What's next?

A study to the relationship between the technical aspects and reuse potential of reused building products

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alba concepts

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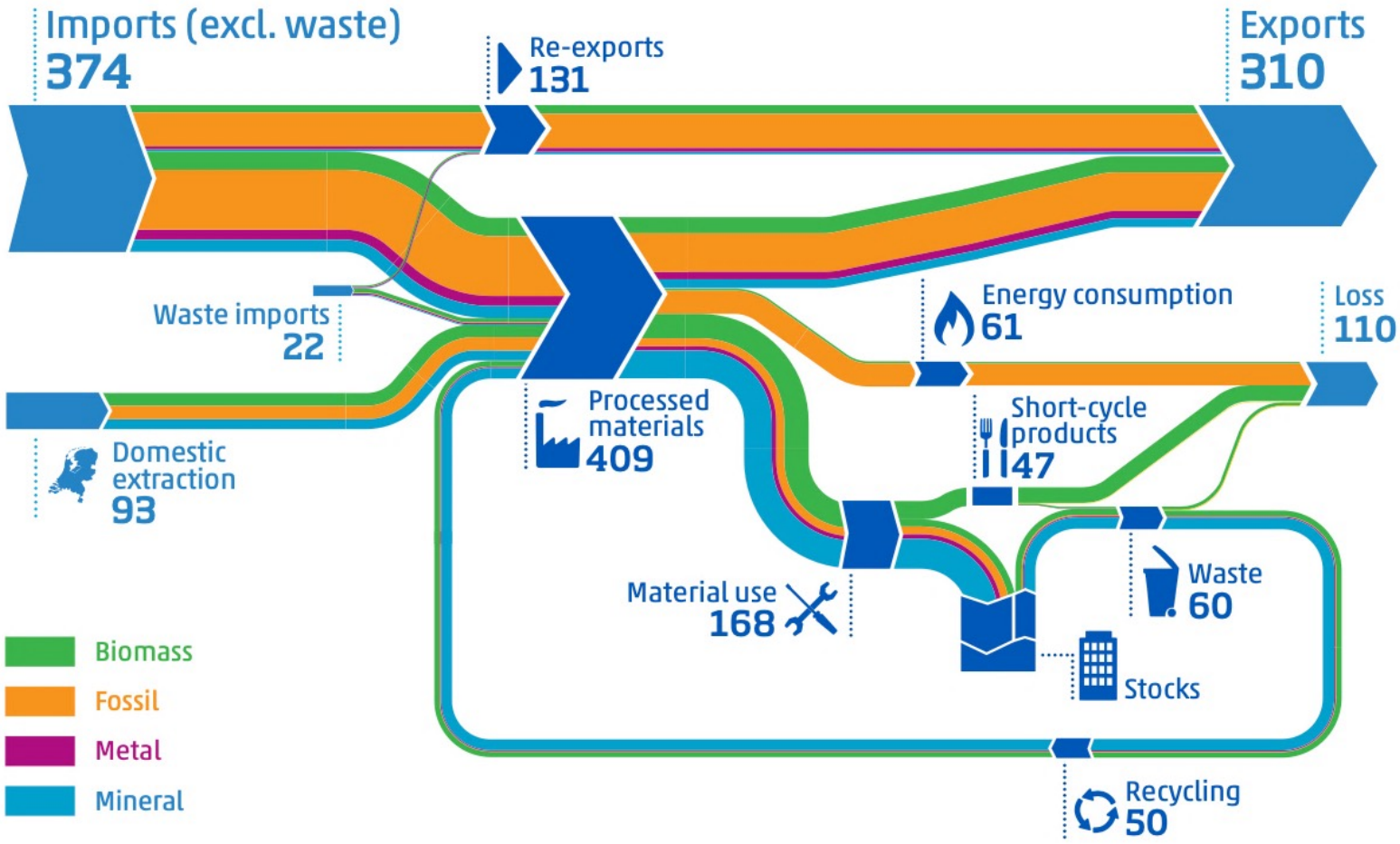
WATER
BLENDSTAR
PREMIUM QUALITY
Billie

Content

01 | Introduction

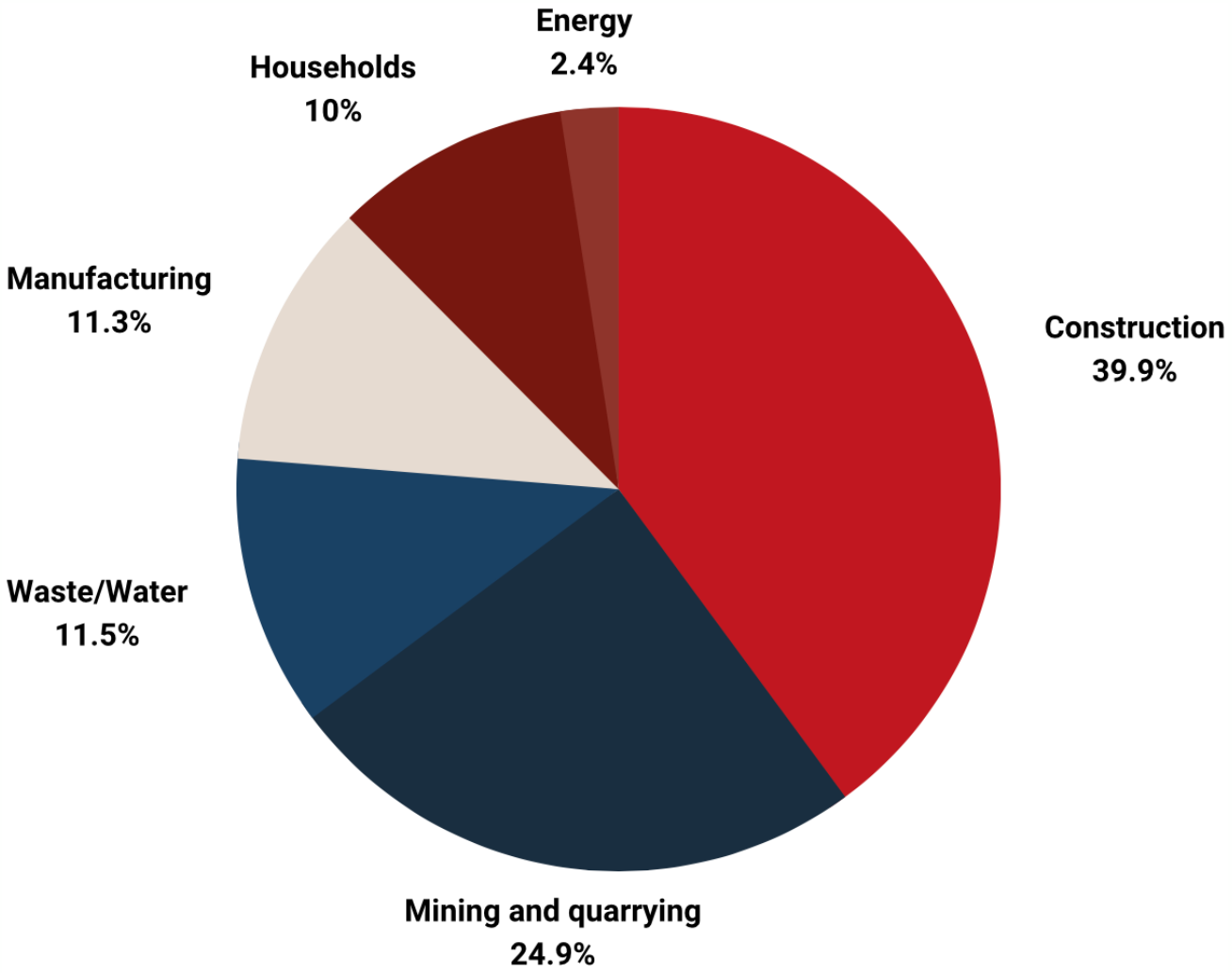
Context
Problem statement
Main Research Question

