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Overview of concrete (re) use in the UK

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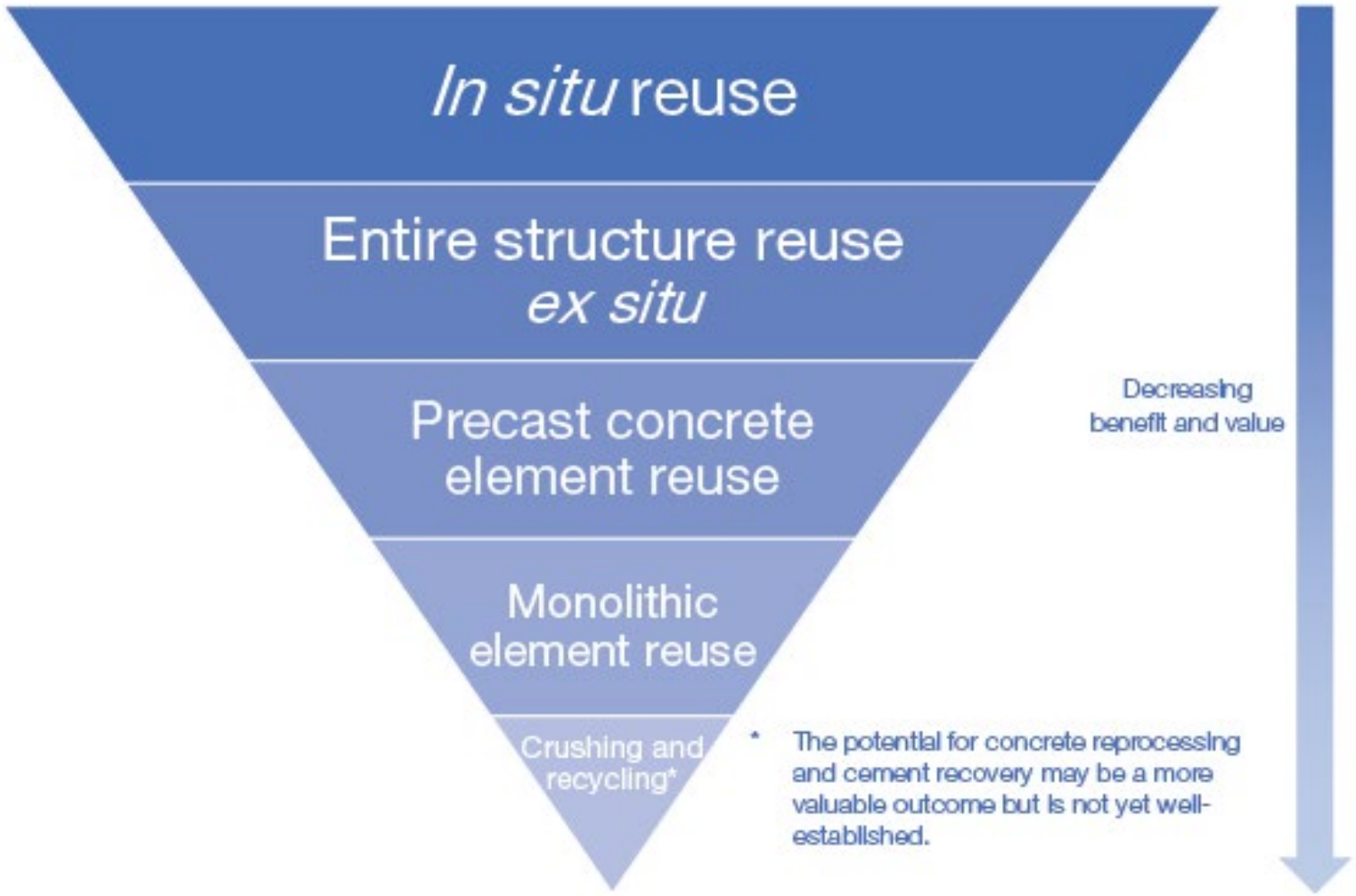
The Concrete Centre

Oct 25

Circular economy hierarchy for concrete



Reuse: 'taking a component from a structure and using it again in the same way as originally intended. Unlike recycling, reuse requires minimal reprocessing.'

