The Built Environment

Contents

The Built Environment

Circular Economy Hotspot
Dublin 2023

Chaired by Ali Grehan, Dublin City Council and Philippa King, Southern Waste Region

How can circular economic solutions help address Dublin's pressing need for housing development? Strategies such as meanwhile use, smart zoning, sustaining materials, flexible architectural design and renovation will be explored at this deep dive workshop..

PANELLIST TOPICS OF DISCUSSION

Key Note Speaker; Sabine Oberhuber, Co-Founder of Turntoo.

Circularity – What we learned from Circular Projects in Ireland and Europe
Janet Lynch, ARUP

Big Shout Out
Open Forum with 1 min for participants to tell their circularity story

The Role of Higher Education in the transition towards a Circular Built Environment
John Scahill, Atlantic Technological University (ATU)

Opera Square Project – Circular Economy Lighthouse Demonstrator
Diarmuid Hayes, Limerick Twenty Thirty

Construction Material Markeplace Project (CMEx)
Rachel Loughrey, Irish Green Building Council (IGBC)

explore our speakers

9:00-12:30pm
Wood Quay
31 May 2023

#circulardublin

Facilitators

Ali Grehan

Dublin City Architect

Philippa King

Co-ordinator, Southern Waste Region

Speakers

Janet Lynch

ARPU

Dr John Scahill

Atlantic Technological University (ATU)

Speakers

Rachel Loughrey

Irish Green Building Council (IGBC)

Diarmuid Hayes

Limerick Twenty Thirty

Levers For A Circular Built Environment

LEVERS FOR A CIRCULAR BUILT ENVIRONMENT

CIRCULAR ECONOMY HOTSPOT DUBLIN 31-05-2023

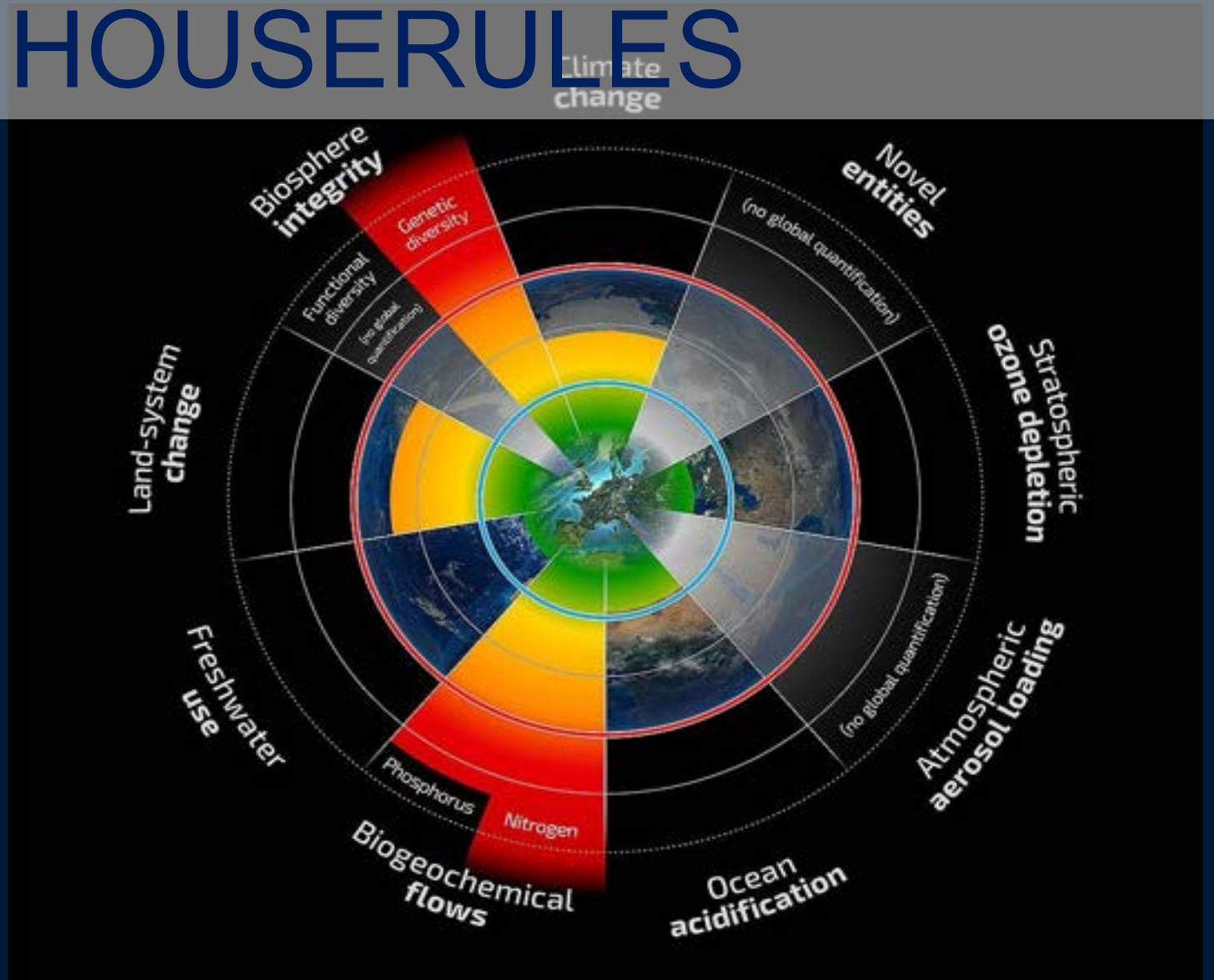
Sabine Rau-Oberhuber
Co-founder/Director Turntoo

“Anyone who believes in indefinite growth of anything physical on a physically finite planet is either mad, or an economist.”

Kenneth E. Boulding

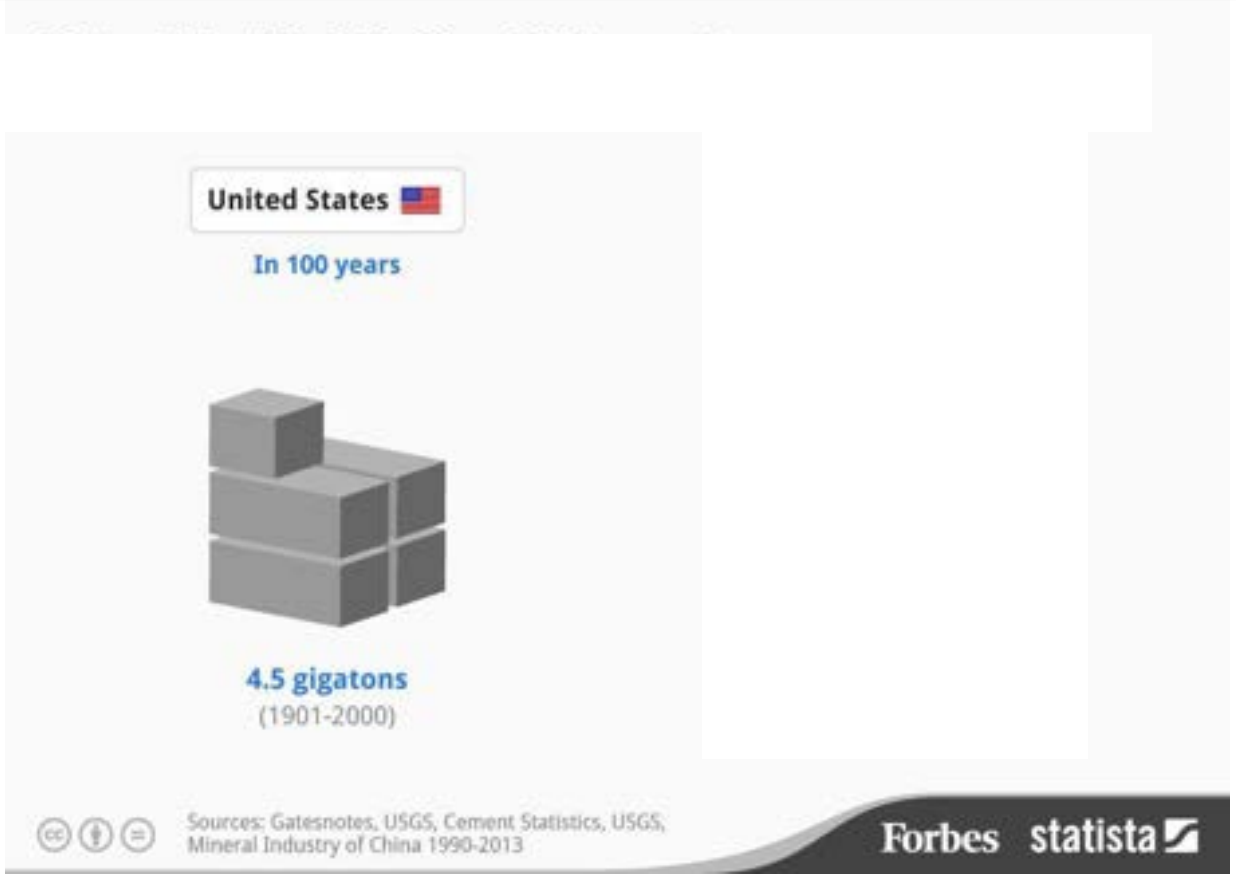
GUESTS OF PLANET EARTH

IGNORING
THE HOUSERULES

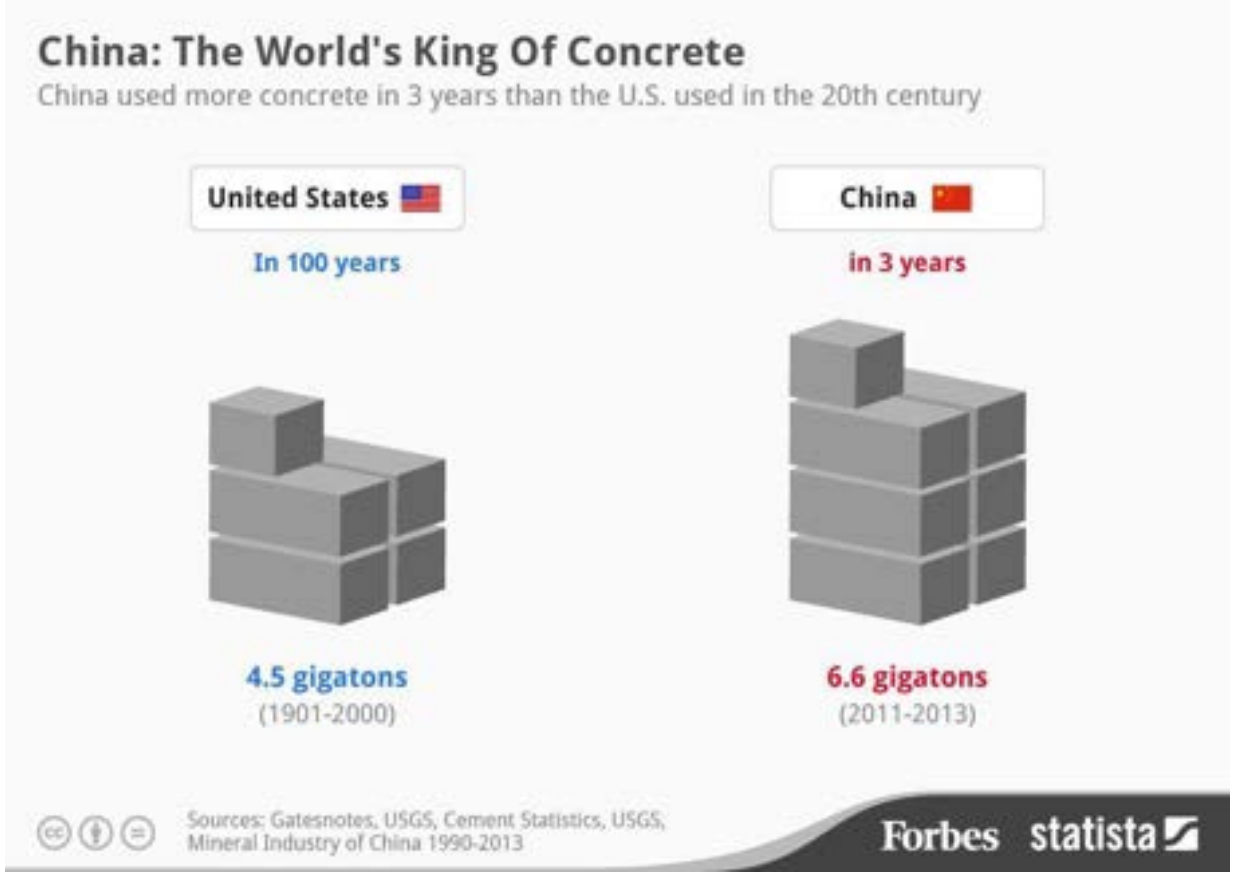


LINEAR
INDUSTRIAL PROCES

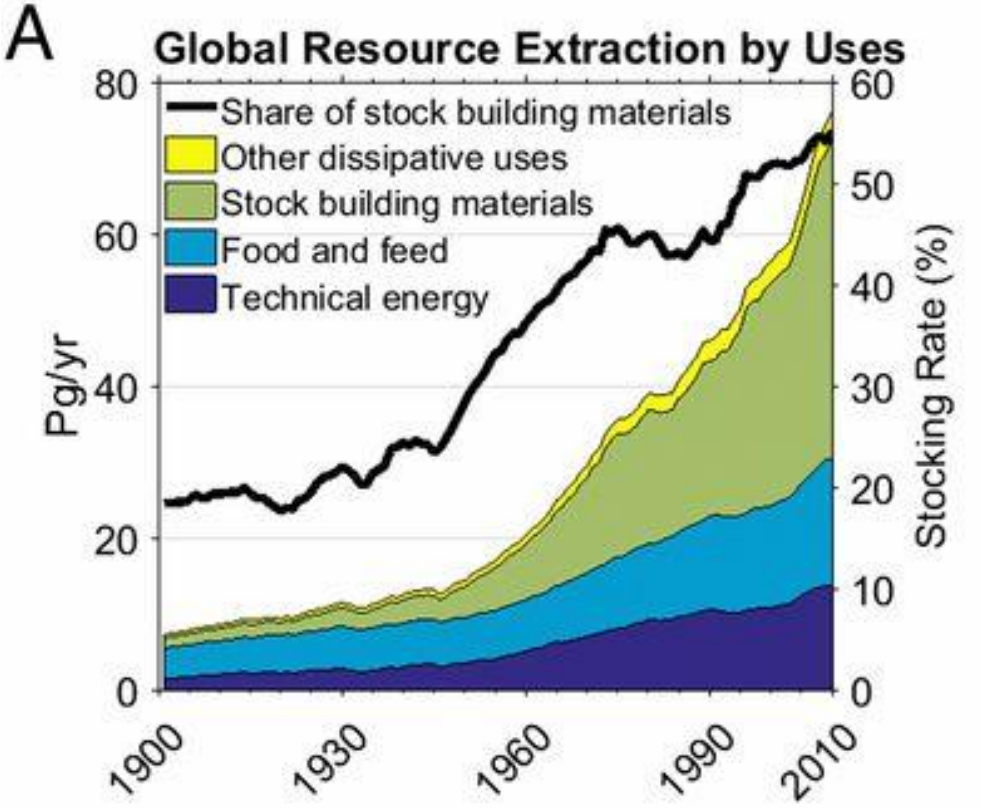
ECONOMIC GROWTH & MATERIAL CONSUMPTION



ECONOMIC GROWTH & MATERIAL CONSUMPTION



ECONOMIC GROWTH & MATERIAL CONSUMPTION



- 60% of the building stock available in 2050 has yet to be built.
- 50% of annual consumption consumed by existing stock
- Up to 30% of construction material is wasted during the construction phase

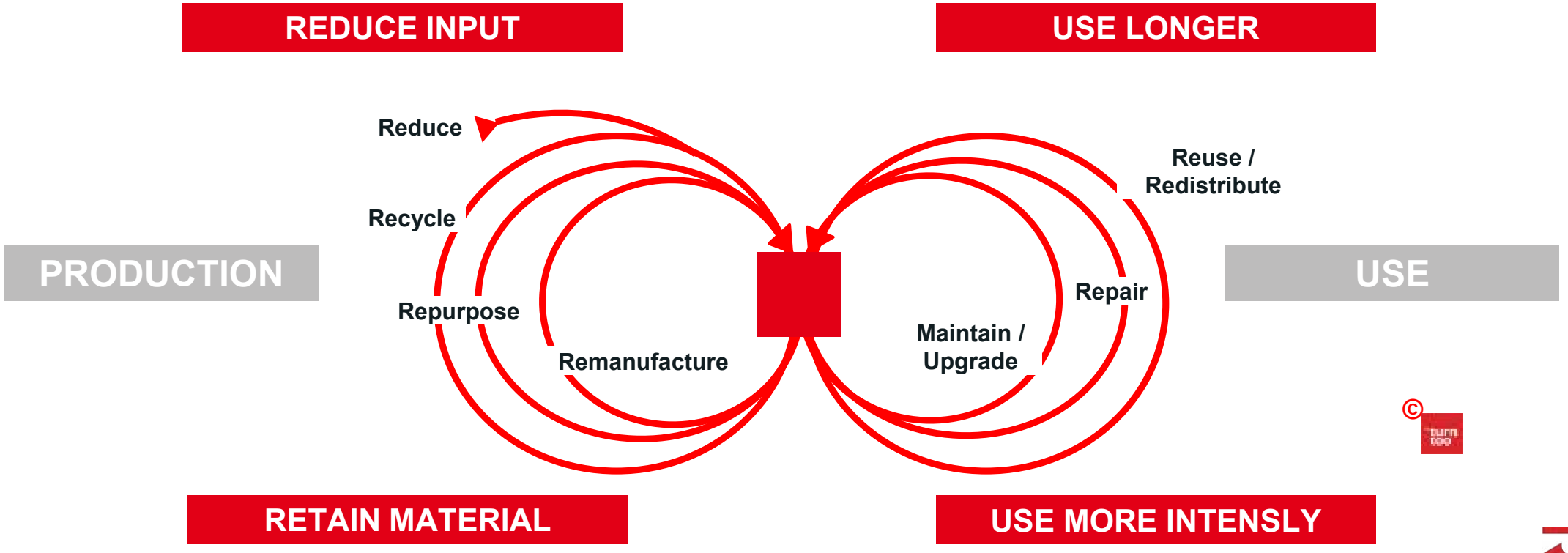
IMPACT OF
THE BUILDING INDUSTRY

UNSUSTAINABLE
CONSUMPTION PATTERN

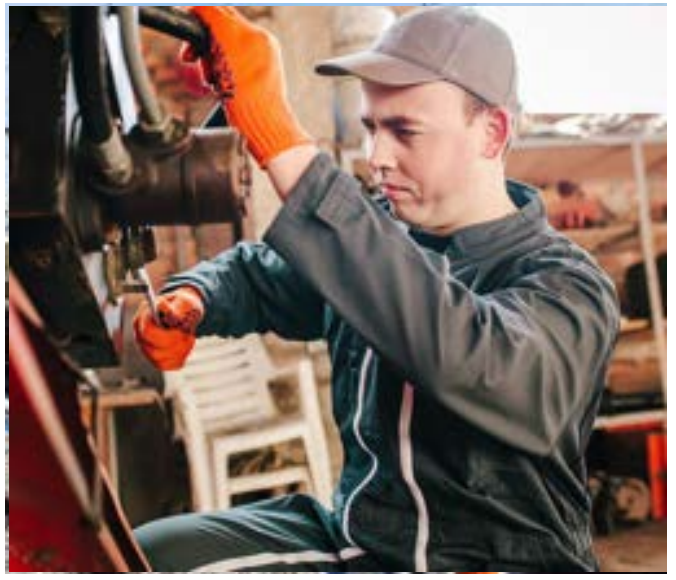
1953 - 1970

2007-2023

NEW MODELS OF PRODUCTION & USE

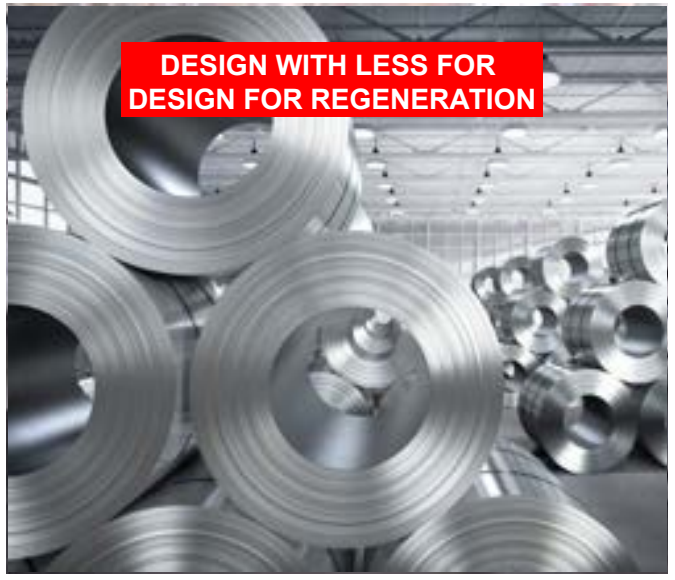


REDESIGN OF PRODUCTS & PROCESSES

	REDUCE MATERIAL INPUT	USE: PROLONG & INTENSIFY	PRESERVE MATERIAL
PRODUCTS & BUILDINGS			
PROCESSES			

CIRCULAR ECONOMY

REDESIGN OF PRODUCTS & PROCESSES

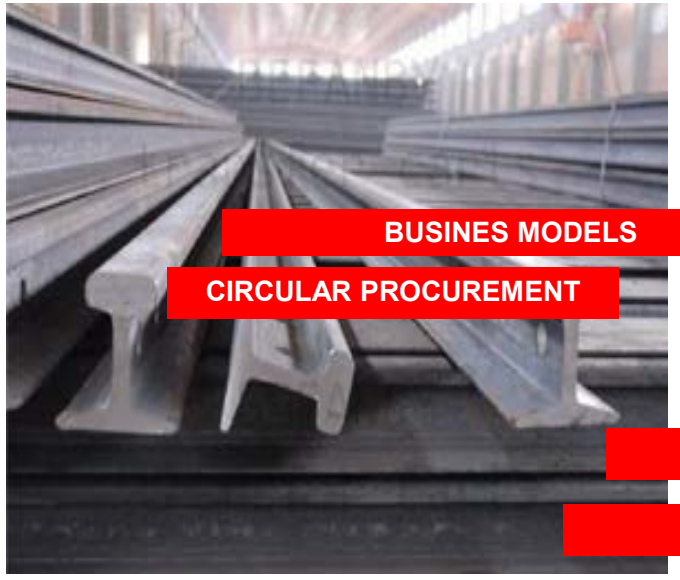
	REDUCE MATERIAL INPUT	USE: PROLONG & INTENSIFY	PRESERVE MATERIAL
PRODUCTS & BUILDINGS	 DESIGN WITH LESS FOR DESIGN FOR REGENERATION	 DESIGN FOR MAINTENANCE, REPAIR & UPGRADES	 DESIGN FOR DISASSEMBLY & RECYLING
PROCESSES			

