

# Innovations in the Built Environment

Exploring Circular Solutions for Modernizing the Building Stock and Creating Affordable Housing

7th of May 2025

10h - 11h EST / 16h - 17h CET



## SESSION 2



**Lisa Graaf**

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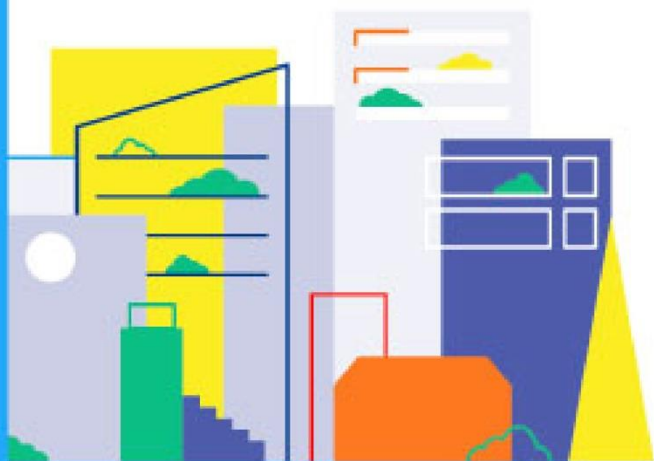
**Helen Goodland**

Principal and Head Of  
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**Jacinthe Séguin**

**Moderator** - IURC-NA  
Circular Economy and  
Nature-based Solutions Expert  
Ottawa, Canada



# Innovations In the built Environment

## Welcome & Introductions

**Monika Norkute, Program Officer for Foreign Policy Instruments in the Americas, EEAS Ottawa**

## Presentations

*1. Prioritising existing buildings for people and planet*

**Lisa Graaf, Building Performance Institute of Europe.**

*2. Sustainable materials management and circularity in the built environment*

**Helen Goodland, Scius Advisory Inc.**

*3. Navigating the Circular Built Environment - the ECESP Reading Guide*

**Veerle Labeeuw, Circular Flanders and ECESP Leadership Group Built Environment**

With special guest discussant: **Carolyn Kovar, Senior Policy Analyst, Real Estate & Housing, City of Atlanta**

# Prioritising existing buildings for people and planet



**Lisa Graaf**

Senior Project Manager,  
Buildings Performance  
Institute Europe  
Berlin, Germany



**Innovations in the Built Environment – Exploring circular solutions to modernize the building stock and creating affordable housing**

# **Prioritising existing buildings for people and planet**

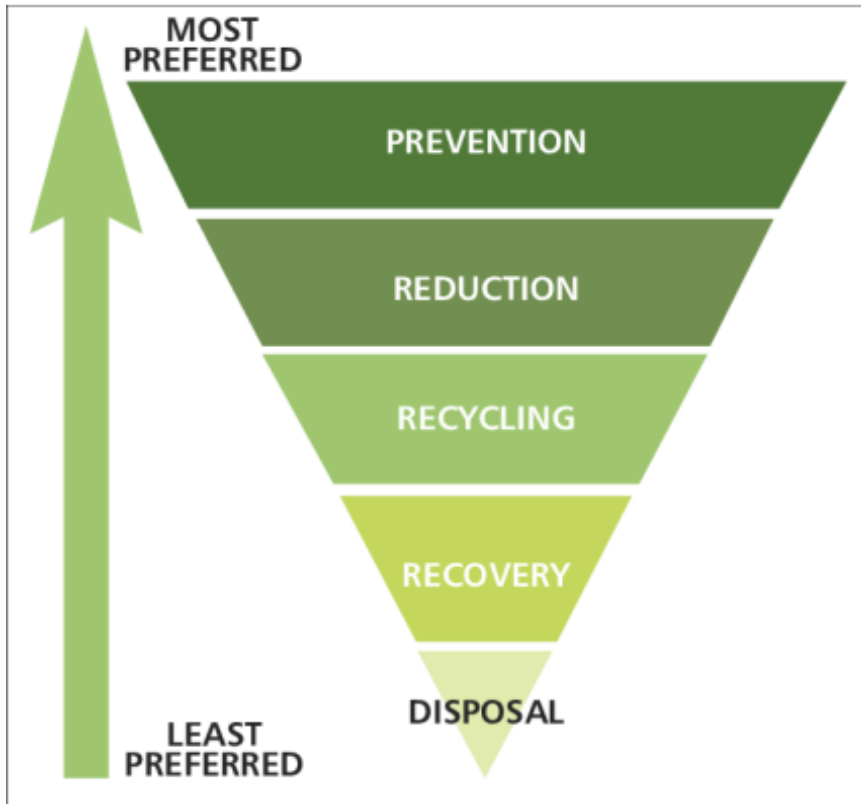
**Lisa Graaf, BPIE - Building Performance Institute Europe**



- **Sufficiency**: what does it mean in the building sector?
- **What do we know about the impacts**: literature and case studies
- **What do we need to do now**: conclusions and recommendations

# SUFFICIENCY & CIRCULARITY

## Decision pyramid



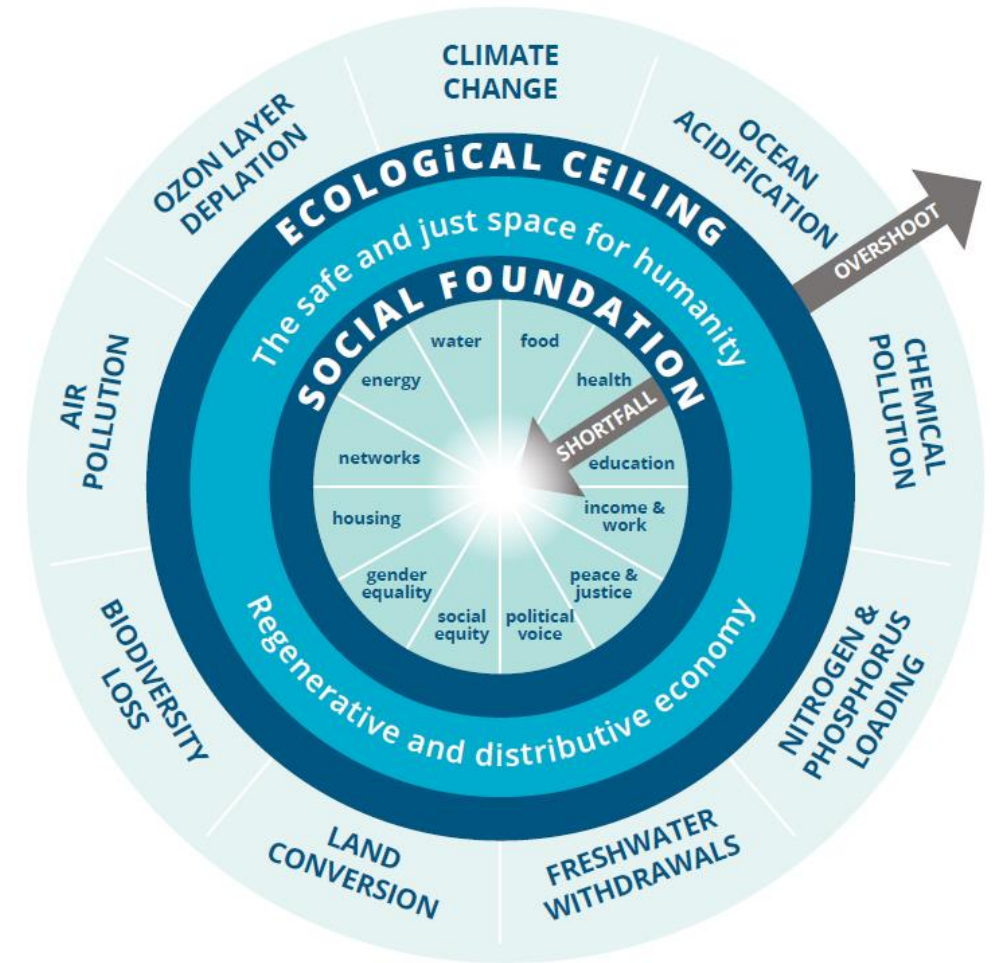
Source: The waste hierarchy as described in the EU Waste Framework Directive

- Circular economy principles:
  - **Prevention** as most preferred option
  - The R-strategies: **Refuse**, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose, and Recycle
- Sufficiency is defined as:
  - “... is a set of measures and daily practices that avoid demand for energy, materials, land and water while delivering human well-being for all within planetary boundaries” (IPCC AR6 WGIII, p. 957).
- Sufficiency provides an additional focus on:
  - Social foundations (needs and well-being)
  - Existing buildings stock

# Sufficiency

## Social foundation in the “two types of enough”

- “Human wellbeing within planetary boundaries”
  - Inside: SDGs => social housing, accessibility, affordability
  - Outside: planetary boundaries
- Sufficiency aligns with a vision that seeks to fulfil the international human right to adequate housing, viewing buildings as vital components of societal well-being

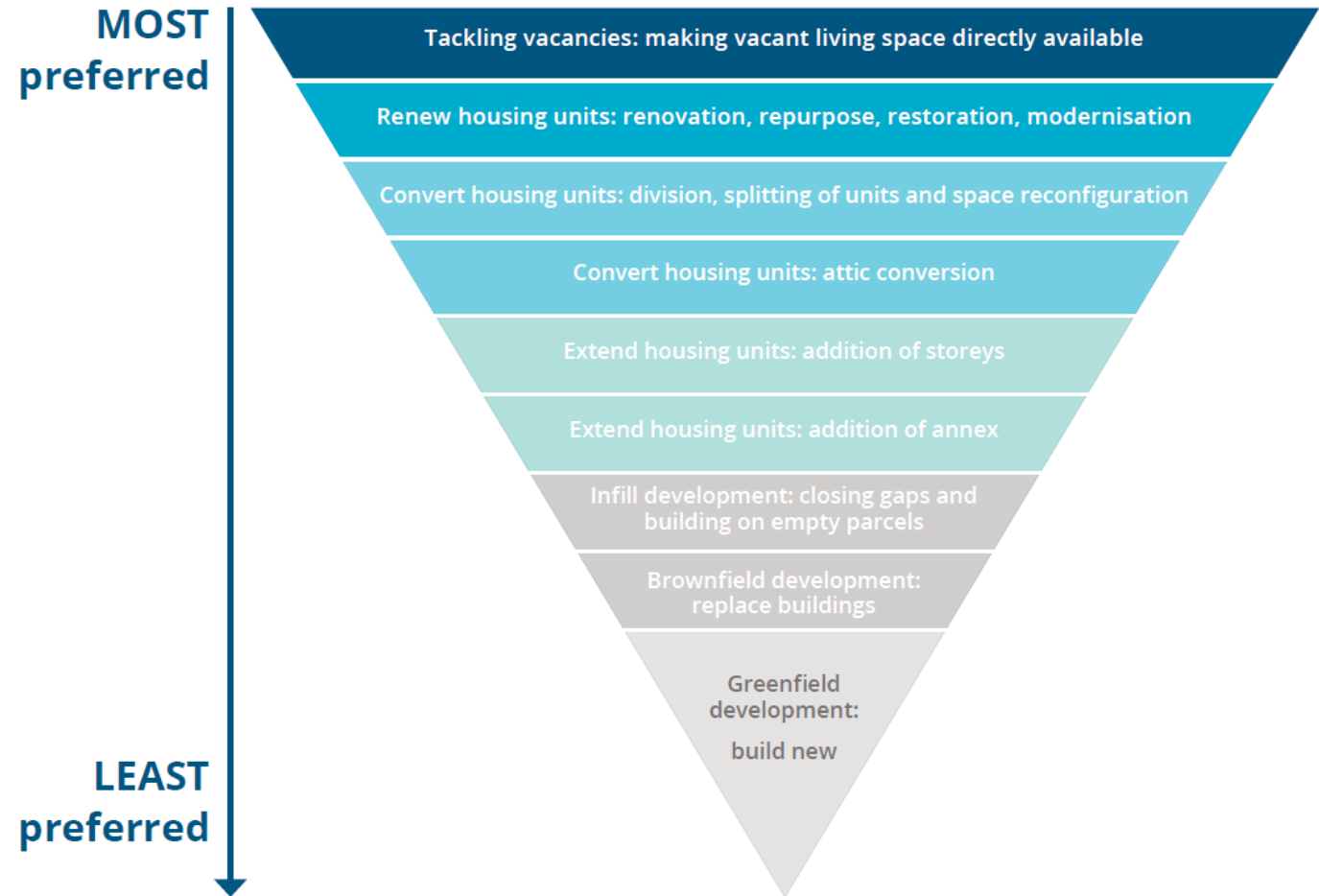


Source: BPIE 2024, based on Doughnut Economics 2019

# SUFFICIENCY IN THE BUILDING SECTOR

## Decision pyramid

- Applying sufficiency principles to buildings can take many different forms
- Individual building, building-stock, neighbourhood perspective



Source: BPIE 2024, adapted from Zimmermann & First (2024), [LINK](#)





# What do we know about the impacts: literature & five examples from Europe



# SUFFICIENCY - THE POTENTIAL

## Literature review: What do we know so far?

**GHG saving potential through using the existing stock instead of building new**

e.g. for Germany (BBSR 2023), for the Netherlands (EIB 2024)