Institution of Structural Engineers (IStructE) publication, 2023

The Glenfinnan viaduct, completed 1898

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Many examples of long-lasting concrete structures, enabling continued use and reuse for many decades.

Insitu reuse: Retain and reuse

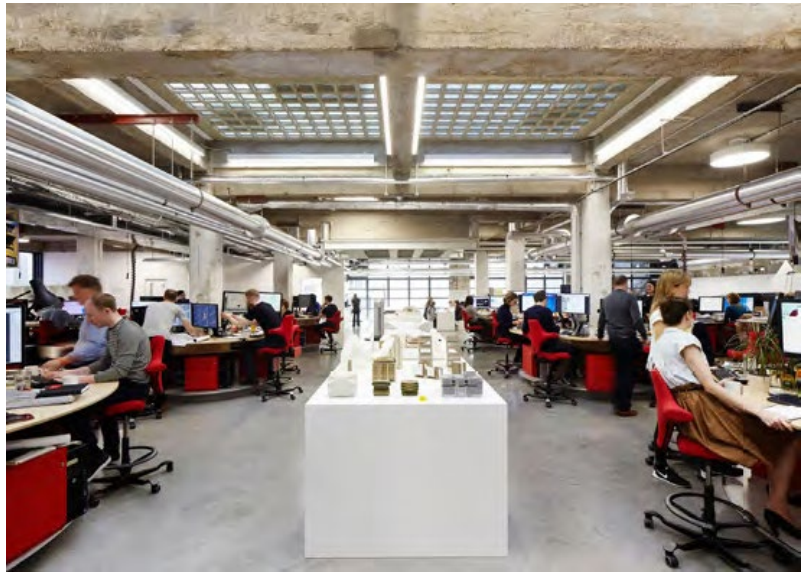
‘The milk bottle strategy’

Concrete buildings, or frames of buildings, reused as a whole

Office ⟶ Homes
Centrepoint
Ref: CQ Autumn 2017

Office ⟶ Hotel
The Standard, London, ORMS
Ref: CQ Winter 2019

Concrete structures retained and reused (retrofit first approach)



Carpark → Offices
Make, London

Office → Energy efficient office
Elizabeth II Court, Bennetts Associates Architects

Depot → School
Northampton Academy, AI

Examples of ceilings and linings being stripped out to expose existing structural frame and soffits to tap into thermal mass potential for improved energy efficiency often categorised as a 'retrofit'.


Park Hill – Phase 2 Mikhail Riches

Number of examples is growing:

- Heritage value of 20th Century+ architecture
- Expanding number of planning policies prioritising retention and refurbishment over demolition
- Project aspirations to reduce embodied carbon in development
- Refurbishing and using an existing building's concrete structure is an effective way to reduce the upfront embodied carbon of a new development.