Material flow in The Netherlands



(CBS, 2020)

Waste generation by economic activities



(Eurostat, 2020)

Waste in the Built Environment

Built Environment sector responsible for about 40%

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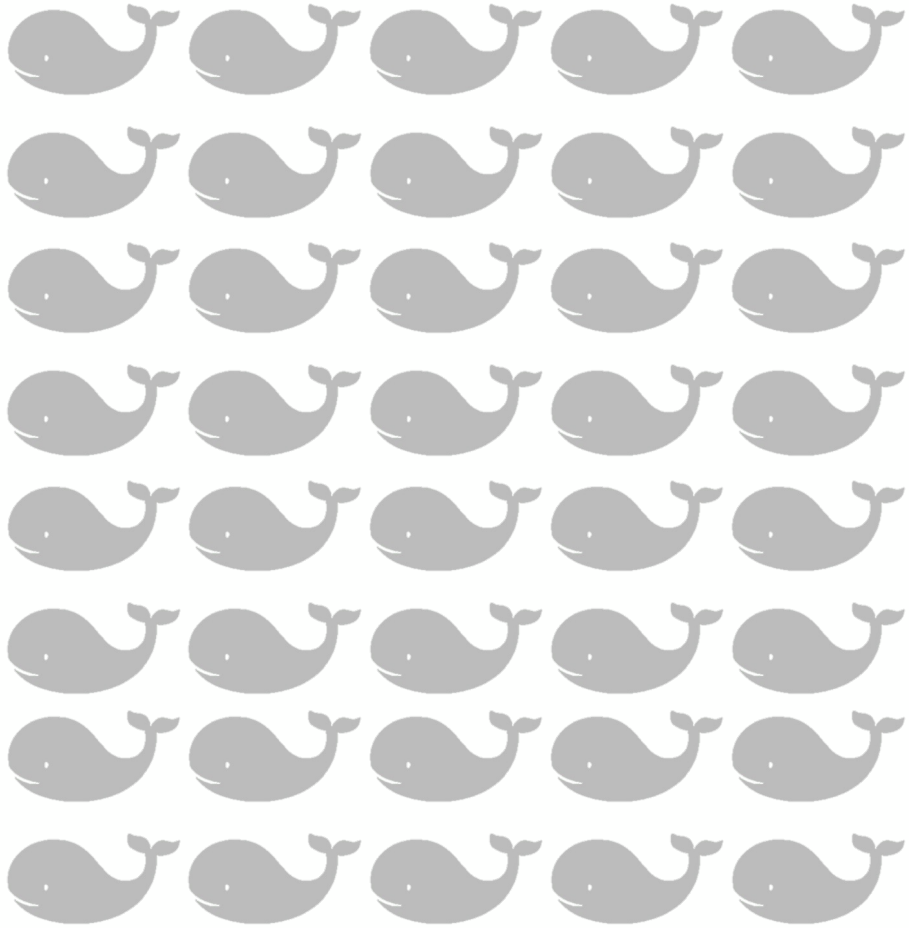
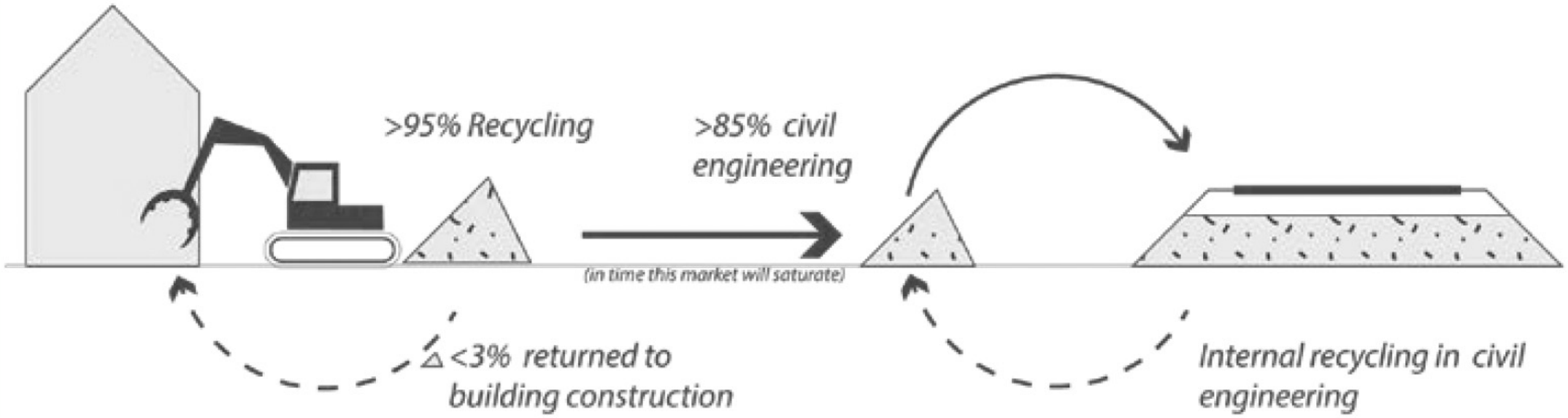
24 billion kg