**... along with massive resource savings (- 60 %)**

e.g. - 60% for Germany (BBSR 2023), EU (Zimmermann 2022)

**... while providing enough homes**

e.g. 400k units / year (Germany); theoretical housing potential for 100 million people in Europe (Lage et al. 2025)

**Huge investment opportunity**


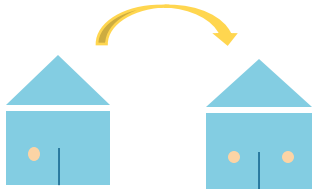



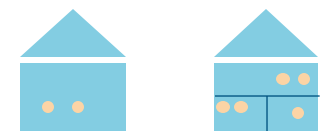



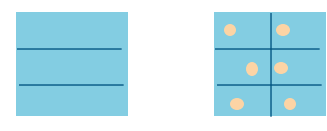
e.g. 4 trillion in urban regeneration projects (Systemiq 2024)

**Social acceptance higher than one would expect from the outset**

e.g. Citizens Assemblies in 8 EU MS (Lage et al. 2024); avoid measures highly relevant (public consultation on EU WLC Roadmap); 30% of home-owners find „home is too large“ (several survey, Germany)

# SUFFICIENCY – EXAMPLES FROM EUROPE






## Different sufficiency mechanisms

COUNTRY	INITIATIVE	MECHANISM	
Belgium	 <b>1TOIT2AGES</b> Brussels and Wallonia	Mobilise 'invisible living space'	
France	 <b>Plan lutte contre les logements vacants</b> National	National strategy to map vacancies and making them habitable	
Germany	 <b>Aus Alt mach 2 .. Oder mehr</b> Pilot project Ravensburg	Premium for consultation for reconstruction of single-family buildings	
Poland	 <b>Empty Spaces for affordable houses</b> National	Mapping vacancies and making them habitable	
Ireland	 <b>Parkwest Dublin 12 The Plaza</b> Office building in Dublin	Conversion of offices into housing units	

Source: BPIE, Ramboll 2024 ([Link](#))

# SUFFICIENCY – EXAMPLES FROM EUROPE

## What did they achieve? What is the potential?

	COUNTRY	INITIATIVE	MECHANISM	CURRENT OUTCOMES	ESTIMATED POTENTIAL (max)	
					Avoided new construction	Avoided embodied emissions
Belgium		1TOIT2AGES Brussels and Wallonia	Mobilise 'invisible living space'	Facilitated 604 matches in 2023	26.800 m <sup>2</sup>	15.000 tCO <sub>2</sub>
France		Plan lutte contre les logements vacants National	National strategy to map vacancies and making them habitable	1,1 Mio vacant buildings; over 6.000 "exited" vacancy status	20.190.000 m <sup>2</sup>	9.500.000 tCO <sub>2</sub>
Germany		Aus Alt mach 2 .. Oder mehr Pilot project Ravensburg	Premium for consultation for reconstruction of single-family buildings	A quarter of homeowners considers a reconstruction	23.526.000 m <sup>2</sup>	11.200.000 tCO <sub>2</sub>
Poland		Empty Spaces for affordable houses National	Mapping vacancies and making them habitable	Estimates of 215.000 usable units after renovation	12.106.000 m <sup>2</sup>	5.750.000 tCO <sub>2</sub>
Ireland		Parkwest Dublin 12 The Plaza Office building in Dublin	Conversion of offices into housing units	86 social housing units created	5.800 m <sup>2</sup>	2.759 tCO <sub>2</sub> (- 82% less embodied carbon compared to new built)

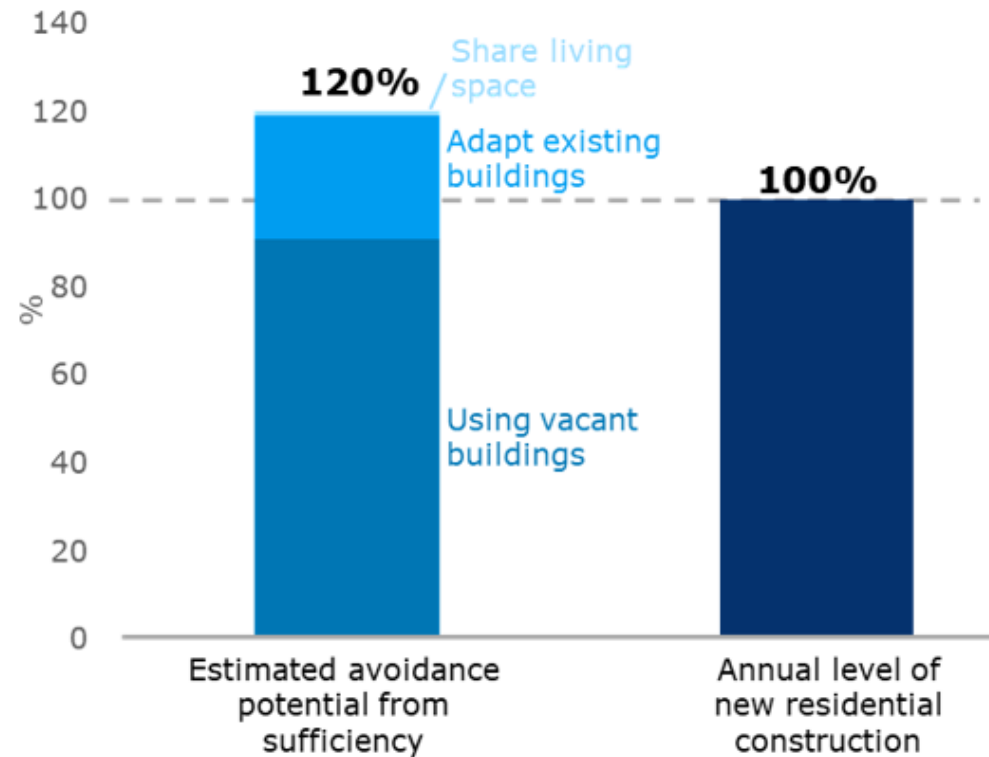
Source: BPIE, Ramboll 2024 ([Link](#))



# SUFFICIENCY – EXAMPLES FROM EUROPE

## Estimating the theoretical potential

- The combined potential of the analysed sufficiency initiatives (BE, FR, DE) in comparison with annual new construction activity in these countries.
- Theoretical potential even higher, as office conversion is not included

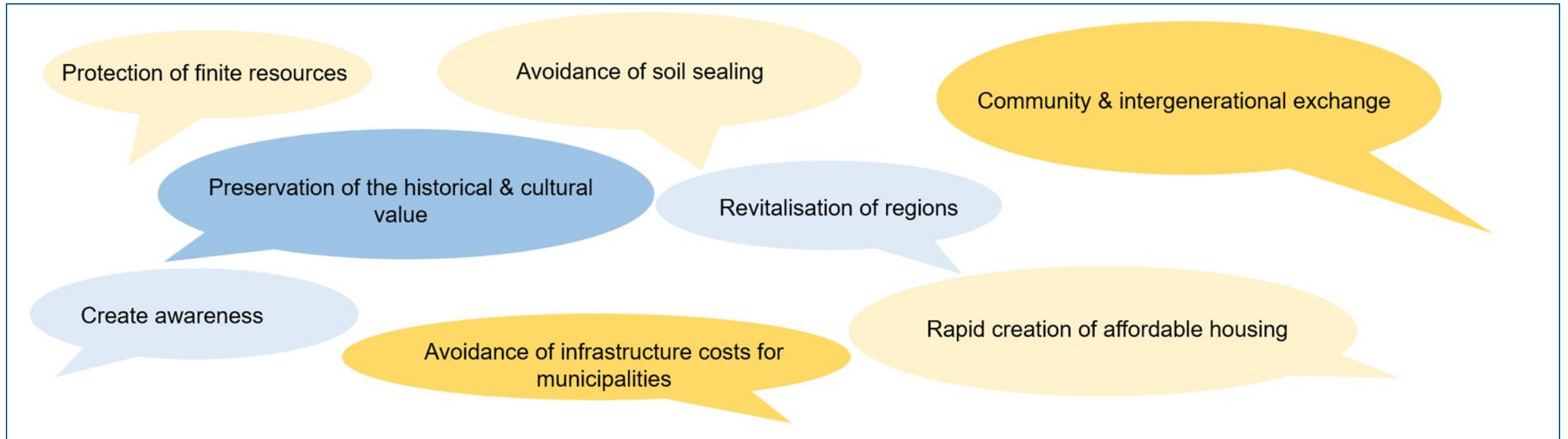


Source: BPIE, Ramboll 2024 ([Link](#))

# Sufficiency – Case Studies

## The potential: What do we know so far?

Harvesting positive social, economic and environmental impact of sufficiency policies:



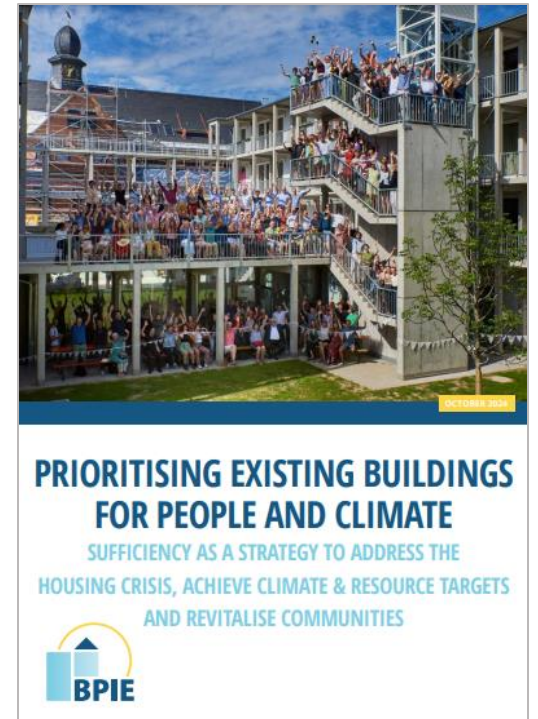


# What do we need to do: conclusions and recommendations

# Sufficiency in the building sector

## Recommendations

1. Make best use of vacant or underoccupied buildings by collecting data
2. Prioritise and incentivise the preservation, repurposing and reuse of the existing building stock ahead of new construction
3. Support experimentation of sufficiency initiatives and exchange of experiences and awareness raising
4. Use synergies with other policy fields and forge new alliances
5. Invest in research on the qualitative and quantitative impacts of sufficiency initiatives



