UCLouvain

Dr. Émilie Gobbo

« Construire circulaire »

Batibouw

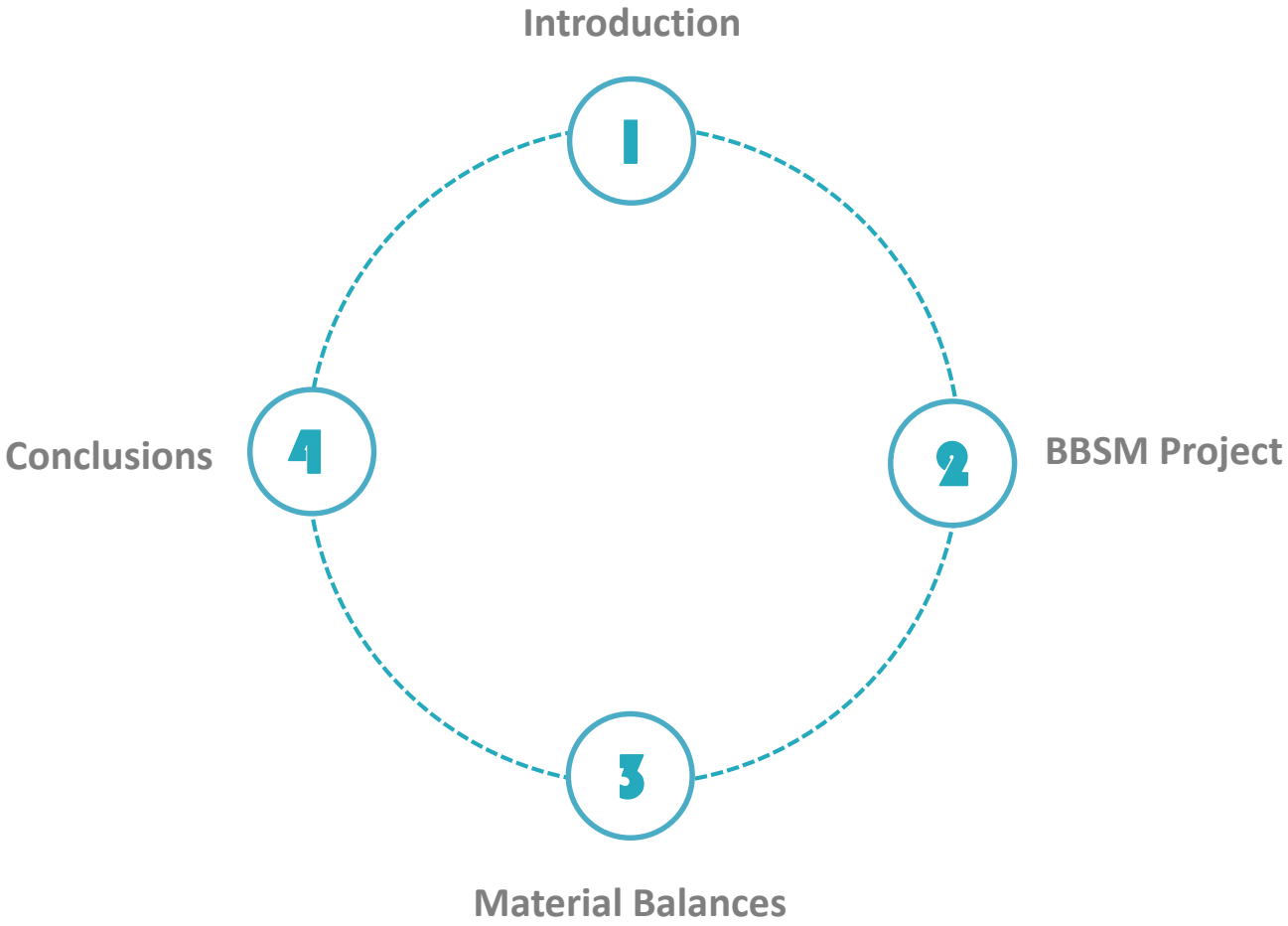
le 28 février 2019

RÉGION DE BRUXELLES-CAPITALE
BRUSSELS HOOFDSTEDELIJK GEWEST

BRUXELLES
FEDER EFRO
BRUSSEL

Union Européenne
Fonds Européen de Développement Régional
Europese Unie
Europees Fonds voor Regionale Ontwikkeling