CIRCULAR ECONOMY

REDESIGN OF PRODUCTS & PROCESSES

REDUCE MATERIAL INPUT | **USE: PROLONG & INTENSIFY** | **PRESERVE MATERIAL**

PRODUCTS & BUILDINGS



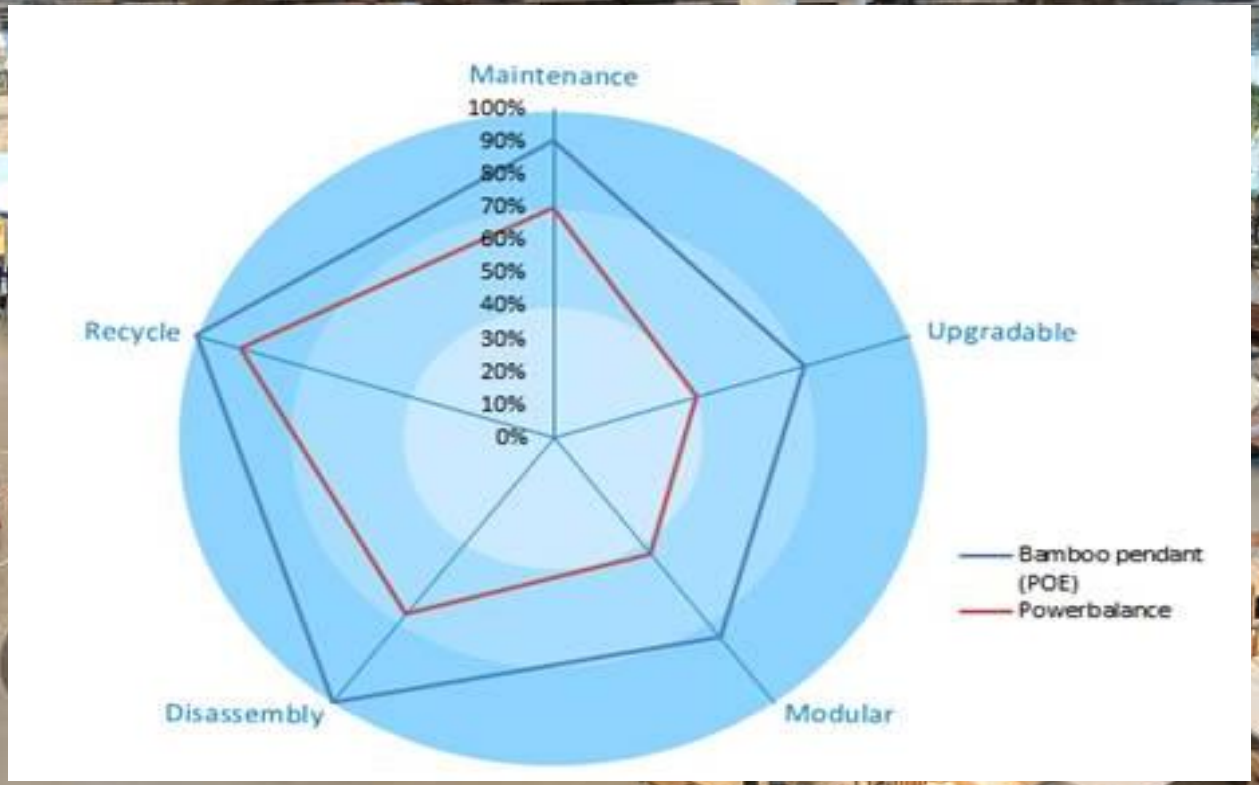
PROCESSES

- BUSINES MODELS
- CIRCULAR PROCUREMENT
- IOT
- ASSET TRACKING
- MATERIAL PASSPORT / DIGITAL TWIN
- CROSS INDUSTRY PARTNERSHIPS
- RECYCLING METHODS
- REMANUFACTURING CAPACITY
- REVERSE LOGISTICS
- MATERIAL HUBS

CIRCULAR ECONOMY

PRODUCTS
AS A SERVICE

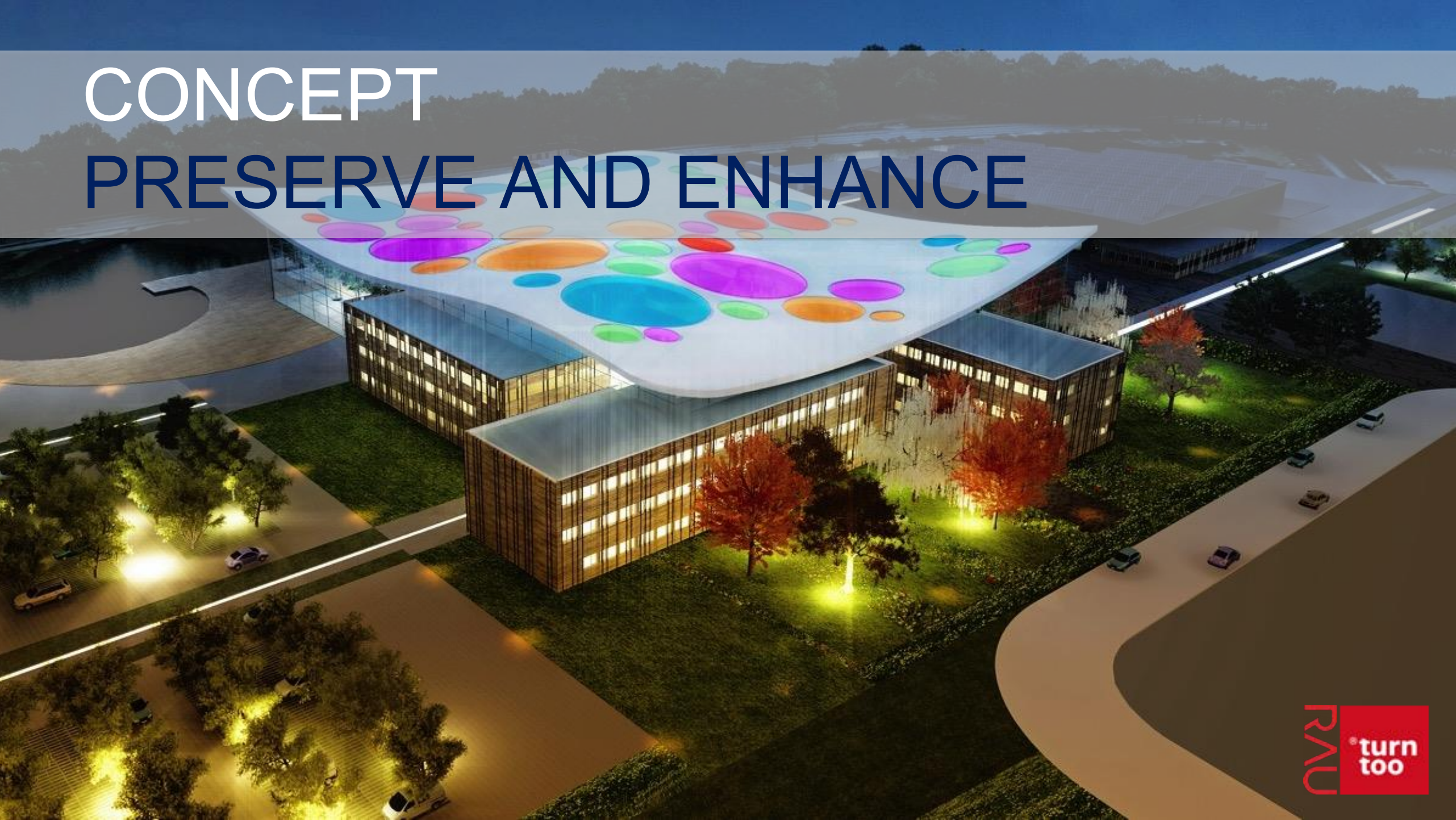
DESIGNED TO BE
UPDATED & MAINTAINED



SELLING ACCESS

BUILDINGS AS A MATERIAL MINE

CONCEPT
PRESERVE AND ENHANCE



MAXIMISE REUSE
FROM TOILETS TO WALLS

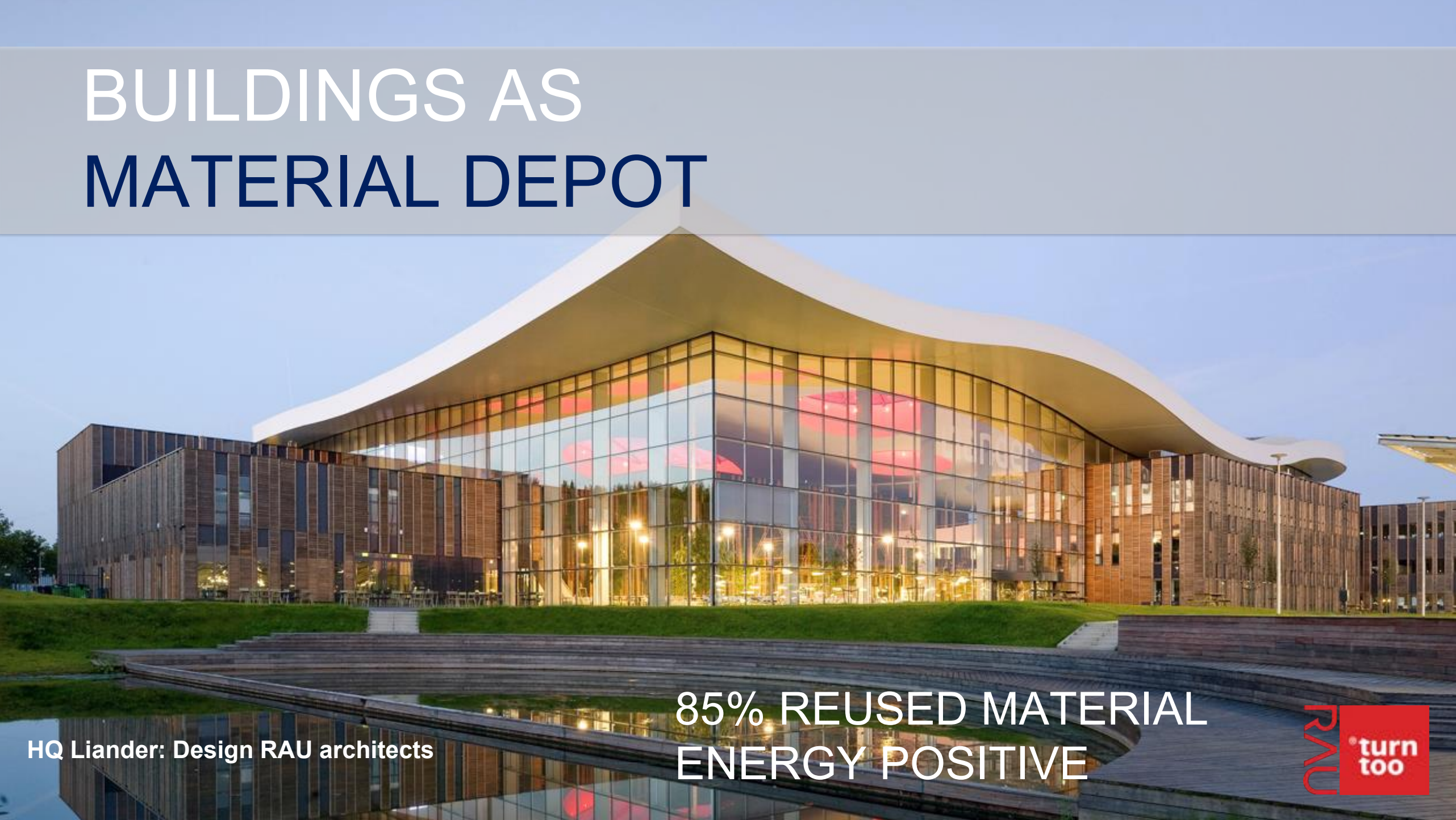
REPURPOSE MATERIAL

FACADE & INSULATION FROM RECLAIMED MATERIAL

RE-THINK
EXISTING SOLUTIONS

RESULT
30% LESS STEEL

BUILDINGS AS MATERIAL DEPOT



HQ Liander: Design RAU architects

85% REUSED MATERIAL
ENERGY POSITIVE

RAU turn too

BUILDING AS A MATERIAL BANK

INTEGRAL DESIGN

DESIGNED FOR DISASSEMBLY

MODULAR
CLT CONSTRUCTION

1.684 tonnes of CO_2 stored

CARBON NEGATIVE
ENERGY POSITIVE

CIRCULAR
SOCIAL HOUSING PROJECT

MODULAR DESIGN
ELIMNATES CONSTRUCTION WASTE

WOOD CONSTRUCTION

ENERGY POSITIVE / CARBON NEGATIVE

595$_T$ CO_{2EQ} SEQUESTERED

ZERO OPERATIONAL CARBON

RAU

SeARCH

WASTE IS MATERIAL
WITHOUT IDENITY

MATERIAL PASSPORT


®MADASTER

MADASTER
CADASTRE FOR MATERIAL

Horizon2020
European Union Funding
for Research & Innovation

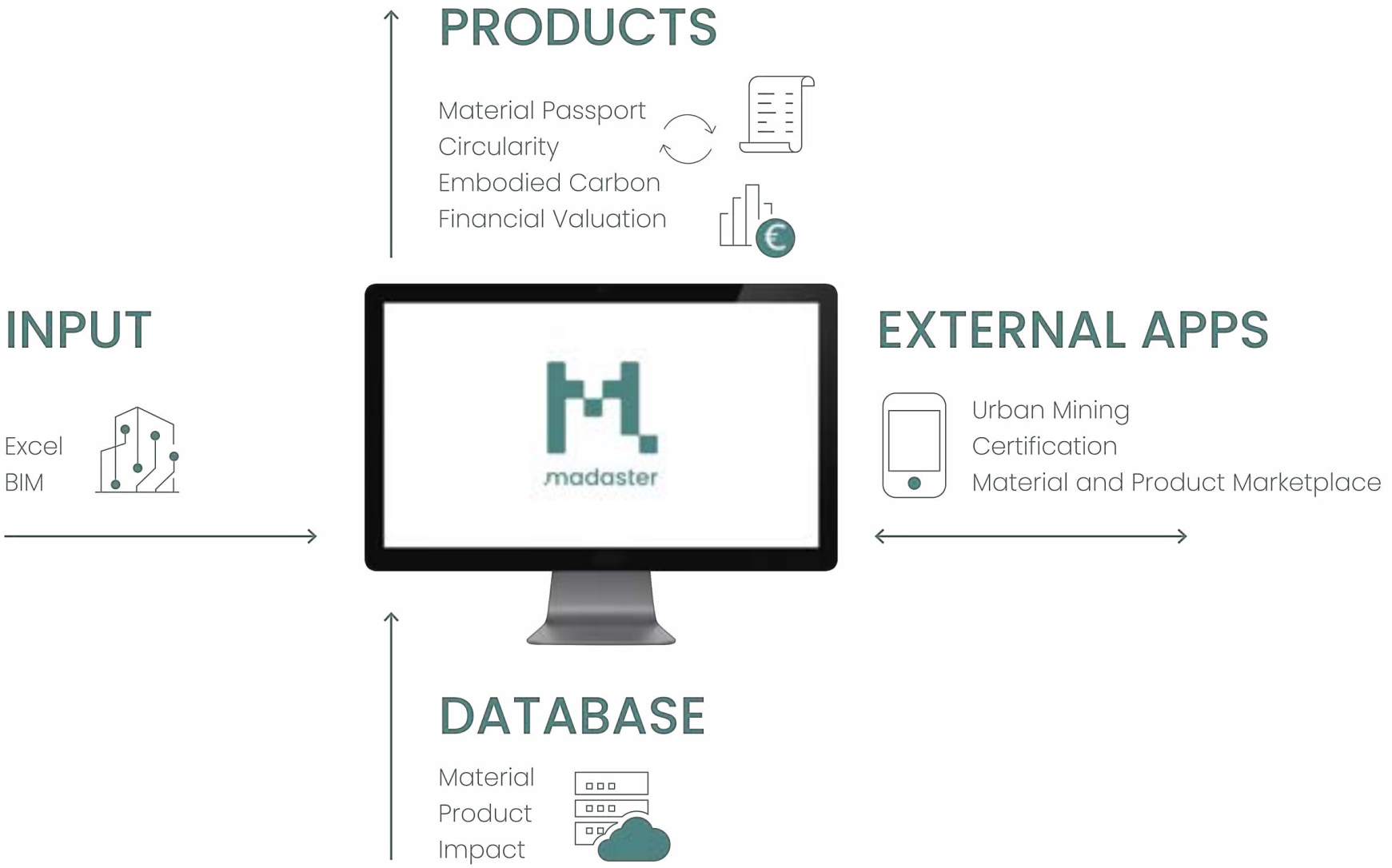
CONNECT & LINK
LCA / PRODUCTS / PUBLIC DATA

NEW BUILDINGS
WITH EXISTING MATERIAL

URBAN MINING AND RRECYCLING UNIT – NEST, ZURICH
KIT KARLSRUHE / W. VAN SOBEK ARCHITECTS

ALTERNATIVE VALUATION

Madaster
Connects

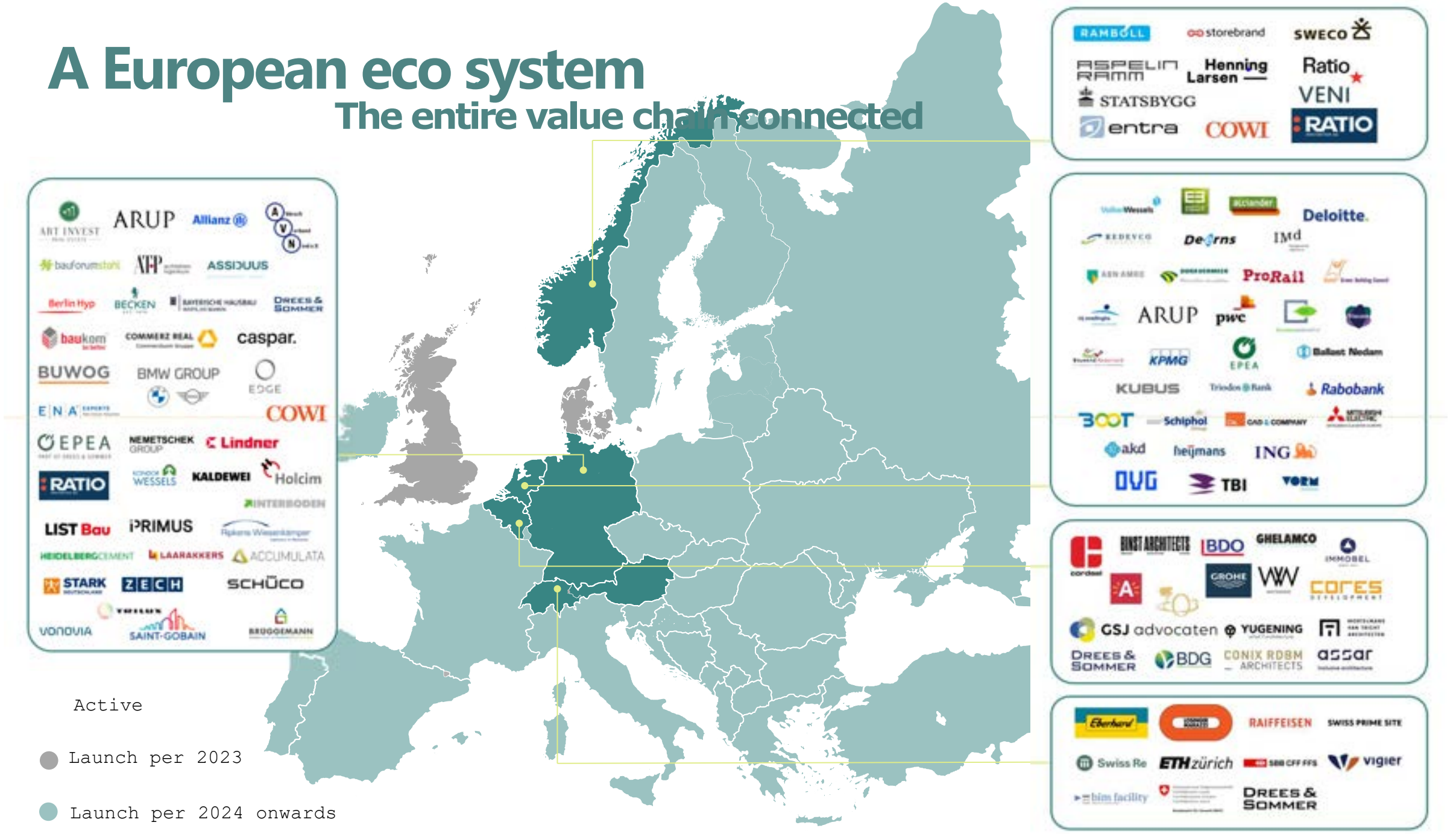


Madaster

Passports

A European eco system

The entire value chain connected



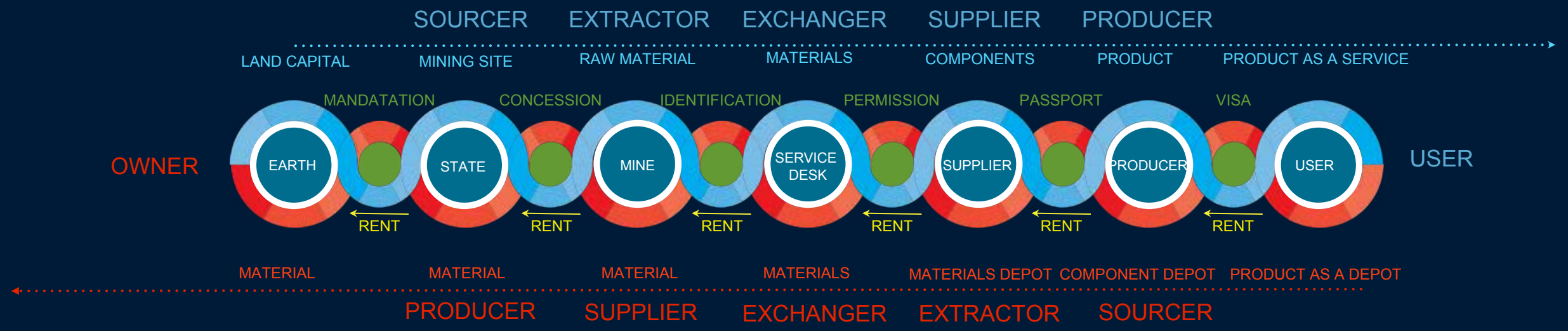
Active

Launch per 2023

Launch per 2024 onwards

MATERIAL LIBRARY

MATERIAL
AS A SERVICE



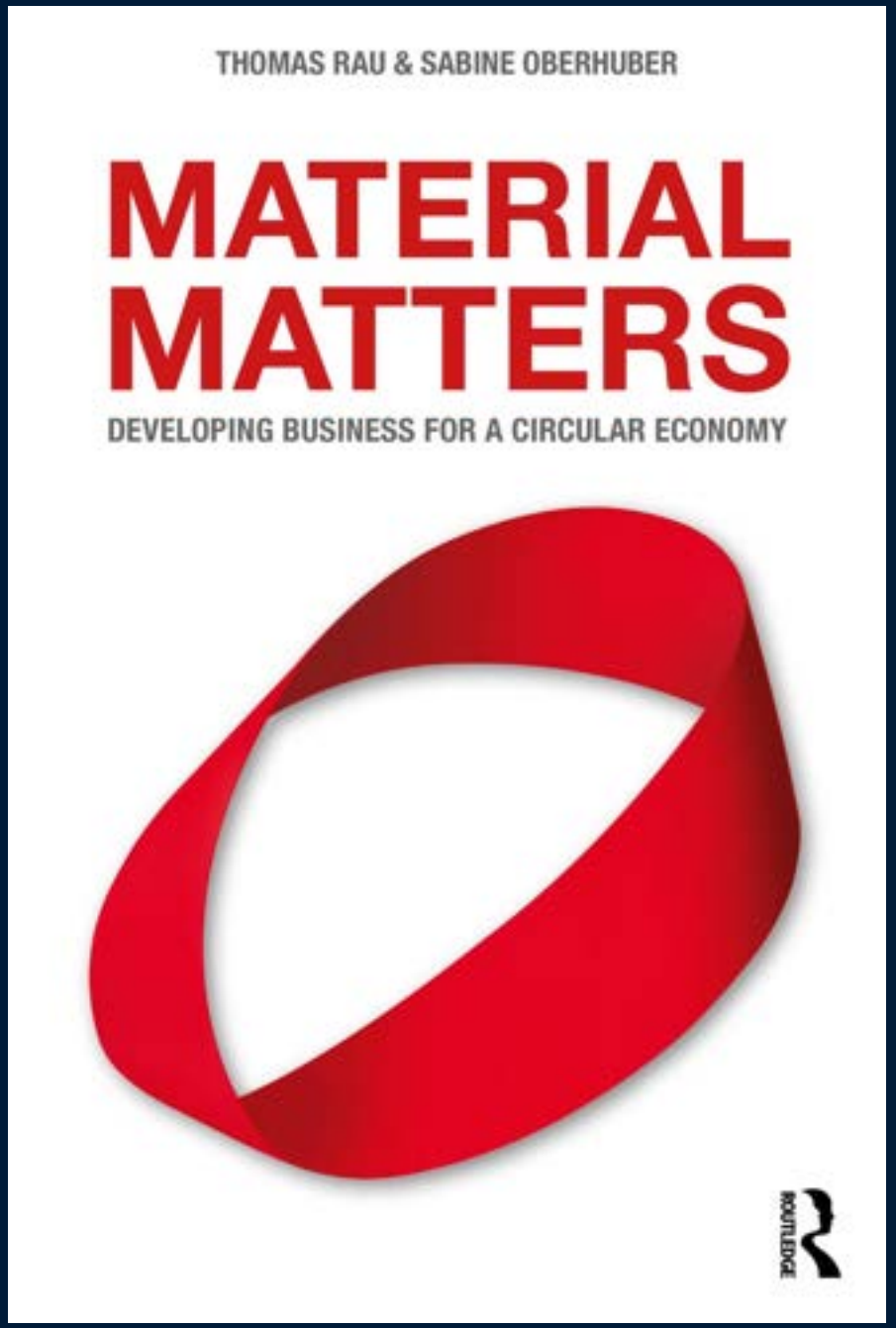
MIND CHANGE

LEADERSHIP
FOR CHANGE

THINKING IN GENERATIONS
IS AN ATTITUDE

“You never actually own a material
You merely take care for it
For the next generation”