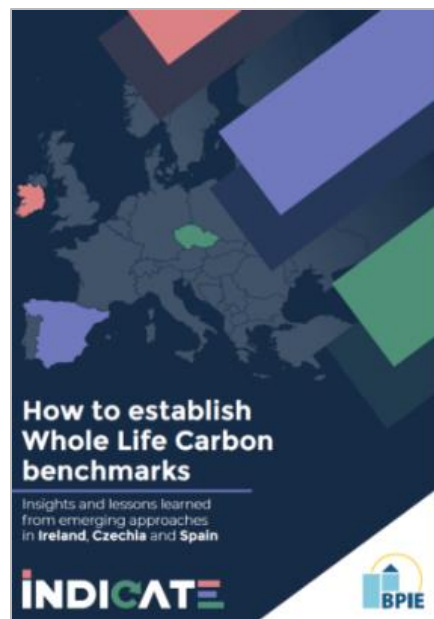


# BPIE's publications (selection)

## Whole Life Carbon & Sufficiency



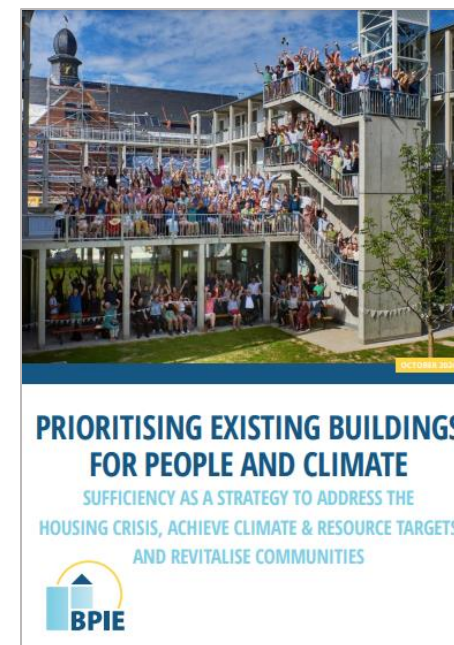
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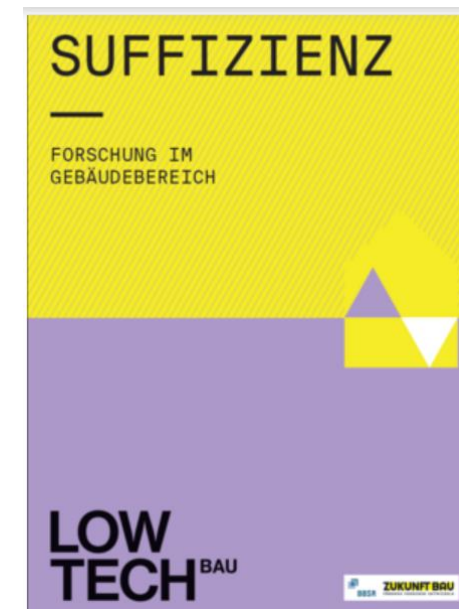
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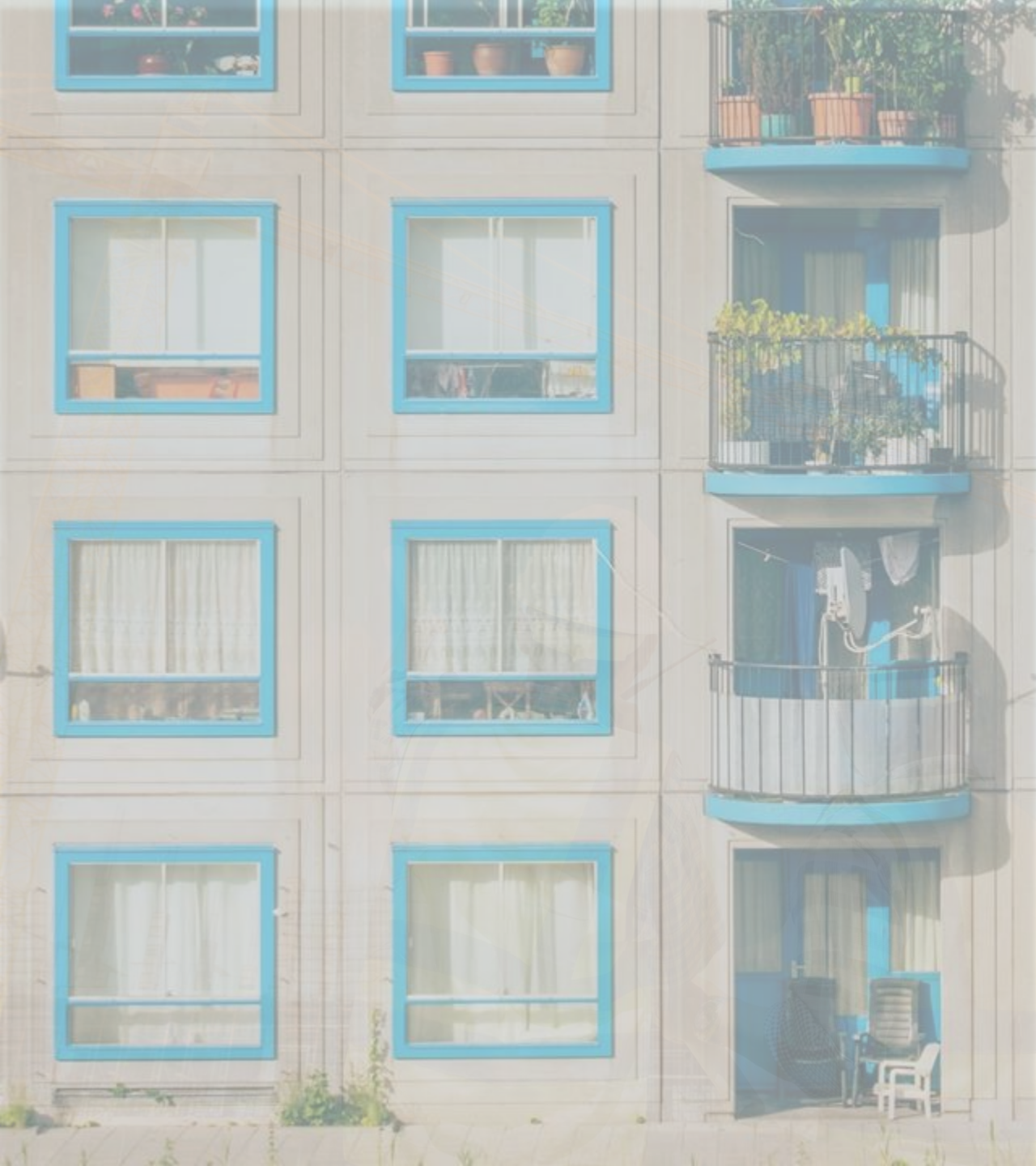
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# Sustainable Materials Management and Circularity in the Built Environment (CBE)

**Helen Goodland**

Principal and Head Of  
Research & Innovation,  
Scius Advisory  
Vancouver, Canada



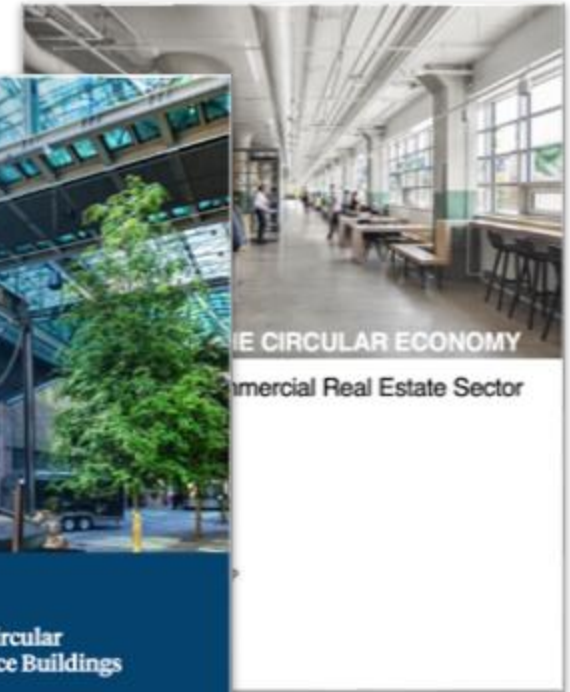
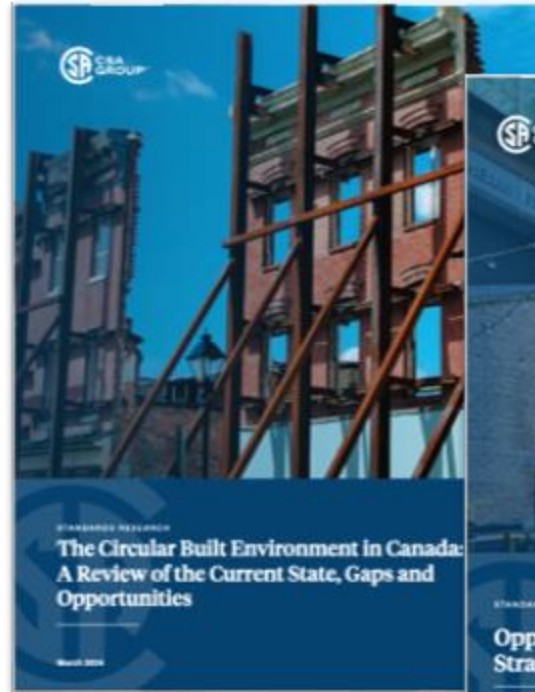


Two Decades of Research Experience on:

# Sustainable Materials Management and Circularity in the Built Environment (CBE)

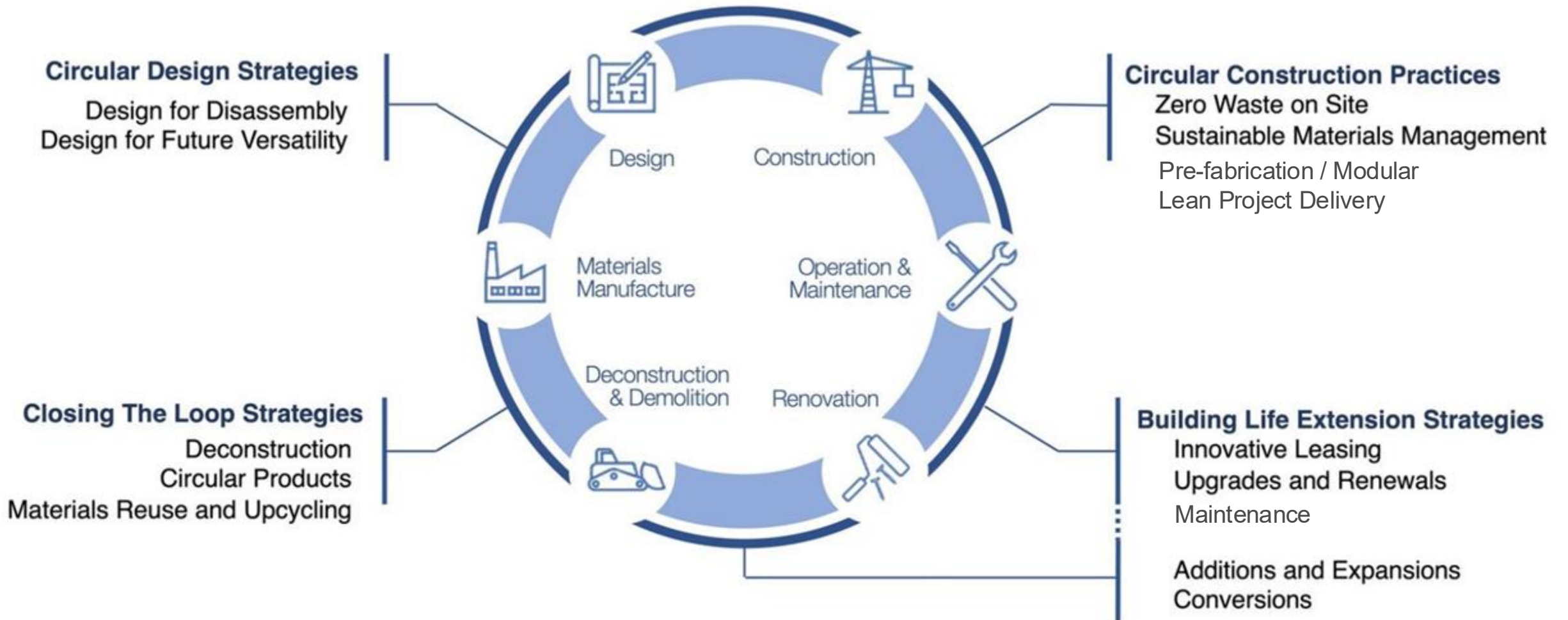
- Investigations into policies, regulations, standards and practices across Canada and in leading countries around the world.
- Documentation of case study projects
- Carbon risk analysis

➤ From our recent projects, offer a few practical examples of what local governments and cities can do to encourage CBE





# CBE Strategies



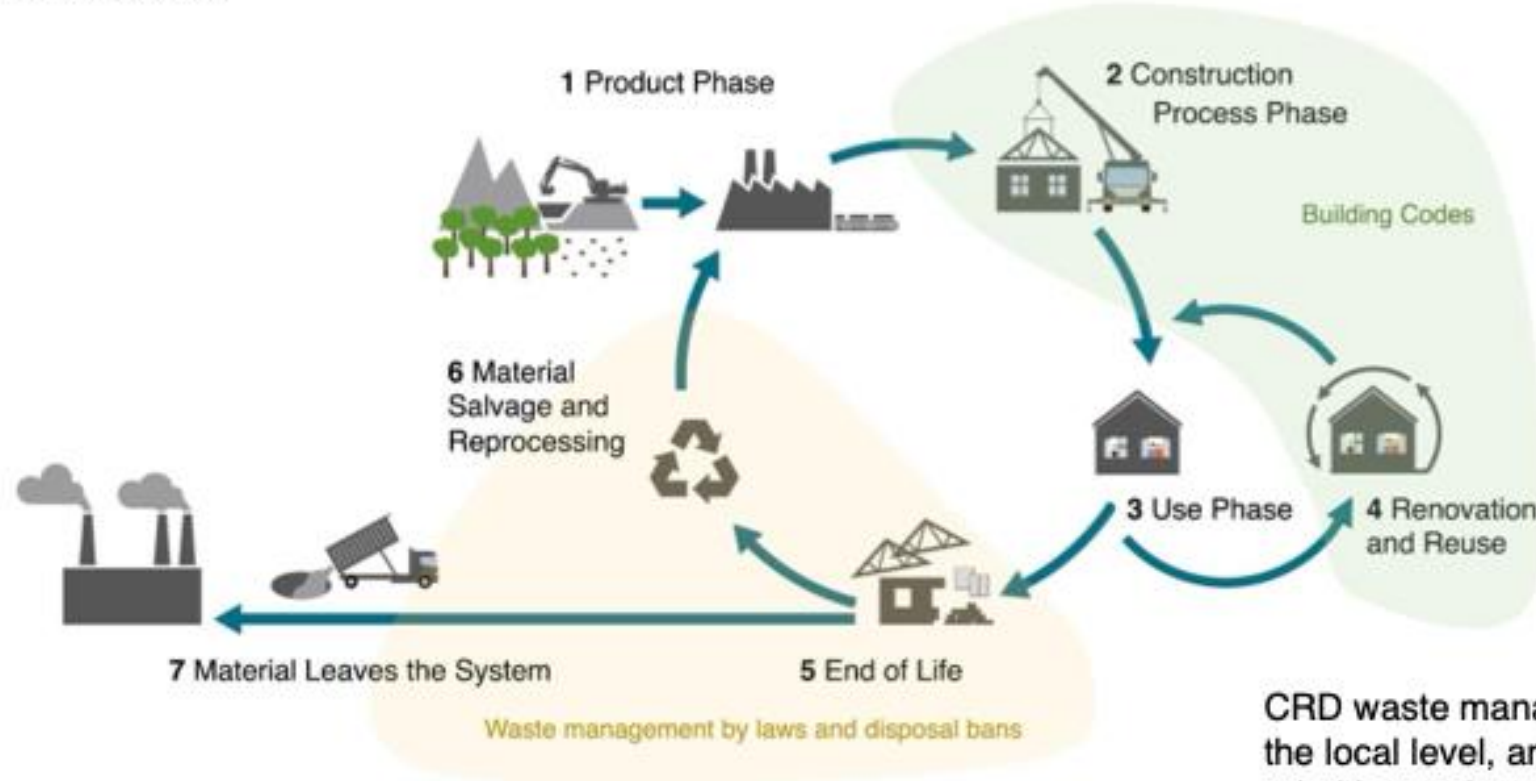
# Regulatory Environment in Canada

Building codes can stipulate permissible building products and technologies but exert no direct control over the upstream manufacturing and production of those materials