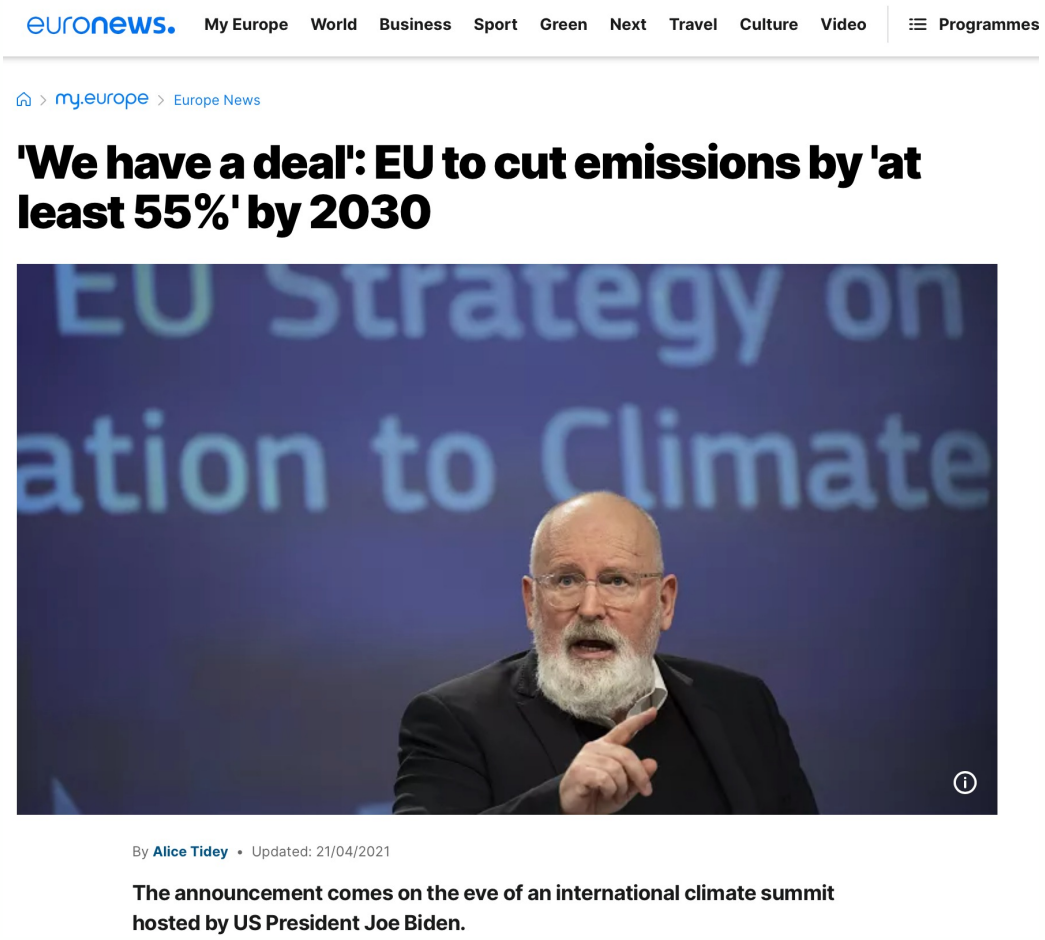
44,400 Blue whales

Recycling in the Dutch Built Environment



(Schut et al, 2015)

Towards a circular economy


euronews. My Europe World Business Sport Green Next Travel Culture Video Programmes

my.europe > Europe News

'We have a deal': EU to cut emissions by 'at least 55%' by 2030

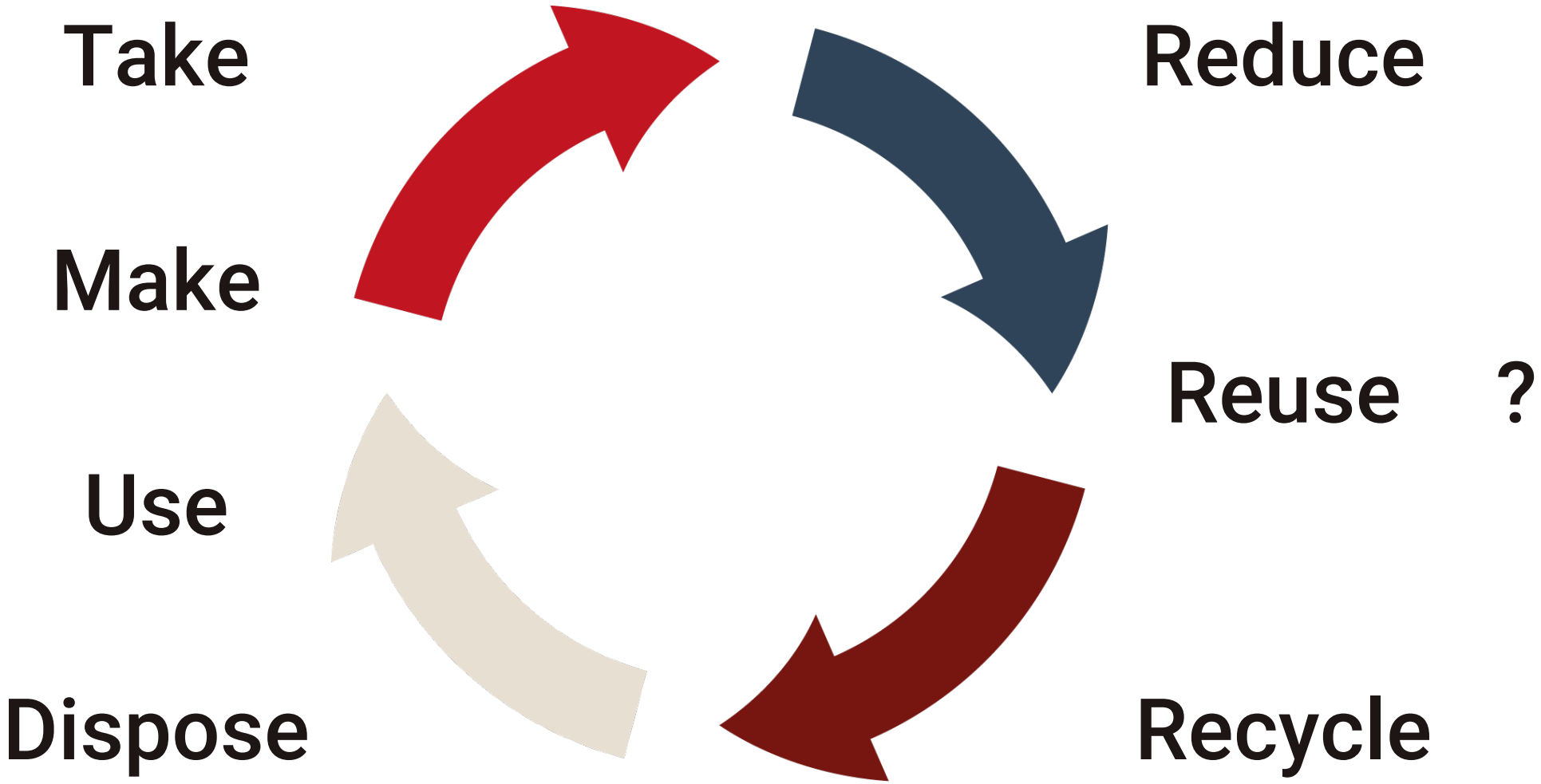
By **Alice Tidey** • Updated: 21/04/2021

The announcement comes on the eve of an international climate summit hosted by US President Joe Biden.