160 Old Street, ORMS

Retaining and reusing concrete structure

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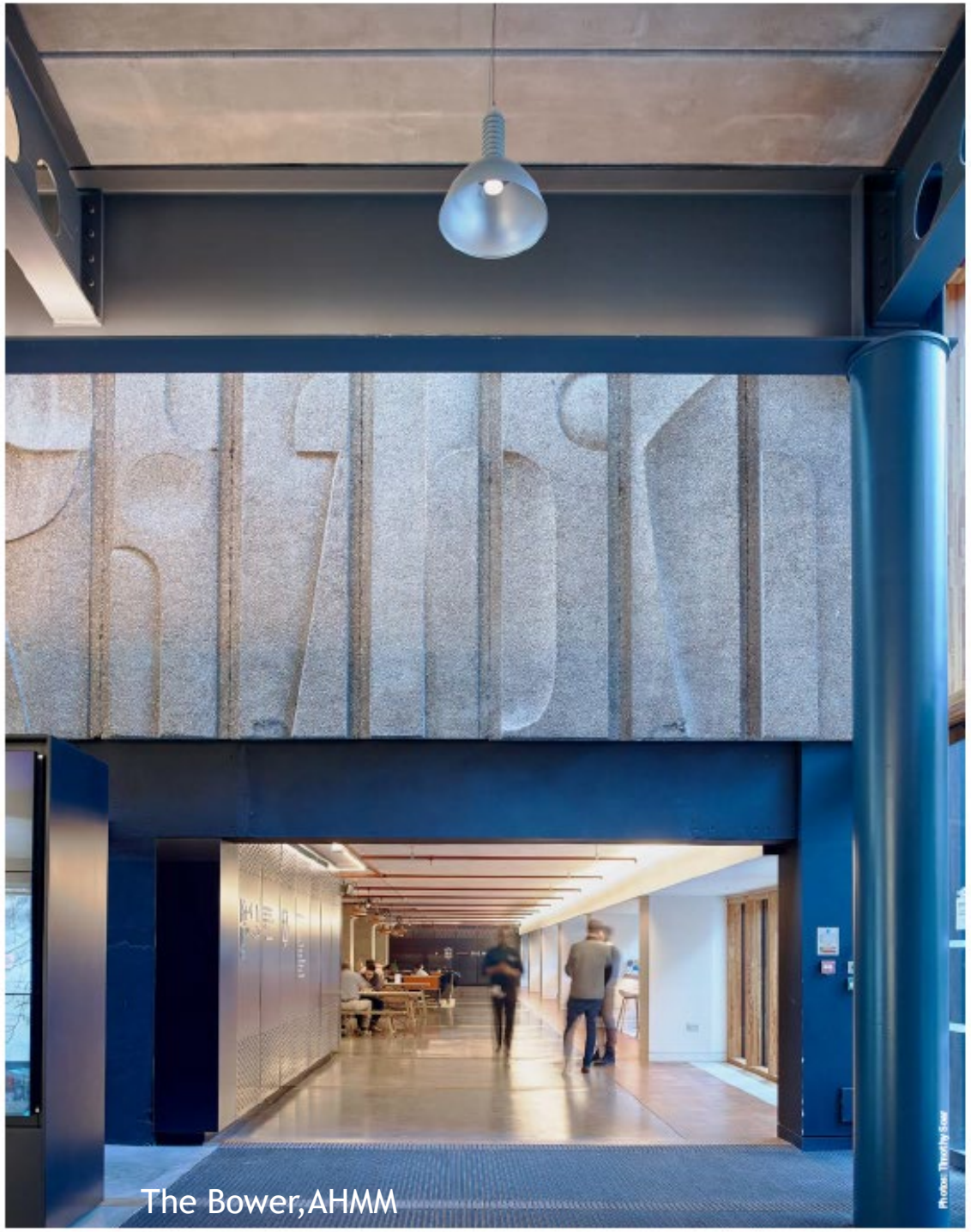
Opportunities include:

- The durability of concrete sub- and super-structure means that they can often remain in place while other shorter-lived building elements are replaced, and often well beyond the notional 60-year service life of a building.
- Aesthetic, resource efficiency and thermal mass of exposed concrete surfaces.
- The methodologies and design standards for establishing the suitability of existing concrete for reuse is well established – but evolving.
- Well-established supply chain for refurbishment and repair of concrete.