Development and Land Use Policies

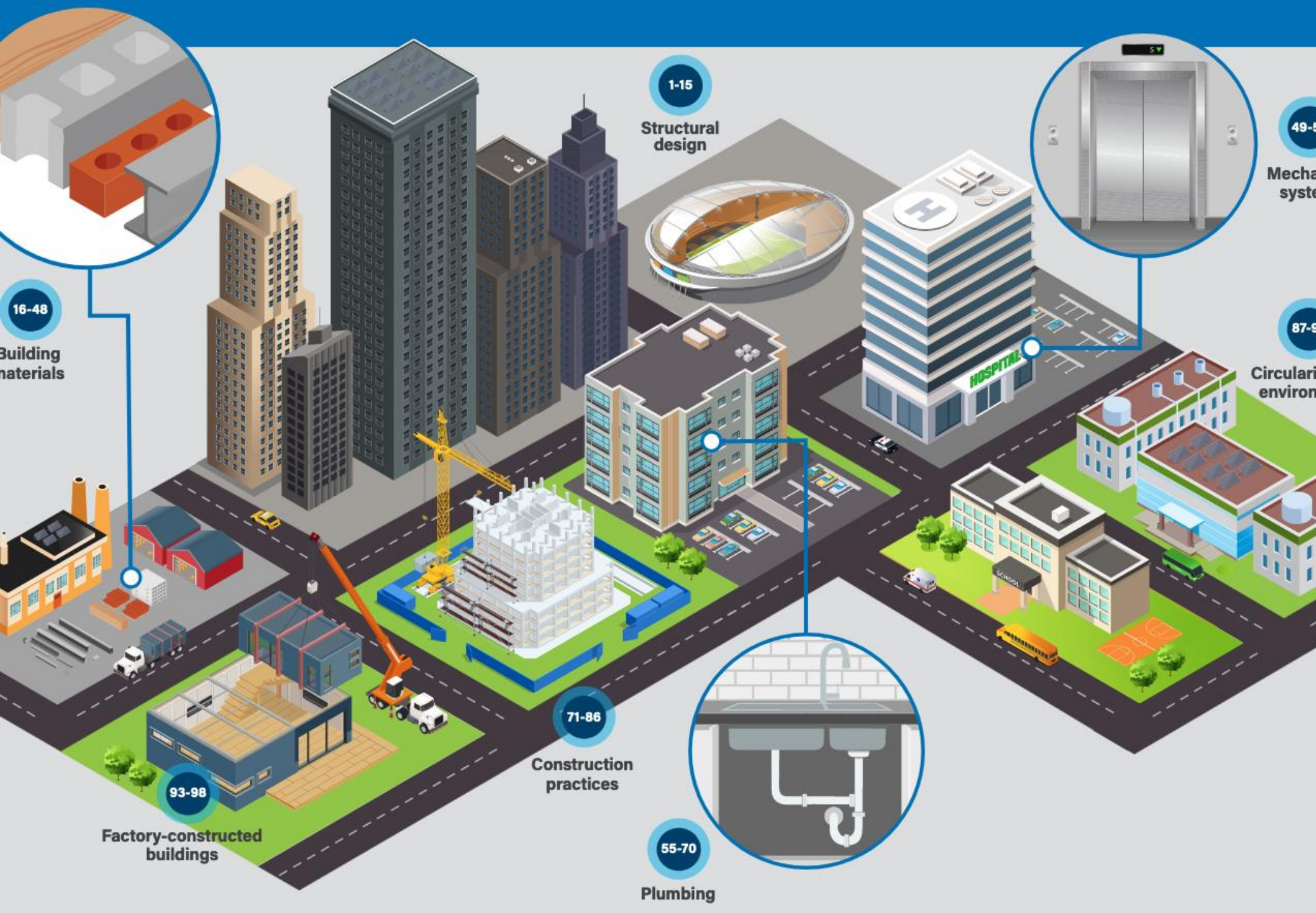
National Master Construction Specification

Retrofit Codes



CRD waste management is primarily regulated at the local level, and each region has its own priorities and approaches resulting in a range of different scopes, definitions, and activities.





# Many Standards Inform and Support Regulations

- Over 250 CSA standards related to buildings.
- Around 50 other standards organizations whose documents are included in building codes and specifications
- We have looked at standards from CSA, ISO and other key international standards (e.g., ASHRAE, BSI) that have a bearing on CBE.

# Emerging CBE Regulations, Policies and Programs in Canada

- Updates to the National Model Code for operating and embodied carbon
- Digitization of codes
- Energy and green building policies (BC Step Code, Vancouver Green Building Policy, etc.)
- Low lifecycle carbon guidelines in federally funded projects.
- Low carbon materials (City of Langford: Low carbon concrete policy)
- Deconstruction policies (City of Vancouver Voluntary Advanced Deconstruction Permit)
- Voluntary programs (LEED, BOMA, TRUE, etc.)
- Green procurement
- Market mechanisms (Calgary Development Incentive, etc.)
- LCA requirements
- Education and training, technical assistance







# Gaps and Challenges

Technical issues (using non-standard materials, etc.)

