

June 2019



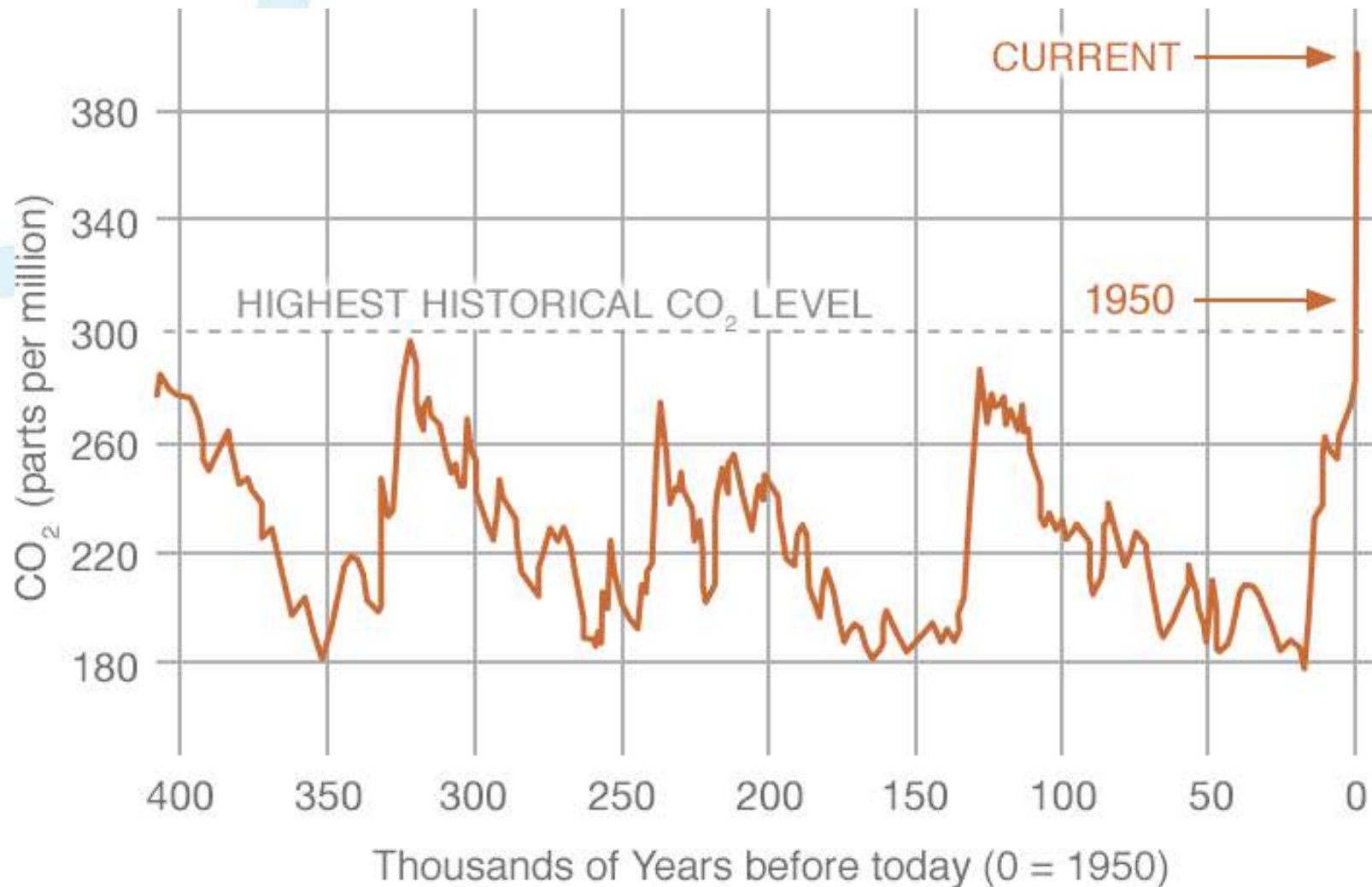
Building circularity into construction

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CO₂ at record levels



Highest level reached May 2019: 415.26ppm

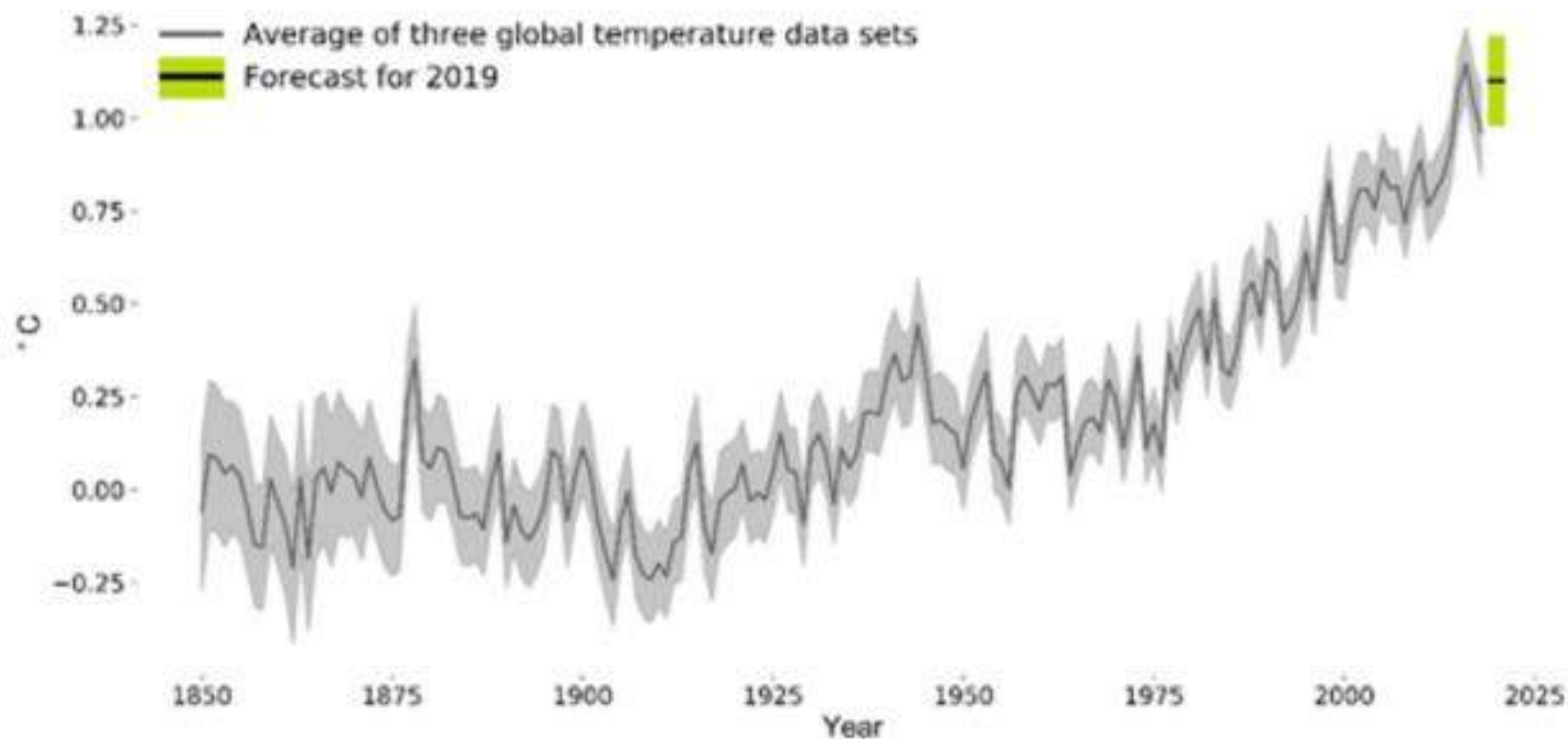


Global temperatures at record levels



Met Office

Global mean temperature difference from 1850-1900 ($^{\circ}\text{C}$)



© Crown Copyright. Source: Met

Key policy drivers

- Climate Change (Scotland) Act 2009
- *Making Things Last*, Scotland's Circular Economy Strategy
- One Planet Prosperity, SEPA Regulatory Strategy
- Scottish Circular Economy Bill (2020?)