Retaining and reusing any structure

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Project dependent challenges include:

- Spatial restrictions and inflexible layouts e.g. column grids, low floor-to-ceiling heights
- Capability to improve energy efficiency
- Lack of data related to original design and subsequent alteration
- Limited loading capacity
- Timely access for site investigations
- VAT

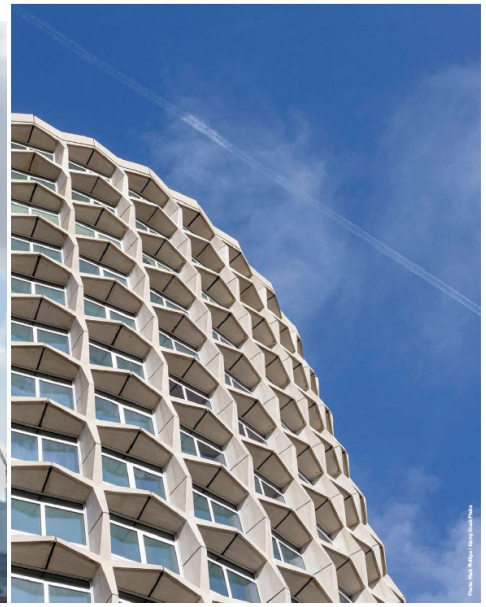
Entire Structure Reuse Ex situ

D frame – System designed for disassembly Laing O'Rourke

DfD car park system – Ballast Nedam

- Relies on full design for dissassembly of concrete structure in the first instance (standardisation of elements and accessible bolted connections)
- Potential to increase with more focus on design for disassembly and reuse
- Arguably most appropriate for temporary/short-life uses. E.g. agricultural/industrial, car parks

Precast concrete element reuse



Space House, PCE – existing precast panels removed and replaced higher up building following construction of additional floors

- Not uncommon for short-life projects and individual unfixed elements. Examples include arena seating, fence panels and posts, paving slabs
- Potential to increase with more focus on design for disassembly and reuse of precast concrete element – not necessarily structural elements
- Emerging Norwegian and Danish standards for reuse

London Olympic Stadium, Populous
Constructed with demountable concrete upper tiers

Monolithic element reuse

18 Holes, Folkestone, Richard Wilson

Euston Tower, London

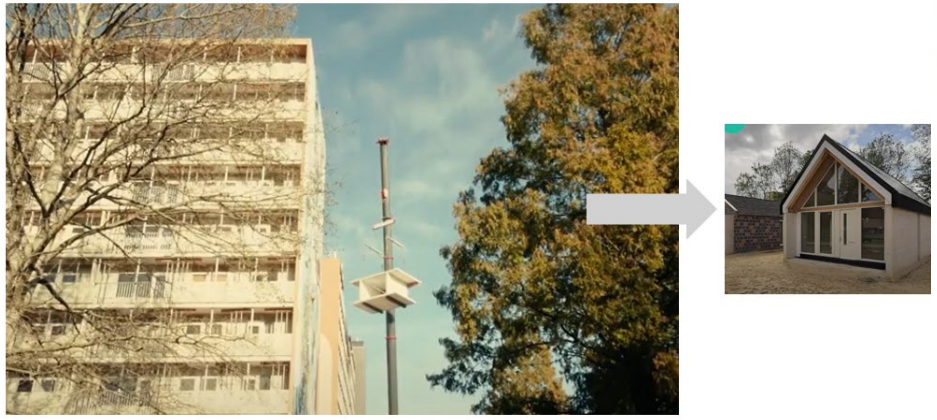
'Salvaging and reusing large, concrete components from demolished or deconstructed buildings'

- Few projects built in the UK to date
- Tend to be prototype projects
- Starting to be explored in a number of London projects
- Area of exploratory project work and learning from elsewhere

Monolithic element reuse

Aker Hospital, Oslo, Sweden

Aarhus ,Denmark
(CQ Spring 2025)