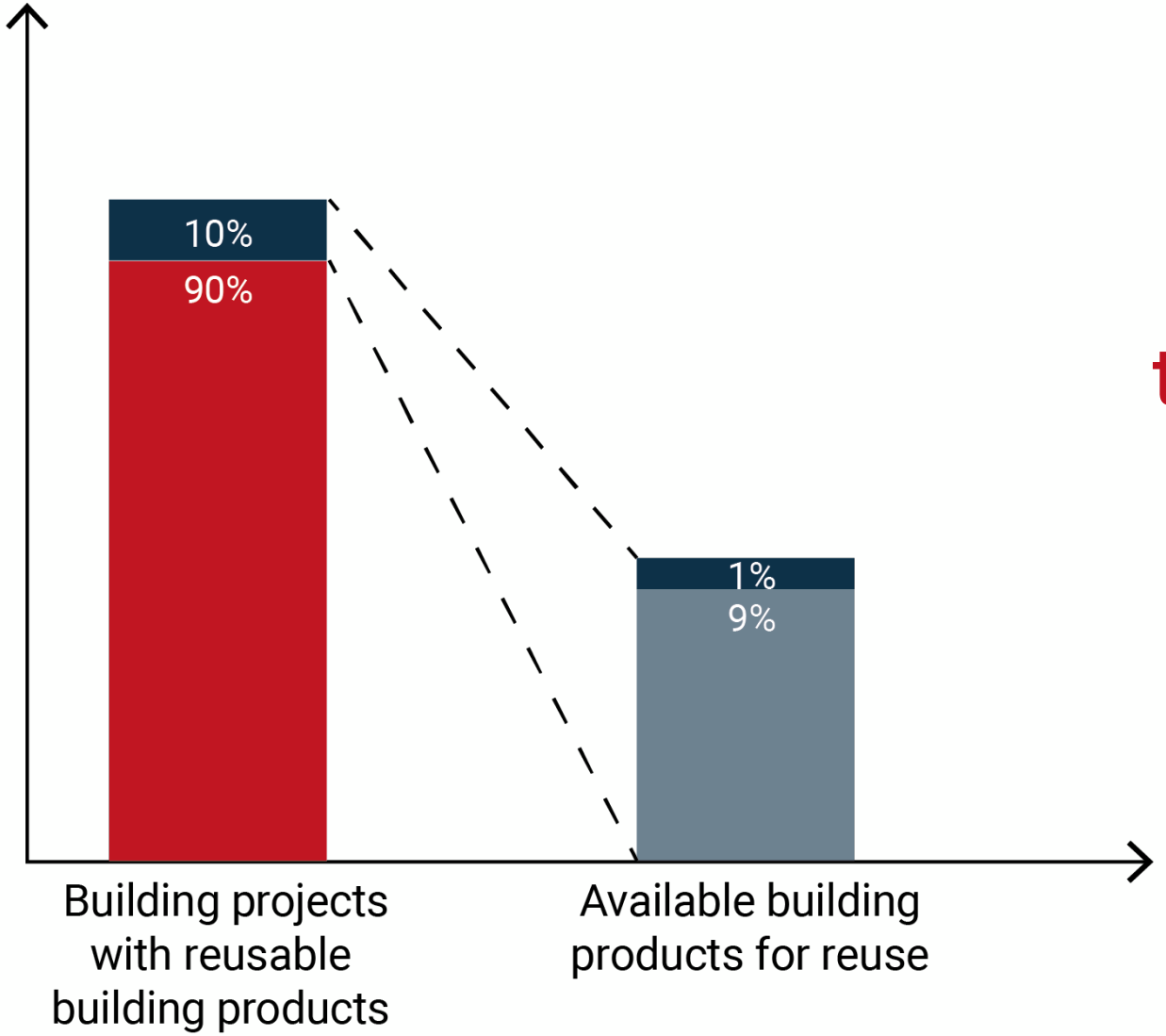
(Euronews, 2021)

(RVO, 2018)

From linear to circular



Reuse of building products



Lack of techniques, awareness and legislation

To reuse or not to reuse?

=

technical aspects

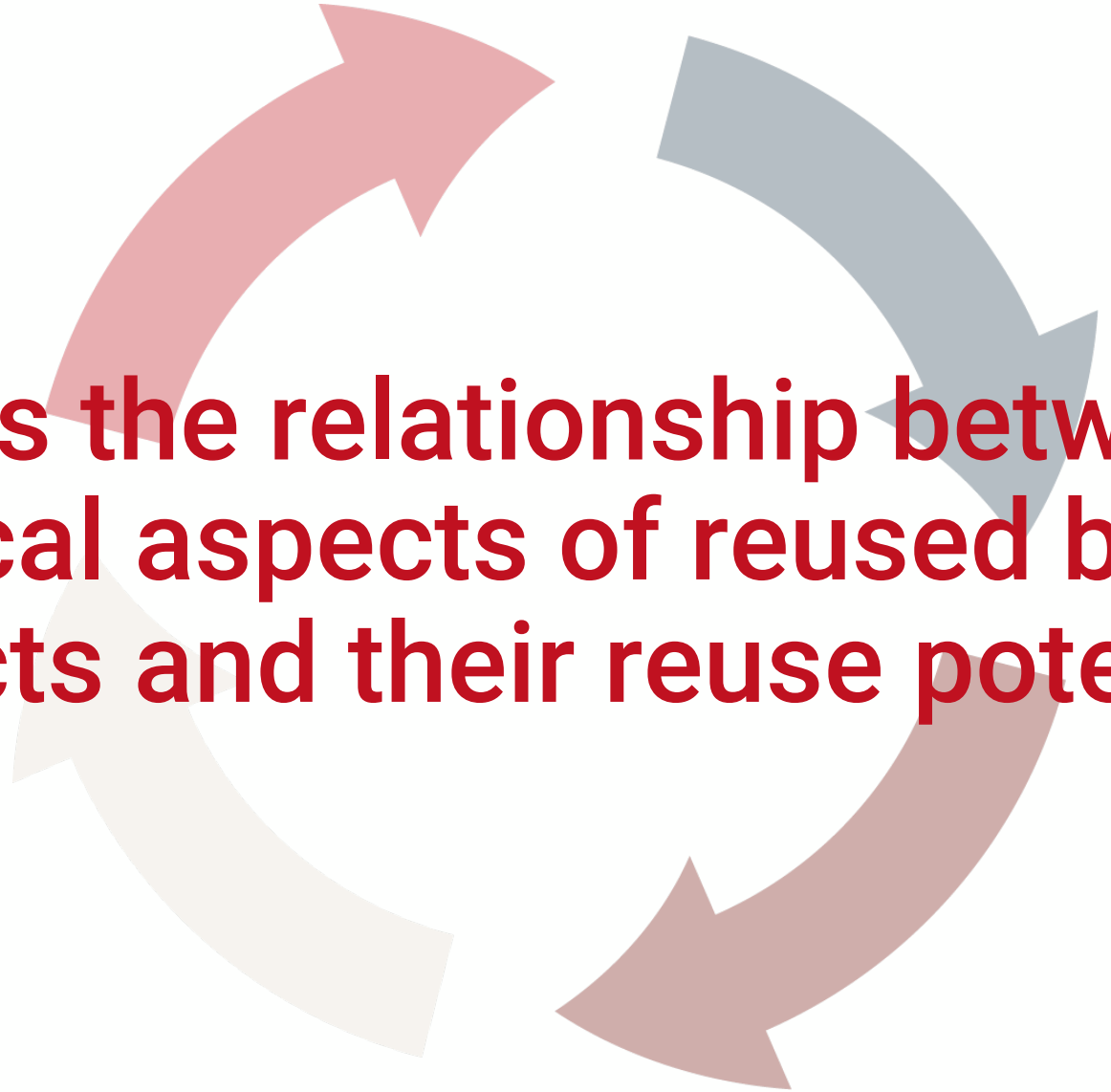
Problem statement

Time and fitting

Conventional building products = are not designed to be reused

New techniques and legislation alternatives to reuse them

Limited research in the technical aspects that make the reuse of building products possible

