves their clients 60–70% on lighting and 20–30% on heating/cooling

Winsun

uses 3D printing technology for construction

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