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# Circularity: Building on the past and looking to the future

Gilli Hobbs

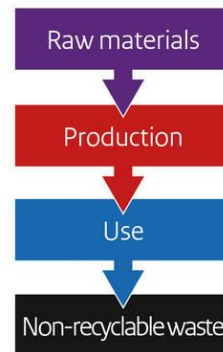
10<sup>th</sup> February 2022

# Overview

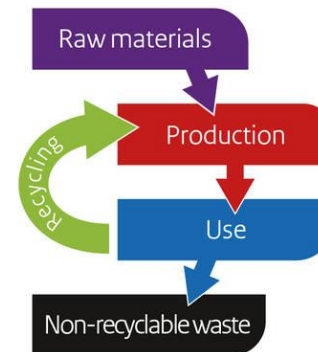
- ▶ Circular economy intro
- ▶ Circular economy opportunities
- ▶ Building life cycles
- ▶ Value retention hierarchy
- ▶ Predevelopment audits
- ▶ Data to support circularity
- ▶ Policy developments

## From a linear to a circular economy

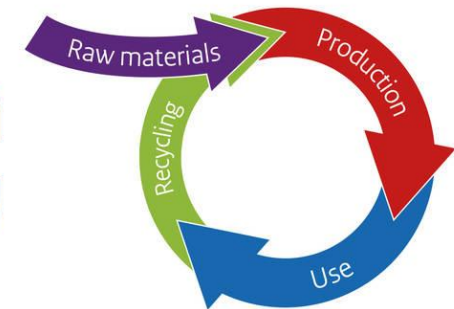
Linear economy



Reuse economy



Circular economy



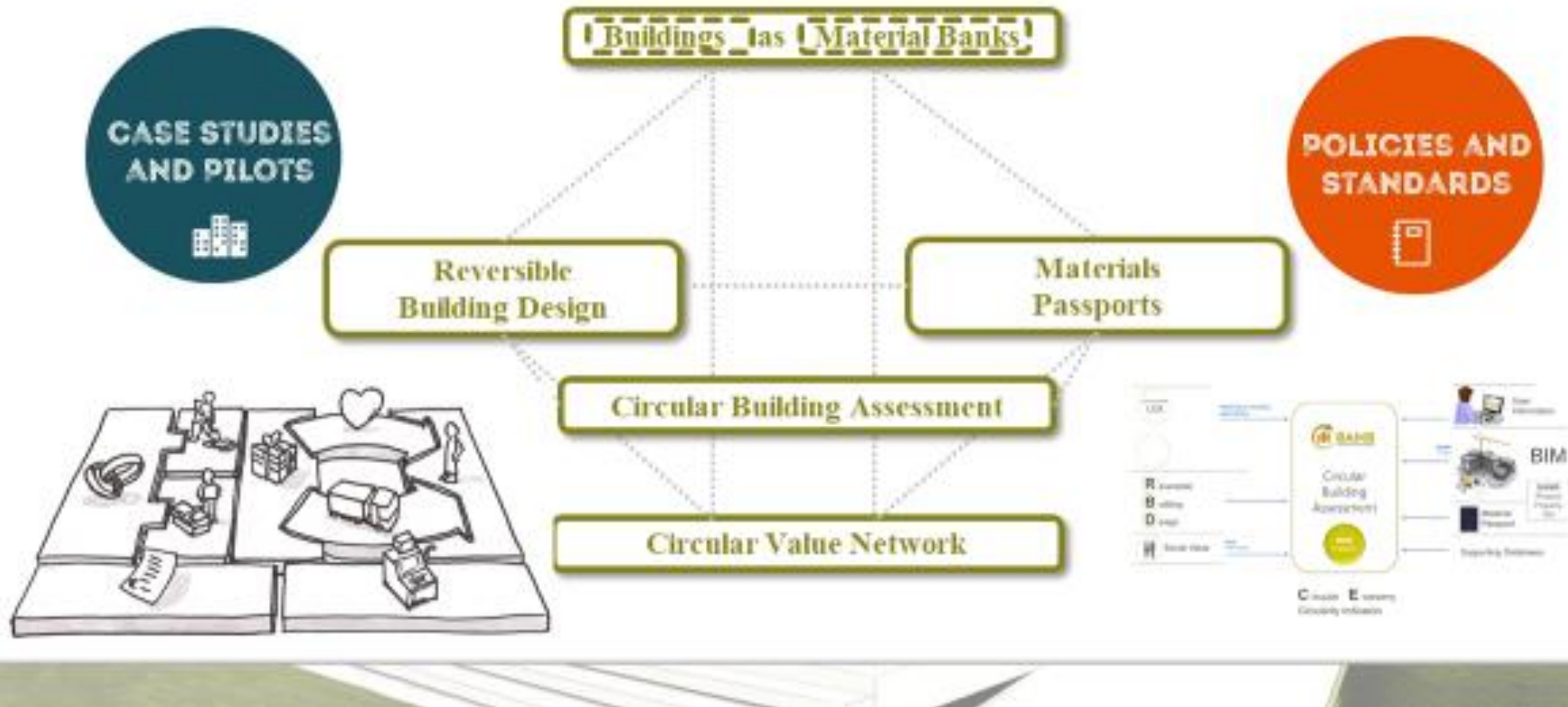


# Circular Economy opportunities

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Design	Manufacture and supply	Construction	In use	End of life