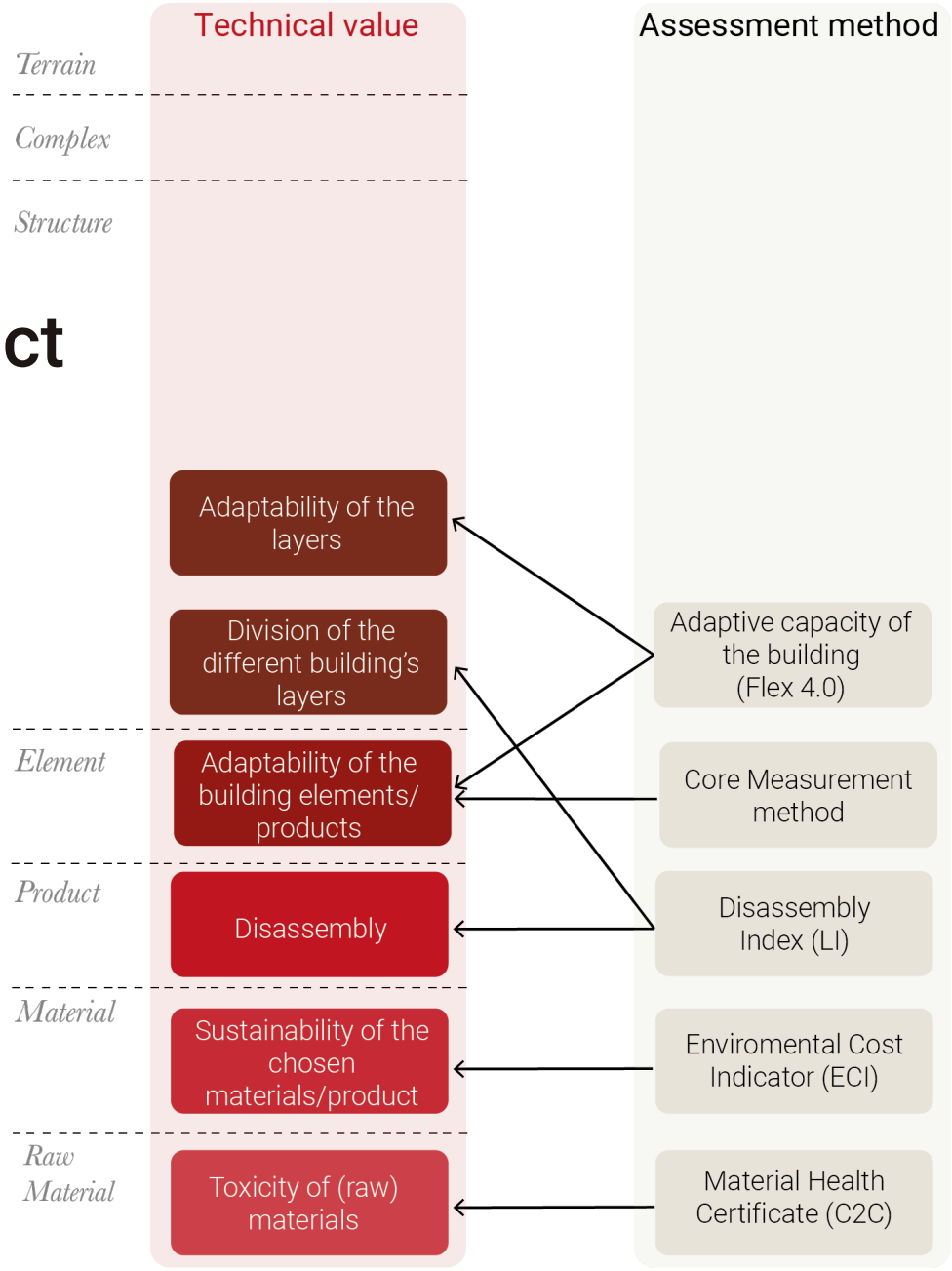


“What is the relationship between the technical aspects of reused building products and their reuse potential?”