Lack of data

Lack of consistent metrics and indicators

Governance and lack of political alignment

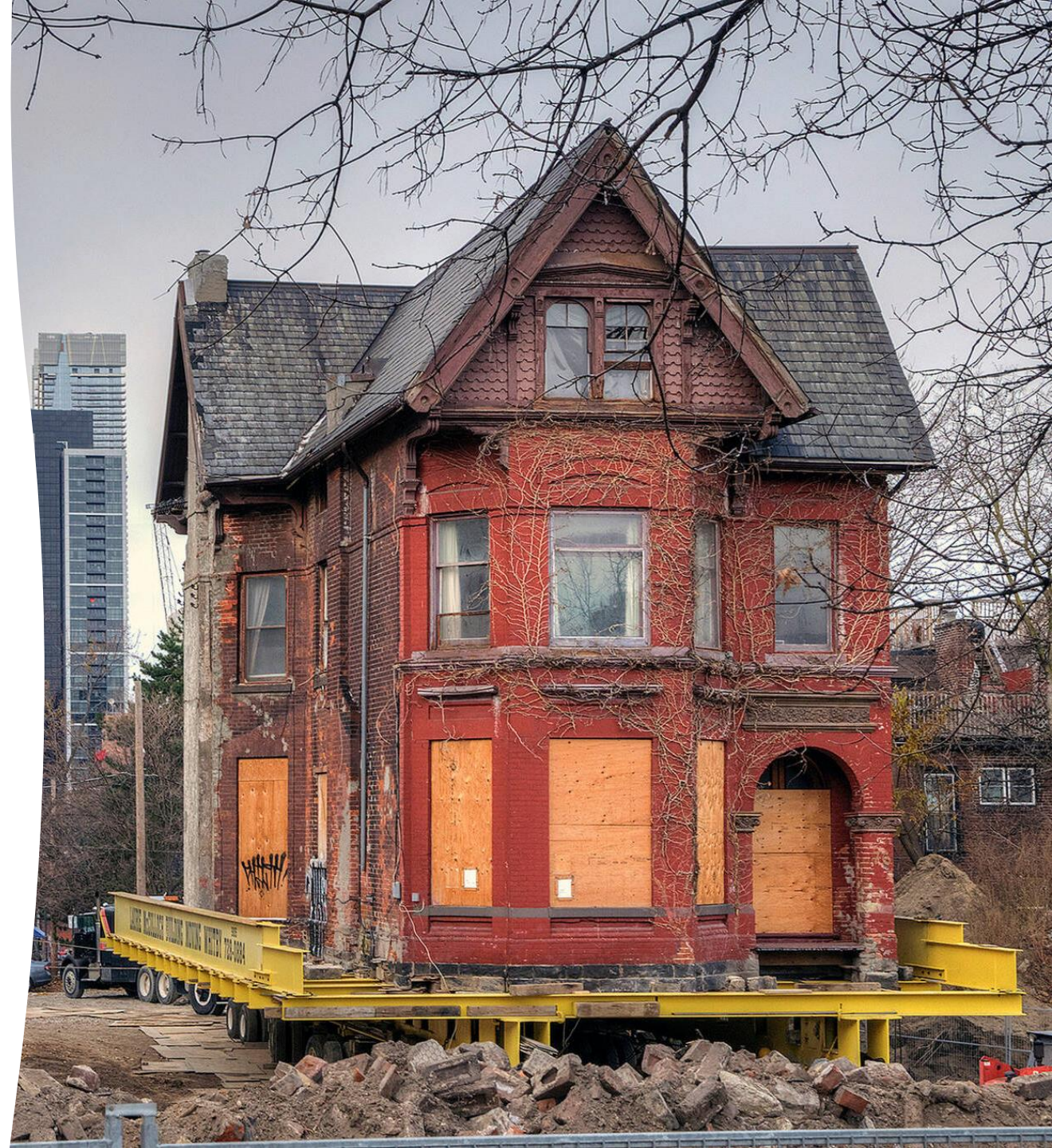
Market barriers

Standards gaps

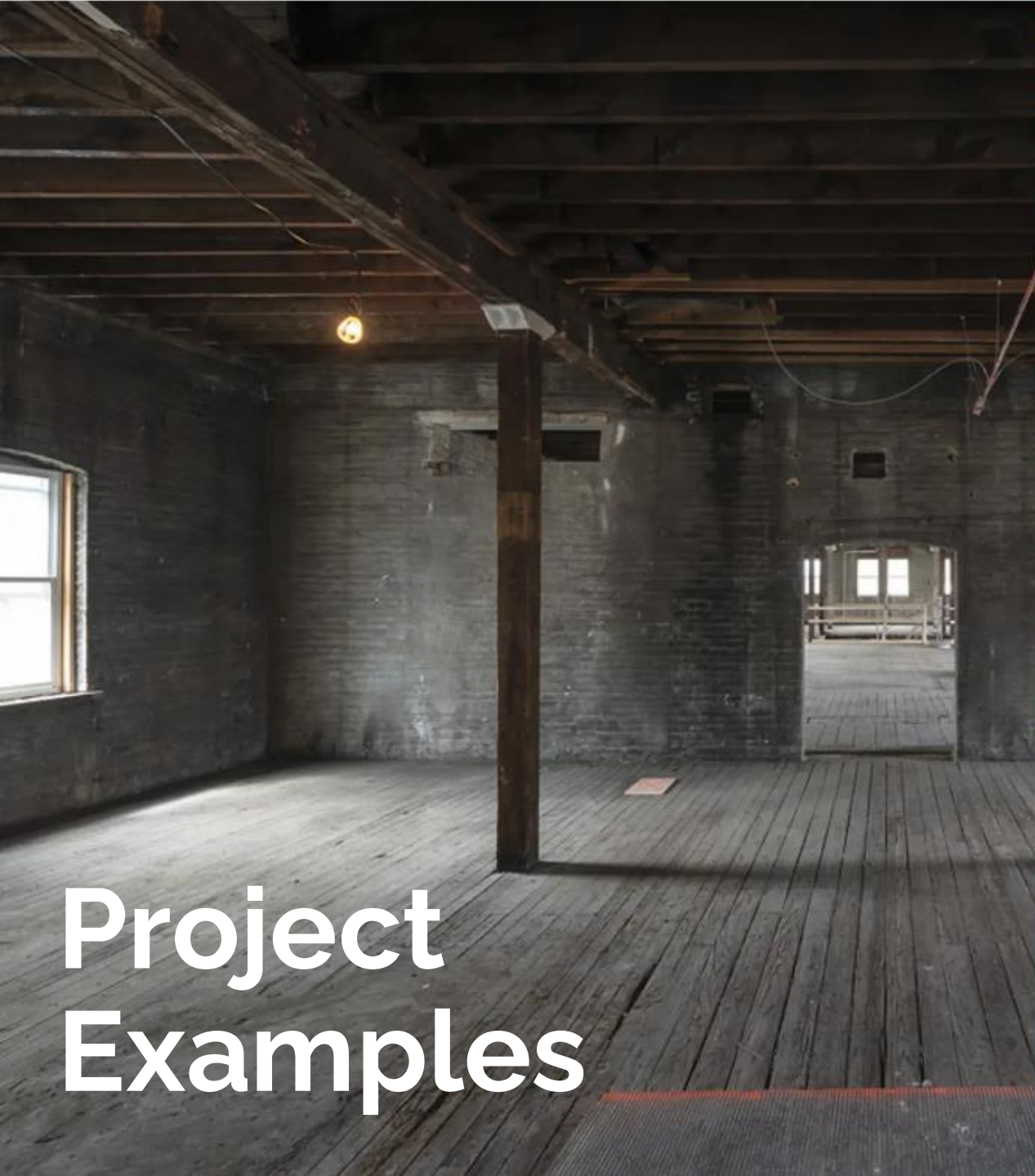


# Suggested “Big Moves”

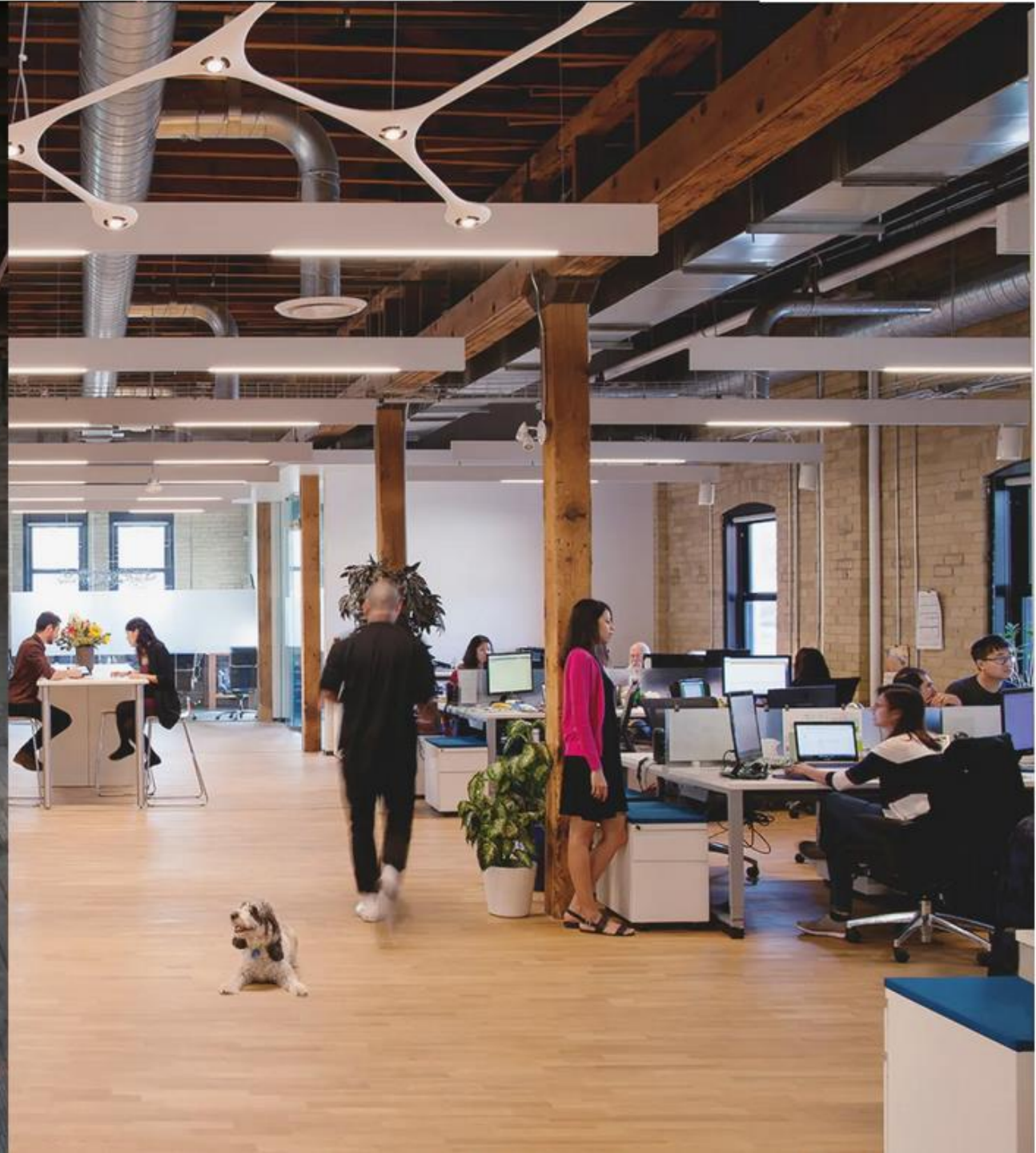
- Create a national waste management framework with aligned metrics, definitions and targets across regions.
- Entrench embodied carbon requirements and references into all codes and policies.
- Incorporate CBE criteria and how to use reclaimed materials into design standards for key structural materials referenced in the building code.
- Simplify certification of salvaged materials for re-use (not down-cycling)
- Create markets for secondary materials through increased disposal fees.
- Commit to a national BIM mandate to facilitate project data management and reporting.
- Extend net zero policy roadmaps to cover waste/resource efficiency and other benefits circular practices may offer.



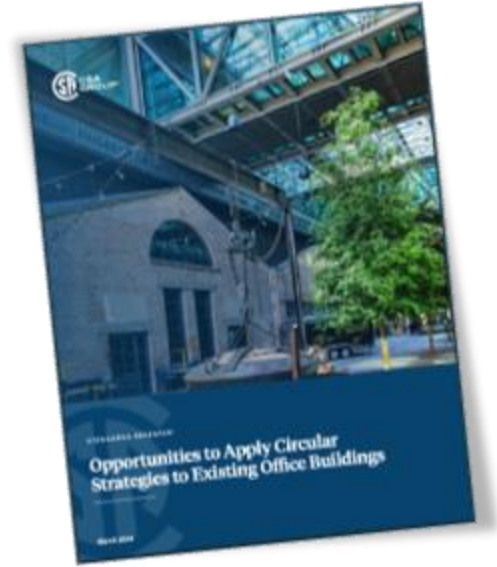




# Project Examples







# Office Conversions, Alberta

# Calgary office > housing conversion program

- **Downtown Development Incentive Program** launched in 2021 to reinvigorate Calgary's languishing downtown
- City is required to build nearly 7,000 housing units by 2027 and almost 36,000 by 2033
- Post 2008, commercial vacancies > 30%
- Offers C\$75/sf incentive (costs currently ~C\$300/sf for full conversion).
- Over a dozen projects gone through the program so far.

## Potential considerations:

■ Must have sufficient number of elevators or stairwells, with easy access to dwelling units.

■ Storey height should be more than 2.6 metres

■ Noise level at the facade.

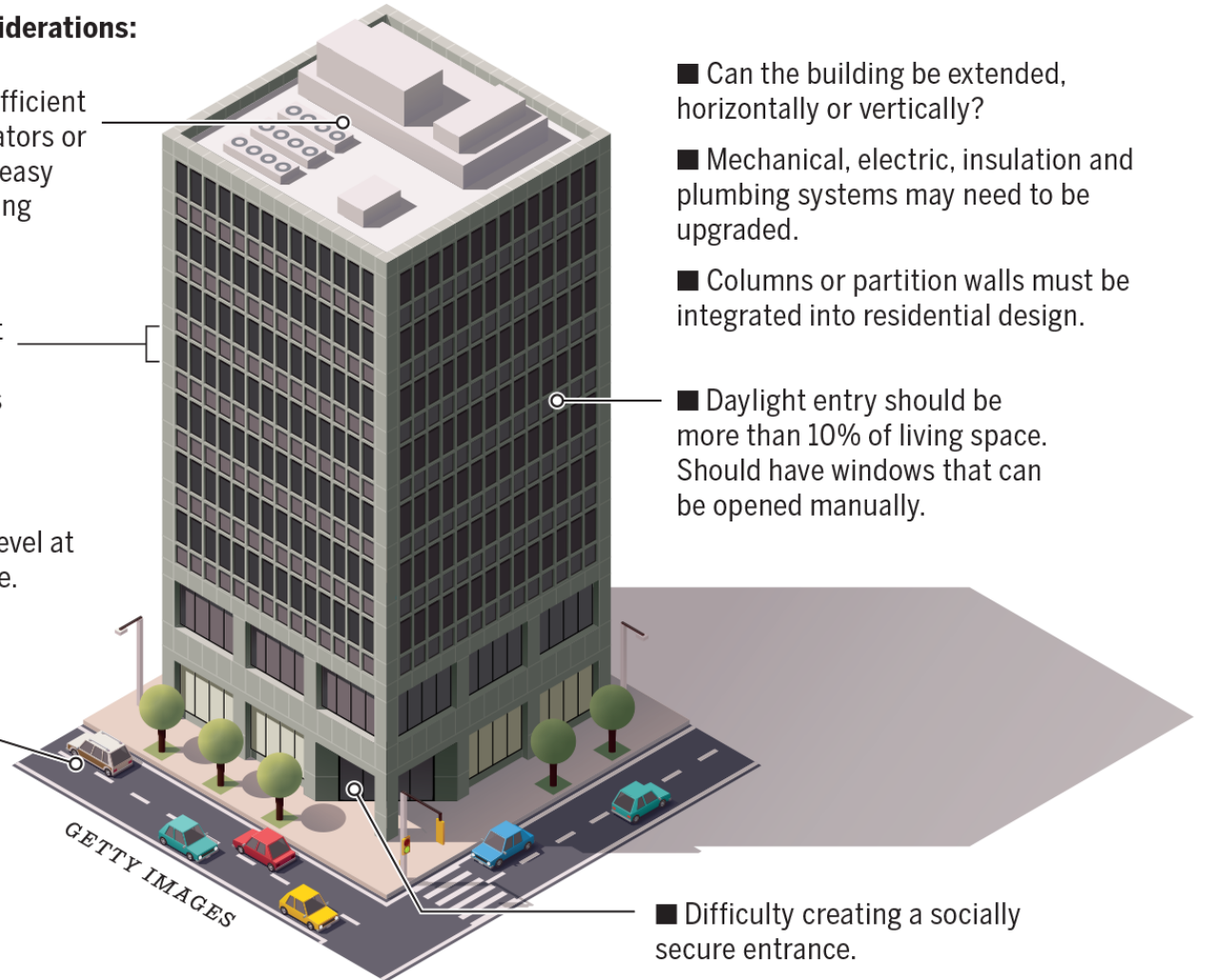
■ Can the building be extended, horizontally or vertically?

■ Mechanical, electric, insulation and plumbing systems may need to be upgraded.

■ Columns or partition walls must be integrated into residential design.

■ Daylight entry should be more than 10% of living space. Should have windows that can be opened manually.

■ Difficulty creating a socially secure entrance.



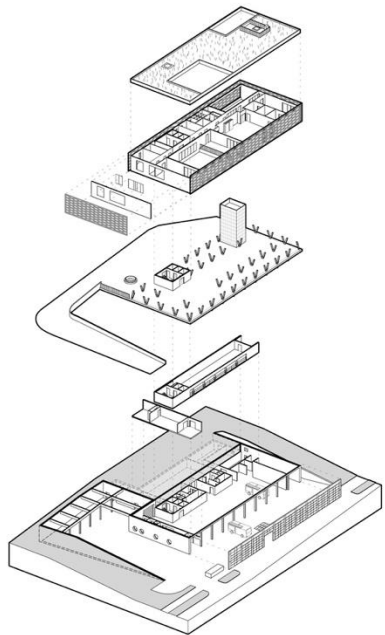
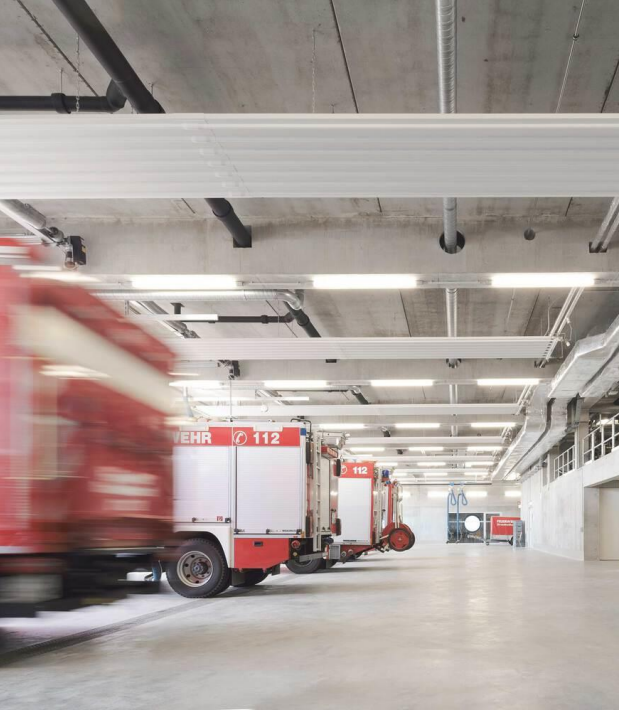




# Straubenhardt Fire Hall, Germany

- Straubenhardt declared itself a cradle-to-cradle (C2C) community, aligning the entire town with CBE principles.
- Fire Hall is the first C2C pilot project
- Designed by Wulf Architekten





- Simple configuration - lightweight mass timber upper storey clad in perforated metal over a concrete podium
- “Clean” Uncontaminated Materials
- Componentized Construction
- Designed for Disassembly
- Planning for Reverse Logistics