Design for deconstruction Design for adaptability and flexibility Design for standardisation Designing out waste Modularity Specifying reclaimed materials Specifying recycled materials	Ecodesign principles Using less materials/optimising material use Using less hazardous materials Increasing the life span Designing for disassembly Designing for standardisation Using more secondary materials Take back schemes Reverse logistics	Minimise construction waste Procuring reused materials Procuring recycled materials Off site construction	Minimise waste Minimal maintenance Easy repair and upgrade Adaptability Flexibility Utilising assets	Deconstruction Selective demolition Reuse of products and components Closed loop recycling Open loop recycling
Management of information including metrics and datasets				

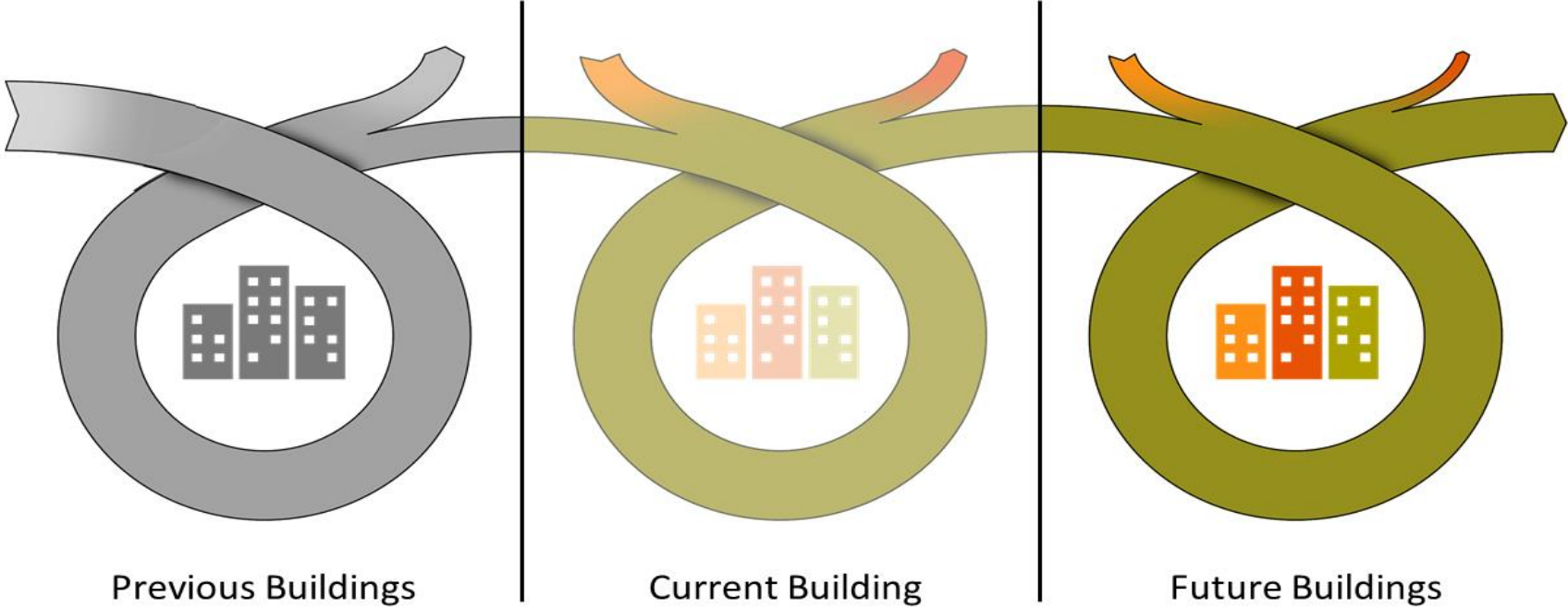
## Buildings as Material Banks (BAMB) – Circular & Dynamic Built Environment