Technical Aspects

Disassembly

Adaptability of the building product



Reuse Potential

Greater value when reused

Technical Factors

Adaptability

Toxicity

Material Quality

Standardisation

Disassembly

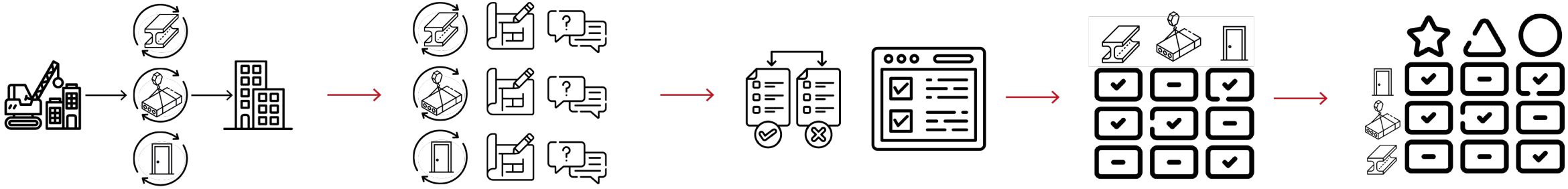
02 | Method

Research method
Case selection criteria
Case Assessment Framework

Research methods

Literature study

Sampling study = nonprobability sampling



Group characteristics
case selection

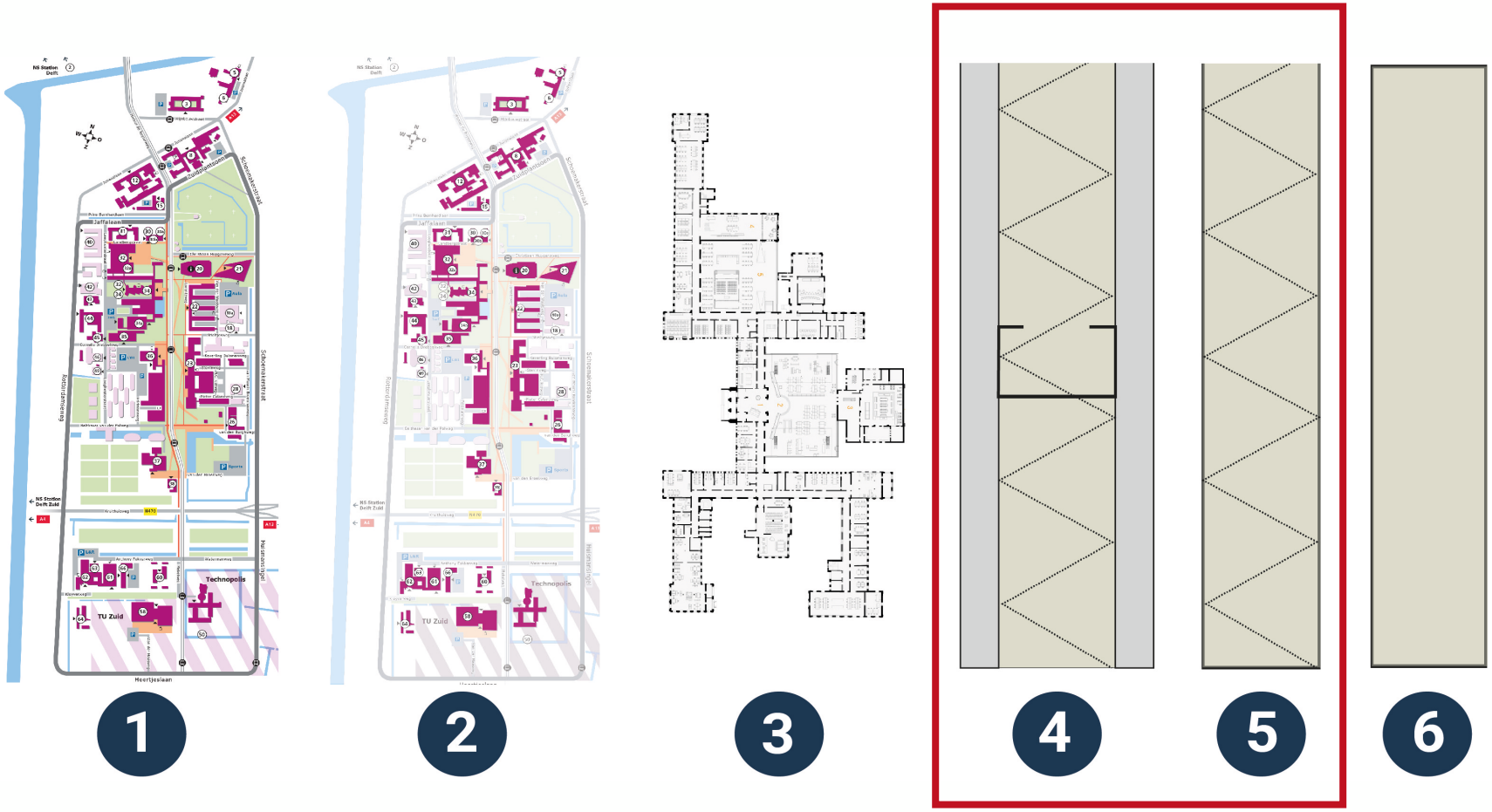
Document review
and interviews

Framework for
the case assessment

Case assessment

Systematic overview

Case selection criteria: building levels



Building elements and products

Case selection criteria: building layer

Skin

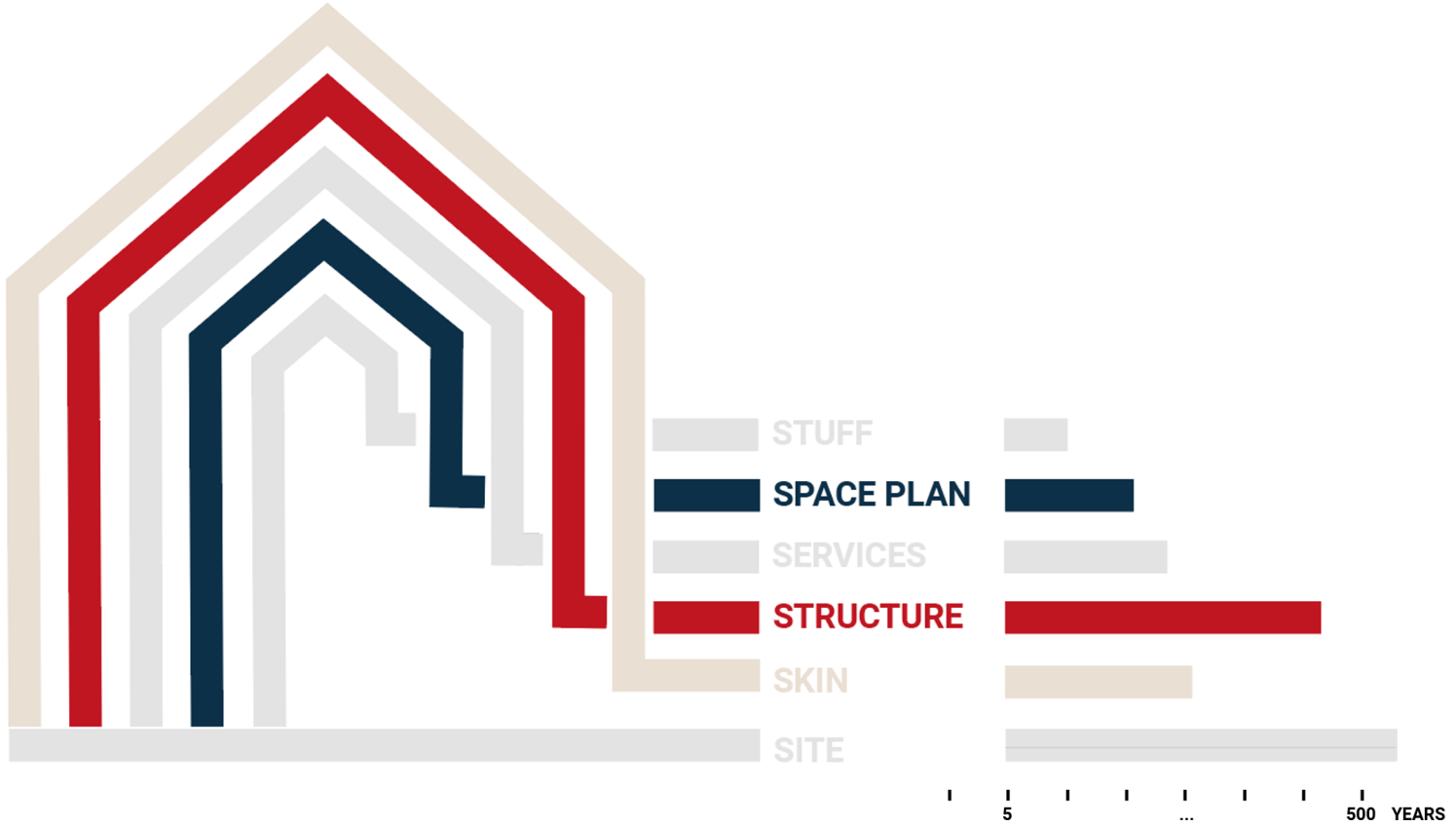
Thermal insulation

Structure

Load-bearing
and fire safety

Space plan

Sound insulation



Case selection criteria: new built project

More in-depth study of the challenges encountered

Reuse potential for subsequent lifecycles

Case Assessment Framework

General information

- Description
- Previous and current function
- Application
- Circularity strategy used