turntoo


THOMAS RAU & SABINE OBERHUBER
MATERIAL MATTERS
DEVELOPING BUSINESS FOR A CIRCULAR ECONOMY
ROUTLEDGE

Circularity

-What we learned from Circular Projects in Ireland and Europe

Circular Economy Hotspot
Dublin 2023

ARUP

Circularity – What we learned from Circular Projects in Ireland and Europe

Circular Economy Hotspot- Built Environment Deep Dive

Janet Lynch, Dublin

31/5/2023

ARUP

Topics

Circular Economy in the Built Environment

- Circular Economy in Construction
- How do we apply circularity on projects
- Circular Buildings Toolkit
- Project Examples- So What have We Learned?

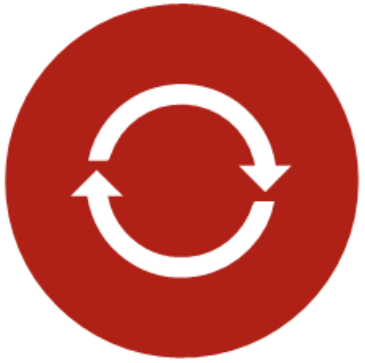
ARUP

Circular Economy in Construction

The three principles

ARUP

Designing out waste and pollution



Keeping products and materials in use

...at their highest possible value

Regenerating natural systems

Policy

Reports and Publications

ARUP

EU Sustainability Strategy

Programme for Government

National Development Plan 2021-2030

Whole of Government Circular Economy Plan 2022-2023

Dec 2019 | March 2020 | June 2020 | Sept 2020 | Oct 2021 | Dec 2021 | 2022

EU Circular Economy Action Plan

Waste Action Plan for a Circular Economy

NIFTI

Circular Economy and Miscellaneous Provisions Act

Circular Economy in Ireland

ARUP

Circular Economy and Miscellaneous Provisions Act 2022.

"*circular economy*" means an economic model and the policies and practices which give effect to that model in which—

(a) production and distribution processes in respect of goods, products and materials are designed so as to minimise the consumption of raw materials associated with the production and use of those goods, products and materials,

(b) the delivery of services is designed so as to reduce the consumption of raw materials,

(c) goods, products and materials are kept in use for as long as possible thereby further reducing the consumption of raw materials and impacts harmful to the environment,

(d) the maximum economic value is extracted from goods, products, and materials by the persons using them, and

(e) goods, products and materials are recovered and regenerated at the end of their useful life;

Circular Economy in Organisations

ARUP

BS8001

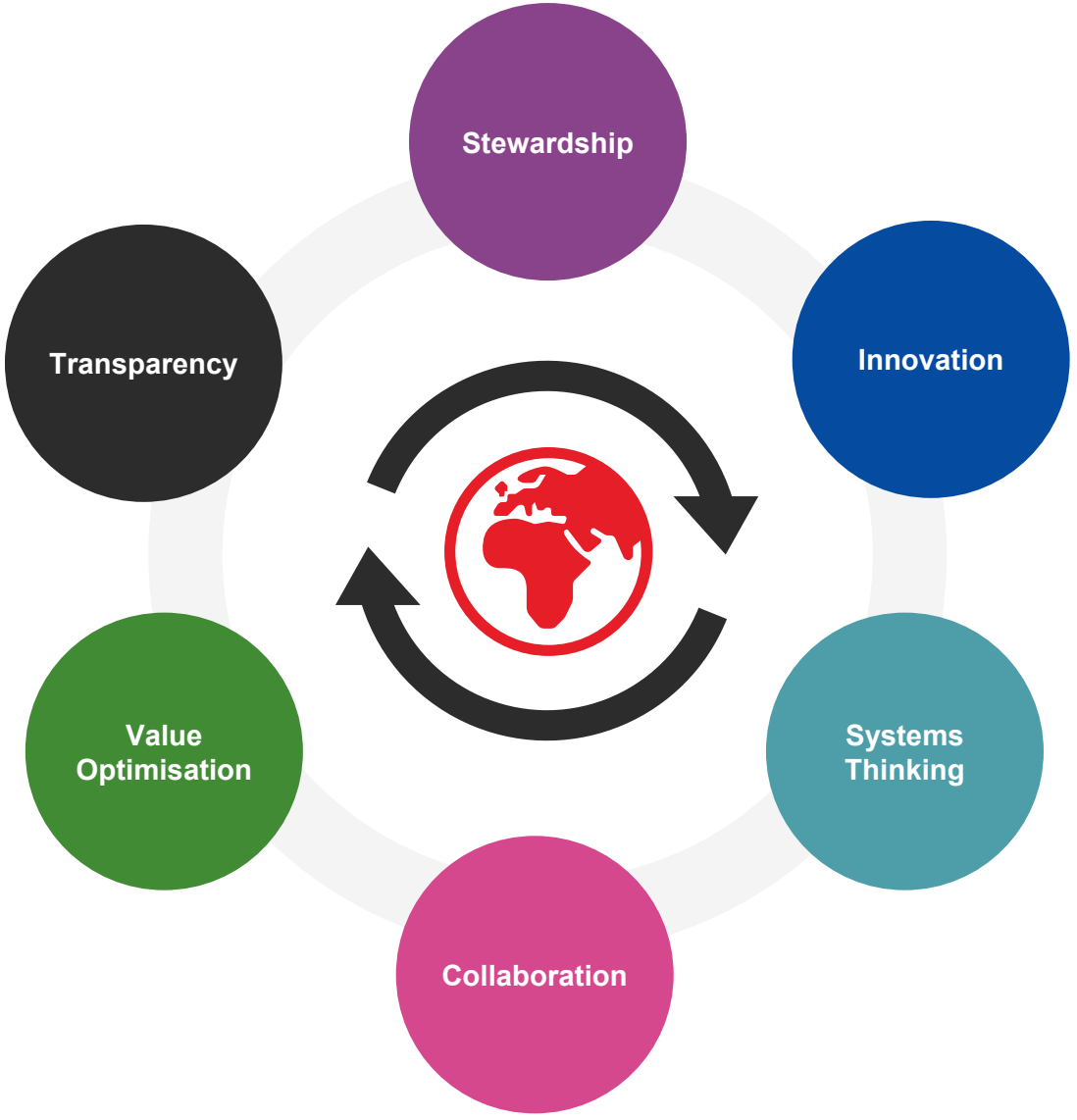
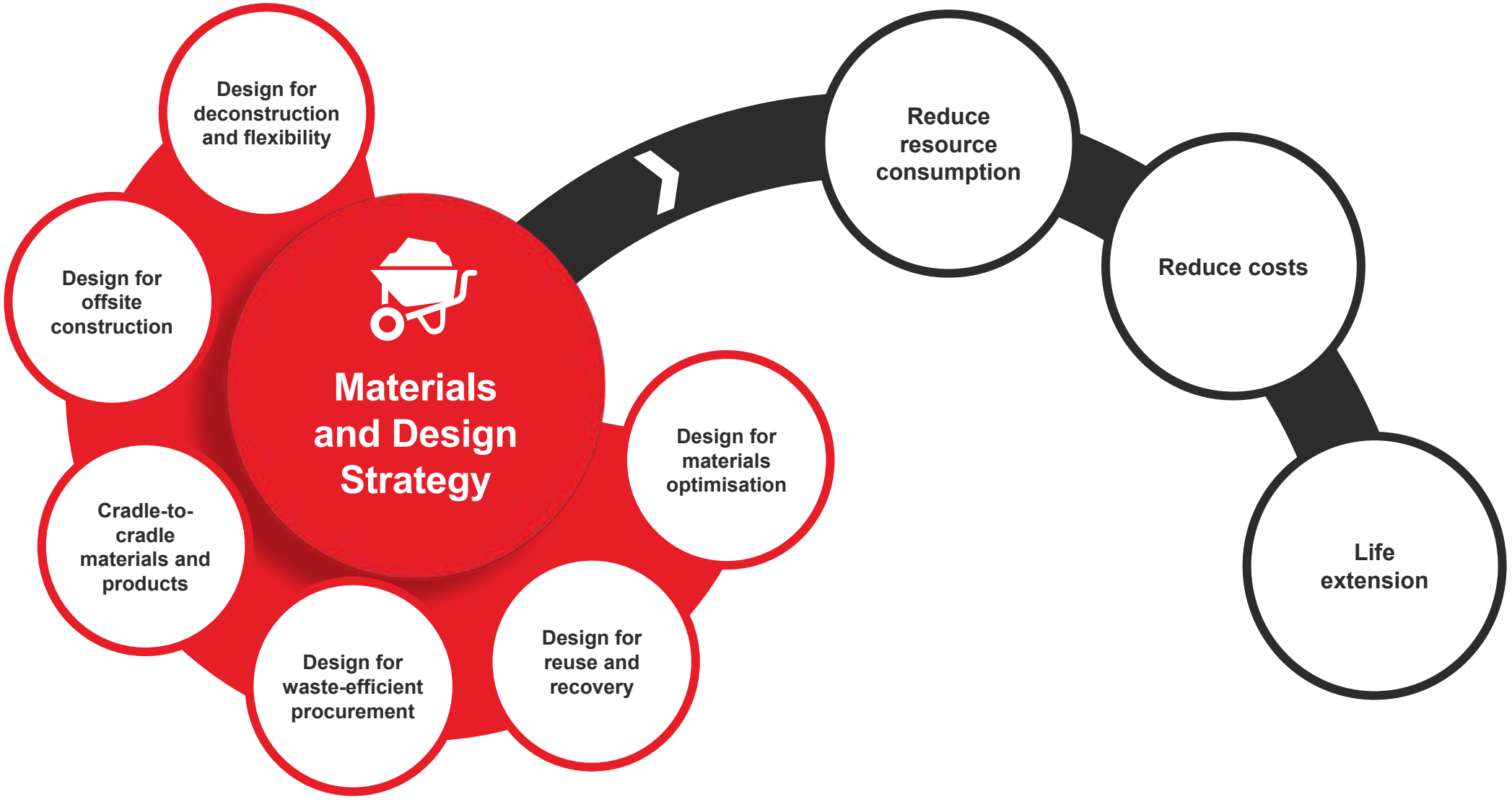


Image credit: BS8001

Circular Economy

As a Materials and Design Strategy

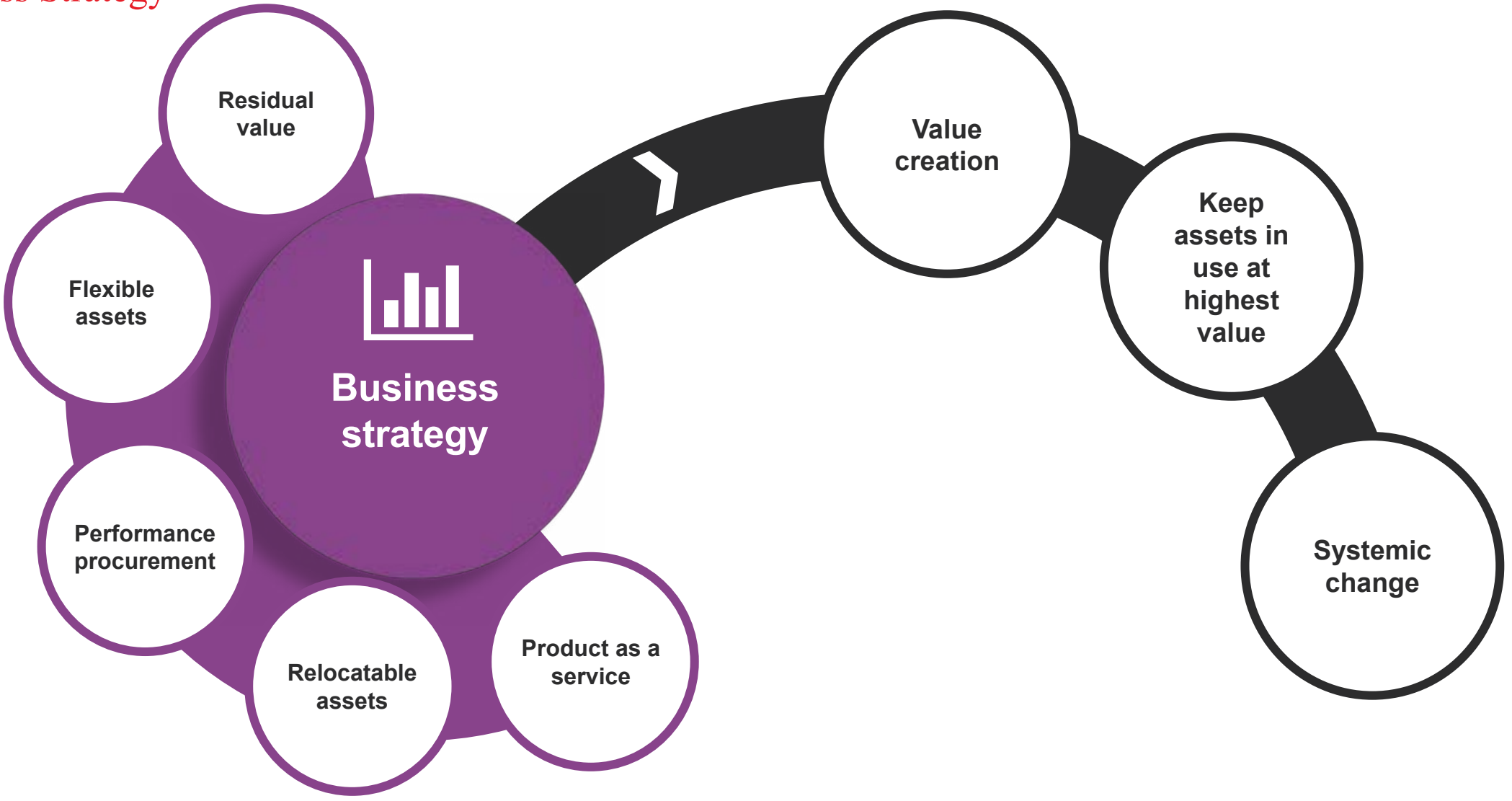
ARUP



Circular Economy

As a Business Strategy

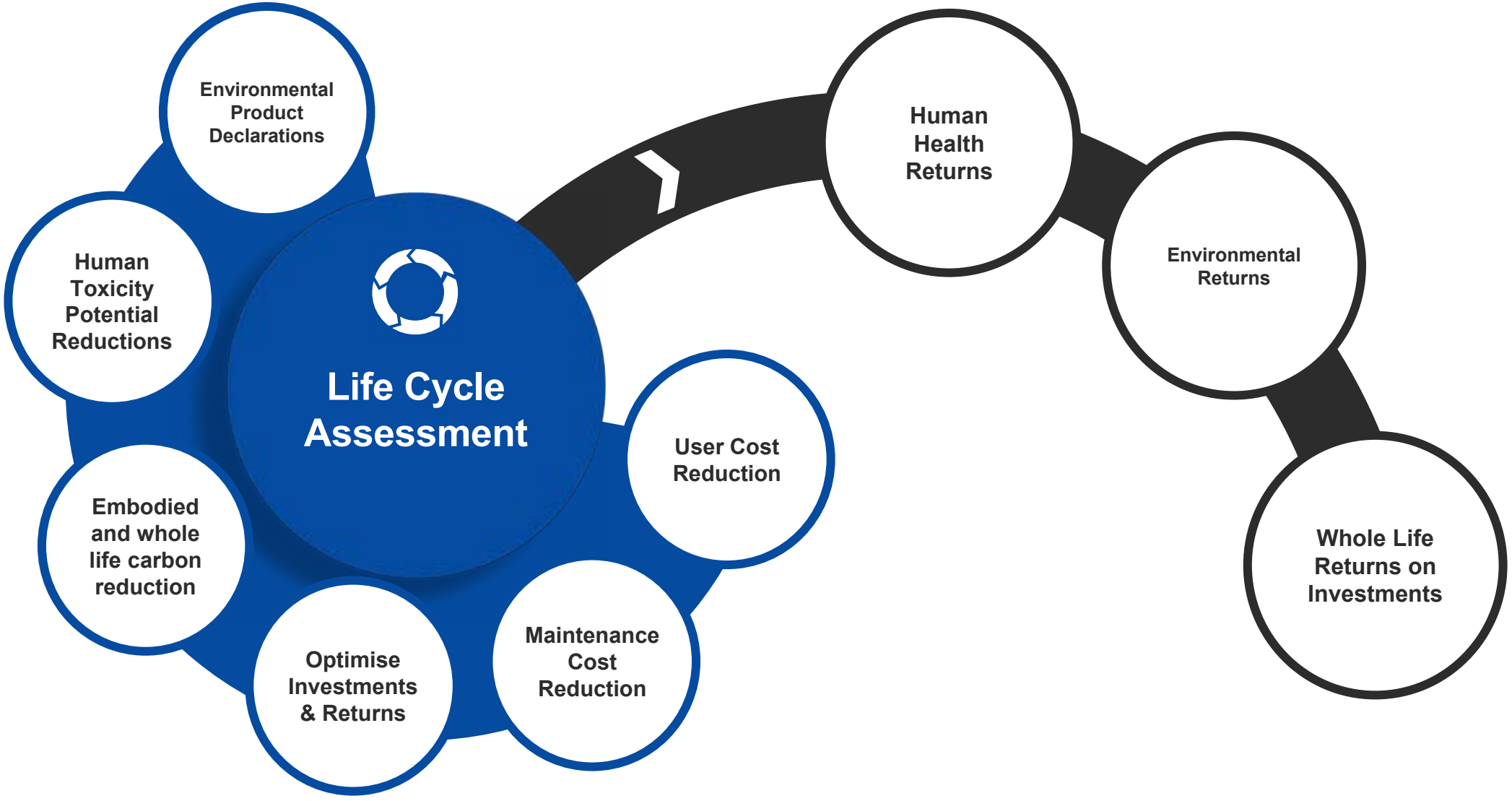
ARUP



Circular Economy

As a Life Cycle Assessment Strategy

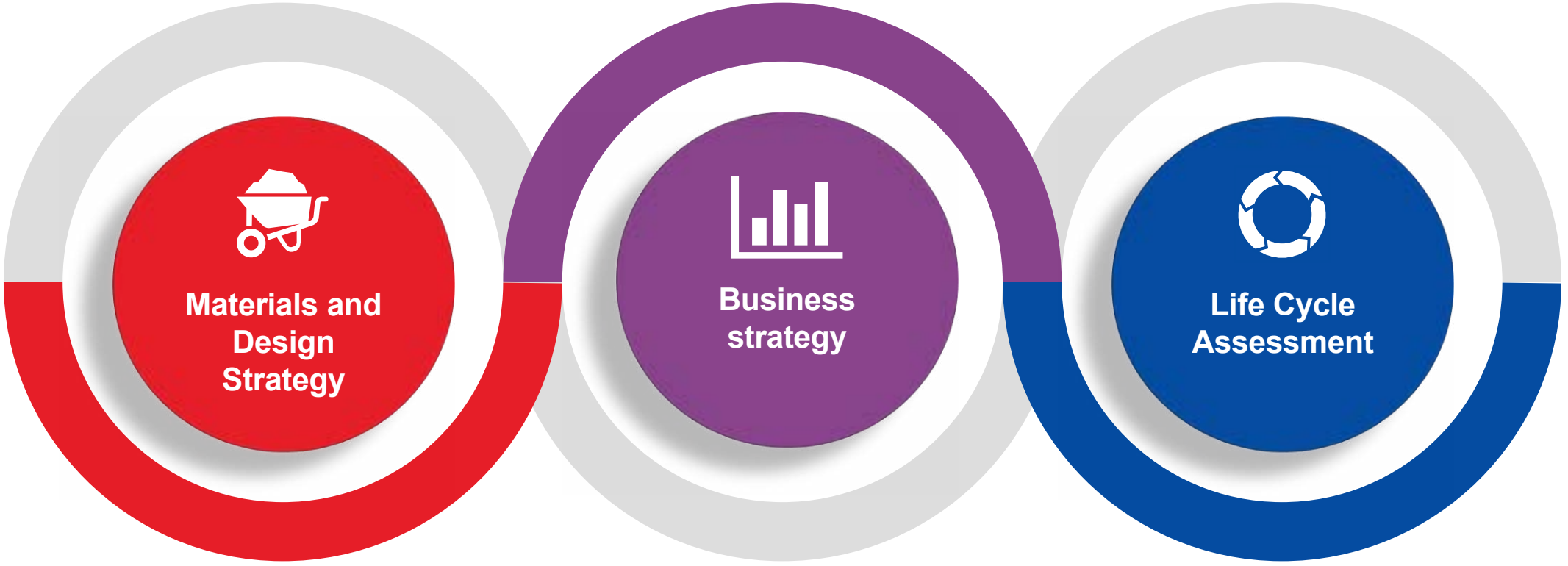
ARUP



Circular Economy

As a Cohesive Strategy

ARUP



ARUP

How can Circular Economy be Applied to our Projects?