Key industry drivers

- 10% (£7 billion) gross value added (GVA)
- 10% of the workforce
- 50% of Scotland's resource consumption
- Produces 50% Scotland's waste



Design, build, landfill and recycle



The true cost of construction waste

An average three-bedroomed house can produce up to 13 tonnes of waste

65% wasted materials

20% tax

3% labour

12% skip hire



The real cost of each skip can cost up to **£1,300**

Scottish Government target 50,000 new houses by 2021

Economic value of plastic



- low grade (contaminated) mixed plastic: <£100/tonne cost

- High grade mixed plastic: £200/tonne income
- Segregated high grade plastic: £500/tonne income



Economic value variability



- 18/8 grade steel: £880/tonne income
- Scrap steel: £100 to £200/tonne income

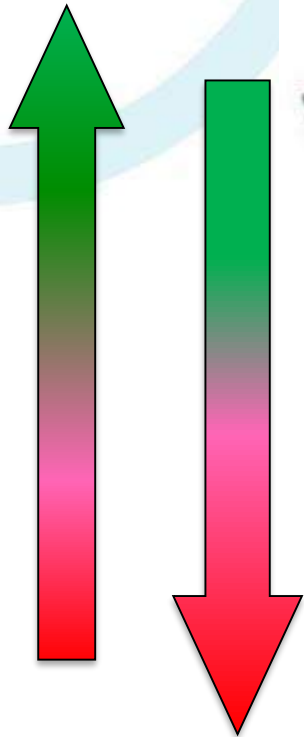
- Glass: £20 cost to £25/tonne income
- Wood: £0 to £60/tonne income



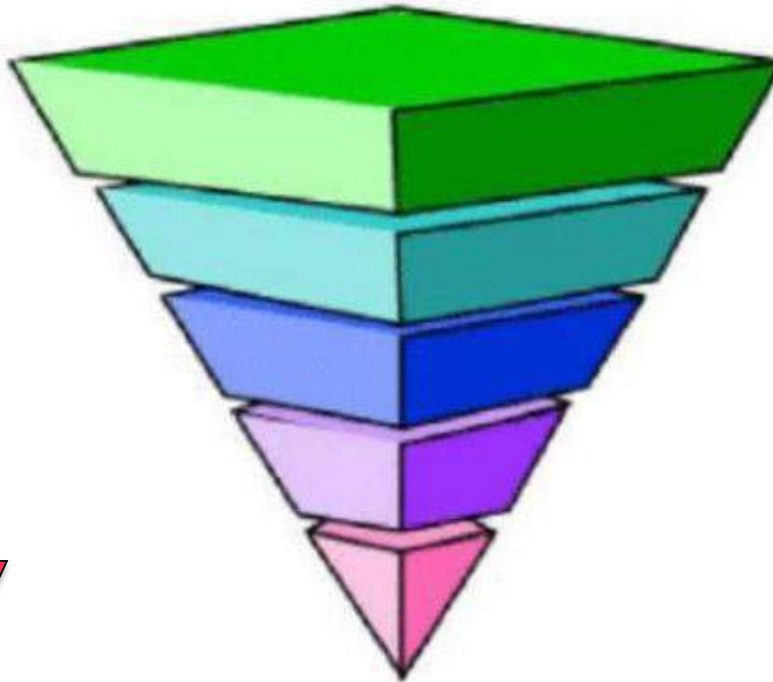
Waste hierarchy



Greatest value



Least preferable



Prevention

Reuse/repair

Recycle /downcycle

Recover value (eg.
energy)

Disposal to **landfill**



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Our Vision



All stakeholders in every construction project in Scotland collaborate to fully adopt a Circular Economy approach where all resources are valued and nothing is wasted for the whole life of a building, from concept to deconstruction.



Circular Economy Construction

- Adapt, refurbish and reuse buildings & materials
- Use recycled content and recycle any waste
- Design for longevity, flexibility, adaptability and low impact healthy use
- Design for assembly, disassembly & recoverability
- Design out waste and design for resource efficiency