Layer information

Adaptive capacity of the building (Flex 4.0)

- Adaptability level of the building product within the layer

Information about the assessed building product

Disassembly potential measurement

- Disassembly Index
- Condition assessment
- Technical requirements

Adaptability aspects from Schmidt

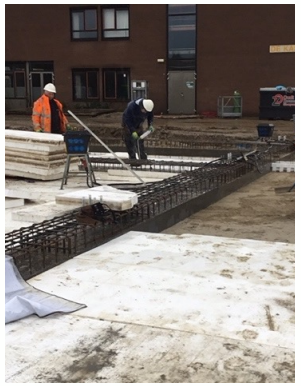
- Adaptive capacity (scalable, movable, adjustable, versatile, refitable, convertible)

03 | Findings

Skin Layer
Structure Layer
Space plan Layer

Skin Layer

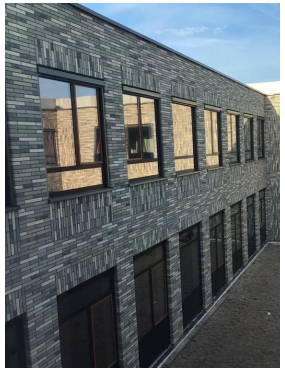
EPS insulation

High

+ Disassembly potential
+ Adaptability
+ Scalable
-/+ Refitable

Window frames and non-ceramic cladding*

Moderate

+ Disassembly potential
- Adaptability

*timber and aluminium window frames

Ceramic cladding


Low

- Disassembly potential
- Adaptability
- Scalable

Structure Layer

Timber and steel structure


Concrete floor slabs


Other concrete structures


High

+ Disassembly potential
+ Adaptability

Moderate

- Disassembly potential
- Scalable
+ Adaptability

Low

- Disassembly potential
- Scalable
- Adaptability

Space Plan Layer

Brick flooring

Moderate

- Refitable
- Scalable
- Convertible
- Adaptability
+ Disassembly potential

System walls

Moderate

- Disassembly potential
-/+ Adaptability
-/+ Refitable (insulation)

Timber ceiling

Moderate

- Refitable
- Scalable
- Convertible
- Adaptability
+ Disassembly potential

Stone tiles

Low

- Disassembly potential
- Refitable
- Scalable
- Convertible
- Adaptability




Disassembly - Scalability - Refitability - Adaptability




06 | Interpretation of the findings

Reuse Potential of building products
Posterior lifecycles
Influencing factors of the Reuse Potential

Reuse Potential of building products

“Not possible to reuse” label

Products with low reuse potential

Timber windows frame with a lower reuse potential

Due to upgrading building requirements

Steel and timber structure products

High Reuse Potential

Posterior Lifecycle

"Reused building products are not being applied in such a way that they can be easily disassembled for the next lifecycle simply because the client does not ask for it"

- Expert interview 1

Posterior Lifecycle

Reuse of convectional building products

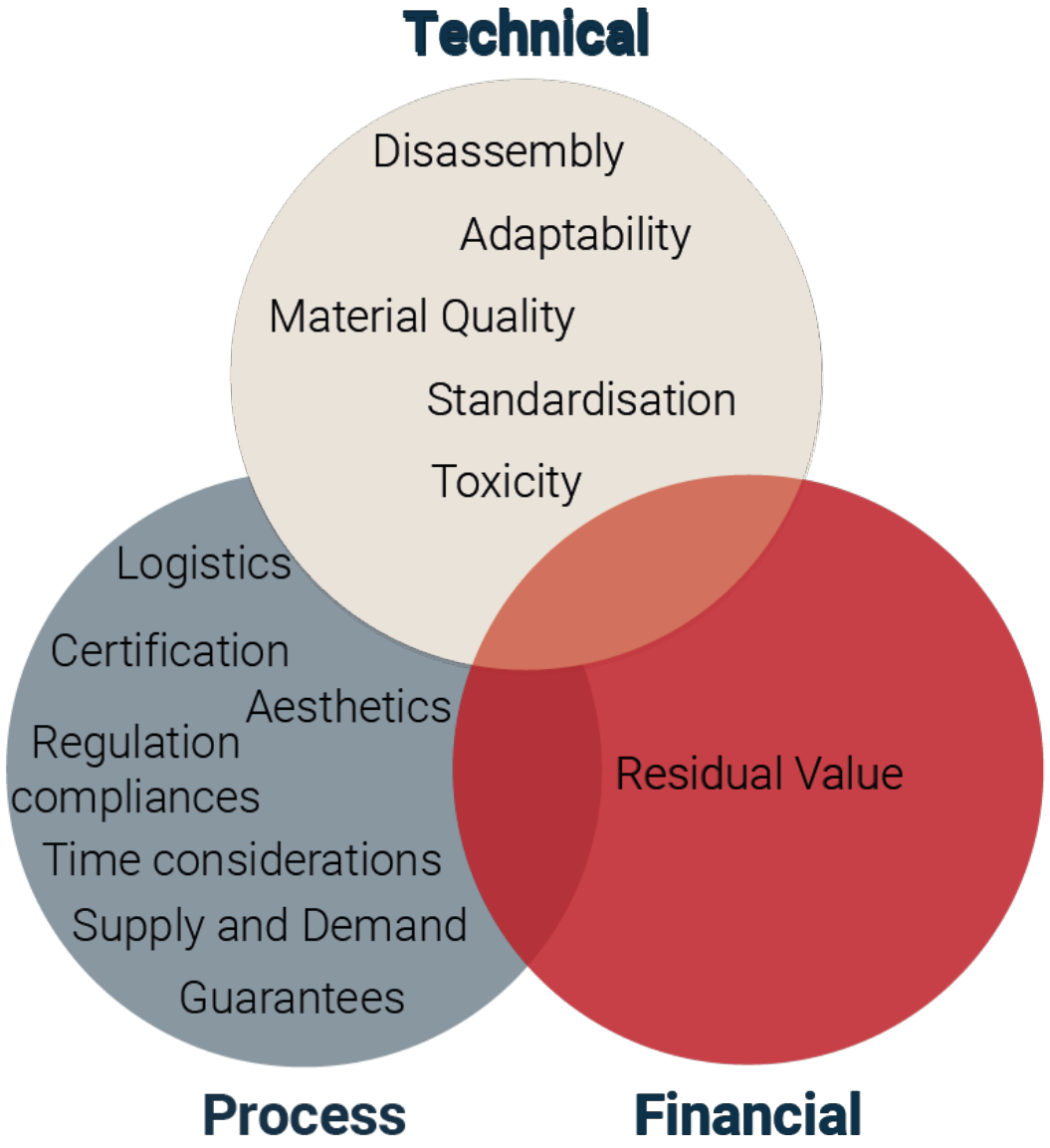
To reuse or not to reuse?