Buildings as Material Banks (2015 – 2019)

# Building life cycles – past, present, future

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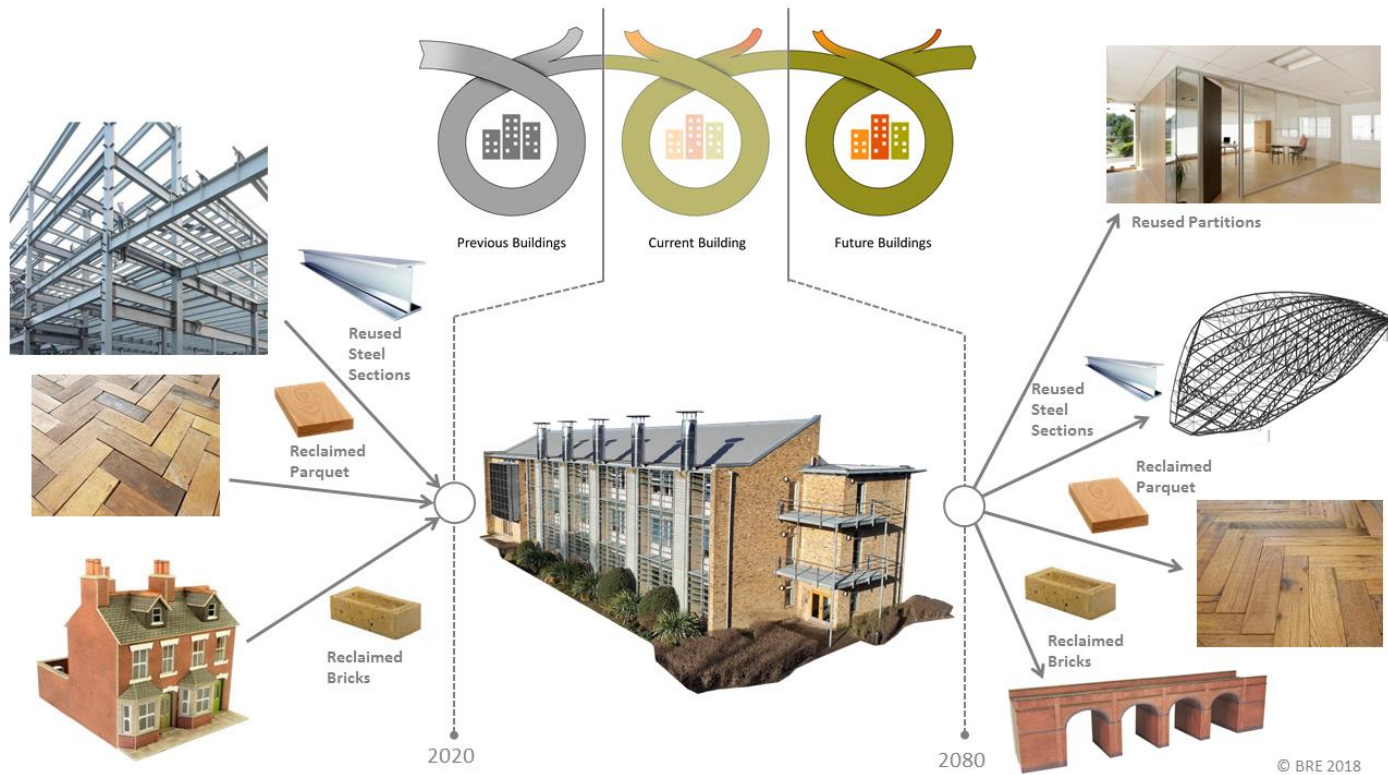