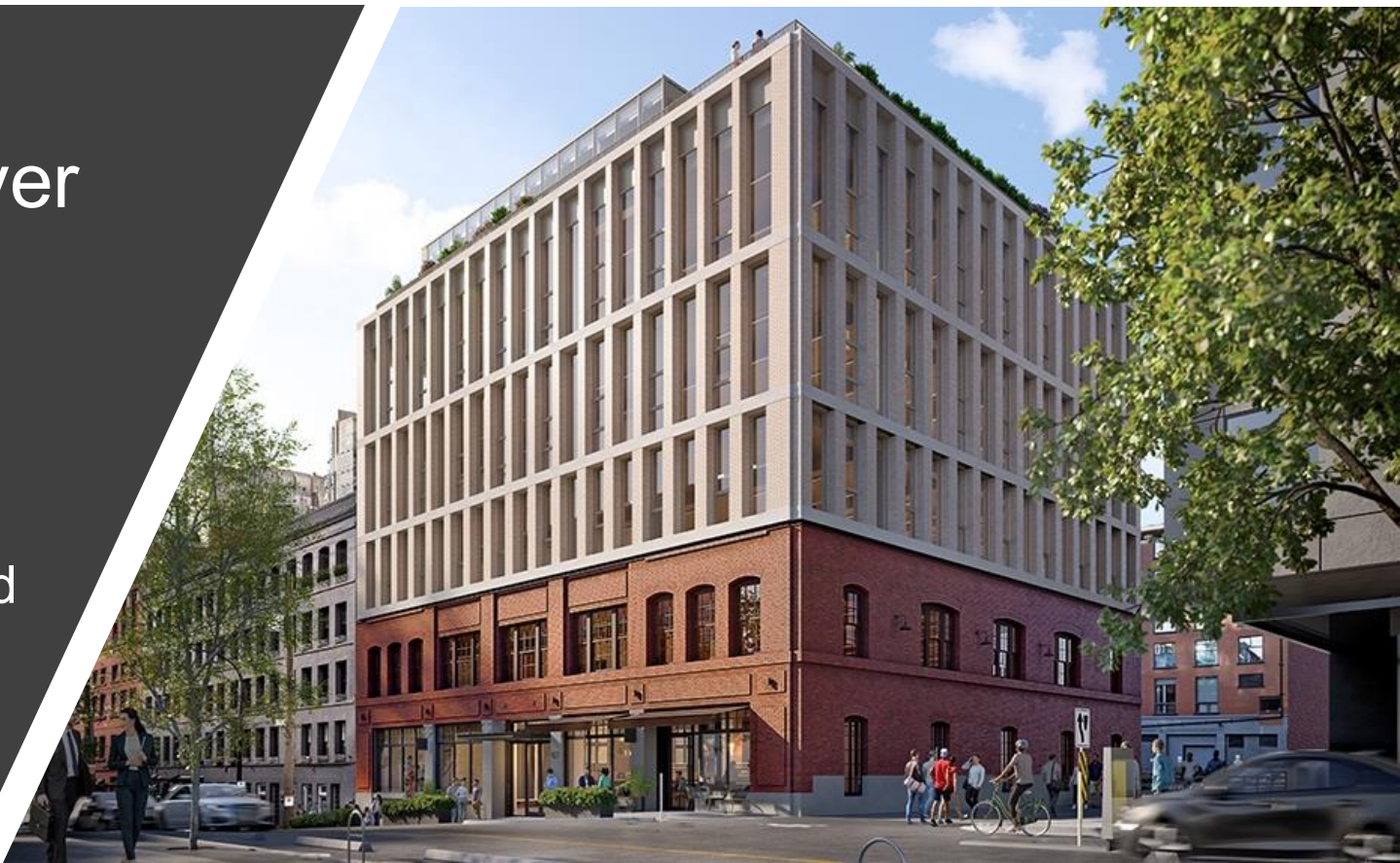


## 838 Beatty Street, Vancouver



4,134m<sup>2</sup> / 40,000sf  
addition

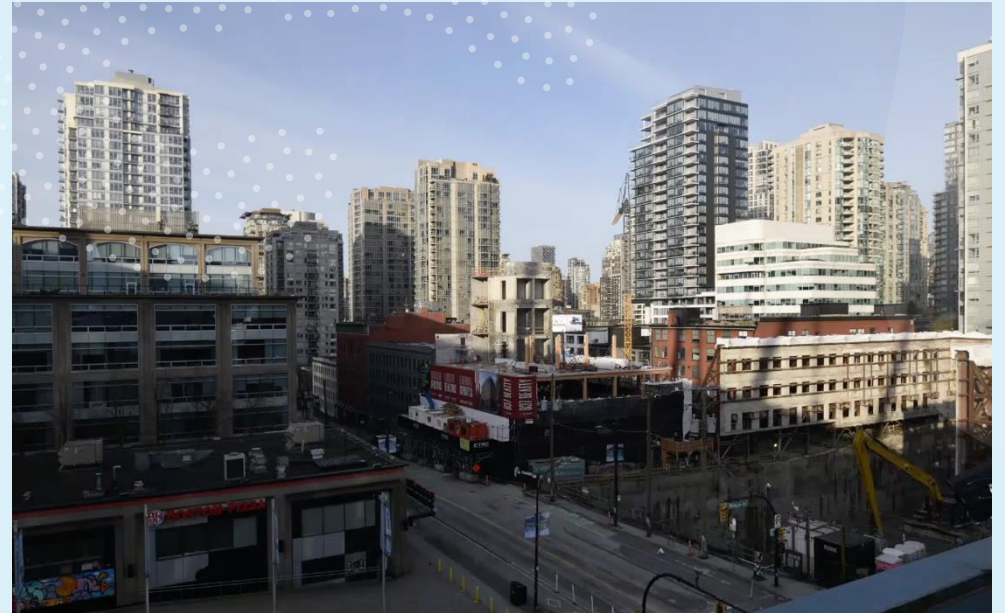
4 storey prefabricated  
mass timber structure  
added over a renovated  
3-storey timber  
warehouse.





# Mass Timber Helps the Business Case for Adaptive Reuse

- 4-storey mass timber addition features cross-laminated timber (CLT) and nail-laminated timber (NLT) systems.
- Mass timber structure is lightweight, versatile, fire resistant, and seismically robust.
- Long spans for flexible layouts.
- City relaxed parking requirements.





**80 M**  
10,000m<sup>2</sup> / 108,000sf Low  
Carbon Addition, Washington DC





# Vancouver-Vienna Ideas Exchange

- 2018 MOU where Vancouver and Vienna agreed to work together on best practices in social housing delivery.
- Convening regular knowledge-sharing events
- 2 pilot projects
- Project charters promote sustainability, social inclusion and modern methods of construction.
- Vancouver > mass timber industrialized construction
- Vienna > DoTank circularity framework



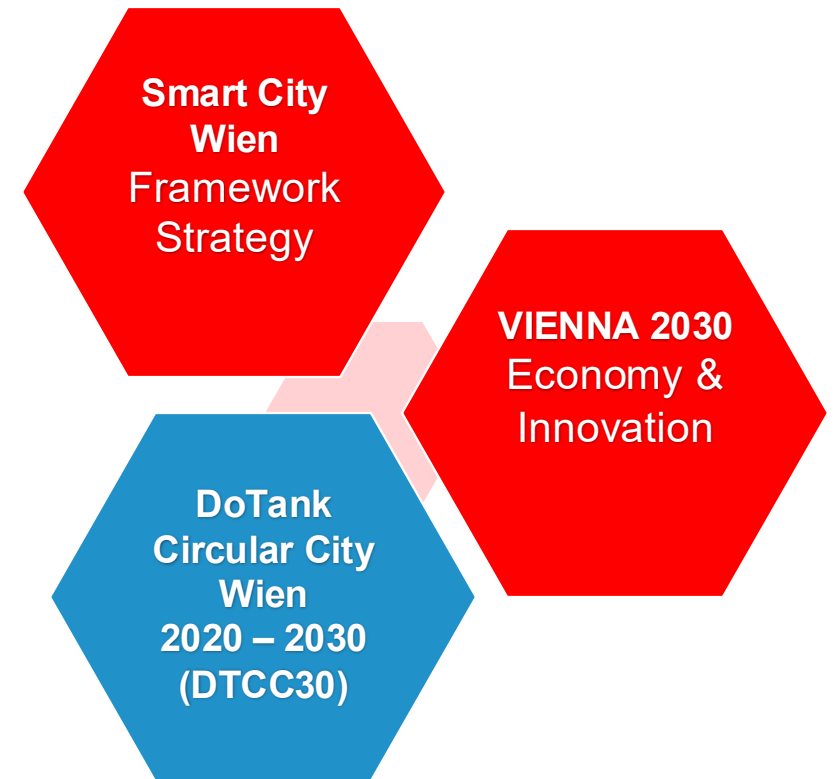


# DoTank Circular City Wien

## Guiding goals for the **DTCC30**

3

- Vienna reduces its consumption-based material footprint per capita by 30% by 2030 and by 50% by 2050.
- From 2030 onwards, site- and use-appropriate planning and construction for maximum resource conservation will be the standard for new construction and refurbishment.
- Components and materials from demolished buildings and major conversions will be 80% reused or recycled by 2050.

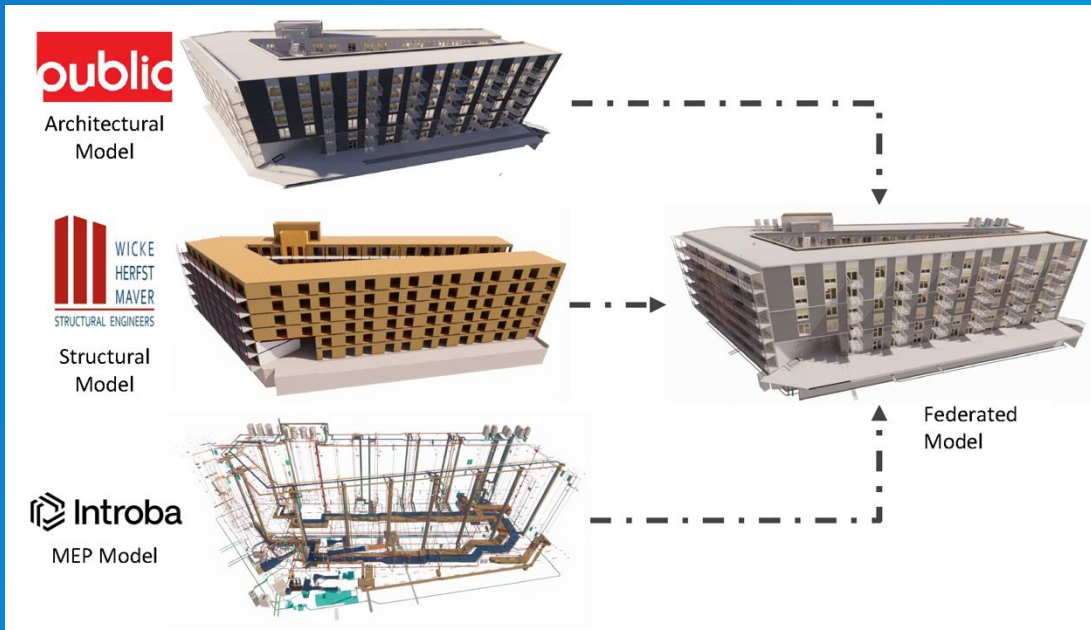




# Applying Lessons From Vienna

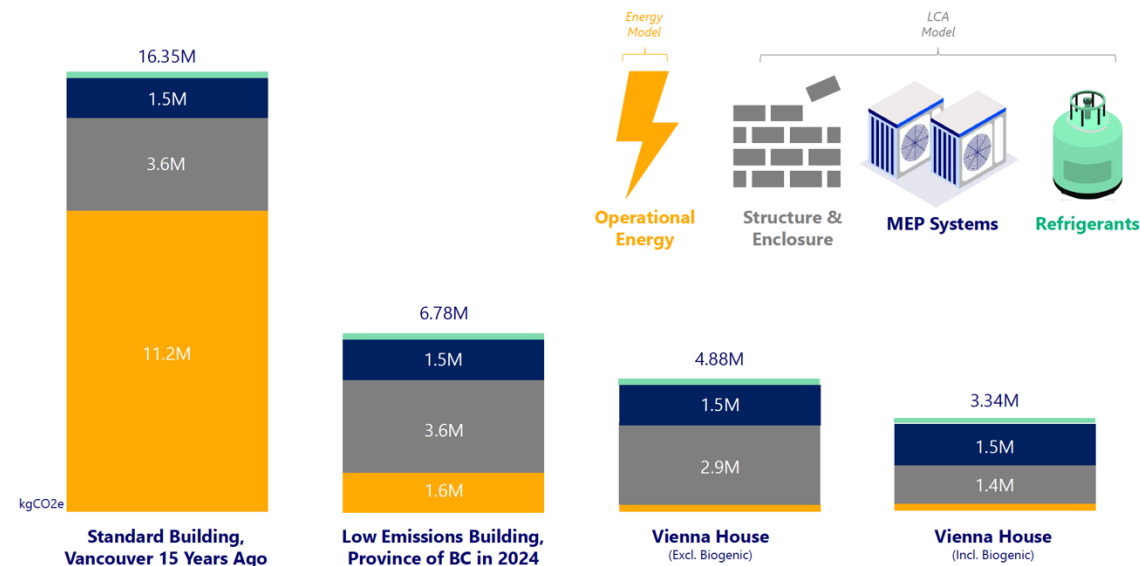
## Vienna House is a National Housing Demonstration Project

- Digital project delivery
- Fossil-free
- Simplified, compact and componentized systems
- Climate resilient (2050 climate files)
- Offsite fabrication
- Low carbon, local materials
- On schedule and on budget!