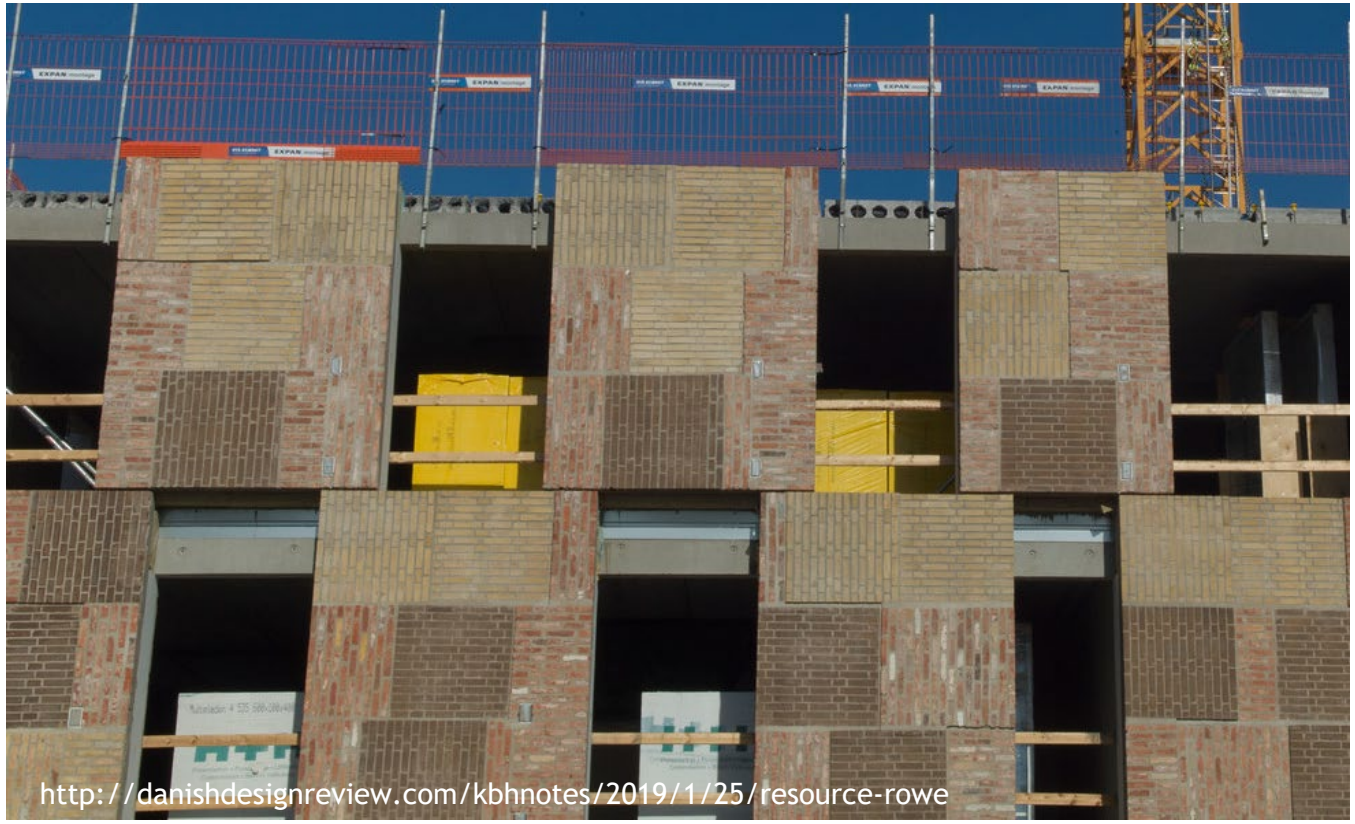
Super Circular Estate Kerkrade, Belgium
www.superlocal.eu/sce-en/

International ReCreate project, Finland

Some international projects

Innovative expression and reuse of elements using concrete

Using existing building components as facing material in new precast concrete cladding



Resource Rowe, Denmark –Lendager
Panels of existing brickwork, cast into concrete cladding panels