**Displacing new products & materials**

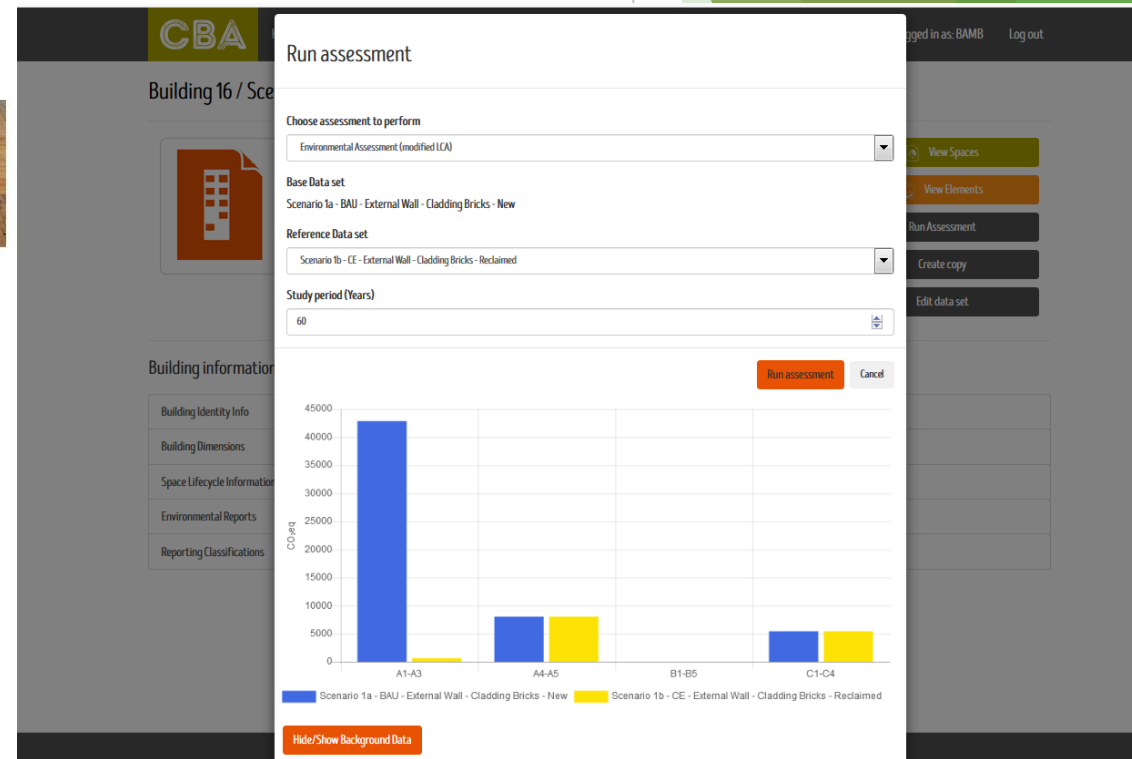
**Transformation capacity**

**Future reuse