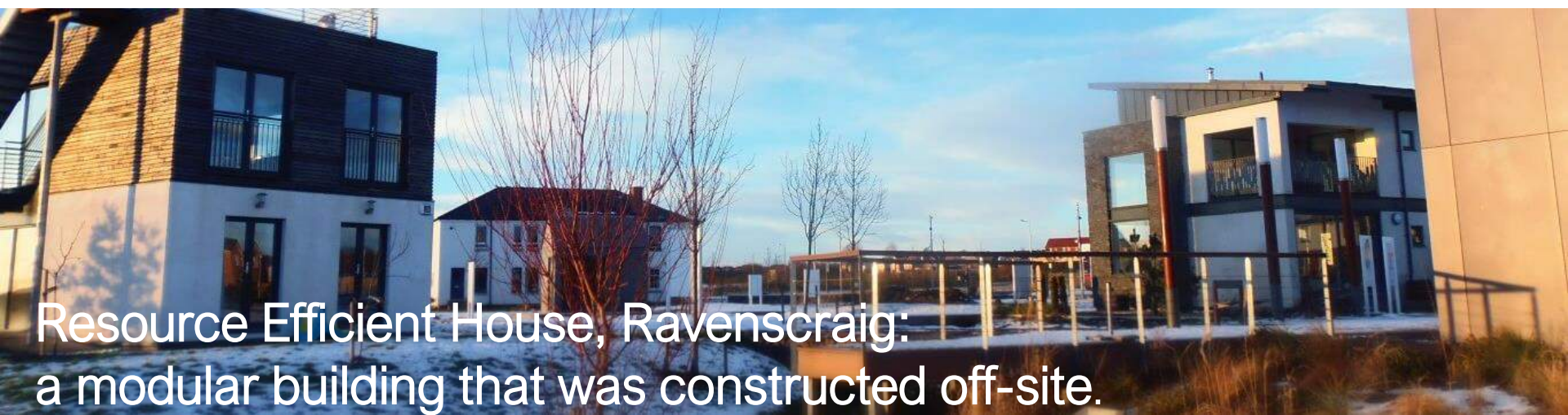
The Queens Park London Olympic Stadium - designed to be partially deconstructed for relocation.

It used surplus gas pipeline for the structure and 104,000 tonnes of recycled crushed concrete for a temporary platform.

Circular Construction ways of working



- Digital technology (BIM)
- Off-site construction and modular design
- Servitisation and leasing
- Site Waste Management Planning
- Whole Life Costing
- Supply chain procurement



Resource Efficient House, Ravenscraig:
a modular building that was constructed off-site.