9R Categorisation of Circularity with Loops

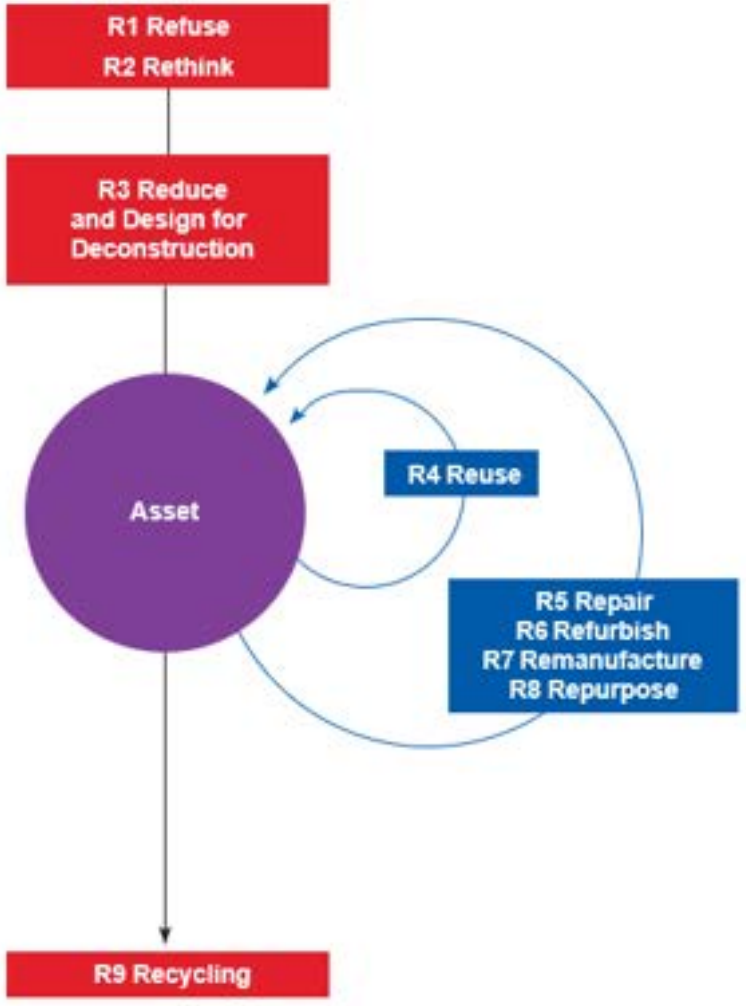
9R Categorisation Depicted with Energy Loops (Adapted from the European Commission Categorisation System for the Circular Economy, 2020)

Increasing Circularity

R1. Implement regenerative design principles to add value, e.g. regenerate existing city space and promote compact growth to increase the value of existing infrastructure. Make the need for new assets redundant by removing the demand for their function.

R2. Intensify asset use (e.g. by delivering transport in shared vehicles, and in particular buses).

R3. Decrease asset impact in construction or use (throughout the life cycle) through design for deconstruction and consuming fewer natural resources and materials.



R4. Reuse by another asset or organisation of a discarded asset which is still in good condition and fulfils its original function.

R5. Repair and maintain a defective asset which is still in good condition and fulfils its original function.

R6. Restore an old asset and bring it up to date.

R7. Use parts of discarded asset in a new asset with the same function.

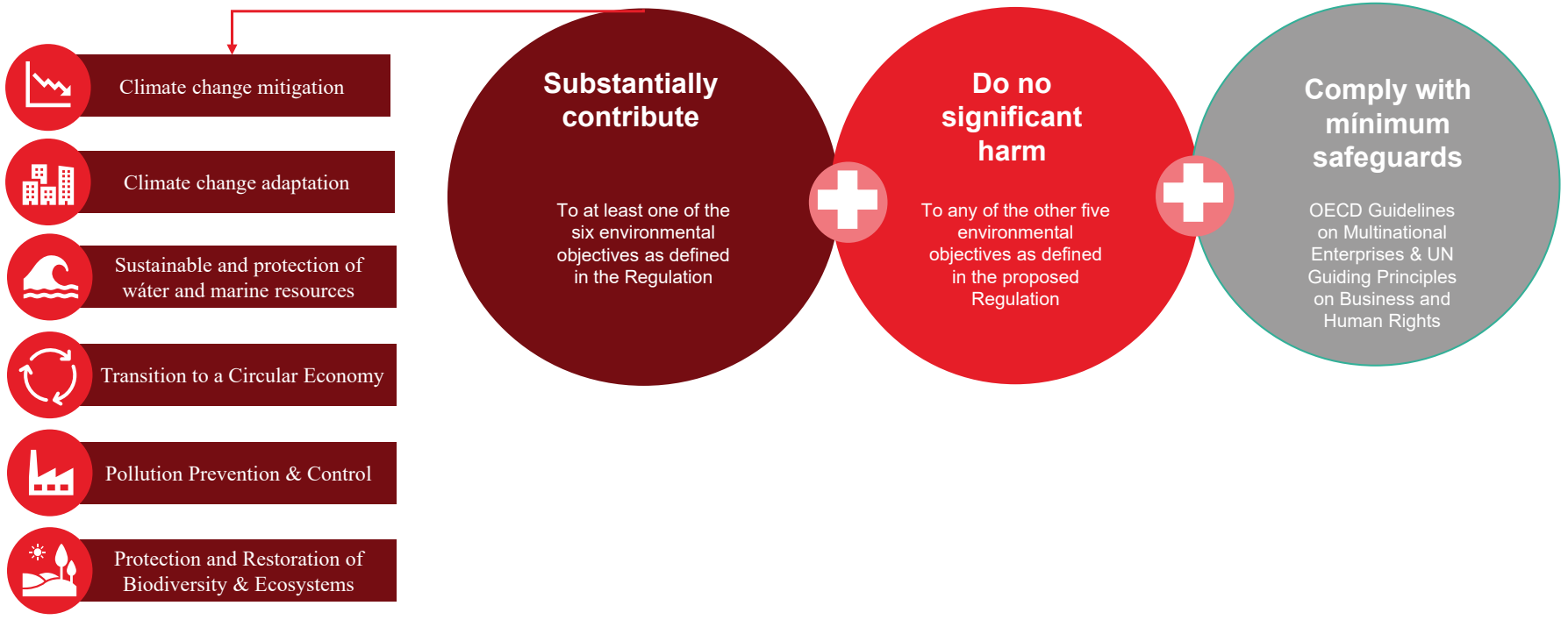
R8. Use discarded asset or its parts in a new asset with a different function.

R9. Recover and process materials to obtain the same (high grade) or lower (low grade) quality.

Sustainable Finance Taxonomy

ARUP

Concrete and the Circular Economy in Europe



ARUP

Sustainable Finance Taxonomy

Transition to a Circular Economy – Significant Contribution Criteria

	New Buildings	Renovation of Existing Buildings	Demolition and Wrecking of Buildings and Other Structures	Use of Concrete in Civil Engineering
Reverse logistics	- 90% prepared for reuse and recycling -- Maximum raw materials limit set for concrete or stone 70% - Other materials targets	- 70% prepared for reuse and recycling -- Maximum raw materials limit set for concrete or stone 85% - Other materials targets	-90% prepared for reuse and recycling	- 90% prepared for reuse and recycling -- Maximum raw materials limit set for concrete 70%
Other Circular Strategies	- Life cycle GWP calculated Design for deconstruction, & adaptability eg to Levels 2.3 and 2.4	- Minimum 50% of the building retained - Design for deconstruction and adaptability using levels 2.3 and 2.4	- Define KPIS and target ambition levels - Outline waste management plan	- Design for deconstruction and adaptability using levels 2.3 and 2.4
Data	-Use of electronic tools to describe the building as built eg using EN ISO 22057 for EPDs	- Electronic tools such a digital logbooks for future maintenance and reuse - Monitoring fucntions on selected assets for predictive maintenance	-Pre demolition audit must be undertaken	-Use of electronic tools to describe the building as built - Bridges, tunnels and other concrete structures must use monitoring

What is level(s)?

ARUP

Level(s) is a **sustainability assessment framework** developed by the EC with a Life cycle approach intended to lead the building sector towards circular economy.

It provides a common language for sustainability performance in buildings.

BUILT ENVIRONMENT & SUSTAINABILITY PROFESSIONALS

Provides simple key sustainable criteria adapted to all project stages and align with key policies (Circular Economy, Energy Efficiency, Green Public Procurement)

POLICY MAKERS & PROCURERS / PUBLIC AUTHORITIES

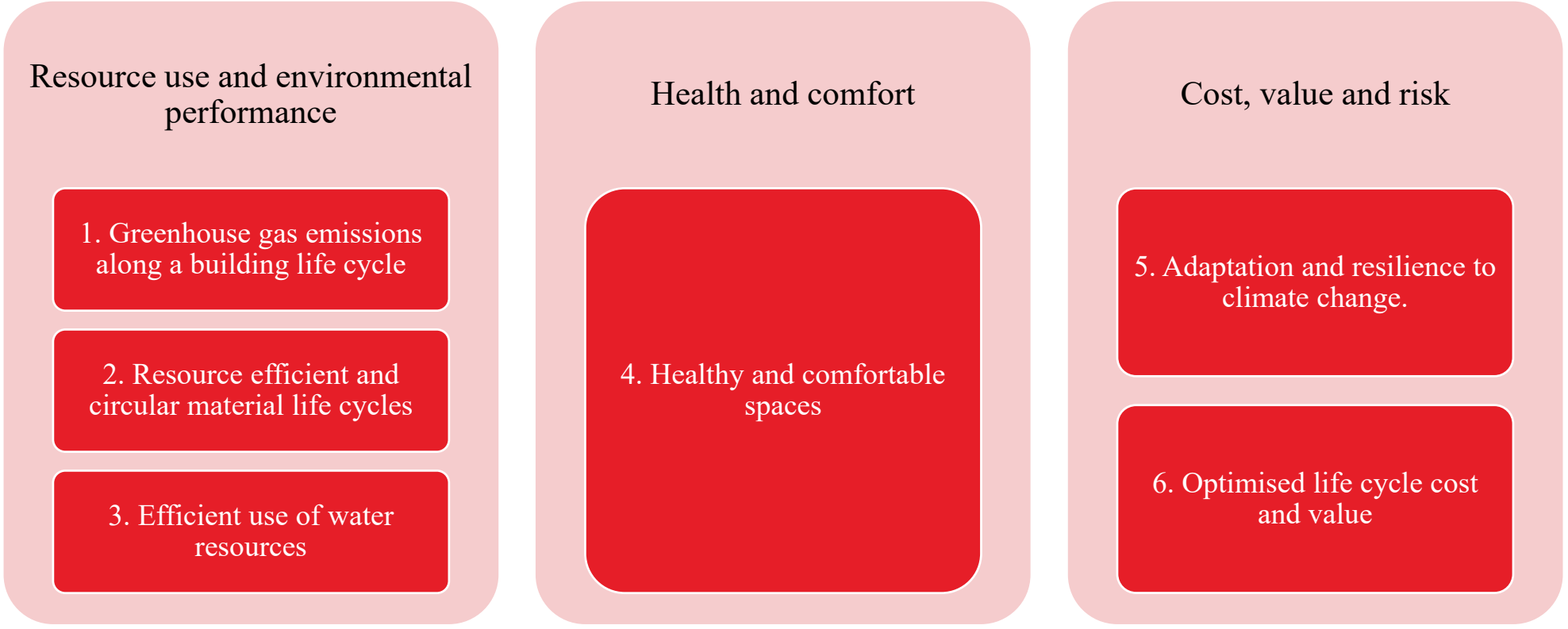
Helps to develop and implement sustainable policies and prioritized action (Green Public Procurement, The European Green Deal).

INVESTORS, PROPERTY OWNERS, LANDLORDS

Defines what is a sustainable building investment and ensures transparency in disclosure requirements reporting. (Green Public Procurement, Sustainable Finance).

Level(s) Focus Areas:

ARUP



ARUP

ARUP

Circular Buildings Toolkit

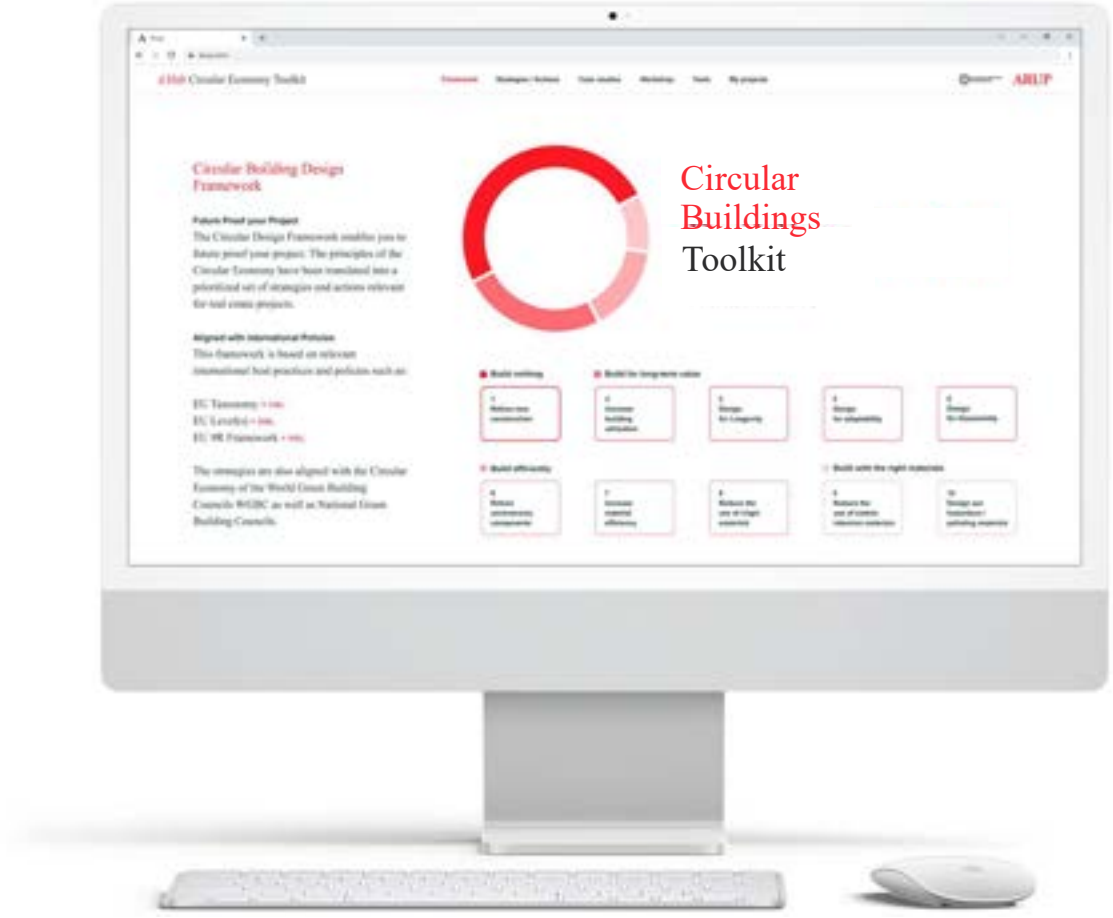
ARUP

Circular buildings

"Arup and the Ellen MacArthur Foundation have created a Circular Buildings Toolkit to embed circularity across the real estate value chain, and help deliver the rapid, scalable reductions in built environment carbon emissions that we urgently need now"

About the Circular Buildings Toolkit

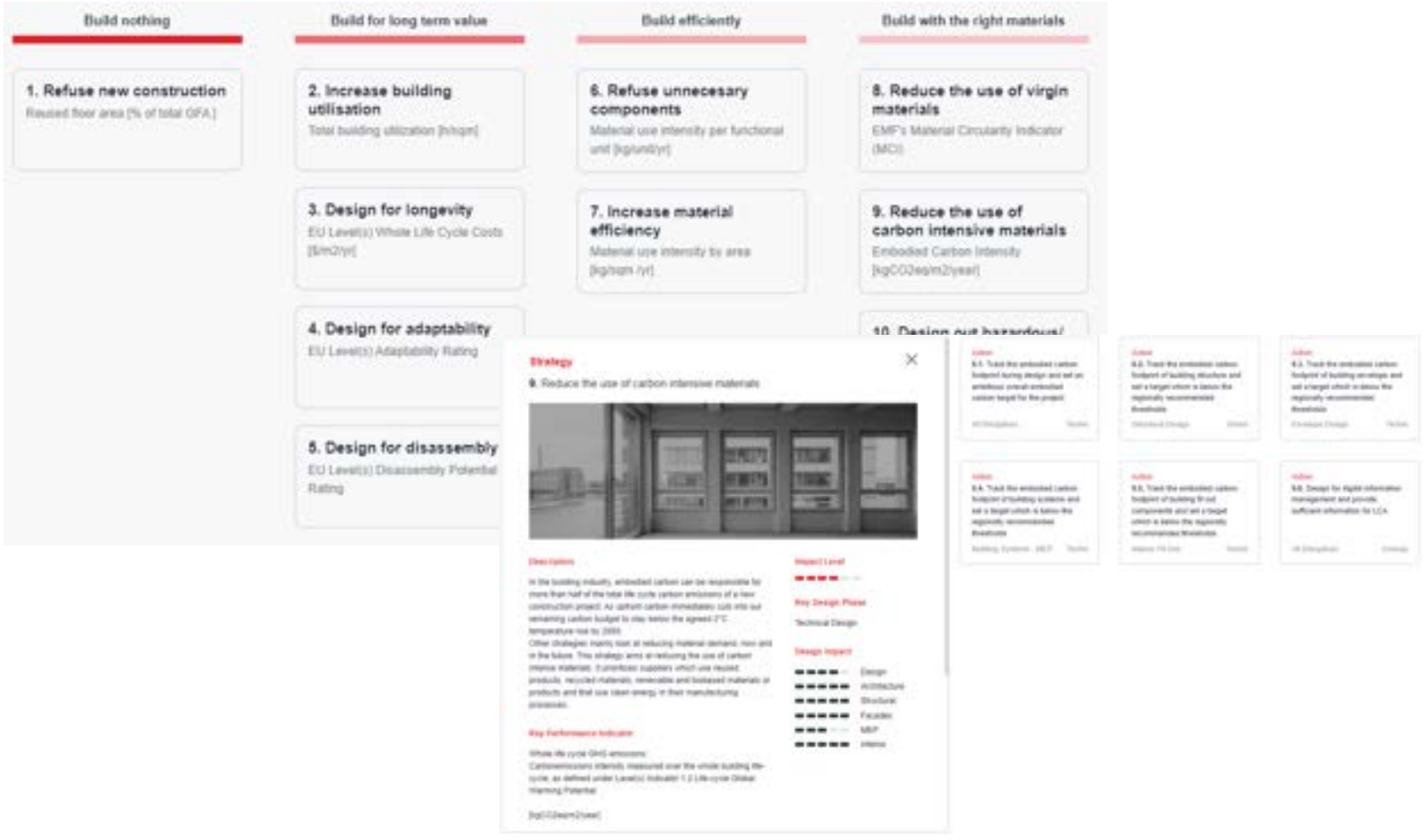
- Brings together strategies, case studies and tools for embedding circularity at the heart of building design and operations, with the aim of reducing waste and carbon emissions.
- Gives designers, construction clients and asset owners resources to transition their projects towards a circular economy.
- Introduces the concept through learning and workshop materials,
- Submit projects to be benchmarked against your peers



Toolkit components

The circular design framework enables you to futureproof your project.

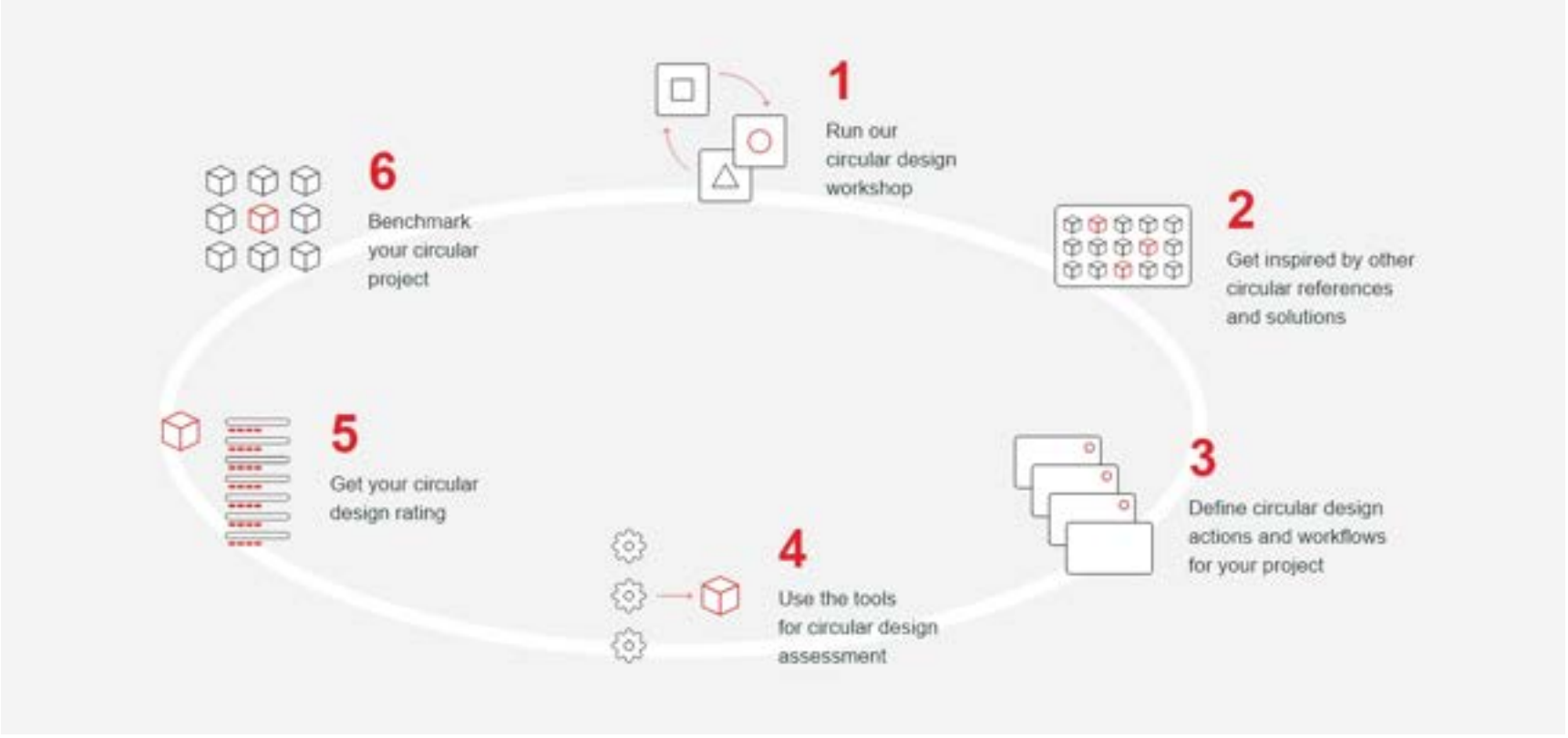
The principles of the circular economy have been translated into a prioritised set of strategies and actions relevant for projects.