potential**

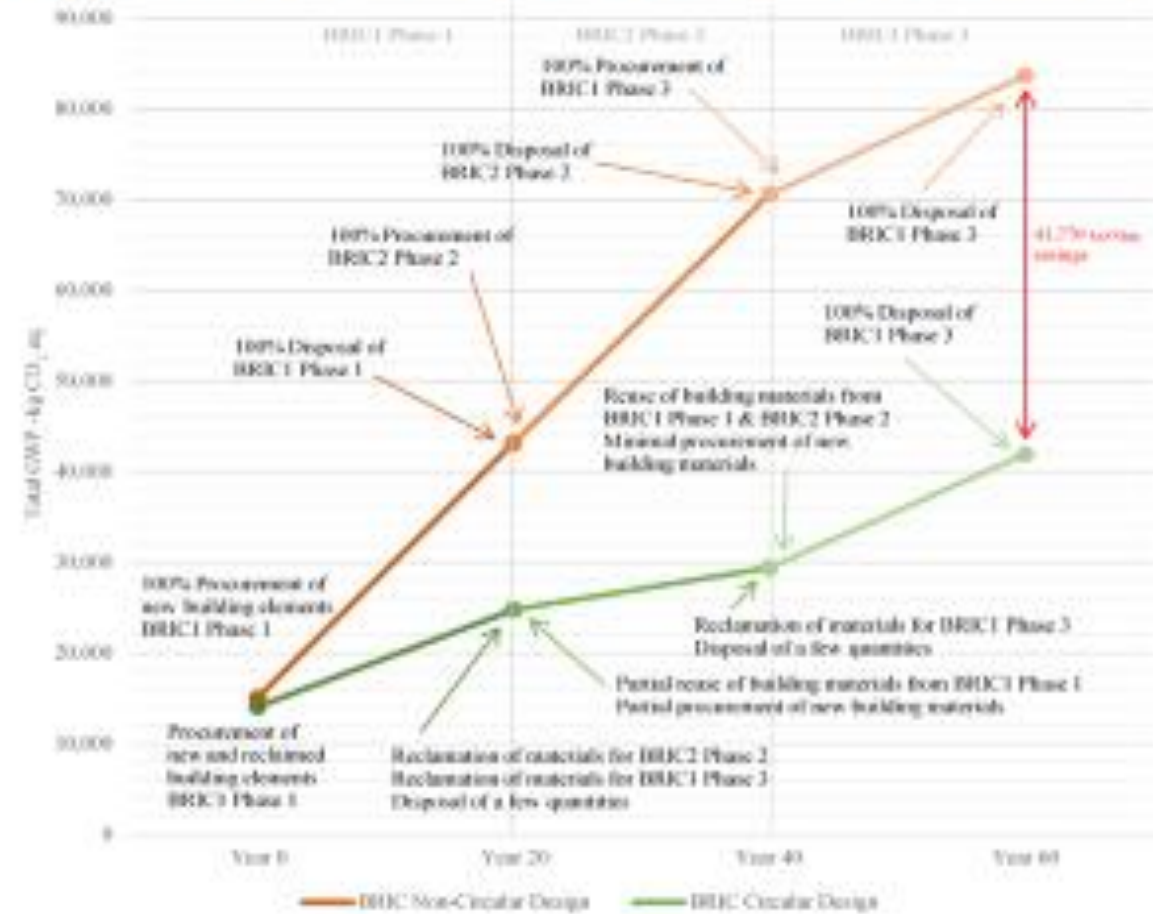
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Constructed Watford, 1997