# Vienna House in Vancouver surpasses the City of Vienna's DTC2030 targets

Whole-life emissions are less than a third of a  
baseline building





# Starting to Plan?

## Carbon Risk Real Estate Monitor (CRREM) Risk Assessment

CRREM helps asset owners and investors to understand the carbon risks inherent in their real estate portfolio from now to 2050.

- Assess the embodied and operating carbon and energy performance of buildings and portfolios
- Benchmark against CRREM pathways and peers
- Derive indicators for risk management, reporting, disclosure
- Plan and prioritize retrofits, conversions, and adaptive reuse strategies

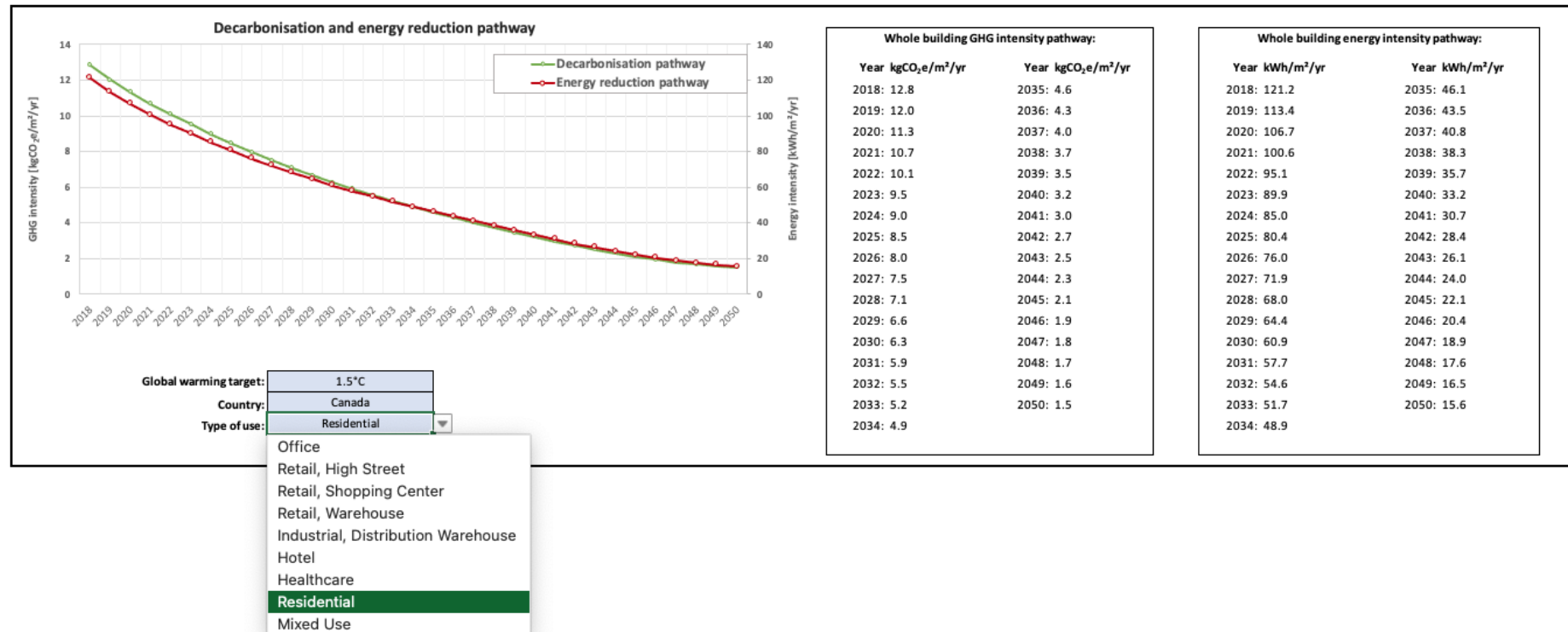




# CRREM Decarbonization and Energy Reduction Pathways for Real Estate

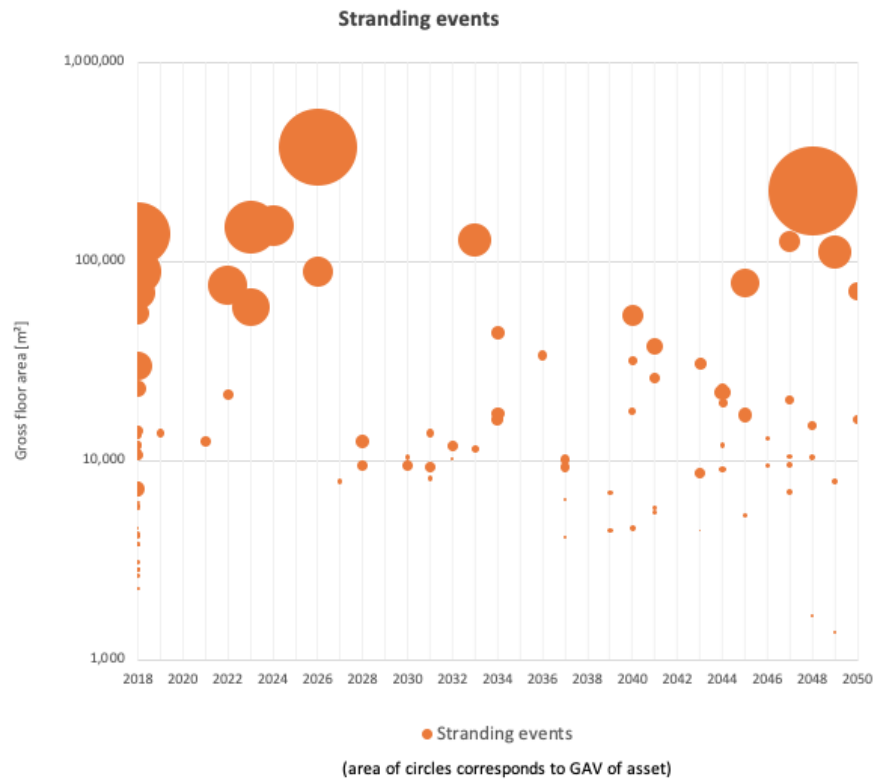
CRREM scales down the global GHG emissions budget necessary to achieve the Paris Climate Agreement by 2050 for 2.0°C and 1.5°C targets.

> To country, region, property type



# Portfolio View

- Aggregate the impacts from collections of buildings by type and location in terms of:
  - Gross Asset Value
  - Gross Floor Area
  - Number of buildings





# Thank You

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**SCIUS**  
Advisory



# Navigating the Circular Built Environment, presentation of the ECESP Reading Guide



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Flanders, Belgium

European Circular Economy  
Stakeholderplatform

# Navigating the Circular Built Environment, presentation of the ECESP Reading Guide

May 7th 2025 – IURC North America



**ETH** zürich



European  
Commission





# Public – Private Partnership Circular Flanders



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veerle@vlaanderen-circulair.be

ECESP Leadership Group Circular Built Environment



VLAANDEREN  
CIRCULAIR



## GOVERNANCE CIRCULAR FLANDERS



### 6 thematic agendas

Public-private collaborations  
with specific dynamics, targets,  
lead partners and actions



circular  
construction



chemistry &  
plastics



water  
loops



bioeconomy



food chain



manufacturing

### 7 strategic levers

Accelerators for overcoming  
barriers and spreading good  
practices

Policy and policy  
measures

Circular  
procurement

Communication

Research

Innovation  
& entrepreneurship

Financing

Jobs & skills

# European Circular Economy Stakeholder Platform

A joint initiative by the European Commission and the European Economic and Social Committee

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Home > Knowledge Hub

## Knowledge Hub

### Good Practice



### Commitment



### Strategies



### Pledges



### Knowledge





# A reading guide on circularity in the built environment

1. Introduction
2. Circular Design Principles
3. Materials and Resource Efficiency
4. Standardization and Digitalisation
5. Policy and Regulation
6. Economic and Environmental Benefits
7. Best practices
8. Publications and Resources



## **Circularity in the built environment**

A Reading Guide

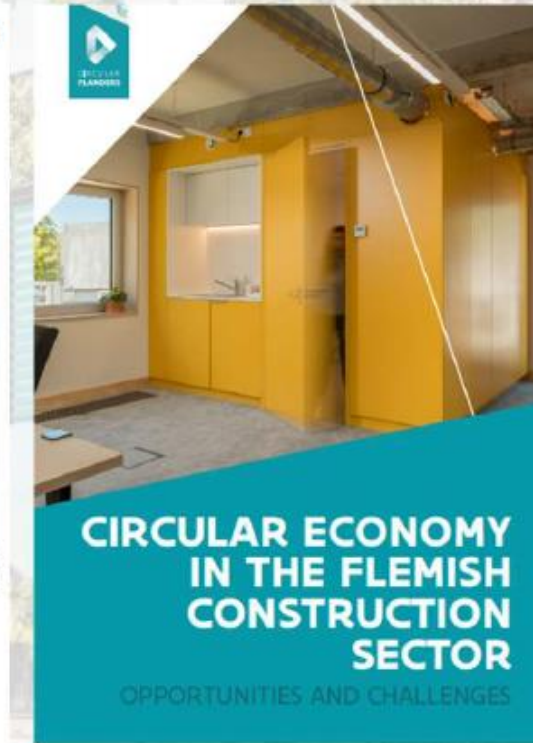
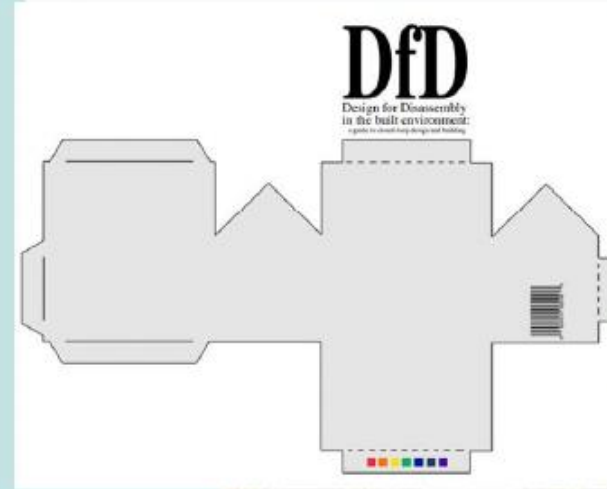
ECESP Leadership Group Circular Construction & Infrastructure, March 26th 2025

# Introduction



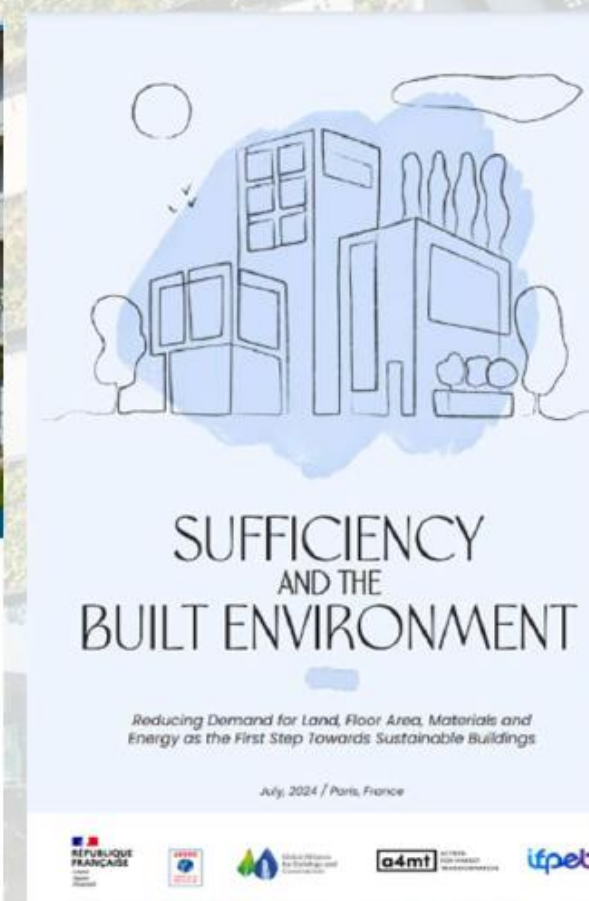
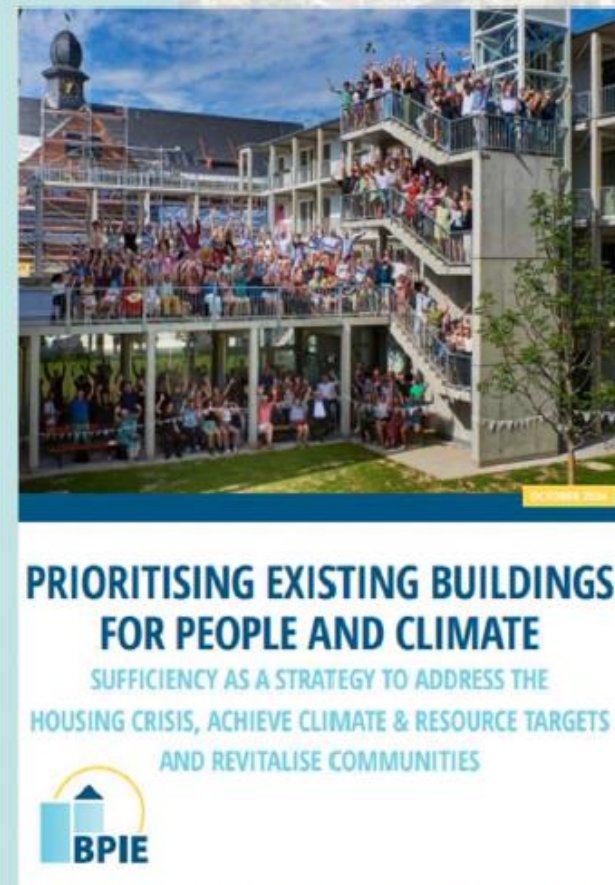