Re:bble, Structural Xploration Lab, EPFL

Reuse of recycled aggregates

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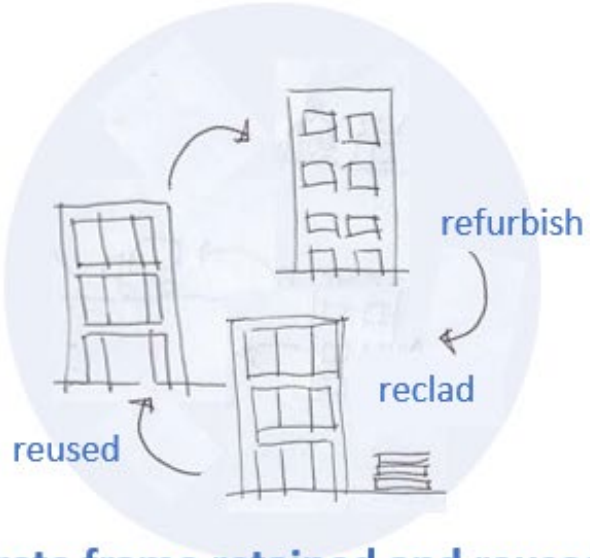
Low carbon concrete used in construction

New build - Resource efficient structure and construction using recycled content

retain



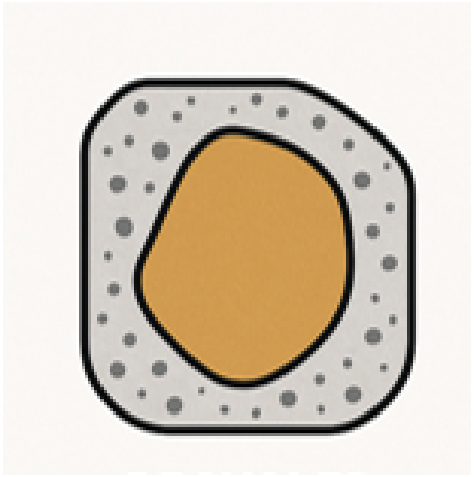
Concrete frame retained and reused multiple times for over 100 years

recycle

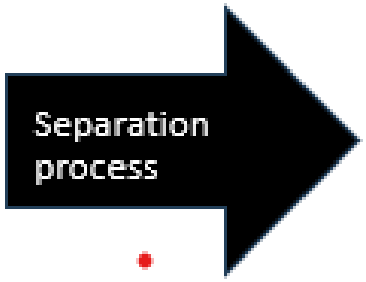
demolish

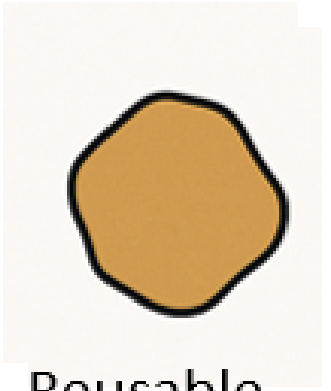
Eventually at end of serviceable life concrete is recycled as aggregates for use as a low carbon resource in construction – ad infinitum

‘Deep cleaned’ crushed concrete aggregates

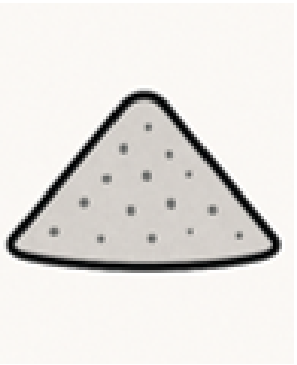


Crushed Concrete Aggregate





Reusable ‘cleaned’ aggregate



Recycled concrete fines (or paste)