ARUP

How do we go about it?

We have developed a design process to support clients identify the opportunities of implementing circular design principles and their associated benefits including building value.



ARUP

Project Case Studies -
So What Have we Learned?

Transport Infrastructure Ireland- Circular Economy Policy & Strategy

TII are in the process of formalising current circular approaches to TII sponsored road, rail and greenway construction and operation activities. In tandem, TII are reviewing and planning the transition of other areas in line with government and EU policies on Cirular Economy.

Key deliverables include:

- Cross organisational and industry consultation including dedicated workshops
- Systems engineering and mapping: Circular Economy Policy and Strategy
- Transport Standards Updates

Design for Deconstruction in Practice

HS2 Circular Calvert Depot Scheme

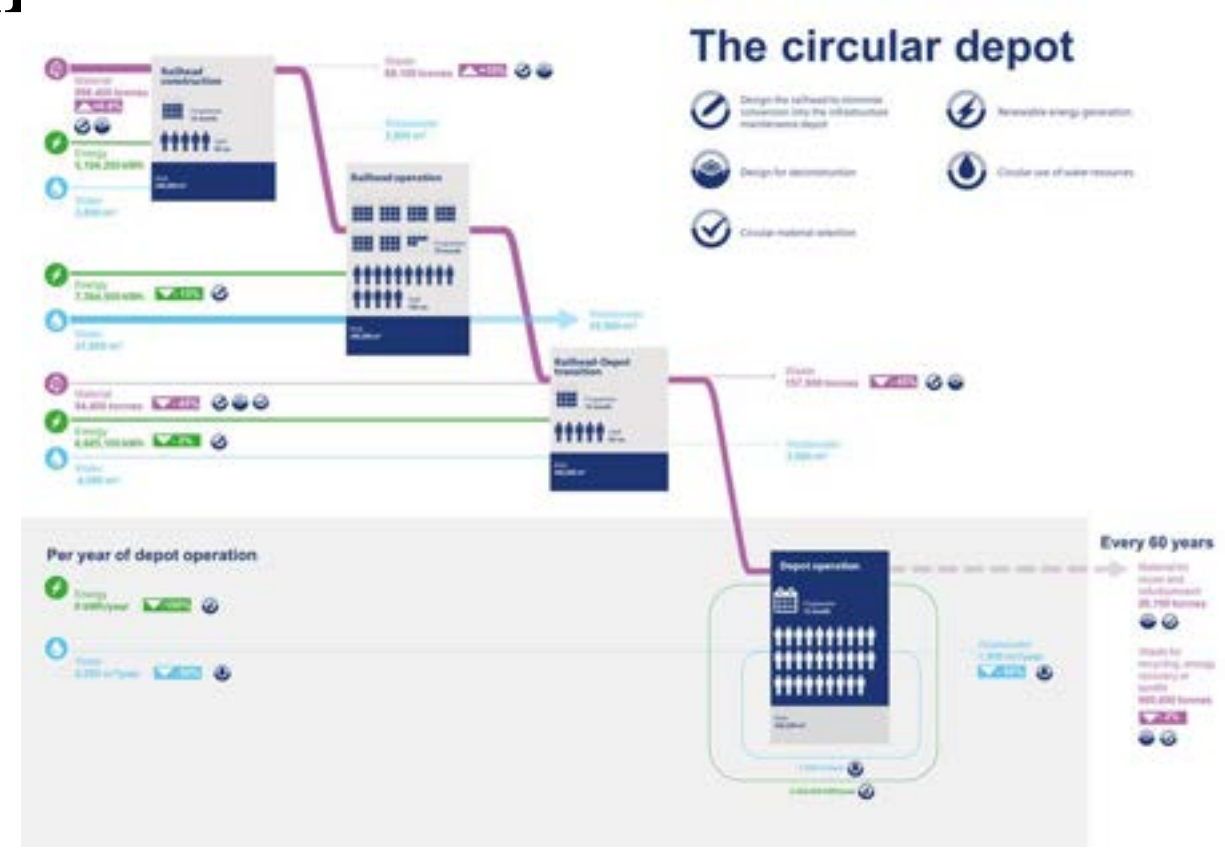
The design brief for the HS2 Circular Calvert Depot Scheme brief included the following requirements

"*All building structures in the Infrastructure Maintenance Depot shall be designed and constructed such that they can be dismantled and reused in their existing form.*

All mechanical, electrical and public health installations in the Infrastructure Maintenance Depot shall be removable for refurbishment and reuse in their existing form."

Entire depot scheme

Approx 8%
reduction in upfront cost
Approx 10%
reduction in virgin material use
Approx 50%
reduction in construction and demolition waste



ARUP

Circularity for Existing Real-Estate / Portfolio's

Embedding CE in Real Estate Asset Portfolios

Replacements during the lifetime of a building contribute for almost 70% to the environmental impact

Using natural refurbishment cycles to align asset to circular economy targets reduces the risk of asset devaluating and facilitates an economical transition

We support clients organization in transitioning to circular procurement and circular business models for their real estate portfolio

Practical gradual transition of assets to material passports, to create identity for products and materials to maintain value.

Projects: Rabobank and VGP Logistics

Fit-out waste & circularity

PVH Group

Integrated approach including Circular Design, Building and Construction Waste Management, and Digital to address PVH “Zero Waste” target by 2025.

- Identification of waste streams’ map of 6 stores representative of PVH’s portfolio
- Application of the Circular Buildings Toolkit (CBT) to assess the new concept design and identify potential opportunities to be easily implemented (e.g. Breathaboard)
- Recommend materials’ alternatives to reduce emissions and increase circularity, drawing on our local and regional networks to map supply chains opportunities

Carbon savings	Up to 80%, depending on the material and transport scenario
Reuse	3 ER Reuse marketplace for construction materials identified
Carbon impact	> 60% store’s furniture
Waste recovery	> 70% (average per representative stores)

Technical advisors

ecologiQ + Transport

Reference guides for recycled and reused materials in infrastructure, trial of recycled glass and future circular policy options assessment

The ecologiQ program is utilising unprecedented investment in infrastructure to be recognised as the world leader in the sustainable use of recycled and reused materials by 2025. This is currently achieved through the Recycled First policy, implemented by ecologiQ – for whom Arup are technical advisors.

Arup has undertaken a forward-looking assessment to identify what future, more circular versions of the 'Recycled First' Policy could be and what an expanded set of KPIs could be.

Recycled content	1,312,720 tonnes used under the Recycled First policy
Carbon saved	Will be measured in future
Utilisation of recycled products	From 35% to 70% utilisation of recycled products

Burrell Renaissance Project

Glasgow Life + PSITSI

CE driven design decisions drove embodied carbon savings and performance improvements reducing carbon emissions in construction and use.

The Burrell Collection houses a unique art collection gifted to the City of Glasgow by William Burrell. Arup supported the £68m redevelopment, providing building envelope consultancy services, supporting John McAslan + Partners to restore this 20th Century Category A listed building. A catalyst for research and innovation resulting in the recycling of 16 tonnes of glass back to flat glass manufacture and the reuse of over 4.5km of glazing bar, saving 8.5 tonnes of aluminium.

Carbon	Carbon of the existing and new build will be accounted
Re Use of Materials	Volume of material re-used is being captured (e.g. aluminium)
Recycling	Volume of material recycled (e.g. glass)

Circular Building Study

Hang Lung Properties

Investigate how Circular Economy concept be implemented in their real estate development business model, particularly in Mainland China.

This project is the first attempt to investigate opportunities and directions for adaption of Circular Economy in their Building Design. Opportunities of circular building design is proposed based on the key circular design strategies and layers of buildings. Recommendations were made for the current design and construction approach to enhance circularity.

Resource productivity	A total of 50 opportunities were analysed on based on their potential on 6 key design approaches. Decision on the recommendations is pending further confirmation from the Client. Further KPIs would be determined when the measures are confirmed
Cost savings	
Waste Reduction	

Brent Cross Substation

Argent + PSITSI

50% of the structural steel salvaged from unused oil pipelines, reducing embodied carbon emissions by over 40%.

The concrete used is a combination of low cement concrete and the new ‘Earth Friendly Concrete’ – a cement-free concrete. Using these alternative concrete mixes saves up to 33% and 70% of embodied carbon respectively compared to standard mixes.

Rewilding of a brownfield site connecting to a wider network of green infrastructure.

KPI 1 (Reused Steel)	40% carbon saving compared with recycled steel
KPI 2 (Cement)	Lower carbon cement
KPI 3 (Nature)	Rewilding

Systemic Change

Opportunities to Influence

ARUP

NSAI

CEN/TC 350/SC 1 - Circular Economy in the Construction Sector

Build Digital Project
A national centre of excellence

Rialtas na hÉireann
Government of Ireland

Tionscadal Éireann
Project Ireland
2040

ARUP

The Role of Higher Education

-In supporting the transition towards a Circular Built Environment

Circular Economy Hotspot
Dublin 2023

The Role of Higher Education in supporting the transition towards a Circular Built Environment

Dr. John Scahill and Dr. Mark Kelly,
ATU Galway-Mayo Build360 Research Group

Circular Economy Hotspot
Dublin 2023

Overview of Session

Reflection on Practice

ATU's Reciprocal Learning Framework Approach

Some thoughts on the Future…

Reflection on Practice

Are we designing out waste?

Are we designing for durability and adaptability?

Do we view our buildings as material banks?

Are we designing for disassembly, reuse and recycling?

Do we truly recognize the VALUE and UTILITY of our existing built environment?

Are we conserving resources, increasing efficiency and sourcing sustainably?

Are we utilizing digitalization to its fullest extent?

Dr. Mark Kelly/Dr. John Scahill

But…are we (higher education) part of the problem?

Are there too many disciplinary silos within Departments?

Is the curriculum too crowded with a focus on ‘passive’ knowledge rather than nurturing creativity and imagination?

Do we allow room for play, experimentation and failure?

Are we ambitious enough for our students?

Do we create space for some real ‘learning by doing’

Do we emphasize the role and responsibility of the built environment in creating social value?

https://www.delftsolardecathlon.com/

Dr. Mark Kelly/Dr. John Scahill

Response-*ability*

Sterling and Martin (2019)


I'VE SEEN
SMARTER CABINETS
AT
IKEA
STOP
ACTIVISM
IS
LEARNING

245,000

Whoa! That’s a big number, what does it represent?

Reciprocal Learning Framework

Applied Research

Dr. Mark Kelly/Dr. John Scahill

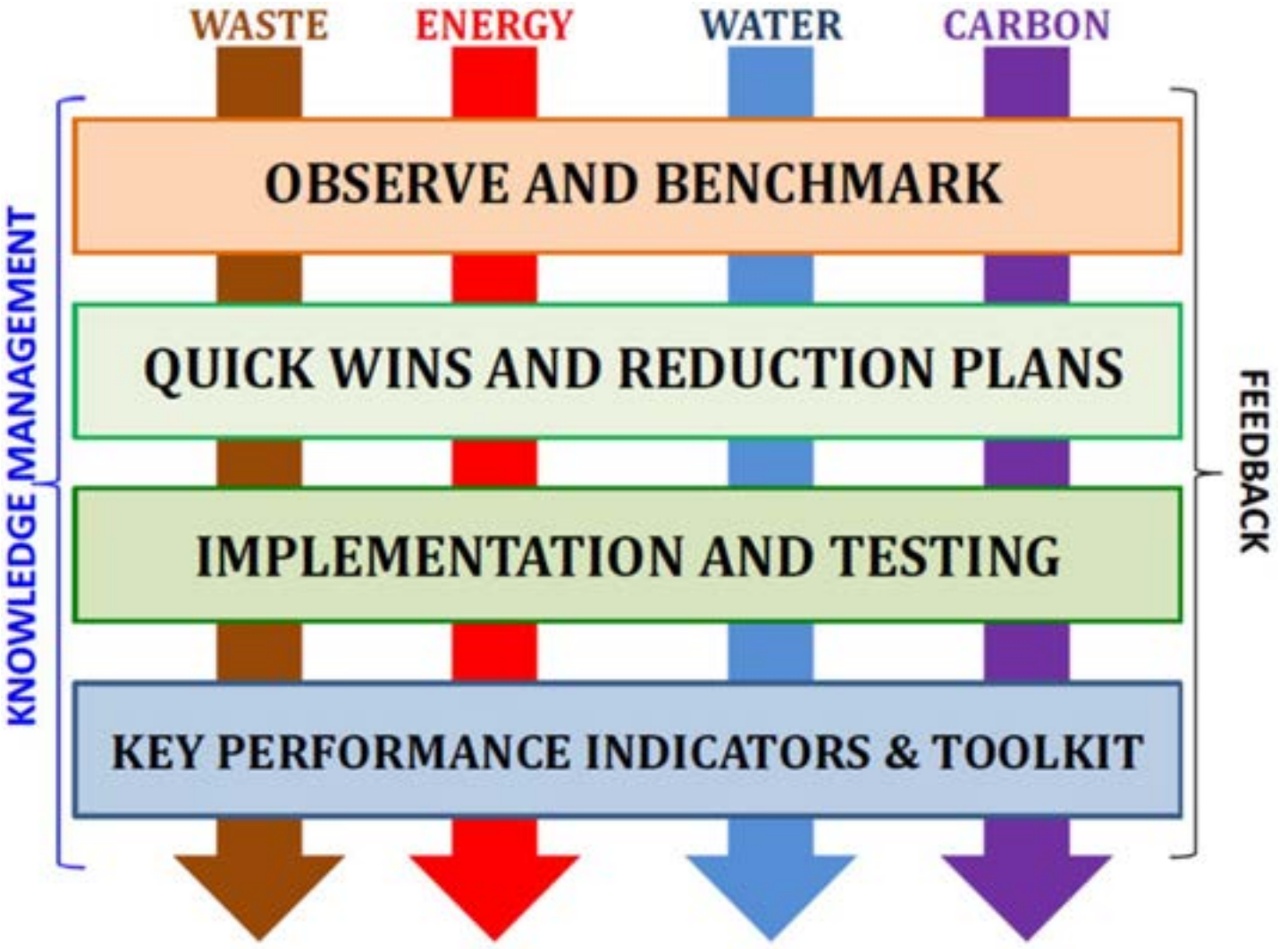
CAREY BUILDING CONTRACTORS

GMIT

EPA Project ‘Resource Efficiency Toolkit’

bam

epa



https://www.epa.ie/our-services/monitoring--assessment/circular-economy/circular-and-sustainable-sectors/sectoral-sustainability/construction/

https://www.southernwasteregion.ie/publications

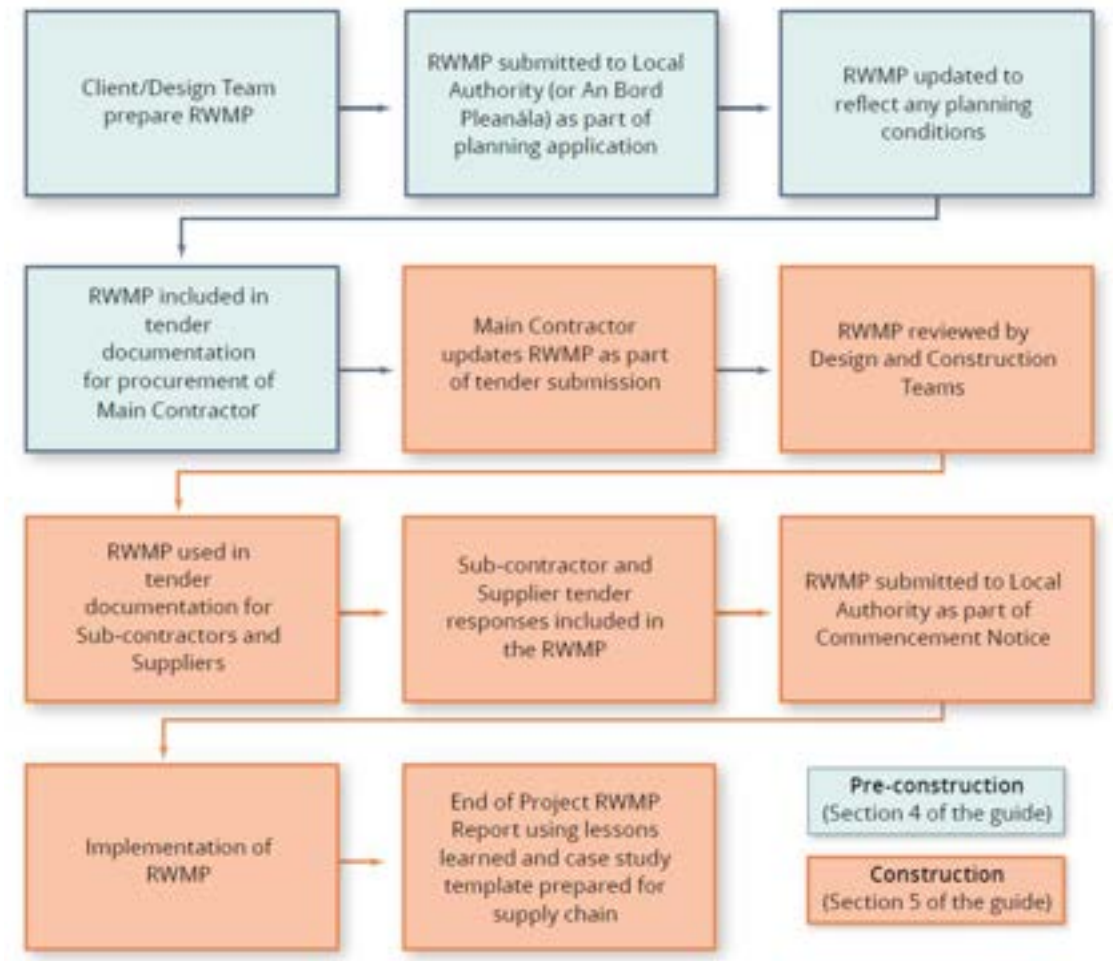
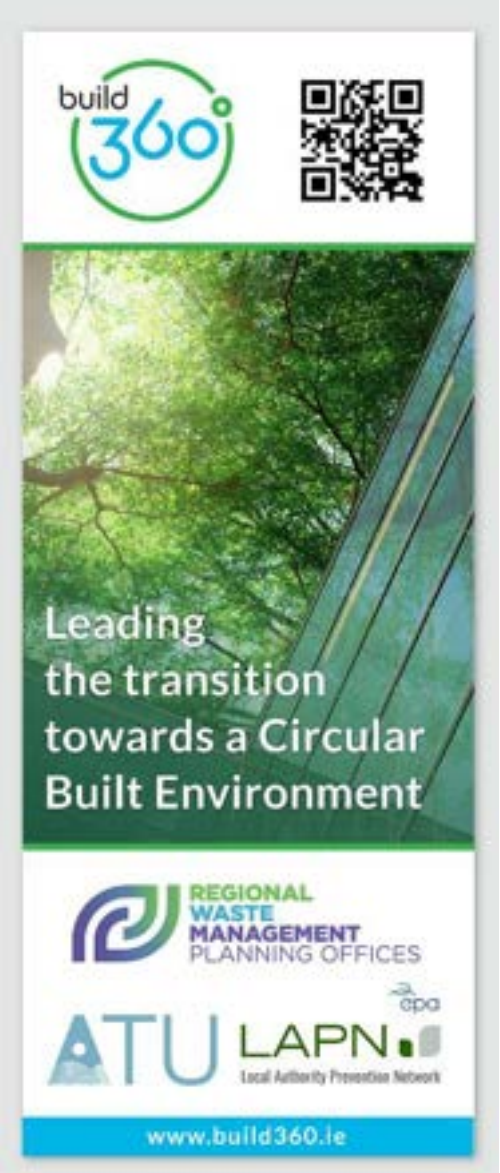


Figure 3-1: Project Life Cycle of the RWMP

https://www.epa.ie/publications/circular-economy/resources/construction--demolition-guidelines.php

southern waste region

build 360



Circular Built Environment Roadmap for Ireland	Develop a national circular economy roadmap for the built environment in Ireland.
Circular Built Environment Toolkit	Develop an evidence-based and research-informed toolkit for the Irish construction sector.
Circular Built Environment Resource Hub	Development of National Resource Hub ‘Build360’

Ollscoil Teicneolaíochta an Atlantaigh
Atlantic Technological University

Ollscoil na Gaillimhe
University of Galway

IGBC
Irish Green Building Council

TU Dublin

Dr. Mark Kelly/Dr. John Scahill

Circular Building ‘Lighthouse’ Project	Limerick Twenty Thirty Opera Site as a Lighthouse Demonstrator Project for the Circular Economy.
Circular Built Environment Demonstrator Industry Briefs	Research-informed and evidence-based best practice for the Irish construction sector.
Circular Economy Literacy Learning Pathway	Triple-A (Awareness, Action, and Attitudes).