# BRIC EVALUATION (BUILDING REVERSIBLE IN CONCEPT)



## BUILDINGS AS MATERIAL BANKS

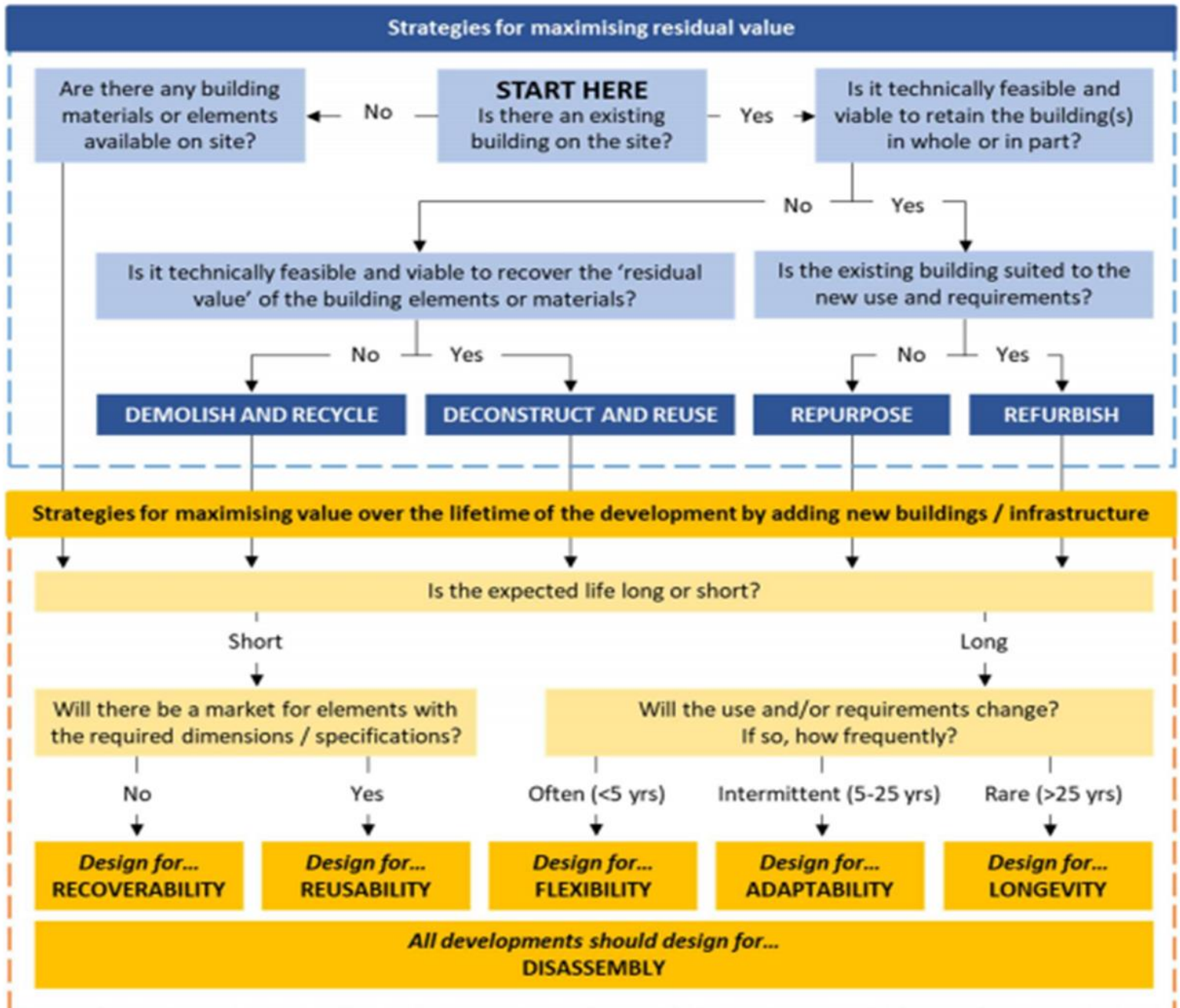
TESTING BAMB DESIGN STRATEGIES THROUGH PROTOTYPES AND TEST PRODUCTS

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# Choosing a strategic approach – Decision Tree



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London -  
Design  
Strategy  
Circular  
Economy  
Statement

# Meridian Water regeneration project

- ▶ London Borough of Enfield – Circular Economy workstream (part of overall Environmental Sustainability Strategy)
- ▶ **Value retention hierarchy**



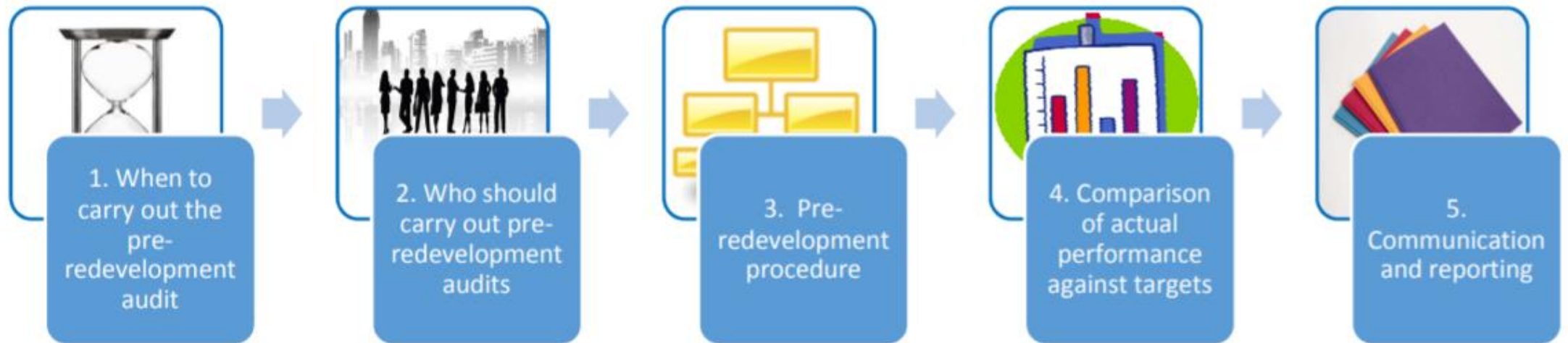
## Quantitative (Triple bottom line) review