# Circular Design Principles





# Materials and Resource Efficiency





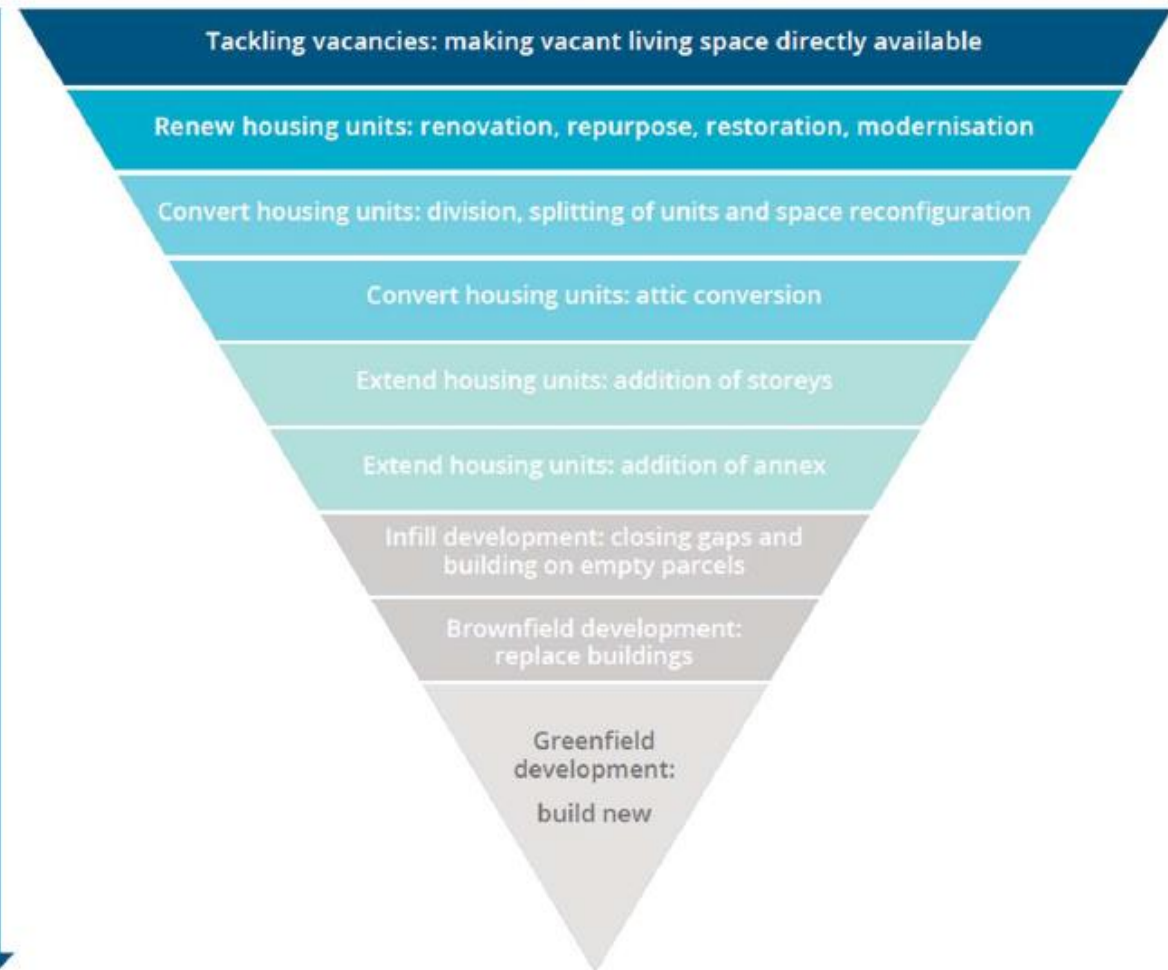
# SUFFICIENCY IN THE BUILDING SECTOR

## Decision pyramid

- Applying sufficiency principles to buildings can take many different forms

**MOST  
preferred**

**LEAST  
preferred**



“

While efficiency is about doing things right, sufficiency is about doing the right things.<sup>10</sup>

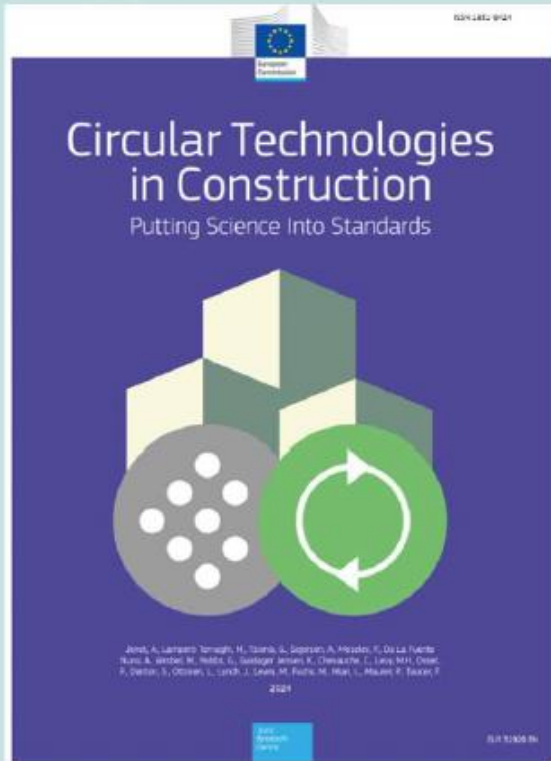
”

# Materials and Resource Efficiency





# Standardization and Digitalisation



## The circular economy: building trust through conformity assessment

Standards and conformity assessment provide assurance on aspects of the circular economy...

## DGNB BUILDING RESOURCE PASSPORT

Document key information on all life cycle phases of a building



## Whitepaper Digital product passport (DPP) for construction products

09/2024



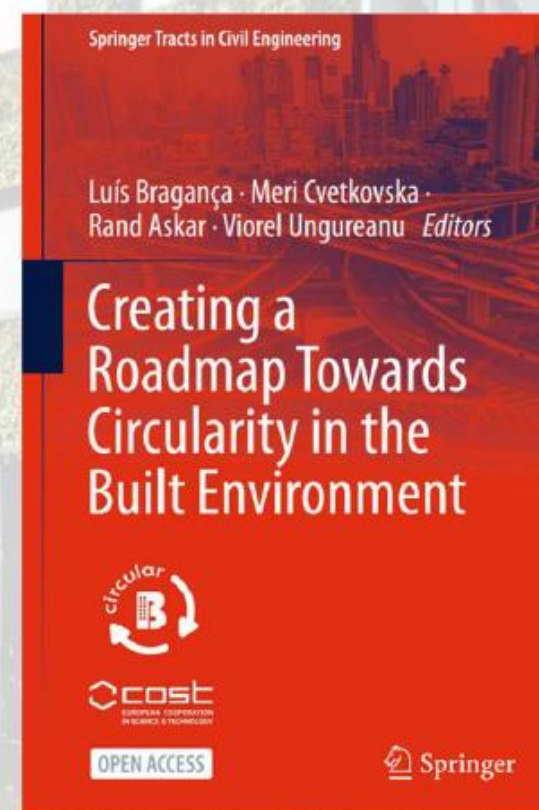
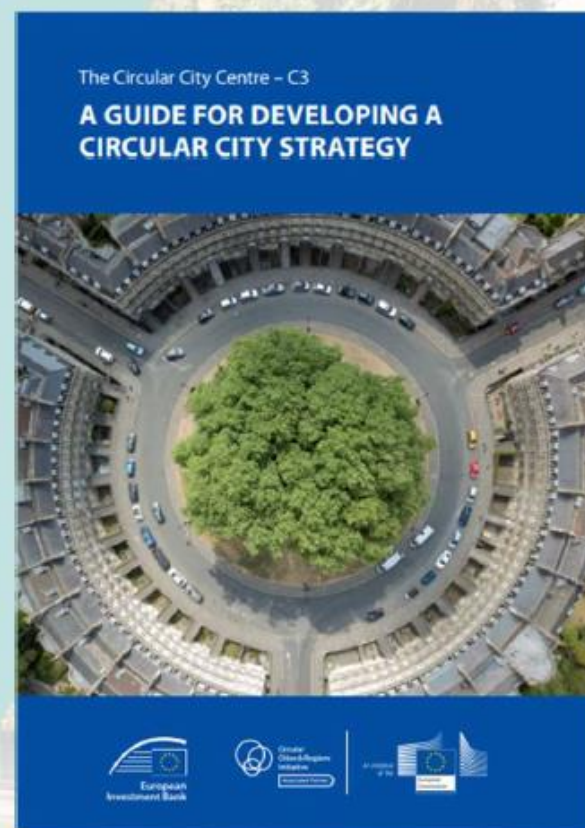
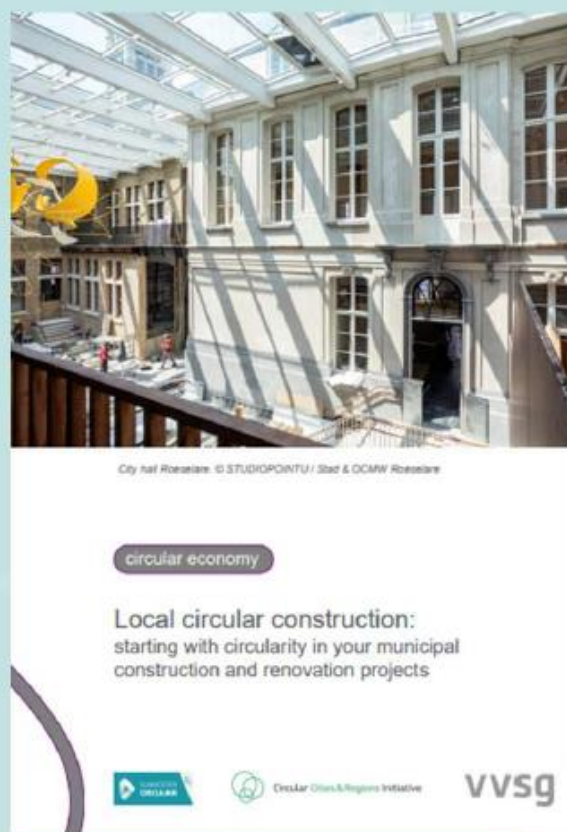
Concular Home Projekte Alle Produkte Kostengruppen Kategorien Beschaffung Kontakt





# Policy & regulation

Circularprocurement.be -> learning hub





# Economic and Environmental Benefits









# #EUCircularTalks

## Meet the speakers



Corina Murafa  
EESC Member



Josefina Lindblom  
European Commission



Zsolt Toth  
Building Performance Institute  
Europe



Nick Jeffries  
Ellen MacArthur Foundation



Evangelia Tsiala  
European Builders' Confederation



Arnaud Evrard  
ETH Zurich



Charlotte Cambier  
Embuild Flanders (moderator)



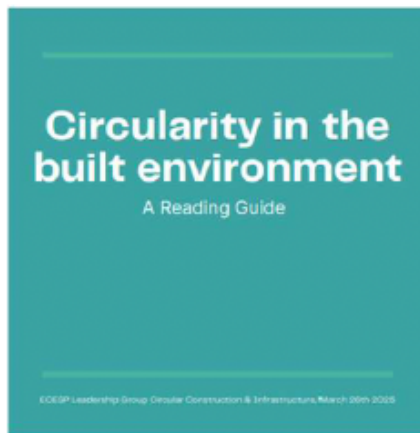
European  
Commission





# Let's keep in touch

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June 5th in Brussels or online



ECESP Group on the Circular  
Built Environment





# Questions & Answers



**Lisa Graaf**

Senior Project Manager,  
Buildings Performance  
Institute Europe  
Berlin, Germany



**Helen Goodland**

Principal and Head of  
Research & Innovation,  
SciUS Advisory  
Vancouver, Canada



**Veerle Labeeuw**

Circular Flanders and  
coordinator of the ECESP  
Leadership Group Built  
Environment  
Flanders, Belgium



**Jacinthe Séguin**

**Moderator** - IURC-NA  
Circular Economy and  
Nature-based Solutions Expert  
Ottawa, Canada

Thank you for participating in  
our Sustainable Urban  
Mobility Webinar

**Innovations In the built  
Environment:** *Exploring  
Circular Solutions for  
Modernizing the Building  
Stock & Creating  
Affordable Housing*

organized by the IURC-NA programme.

*Please fill in the survey  
sent through the chat!*