Oilscoil Teicneolaíochta an Atlantaigh
Atlantic Technological University

southern waste region

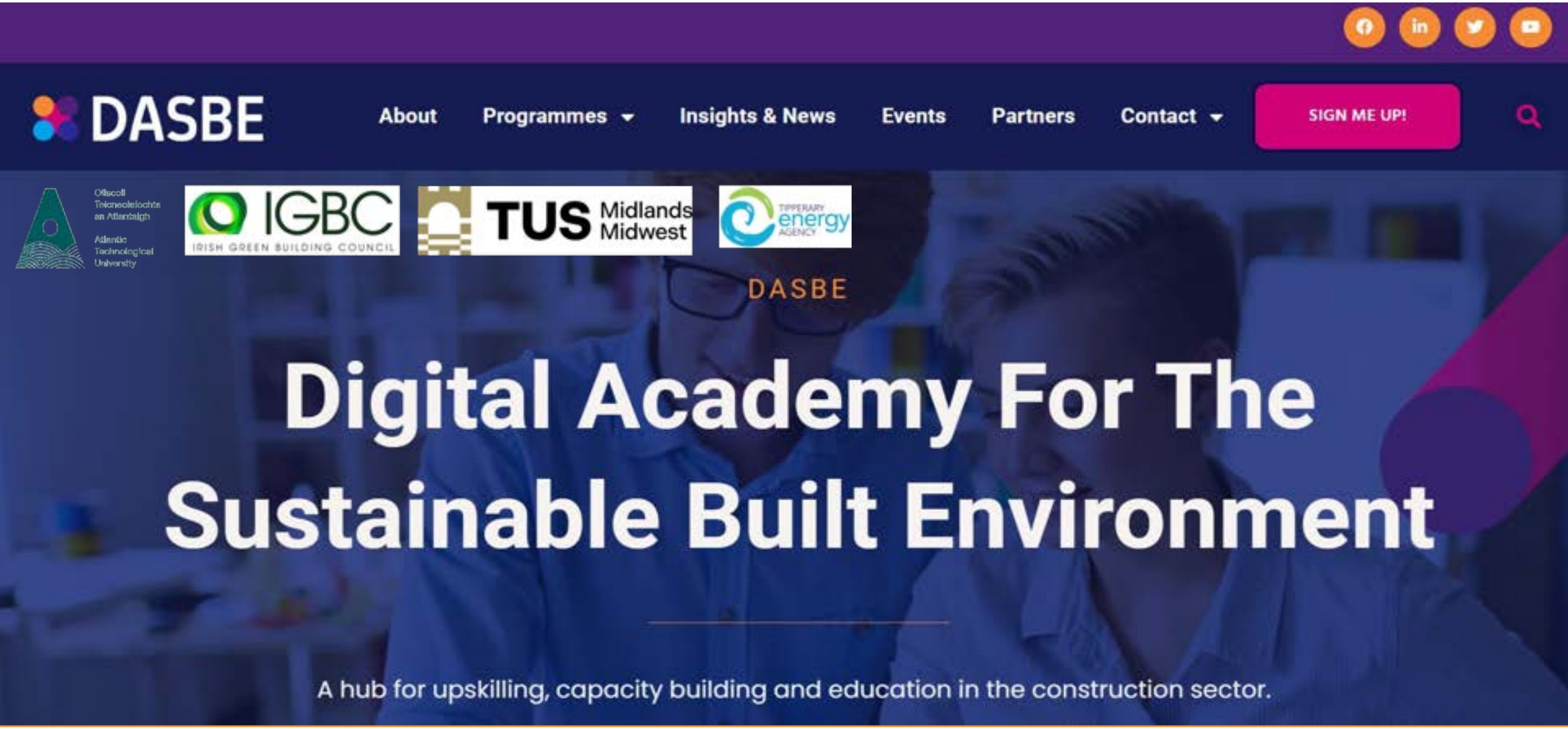
IGBC
IRISH GREEN BUILDING COUNCIL

LIMERICK TWENTY THIRTY DAC

Dr. Mark Kelly/Dr. John Scahill

Curriculum

Dr. Mark Kelly/Dr. John Scahill


DASBE
About
Programmes
Insights & News
Events
Partners
Contact
SIGN ME UP!
Oifigeil Teicneolaíochta an Atlantaigh
Atlantic Technological University
IGBC
IRISH GREEN BUILDING COUNCIL
TUS Midlands Midwest
Tipperary energy AGENCY
DASBE
Digital Academy For The Sustainable Built Environment
A hub for upskilling, capacity building and education in the construction sector.

MSc in

Circular Economy Leadersh for the Built Environment

The MSc in Circular Economy Leadership for the Built Environment has b developed in close collaboration with construction industry professionals provide a flexible, multidisciplinary and industry-focused programme that seeks to address the current circular economy competency and skills gap the construction sector both nationally and in a global context.

YEAR 1

Semester 9

Circular Economy Principles for the Built Environment
15 Credits

Semester 10

Circular Economy Leadership and Organisational Transitions
15 Credits

YEAR 2

Semester 11

Year 2 Applied Work-Based Research Project
30 Credits

YEAR 3

Semester 12

M.Sc. in Circular Economy Leadership for the Built Environment
30 Credits

Postgraduate Certificate in Circular Economy Leadership for the Built Environment
30 Credits

Postgraduate Certificate in Circular Economy Leadership for the Built Environment
30 Credits

Postgraduate Diploma in Circular Economy Leadership for the Built Environment
60 Credits

M.Sc. in Circular Economy Leadership for the Built Environment
90 Credits

Building Change: Designing a Resilient Future through Architecture Education

A Human Capital project 'Resilient Design Curricula for 21st Century Professionals' led by TU Dublin in collaboration with UCD, UL, SETU, ATU, the Cork Centre for Architecture Education (a joint initiative of UCC and MTU) is piloting a radical revision in architectural education to prioritize the United Nations Sustainable Development Goals 2030 Climate Action (SDG 13.3) and Housing (SDG 11.1).

https://www.tudublin.ie/explore/about-the-university/sustainability/projects/resilient-design-curricula/

Dr. Mark Kelly/Dr. John Scahill

Industry Best Practice

Client Perspective

Reviewed the Outline Construction and Demolition Waste Management Plan.

Reviewed the Performance Specification for Waste Management.

Prepared client brief and policy examples of resource efficiency and CDW management best practice for consideration by the client.

Prepared pre-demolition audit tender brief with client.

Reviewed pre-demolition tender responses.

Reviewed the successful pre-demolition audit tender before the commencement of pre-demolition audit.

Reviewed the pre-demolition audit report.

Prepared a resource efficiency and CDW management brief for inclusion in the Demolition and Enabling Works tender.

Reviewed the successful Demolition and Enabling Works tender response.

Submitted proposal on project tracking framework to capture best practice.

SME Contractor Perspective

Policy and Targets

Resource Management Plans

Supply Chain RMP Checklists

Targeted Interventions

LIMERICK TWENTY THIRTY

southern waste region

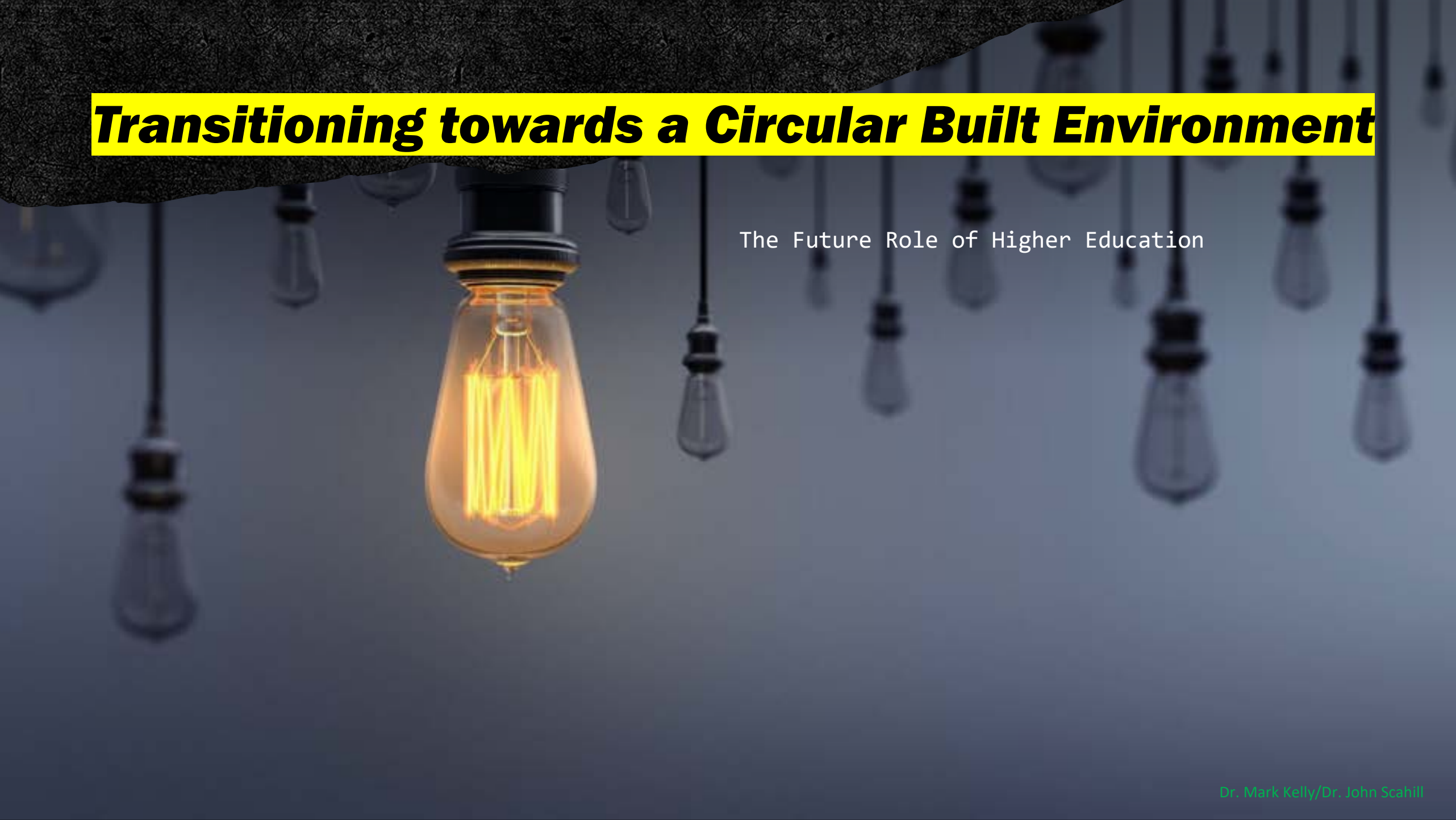
epa Environmental Protection Agency

Zero3 Zero Accidents Zero Waste Zero Emissions

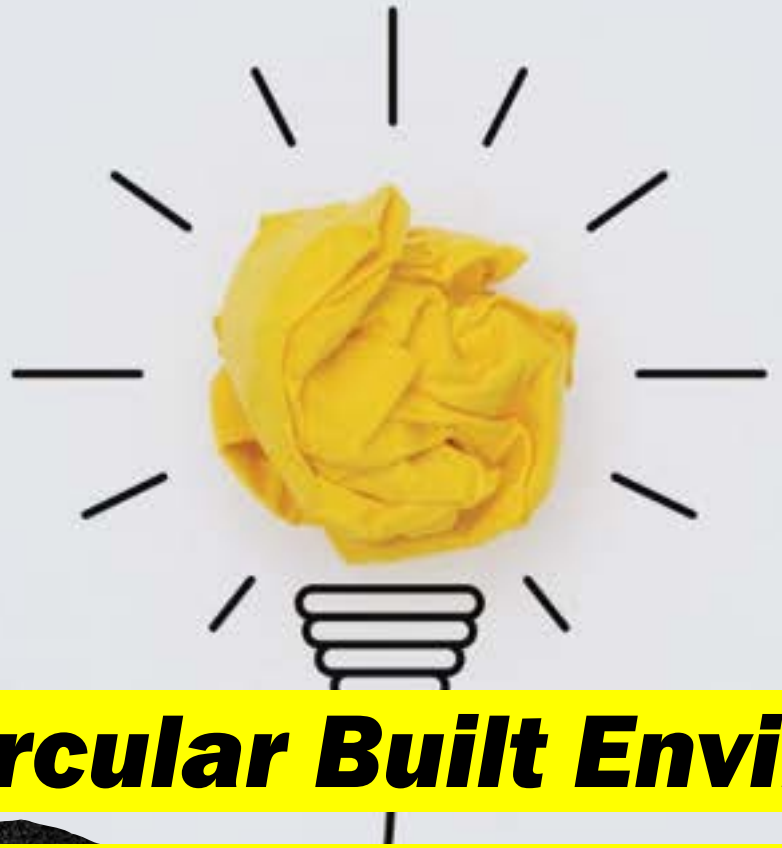
build 360

Transitioning towards a Circular Built Environment

The Future Role of Higher Education



Dr. Mark Kelly/Dr. John Scahill



Design and facilitate an innovative, agile and responsive ‘Triple A’ (Awareness, Action, Attitudes) educational approach to build competences across all facets of the built environment value chain.

Establish an Industry-Academic Research Ecosystem to create a research-informed community of practice to inform industry best practice, and curriculum development.

Continue to build an evidence base on practical circular built environment solutions to establish a Circular Economy Learning Legacy (CELL) output.

Explore and test circular business models in collaboration with industry.

Translate into an evidence-based and research-informed active and ‘hands-on’ dynamic curriculum.

Circular Built Environment Accelerator Project

Transforming the Built Environment Sector

Dr. Mark Kelly/Dr. John Scahill

Speculative Campus Vision

https://www.ul.ie/sustainability

https://www.unesco.org/en/articles/positive-changes-through-leadership-development

THANKS!

Any questions?

You can find us at Mark.Kelly@atu.ie and John.Scahill@atu.ie

Limerick Twenty Thirty

Circular Economy Hotspot
Dublin 2023

LIMERICK TWENTY THIRTY DAC

Opera Square Development

OPERA SQUARE LIMERICK

LIMERICK TWENTY THIRTY

Circular Economy Lighthouse Demonstrator

Circular Economy Hotspot Dublin 2023

Circular Economy Hotspot
Dublin 2023

LIMERICK TWENTY THIRTY

Agenda

Section 1 – Limerick Twenty Thirty & Built Environment

i. Who we are?

ii. Why we must Act?

Section 2 - Case Study: Pre-Demolition Audit & Resource Management Routes

iii. Opera Pre-Demolition Audit – Circular Economy Initiatives –

iv. Recommendations to Industry

v. Future plans

Circular Economy Hotspot
Dublin 2023

LIMERICK TWENTY THIRTY

Diarmuid Hayes
Project Manager
Limerick Twenty Thirty

Role:

- Project Manager with Limerick Twenty Thirty DAC

Specific Responsibilities:

- Opera Square Project

- Company Sustainability Lead

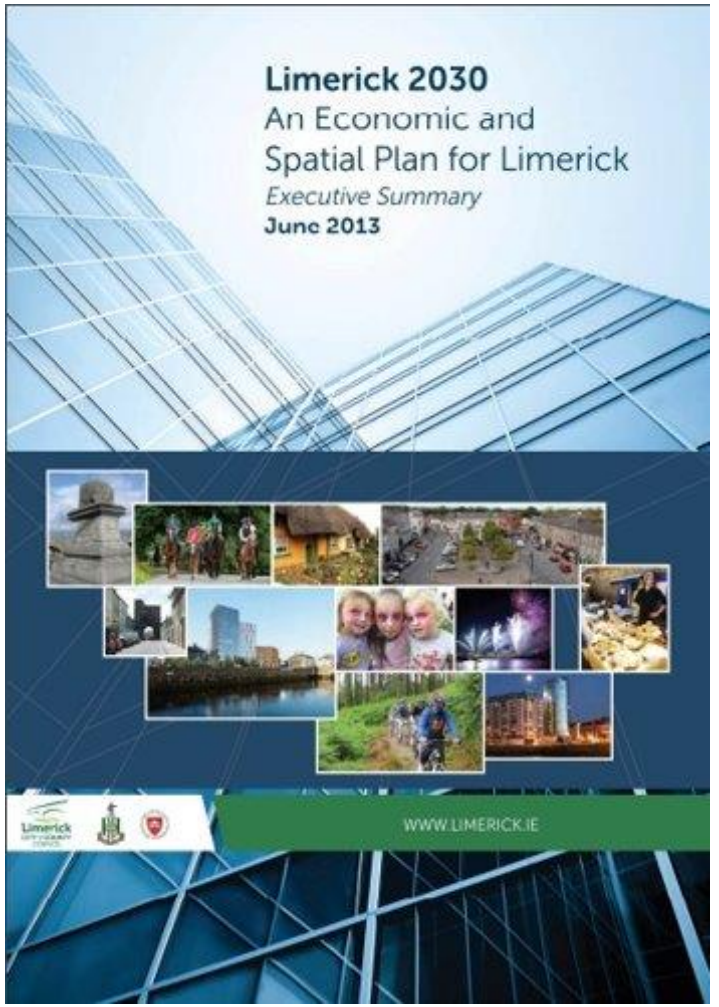
Experience:

- Civil & Environmental Engineering Graduate
- Postgraduate MSc in Project Management

- Combined Designer and Contractor experience

LIMERICK TWENTY THIRTY

WHERE IT ALL BEGAN



About Us:

Limerick Twenty Thirty DAC is a dynamic property development company established as a special purpose vehicle of Limerick City and County Council to plan and develop key strategic sites in Limerick City and County.

Our Vision:

is to be recognised internationally as an exemplar for delivering an innovative region and reinventing Limerick as a vibrant modern and dynamic place to **live, learn, work and grow up in**.

LIMERICK TWENTY THIRTY

CLEEVES RIVERSIDE QUARTER

OPERA SQUARE

GARDENS INTERNATIONAL

LIMERICK TWENTY THIRTY PORTFOLIO

TROY STUDIOS

MUNGRET PARK

Opera Square

Gardens International

LIMERICK TWENTY THIRTY

Cleeves Riverside Quarter

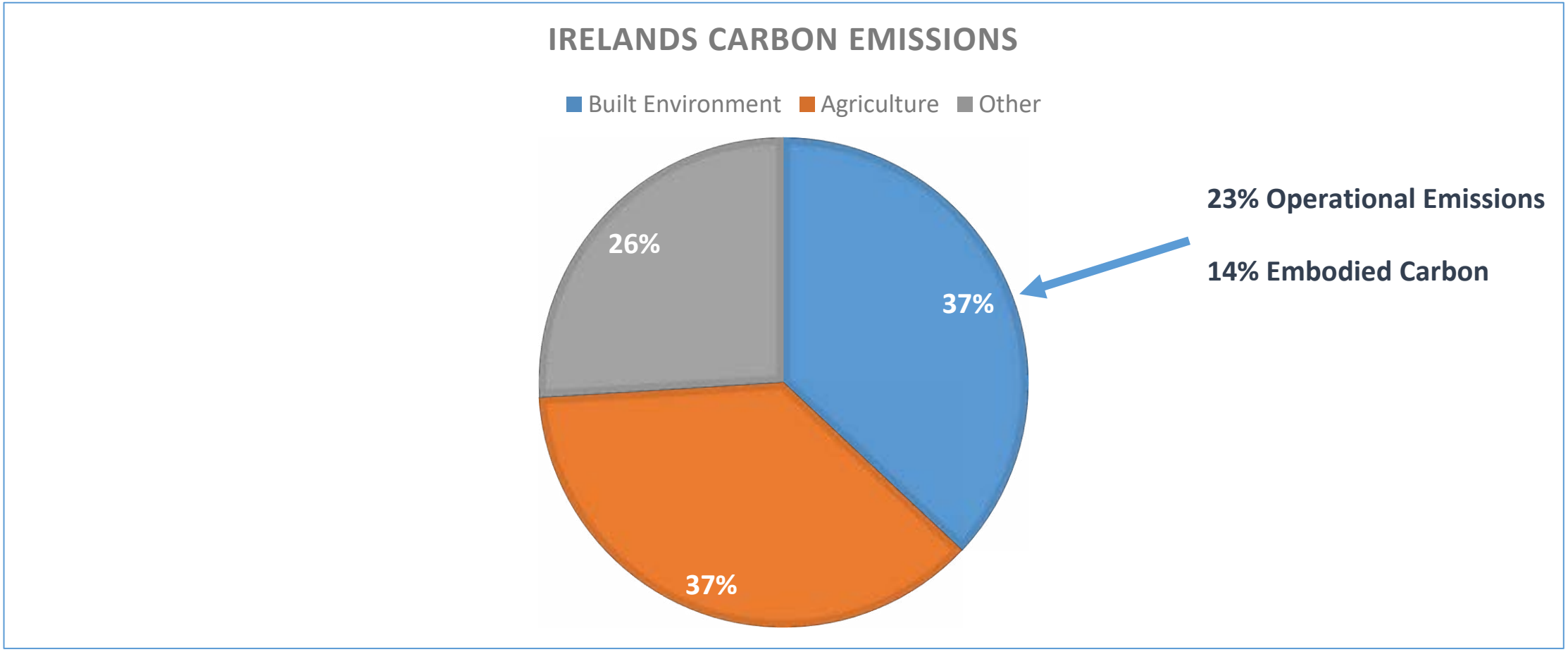
Sustainability – key value of the organisation, targeting best practice

Climate Resilience – Crucial to transition towards a low-carbon economy and ultimately Net Zero

Water & Wastewater Management – Reduction plans implemented to minimise consumption in new build and operations

LIMERICK TWENTY THIRTY

Why Must We Act?



Source: IGBC – Building in a Climate Emergency (BIACE) Research Lab

Options on How to Act?

Where to Start?

LAPN epa
Local Authority Prevention Network

LIMERICK TWENTY THIRTY

PROFESSIONAL TRAINING WORKSHOP

Designing out Waste and Sustainable Procurement

Limerick City & County Council
17TH SEPTEMBER 2019
8TH OCTOBER 2019
Corporate Headquarters, Merchants Quay. Limerick, V94 EH90 - Chief Executives Board Room.