Design



Designing Out Construction Waste

A guide for project design teams



European Union

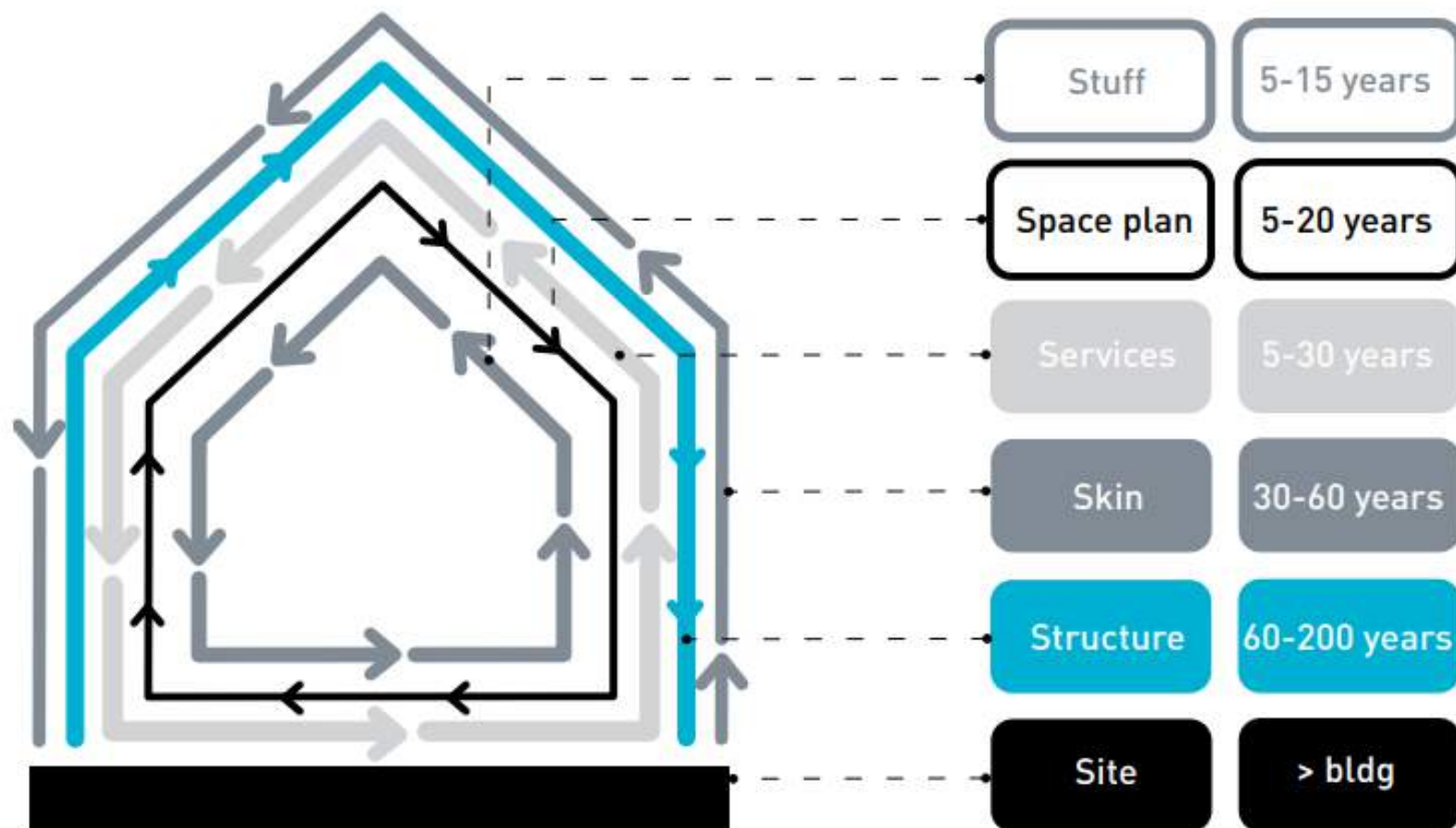


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Building in layers for whole life value



Sketch: John Gilbert Architects based on 'How Buildings Learn', Brand (Viking, London 1994)

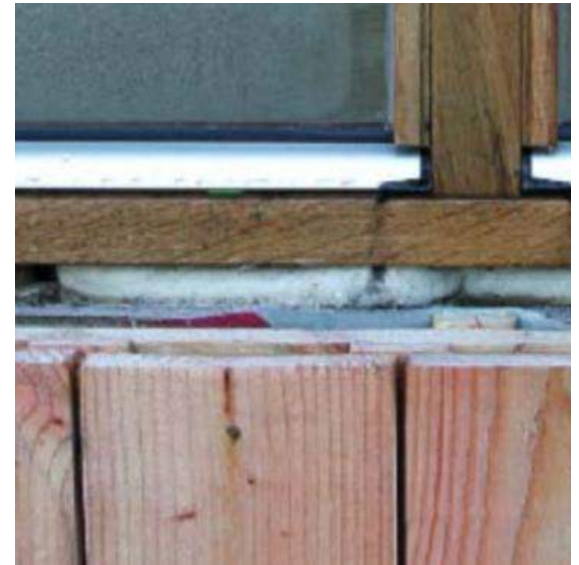
Design maintenance, repair or replacement



Locating services at skirting level behind cup and screw skirting boards



Floorboards held in place by screwed down strips



Installing windows with a good space tolerance allows them to be easily replaced

Procuring Resource Efficient Construction Projects

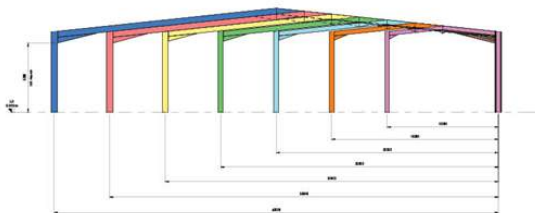
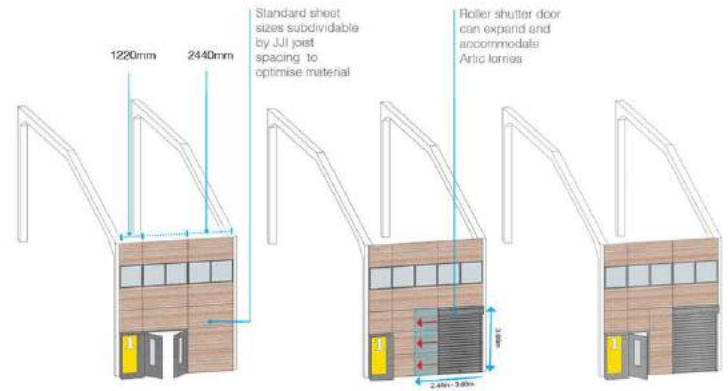