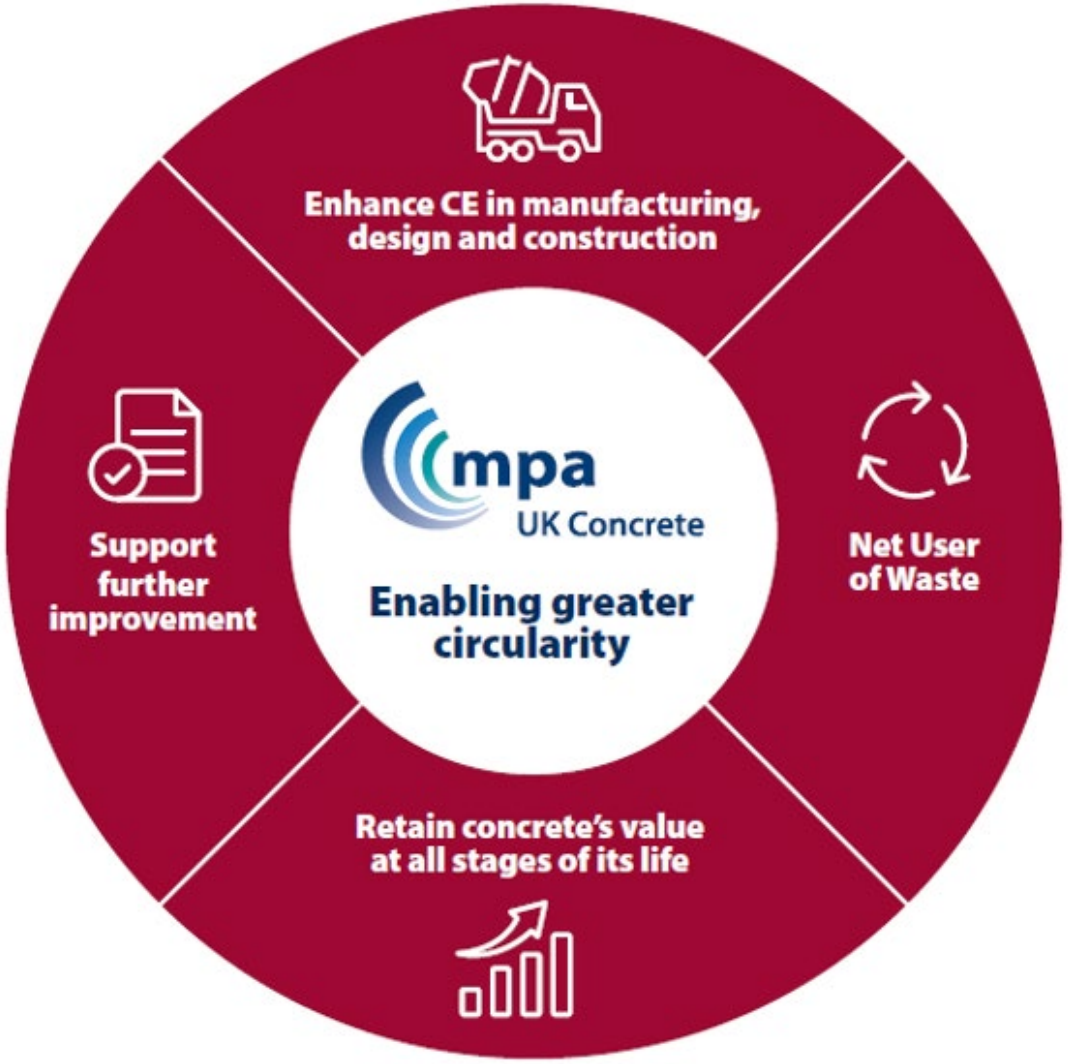
Greater potential use in concrete manufacture

Potential low carbon resource for cement and/or concrete manufacture

Reuse in the UK in the future

- Anticipate greater reuse of concrete structure insitu
- Take up of other reuse opportunities likely to depend on many factors including
  - Policies supporting/ requiring reuse
  - Development of standards/ understanding to facilitate reuse offsite
  - Building forms designed to facilitate reuse (lessons learned regarding adaptability)
  - Passing data forward (material passports/ digital twins/ e-tagging etc)
  - Design for disassembly and reuse
  - Carbon and cost of transportation
  - Linking supply and demand
  - Carbon and financial value of deep cleaned aggregates and RCP

UK Concrete Industry Sustainable Construction Strategy Framework



Enabling greater circularity is one of 5 core commitments

Our goal is to enable greater circularity across the built environment using concrete and encouraging retention of concrete's value throughout all stages of its life cycle.

www.sustainableconcrete.org.uk/CircularEconomy

Sustainability series

THANK YOU

Developing and sharing guidance and exemplars

www.concretecentre.com/circulareconomy