"This workshop is delivered by Allan Sandilands of Resource Futures aimed at Architects, QS, Planners, Design & Delivery Staff and Procurement Staff"

Agenda

Morning Session – Designing out Waste in Construction

Arrival / registration	8:30
Introductions and learning outcome expectations	9.00
Introduction to construction waste and the need to change our approach	9.15
Introduction to the designing out waste workshop	10.00
Coffee break	**10.30**
Scenario workshop to apply the designing out waste principles	10.45
Identification of support tools which are available	12.15

Afternoon Session – Resource Efficient Procurement in Construction

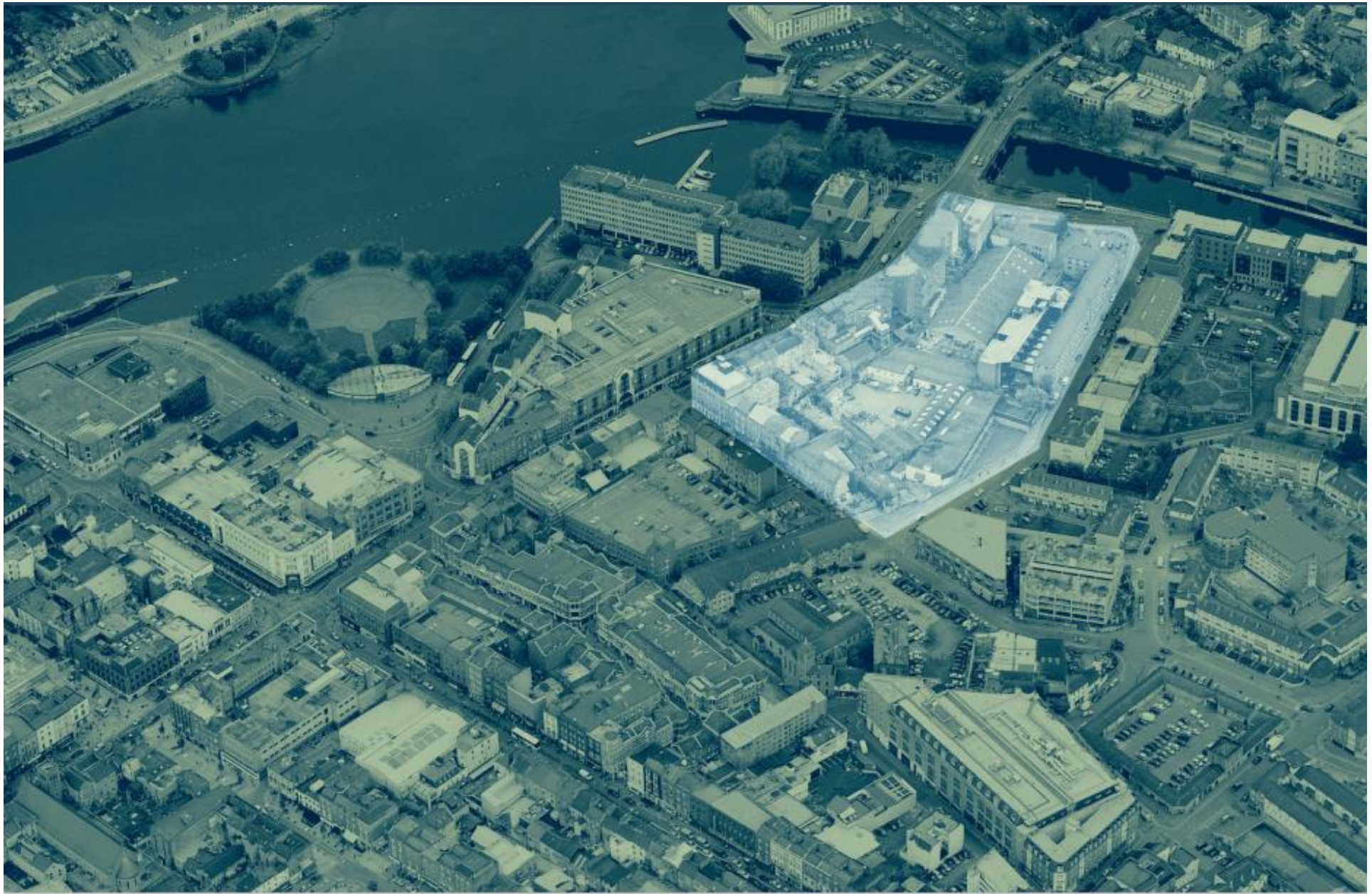
Arrival / registration	13.30
Introductions and learning outcome expectations	13.45
Introduction to construction waste and the need to change our approach	14.00
Introduction to Circular Planning Statement concept	14.30

southern waste region

Circular Economy Hotspot
Dublin 2023

LIMERICK
TWENTY
THIRTY

Section 2 Case Study:
Opera Square Project – Circular Economy Lighthouse



LIMERICK
TWENTY
THIRTY

3.7 Acre City Centre Key Strategic Site

Opera Square

Development Objectives

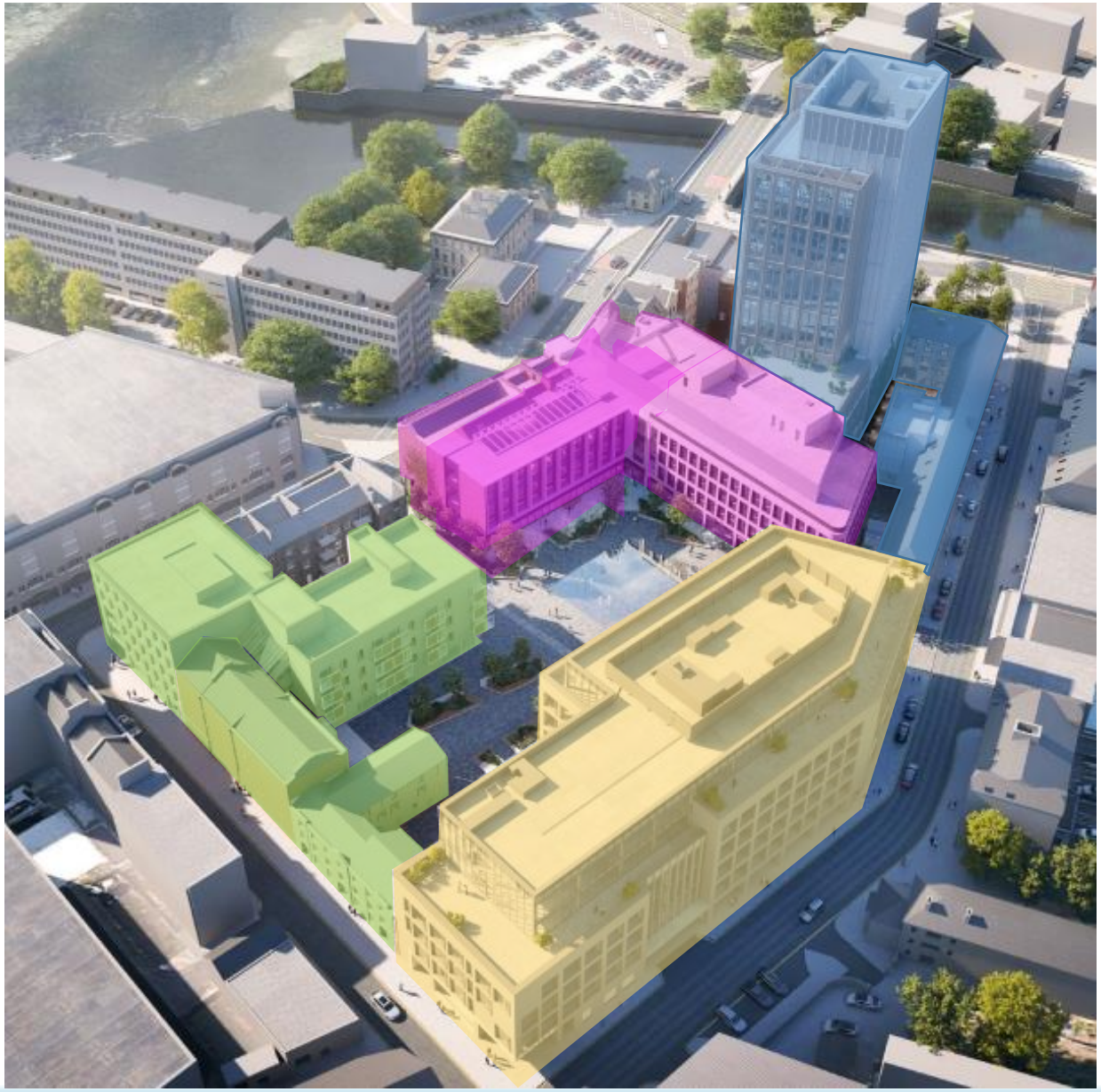
- Business and Employment Hub
- Relocation of the Revenue Commissioners to new Landmark Building
- Regeneration Project - restoration of heritage buildings
- Creation of a new vibrant Public Space
- New City library – ‘A Living Room for Limerick’

Circular Economy Hotspot
Dublin 2023

Opera Square Project Overview

- Capacity - 550,000 Sqft
- Campus Jobs - 2,500+
- Construction Jobs – 500
- Project Value - €300m
- Vision for World Class Development

LIMERICK TWENTY THIRTY



Parcel 1 - One Opera Square - 14,000sq.m

i. 6 Storey Office, Retail & Restaurant

Parcel 2 - Hotel – 4,700sqm.

i. Quinn's Bar(1,000sqm), 7 retail units & 13 apts.
ii. Bedroom & Restaurant

Parcel 3 - New City Library - 4,410 sqm. (circa)

i. Library, Living Room & Café

Parcel 4 – 4 Opera Square – 2,580sqm.

i. 5-Storey Office (flexspace)
ii. 3 apartment & Retail

Parcel 5 - Landmark Building - 12,300 sqm.

i. 14-Storey Office (NZEB)

Parcel 6 - Granary - 2,715 sqm.

i. Full Refurbishment, Office & Restaurant

Basement – 8,000sqm.

i. 155 Car Spaces & 495 Bike spaces

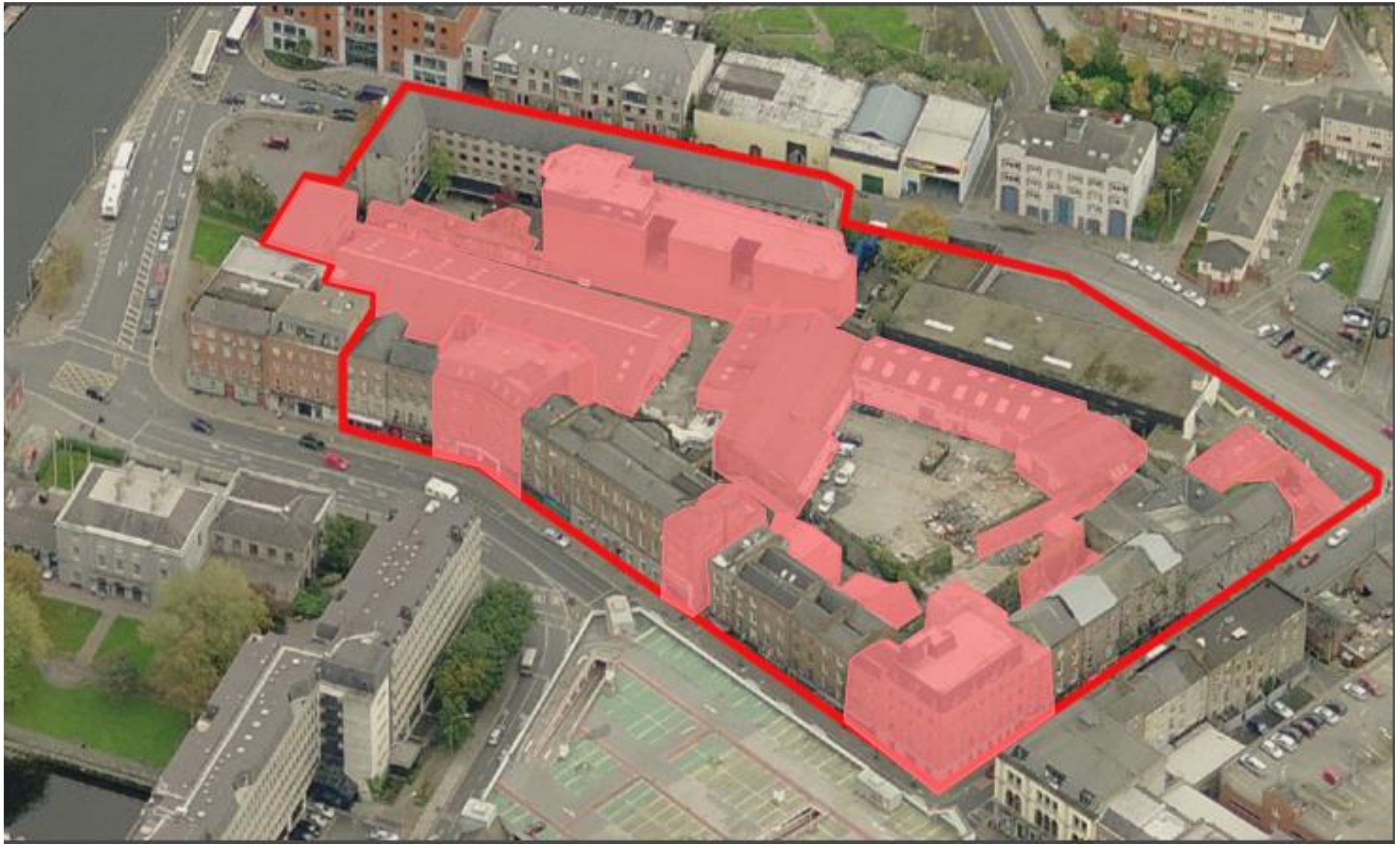
Public Realm - 5,700sqm.

i. Main Plaza, Granary Courtyard & Bank Place

LIMERICK
TWENTY
THIRTY

Site
Pre-commencement of Works

LIMERICK TWENTY THIRTY



Warehouses, 1980's Offices and Annexes to be demolished.

Retain 16/18 Historic Buildings

Circular Economy Hotspot
Dublin 2023

LIMERICK TWENTY THIRTY

How the Story began

- Limerick Twenty Thirty attended free training - "Designing out Waste"
- SRWMO secured funding for pre-demolition audit and tracking of waste & resources
- Developed scope of works
- Procured through RFQ

Opera – Contract A_Demolition & Enabling

Circular Economy Implementation

Tender Documents

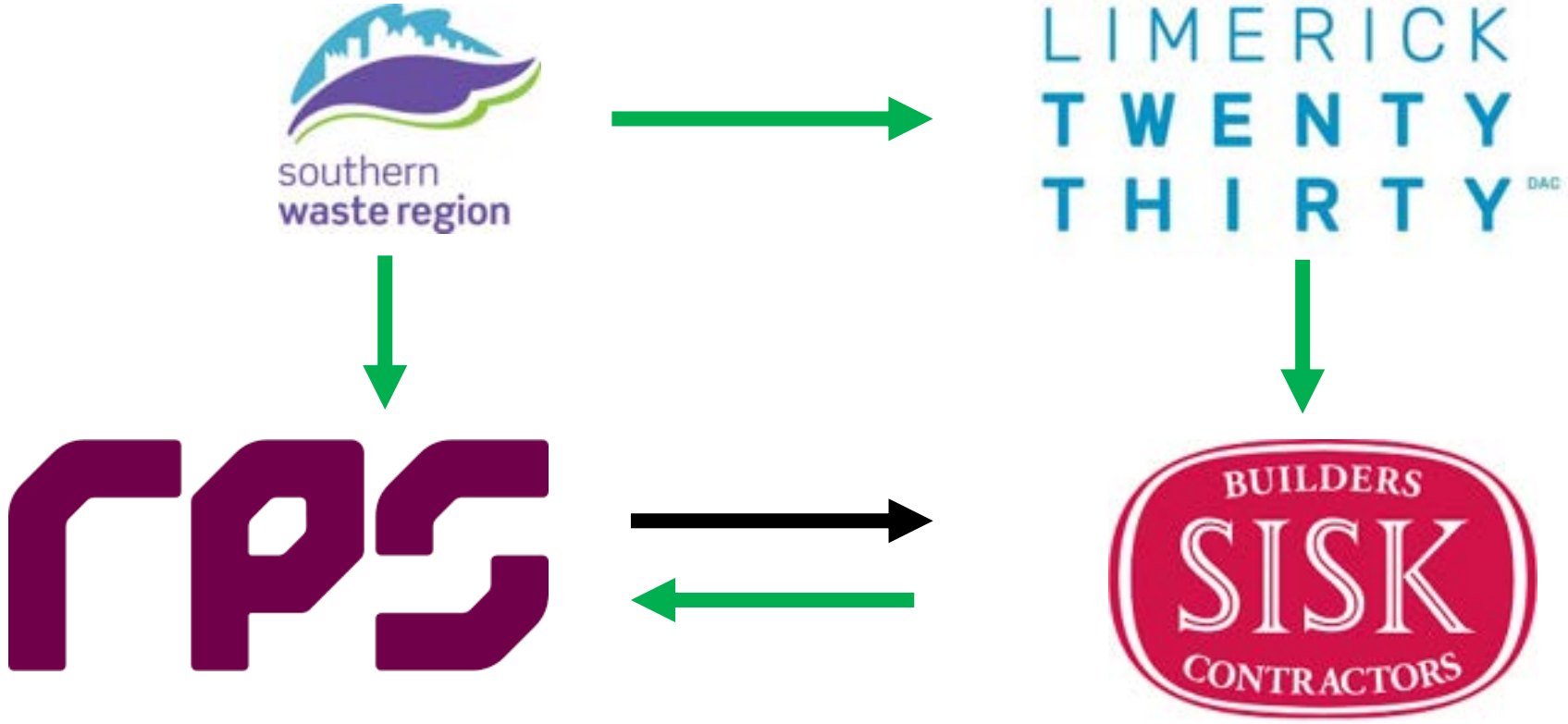
- Public Procurement – Design Build Contract
- Focus on Construction Demolition Waste Management Plan (CDWMP)

- **Consultation with Atlantic Technological University**
  - Department of Building and Civil Engineering

ATU
Ollscoil Teicneolaíochta an Atlantaigh
Atlantic Technological University

- *"Endeavour to divert **at least 75%** of demolition construction waste from landfill"*.

Circular Economy Implementation



Circular Economy Implementation

LIMERICK TWENTY THIRTY

Pre-Demolition Audit - Output

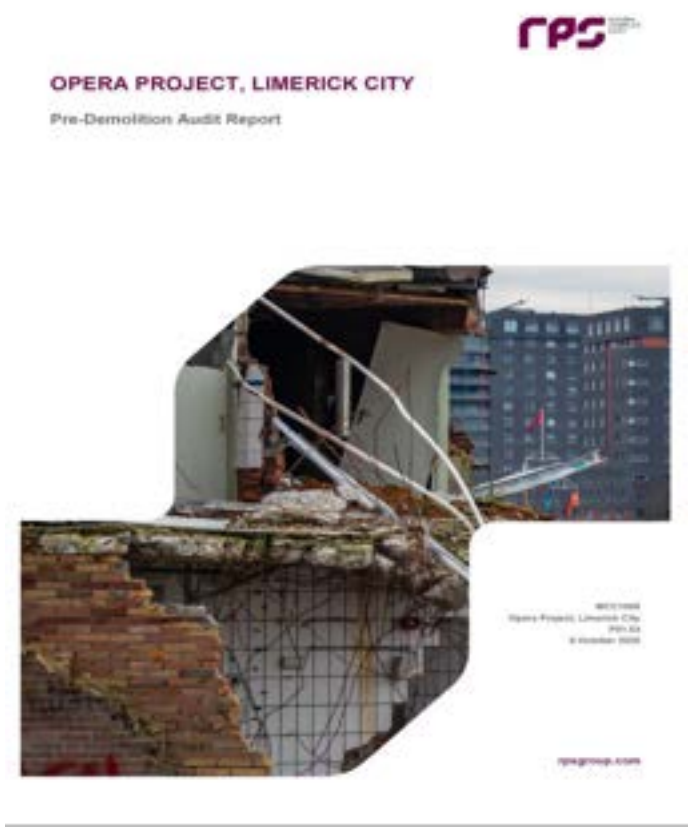


Table 3-1: Estimated Demolition Material Arisings

Material Category	Estimated Quantity (tonnes)
Concrete	12,213
Natural stone	2,202
Red Brick	1,658.2
Metal	213.5
Bituminous Stone Material	195
Timber	176.5
Gypsum-based Material	110.7
Asphalt / Bituminous Roofing Material	71.3
Asbestos Containing Material	45.5
Composite (glazing etc)	21.7
Clay / Ceramic Tiles	19
Textiles	16.5
Mineral fibre ceiling tiles	16.1
Electrical (including light fittings)	6.2
Plastic	4.5
Other Fittings	3.3
Total	**16,973**

Material Segragation

Material Segregation

LIMERICK TWENTY THIRTY

Material Segregation

Material Segregation

LIMERICK TWENTY THIRTY

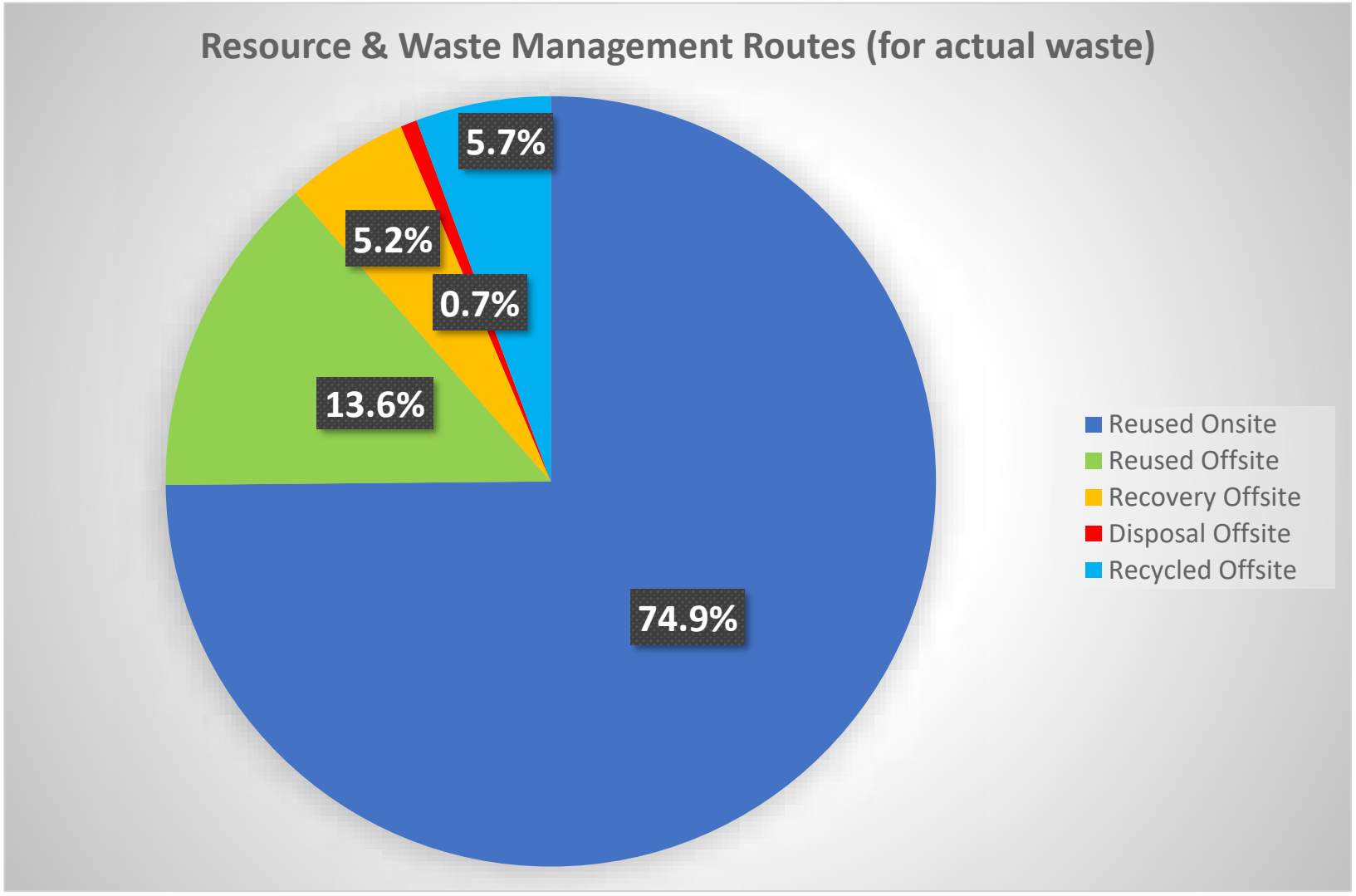
Contractor Results – Waste Sent Offsite

LIMERICK TWENTY THIRTY

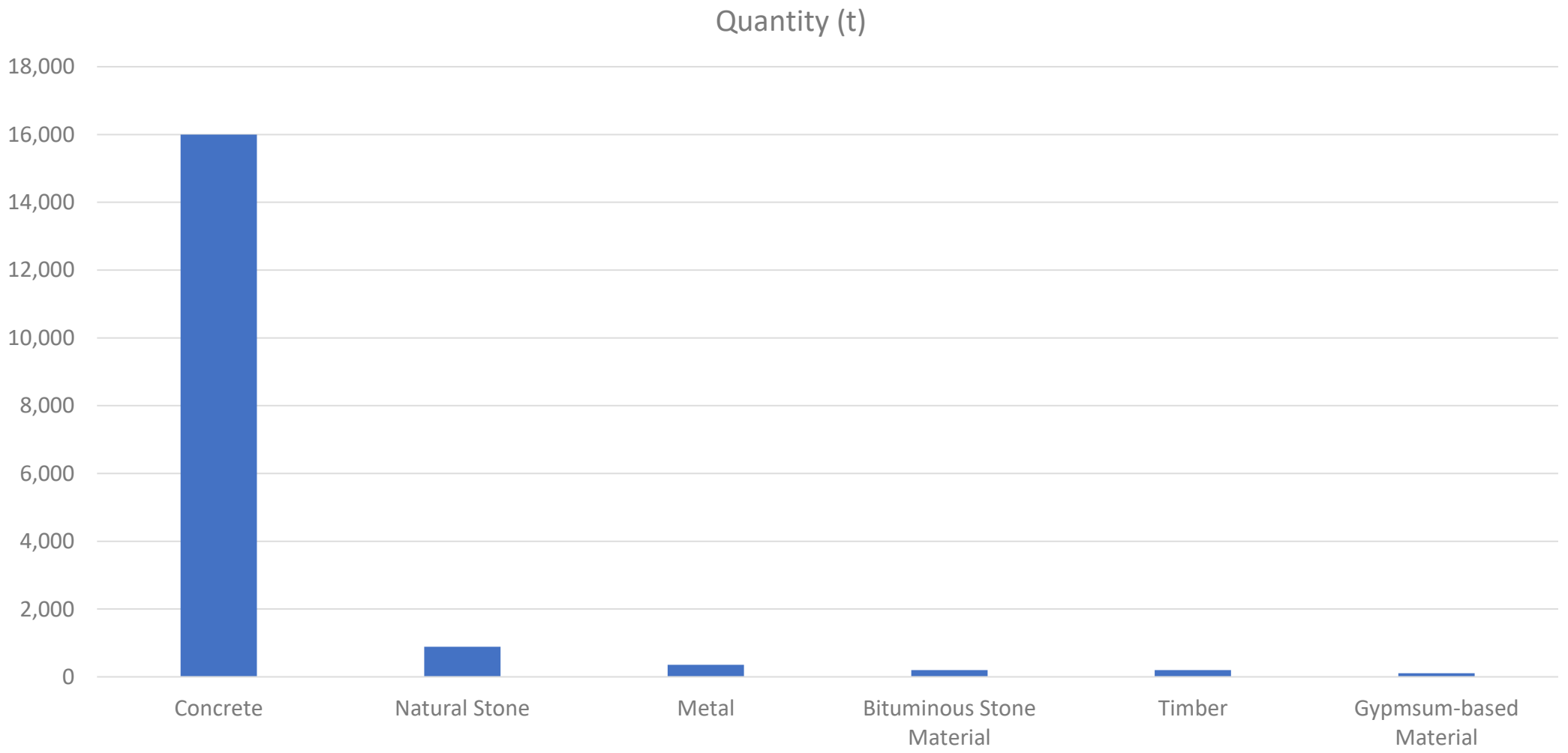
Actual waste sent offsite

	Total (t)	t/£100k	t/100m^2	Diverted from landfill (t)	Diverted from landfill (%)
Construction	0.0	0.0	0.0	0.0	0.00
Demolition	2,205.6	95.2	6.0	2,172.6	98.50
Excavation	2,717.0	117.3	7.3	2,717.0	100.00
Modular	0.0	0.0	0.0	0.0	0.00
Post-Completion	0.0	0.0	0.0	0.0	0.00
Total (offsite):	**4,922.6**	**212.5**	**13.3**	**4,889.6**	**99.33**
Total (offsite & onsite):	**4,922.6**	**212.5**	**13.3**	**4,889.6**	**99.33**