Growth that doesn't cost the earth

Model procurement wording for public and private sector clients and contractors on construction projects



Modular design & offsite construction



<http://www.cs-ic.org/innovationcentre/business-support/online-resources/project-portal/portal-digital-brochure/>

Way forward?



- Skills development and training
- Robust evidence, examples and case studies
- Targeting decision makers
- Focus on the multi-benefits
- Innovation, digital technology and MMC
- Little changes – big difference

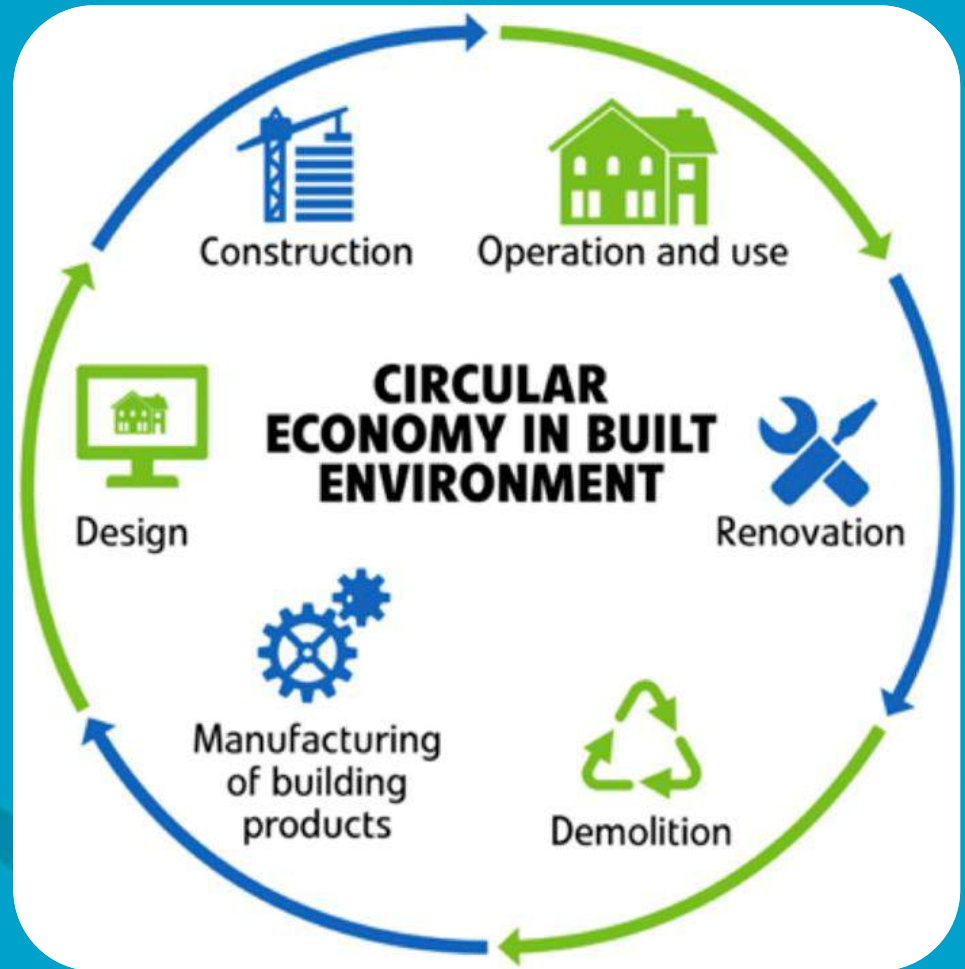
Brummen Town
Hall designed for
disassembly and
using reusable and
renewable materials.



FREE Support Spans the whole building 'life'



Thank you.



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