Commercially viable	
Projected net revenue over 15 years/ £	
Demolition costs	Revenue from land
Construction costs	Revenue from building
Marketing, management, security, maintenance	
Opportunities	
Projected return over 15 years/ £	
Total no of jobs created	
Net total additional Gross Value Added (GVA)	
Sustainability	
Total payback / £	
Embodied carbon saved	
Sale of residual assets/ materials	
(Triple bottom line) Total ROI	
Commercially viable + (Social) Opportunities + Sustainability	

# Pre-development audits

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2017 Code of Practice – BRE and CIWM Construction and Demolition Waste Forum – [www.condemwaste.org](http://www.condemwaste.org)



## Support circular business models

- 1) Provide markets/ support to reuse & recycle existing assets
- 2) Learning from these audits (& what happens) to support future reuse (Design for Disassembly, supplier take back, capacity building, new business models)
- 3) Data, and access, at End of (first) Life to enable future disassembly, reuse, high value recycling

# Pre-demolition audit – recent example

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Description	Estimated quantity	Tonnes
Concrete from buildings on site	22,000 m <sup>3</sup>	52,800
Stone cladding	2860 m <sup>2</sup>	715
Metal (mainly steel)	350 tonnes	350
Brick & block work	250 m <sup>3</sup>	400
Timber	250 m <sup>3</sup>	125
Glass	70 m <sup>3</sup>	172
Plasterboard	100 m <sup>3</sup>	75
Plastics	35 tonnes	35

# Reuse and recycling recommendations

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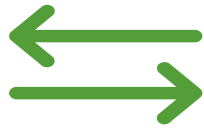
Product/ material	Current	Proposed uplift
Concrete	Recycle to fill material	Recycle to RCA and use in new concrete on site
Bricks	Recycle to fill material	No change
Stone cladding	Recycle to fill material	Reuse cladding
Glass	Recycle to fill material	Recycle back into glass
Metals	Recycle everything	Reuse & recycle
Plastics (carpet tiles)	50% reuse, 50% recycle	Reuse 100%
Timber	Recycle & temporary reuse	No change
Plasterboard	Recycle to form soil conditioner	No change

# Data – still TBC



## What Data?

Products & materials used  
Supplier details  
(Product data  
templates/passports)  
Design for Disassembly &  
Adaptability details  
Digital twin/Asset  
registers/pre-demolition/  
refurbishment audits (esp.  
existing assets)



## How to store/transfer it?

Digital ( Building Information  
Model)  
Virtual > Physical  
(Deconstruction Plan)  
Physical > Digital (QR  
code)  
Physical (RFID tag/label)



## How to update it?

Digital (via Asset  
Information Model)  
Digital (via Supplier e.g.  
Material/Product passport)  
Virtual > Physical (FM  
Maintenance records,  
replacements,  
refurbishments)

## Policy drivers ahead

### EU

- ▶ Revision of Construction Product Regulation (CPR)
- ▶ Revision of Energy Performance in Buildings Directive (EPBD)
- ▶ Green Public Procurement (including mandating of Level(s))
- ▶ EU Taxonomy – technical criteria for circular economy
- ▶ CEN TC 350 & B558 – Sustainability of Construction Works - Sub-committee: Circular Economy in the Construction Sector

### UK

- ▶ Extended Producer Responsibility
- ▶ England Waste Prevention Programme (consultation ended June 2021)
- ▶ Scotland & Wales Circular economy strategies > action
- ▶ Circular Economy Statement 'ratcheting' requirements - London Plan
- ▶ Green Public Procurement (CiH Value Toolkit)



Thanks for listening  
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