Resource & Waste Management Routes



Tracking of Materials

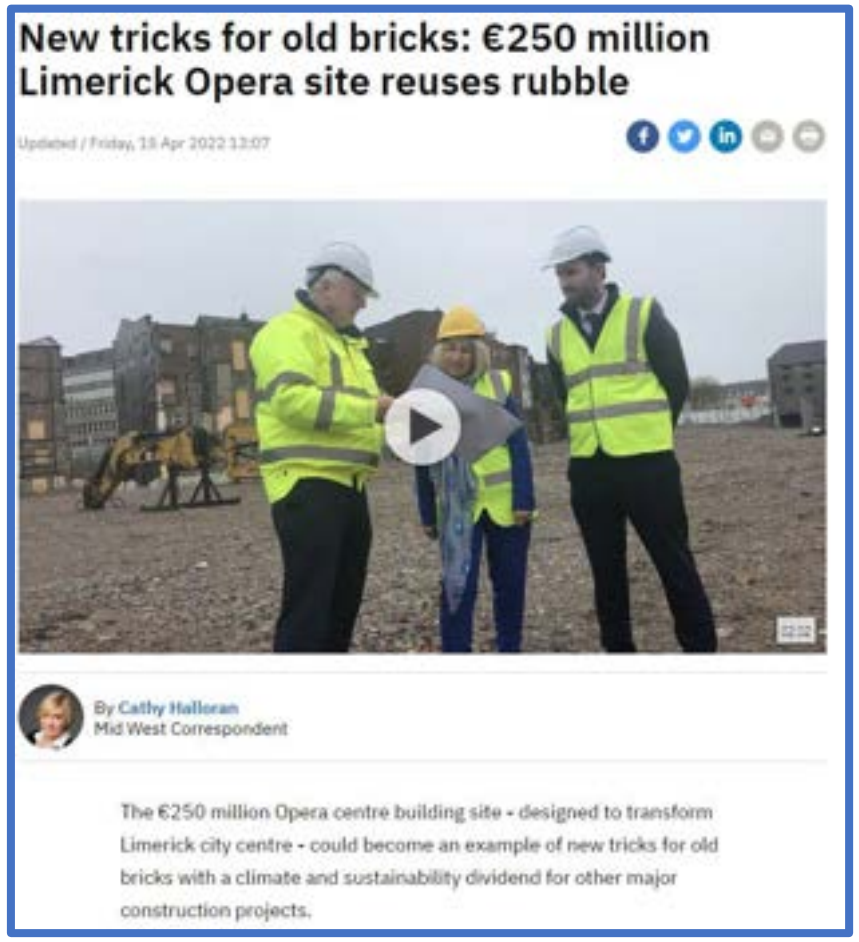


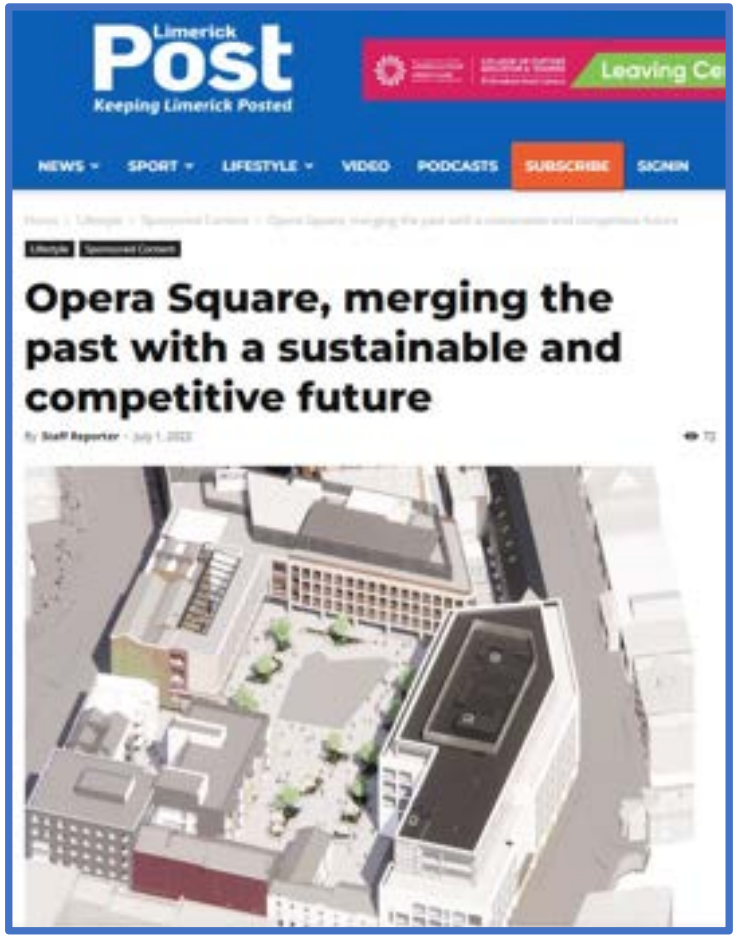
Opera C&D Story

- **Concrete** – crushed onsite and classified as 6F2 for future piling mat phase.
- **Natural Stone** – significant proportion extracted for re-use off site.
- **Red Brick** – crushed onsite and classified as 6F2 for future piling mat phase. Old clay brick Canal Harbour Buildings
- **Metal** – segregated and sent for recycling – example of community engagement also.
- **Bituminous Material** – segregated and sent for recycling
- **Timber** – segregated onsite and sent for recycling
- **Composites (Glazing)** – internal timber wall with glass panels was sent for re-use at LCCC offices. Remainder was sent for further processing off-site.
- **Mineral fibre ceiling tiles** – included within mixed waste stream sent off-site for further processing.

Communications & Marketing

LIMERICK TWENTY THIRTY





LinkedIn

twitter

Communications & Marketing

LIMERICK TWENTY THIRTY

LIMERICK CITY BUILD TRAINING ACADEMY

Limerick CITY & COUNTY COUNCIL

RICHMOND R.F.C.

LIMERICK CIVIC TRUST
CIVIC PRIDE IN ACTION

CONCERN worldwide

Reuse of Demolition Material

LIMERICK TWENTY THIRTY

Reuse of Stone throughout Limerick

- **75 tonnes delivered to Herbertstown – Wall construction**
- **125 tonnes delivered to LCCC Depots**
- **650 tonnes delivered to Limerick City Build– Training Scheme**
- **2000 Bricks reused in construction of Canal Harbour building, Limerick.**

Reuse of Demolition Material

LIMERICK TWENTY THIRTY

Reuse of Materials throughout Limerick

- **Palisade fence panels and gate sent to – Richmond Rugby Club**
- **Metal Gateway and Stone Pillars donated to Limerick Civic Trust**
- **Stone for use in Finucane Memorial - Concern**

Recommendations for Future Projects

LIMERICK TWENTY THIRTY

1. **Reach out to your Local Authority**

   I. Identify partnerships
   II. Identify funding streams
   III. Co-operation and Collaboration

2. **Timing**

   I. Incorporate circular economy principles into design and planning process
   II. Pre-Demolition audit should be undertaken at preliminary design phase to identify surplus material not required for reuse onsite.
   III. Critical that pre-demolition audit results/targets are incorporated into Construction Tender documents

Recommendations for Future Projects

LIMERICK TWENTY THIRTY

3. Inclusion of Circular Economy initiatives within Project Cost Plan

I. Quantify project benefits and associated costs
II. Programme implications to be understood
III. Identify KPI's

Outcomes

LIMERICK TWENTY THIRTY

1. **Data collection to assist future Tenders / KPI target setting**
2. **ESG – alignment with Limerick Twenty Thirty company strategy**

3. **PR / Marketing – positive promotion of the project**
4. **Local community engagement**

Change the business as usual approach

Where are we now?

LIMERICK
TWENTY
THIRTY

Circular Economy - Opera Square Projects

1. EPA Green Enterprise Scheme

- Led by IGBC in collaboration with ATU, LTT and SRWMO
- MSc Research - Lighthouse Demonstrator for Circular Built Environment
  - Pre-construction
  - Construction
  - Operational
- Embedding ATU MSc candidate within LTT

2. EPA – The Circular Economy Programme (Local Authority Funding Call)

- Joint submission between LCCC and LTT
- Managing Waste & Resources at Opera Contract B
  - Prepare a Tier 2 Resource & Waste Management Plan
  - Training & Awareness campaign

LIMERICK
TWENTY
THIRTY

LIMERICK
TWENTY
THIRTY


SIGNAGE

Thank You

Construction Materials Exchange (CMEx)

Circular Economy Hotspot
Dublin 2023

IGBC
IRISH GREEN BUILDING COUNCIL

Construction Materials Exchange (CMEx)

Rachel Loughrey

IGBC
IRISH GREEN BUILDING COUNCIL

Project Lead for Construction Materials Exchange (CMEx)

About the Irish Green Building Council

NGO

Registered charity

Membership

Our aim is to transform the building industry to become the best in class in sustainable building practices

We deliver innovative projects funded by our members, the European Commission, Sustainable Energy Authority Ireland and Environmental Protection Agency Ireland

IGBC
IRISH GREEN BUILDING COUNCIL

Reuse of excess and reclaimed construction materials:

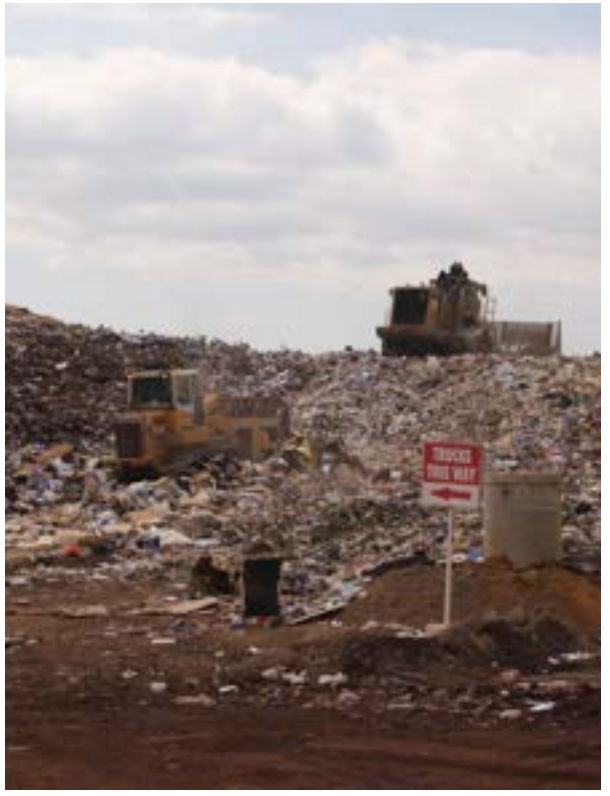
A key element in the transition to the circular economy in construction

Why is implementing the circular economy in the built environment important ?

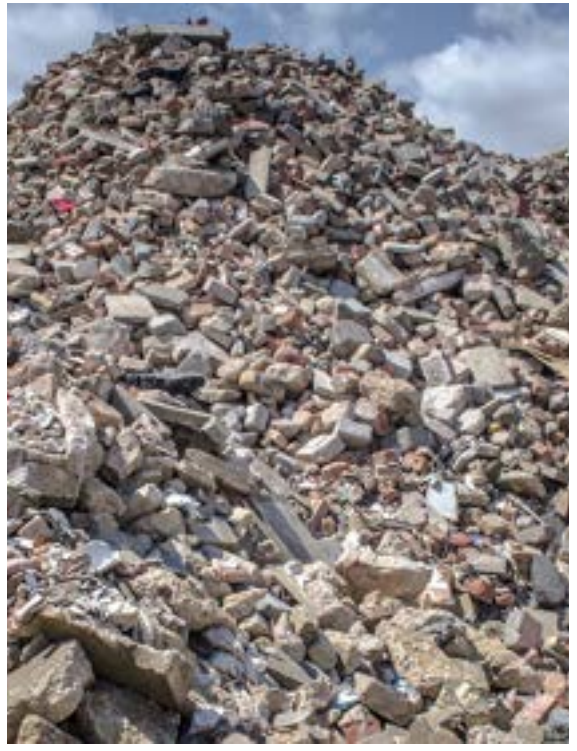
- The built environment is responsible for almost 50 per cent of raw material consumption and it produces the largest source of waste annually in Europe.
- Over the last number of years, the world at large has been focused on the journey of switching to renewable sources of energy.
- However, this will only address 55% of global emissions. The remaining 45% come from the fact that we are stuck in a linear economy. In construction, this means that raw materials for buildings are mined and excavated, building components are manufactured and subsequently used in buildings, and ultimately, these raw materials end up as construction waste. This means that the raw materials and the energy that went into making the material are wasted.
- Resource depletion is occurring at a rapid pace. This is part of the cause of the climate and biodiversity crisis.
- This is the reason why we need to start using reclaimed and excess construction materials.

Currently 57.5% of our waste in Ireland comes from Construction and Demolition Waste.



Currently only 1% of all construction materials are reused. Most of these materials are landfilled.



KA13 _80% Reuse of Material_ Mad Arkitekter

Holbein Garden_ Structural Steel Reuse _ Bar Gazetas

1 Triton Square_ Refurbishment and Reuse of Façade_ ARUP

Reclaimed Brick Façade_ Rotor

Resource Rows_ Panels of Recycled Brickwork_ Lendager Group

Buitenplaats Brienenoord_ 90% Reuse of Materials_ SuperUse

As an industry, we should strive to save and retain these materials at their highest value and save their embodied carbon.

Using reclaimed materials within the construction industry is not new.

Taking materials from one redundant structure and reusing them in another has taken place since humans started constructing.

Construction Materials Exchange (CMEx)

Construction Materials Exchange (CMEx)

- **Construction Materials Exchange (CMEx)** is a friendly, digital platform that connects organsitions with each other so that they can exchange or trade excess or reclaimed construction materials.
- It is the only digital secondary construction material platform in Ireland.
- IGBC collaborated with The **Excess Materials Exchange** (EME) to create the CMEx platform with funding from the Circular Economy Innovation Grant Scheme of the Department of the Environment, Climate & Communications.
- The **Excess Materials Exchange** (EME) is a digital **marketplace** where companies can exchange **excess materials** with each other. It is based in the Netherlands.

Construction Materials Exchange (CMEx)

Construction Materials Exchange (CMEx) enables construction materials:

- To be reused at their highest value
- Conserves the raw materials and energy that went into making the material

Construction Materials Exchange (CMEx)

Construction Materials Exchange (CMEx):

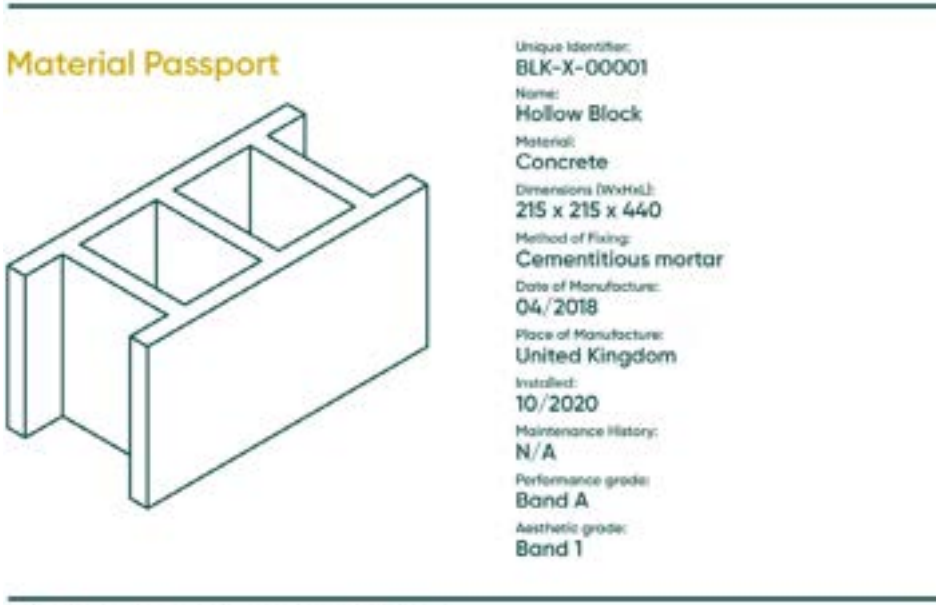
- Protects biodiversity (caused by extraction) and mitigates climate change
- Enables the construction industry to take a big step in the transition to a circular economy

CMEx aim is to demonstrate a feasible, transparent, fair, user-friendly system for the reuse of construction materials that would otherwise enter the waste stream.

The project will identify and track resources through the supply chain; identify the potential value of matching materials; and apply these insights to steer organisational processes towards supporting a circular economy.

It will identify materials from the waste stream with the potential for diversion to reuse and develop mechanisms to enable reuse through an online platform that generates materials passports, facilitates material matches, and utilises blockchain technology to document transactions.

The outcomes of the project will be a construction material marketplace, training workshops, training materials, materials data, match data and training about the creation of material passports.



Material Passports

- A Material Passport is an identity document for materials. All materials on CMEx will have a material passport.
- Material Passports contain data that describes the defined characteristics of materials in products, that ultimately give them value for recovery and reuse.
- Material Passports increase or keep the value of materials, products and components over time.

3 types of users on the CMEx platform

- An organisation that would like to create a profile and upload materials for exchange from their projects
- An organisation that would like to find materials for their projects
- An individual that would like to find material for their projects

Organisations who joined Construction Materials Exchange (CMEx)

Peter McVerry Trust
Opening doors for homeless people

Hegarty
Building Contractors

MURPHY
WORLD-CLASS INFRASTRUCTURE

OPW
Oifig na nOibreacha Poiblí
Office of Public Works

Plasterboard to rooflight wells

N/A

See More

Suspended ceiling & tiles

N/A

See More

Existing kitchen units

N/A

See More

All Stairwell Balustrades

N/A

See More

OPW Internal Marketplace: CMEx Case Study

- As a direct result of the OPW implementing an internal CMEx platform into their organisation, they have written specifications into tender documentation to save certain materials from refurbishment projects they are undertaking so they can be uploaded to their CMEx platform and reused.

Learning + Improving

Generally, in the building sector, the gap that exists is one of knowledge rather than skills. This knowledge is fundamental for the successful implementation of circular economy principles. It is important to understand the mind set of workers who, based on their years of experience, believe that they already know the ‘right way‘ to do their job. The challenge lies in fostering a change in attitude and facilitating the acceptance that a new approach to their work is needed. This new approach is key to implementing the use of reclaimed and excess materials in buildings.

Construction Materials Exchange (CMEx): Learning and Improving

- The second iteration of CMEx was launched post a stakeholder workshop with key players from the construction industry, including; developers, architects, engineers, reclaimed construction material experts, sustainability consultants.
- Nothing in the circular economy occurs in isolation. We need the entire value chain to be involved and committed to cross-sectoral partnerships in order to promote the use of reclaimed and excess materials. Every single person in the construction industry has a part to play from planners, to architects, to contractors, to engineers, to material manufacturers.

Construction Materials Exchange (CMEx): Learning and Improving

Lessons learnt from the first iteration of CMEx:

- Importance of scale of materials and engaging large stakeholders
- Demand for reclaimed material is high but supply is not available
- Importance of education and creating spaces where stakeholders can learn and improve their knowledge on reclaimed materials
- Importance of CMEx focusing on materials that stakeholders in the construction industry feel safe to use at present such as:
  - **Reclaimed bricks**
  - **Reclaimed steel**
  - **Reclaimed raised access floors**
  - **Reclaimed stone**
  - **Reclaimed timber**

CMEx
CONSTRUCTION MATERIALS EXCHANGE

Sign up to CMEx

IGBC
IRISH GREEN BUILDING COUNCIL

Thank you.

If you'd like to know more, contact

Rachel Loughrey rachel@igbc.ie

IGBC

IRISH GREEN BUILDING COUNCIL

Gallery

Graphic Recording

By Katherine Foyle


Thank You
Circular Economy Hotspot
Dublin 2023