=

technical aspects
and beyond

Influencing factors of the Reuse Potential

"Time cost money"



Economic benefit

07 | Conclusions

What is the relationship between the technical aspects of reused building products and their reuse potential?

The Reuse Potential is influenced by the application within the layer **(disassembly potential);** how the building product can meet new technical requirements **(adaptability);** how this can be improved to meet new requirements **(refit aspect)** and how this can change its size **(scalable aspect)**

What’s next?

A top-down approach is needed to facilitate the transition to the reuse of building products to meet the goals

Questions?

Appendix

Reuse Potential Levels

- **High**: possible to disassemble and move; scalable and convertible and moderate to high adaptability potential or refit to meet new requirements
- **Moderate**: possible to disassemble and move, low adaptability, refit and scalable aspect
- **Low:** not possible to disassemble, moved, refitted or converted

Reuse Potential of building products

- More building products are possible to reuse
- Steel and timber structure products have the higher reuse potential
- Timber windows frames have a lower reuse potential rate due to upgrading building requirements

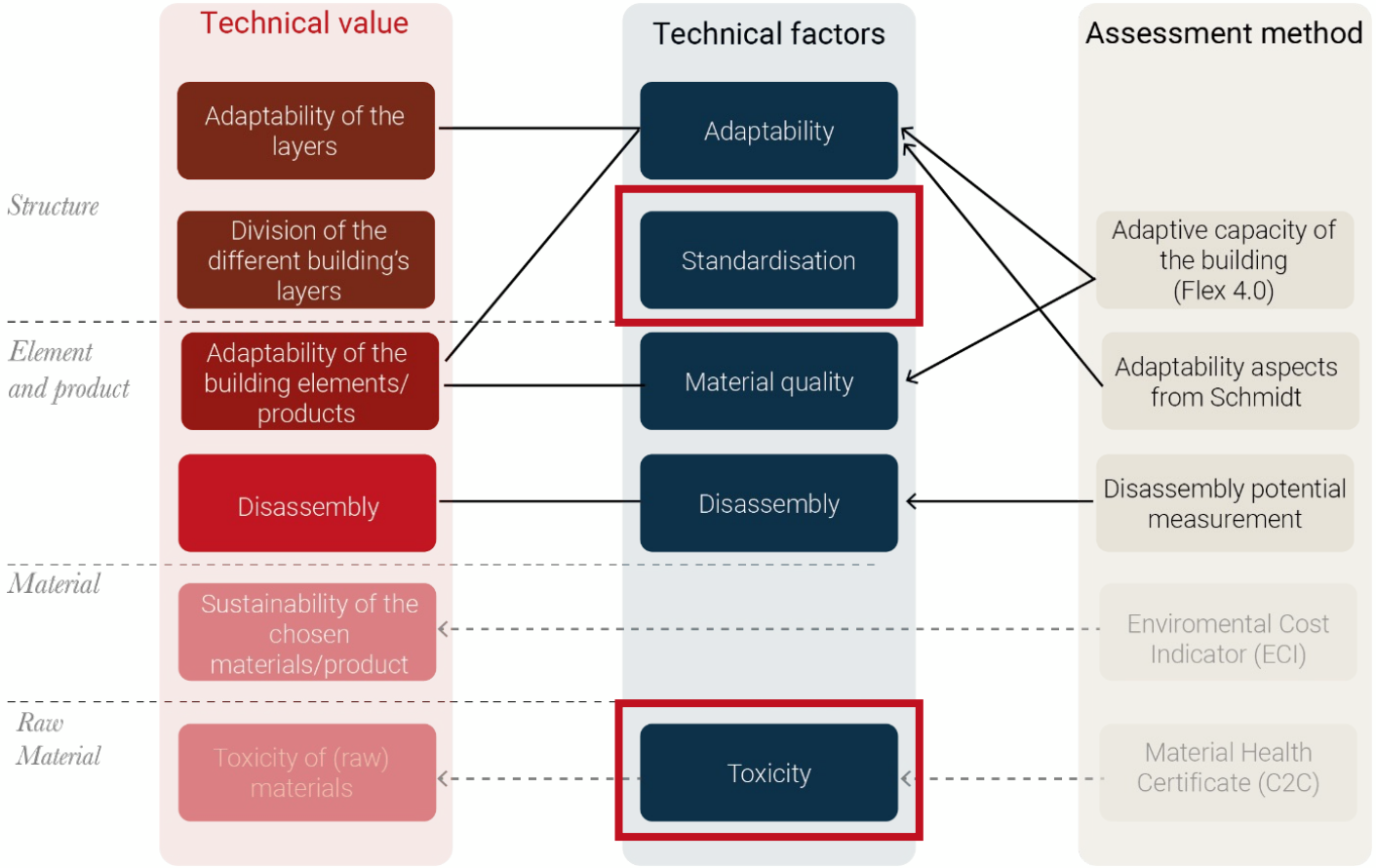
	Typology		Reuse potential: Literature	Reuse potential: Case Assessment	Influencing factors
Structure layer	Steel structure products		High	High	Adaptability potential and disassembly potential (+)
	Timber structure products		High	High	Adaptability potential and disassembly potential (+)
	Concrete floor slabs		No possible	Moderate	Disassembly potential and scalable aspect (-)
	Other concrete structure products		No possible	Low	Disassembly potential and scalable aspect (-)
Skin layer	Non-timber window		No possible	Low	Adaptability potential (regarding building requirements) (-)
	Ceramic cladding	Cement-based mortar	No possible	Low	Disassembly potential (-)
	Non-ceramic cladding	Aluminium cladding	No possible	Moderate	Adaptability and scalable aspect (-)
		Timber cladding	High		Adaptability and scalable aspect (-)
	Insulation products	EPS insulation	-	High	Adaptability potential, refitable and scalable aspects and disassembly potential (+)
	Timber window		High	Moderate	Adaptability potential (regarding building requirements) and scalable aspect (-)
Space plan	Flooring	Slate tiles	Moderate	Moderate	Disassembly potential and scalable aspect (-)
		Stone tiles	High		
	Ceiling products		-	Moderate	Scalable and convertible aspect (-)
	System wall		Low	Low	Scalable aspect (-)

Appendix

Technical Aspects and Reuse Potential

Standardisation is challenging for building products not initially designed to be reused

Toxicity can reduce the Reuse Potential



Able	Type of change	Decision-level	Time (cycle speed)	Brand's layer
Adjustable	Change of task	user	daily/monthly	Stuff
Versatile (flexible)	Change of space	user	daily/monthly	Space
Refitable	Change of perfomance	user/owner	7 years	Service
Convertible	Change of function	user/owner	15 years	Skin
Scalable	Change of size	owner	15 years	Structure
Movable	Change of location	owner	30 years	Site