Summary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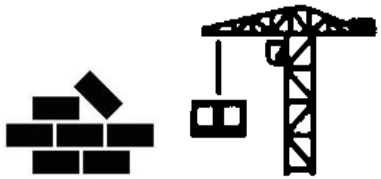
1

Introduction

Context

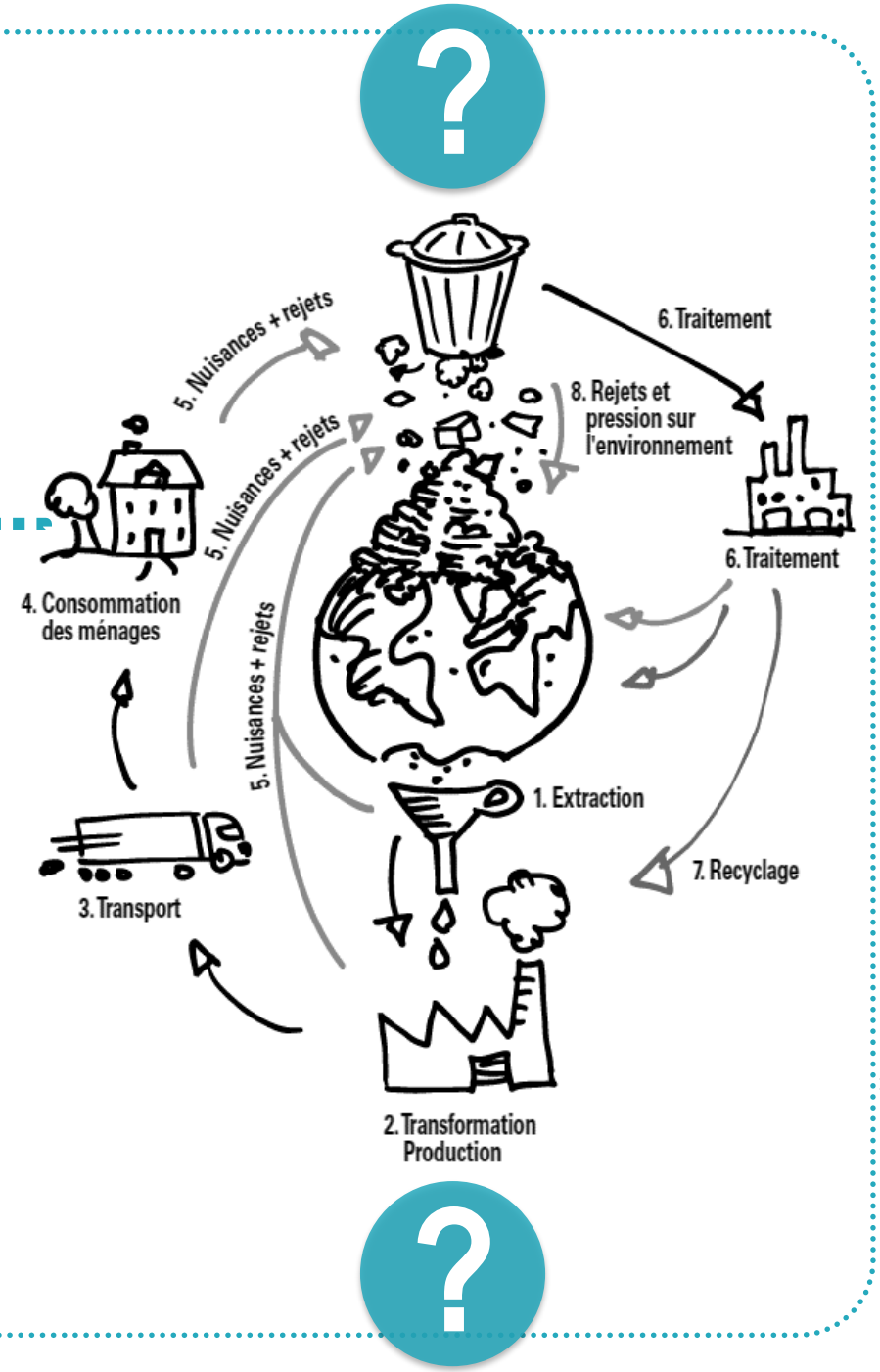
Key Sector



Existing Buildings

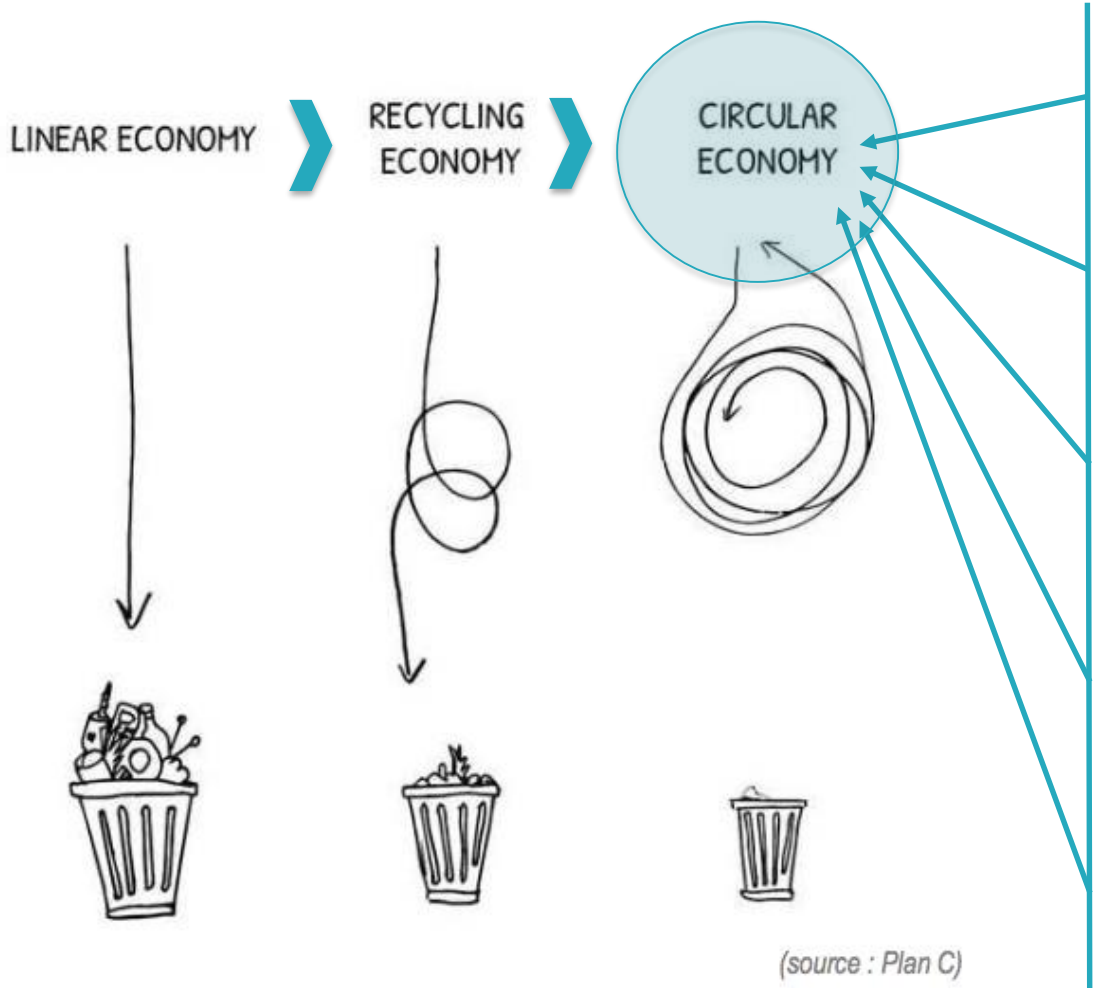
ENERGY RETROFIT

EPB, passive, NZEB …

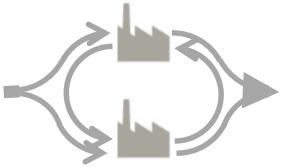


http://les.cahiers-developpement-durable.be

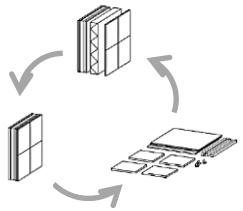
Context



Cradle to Cradle



Ecologie Industrielle



Design for Change

Urban Metabolism

Urban Mining

And many more …

Circularity in Energy Retrofit processes?

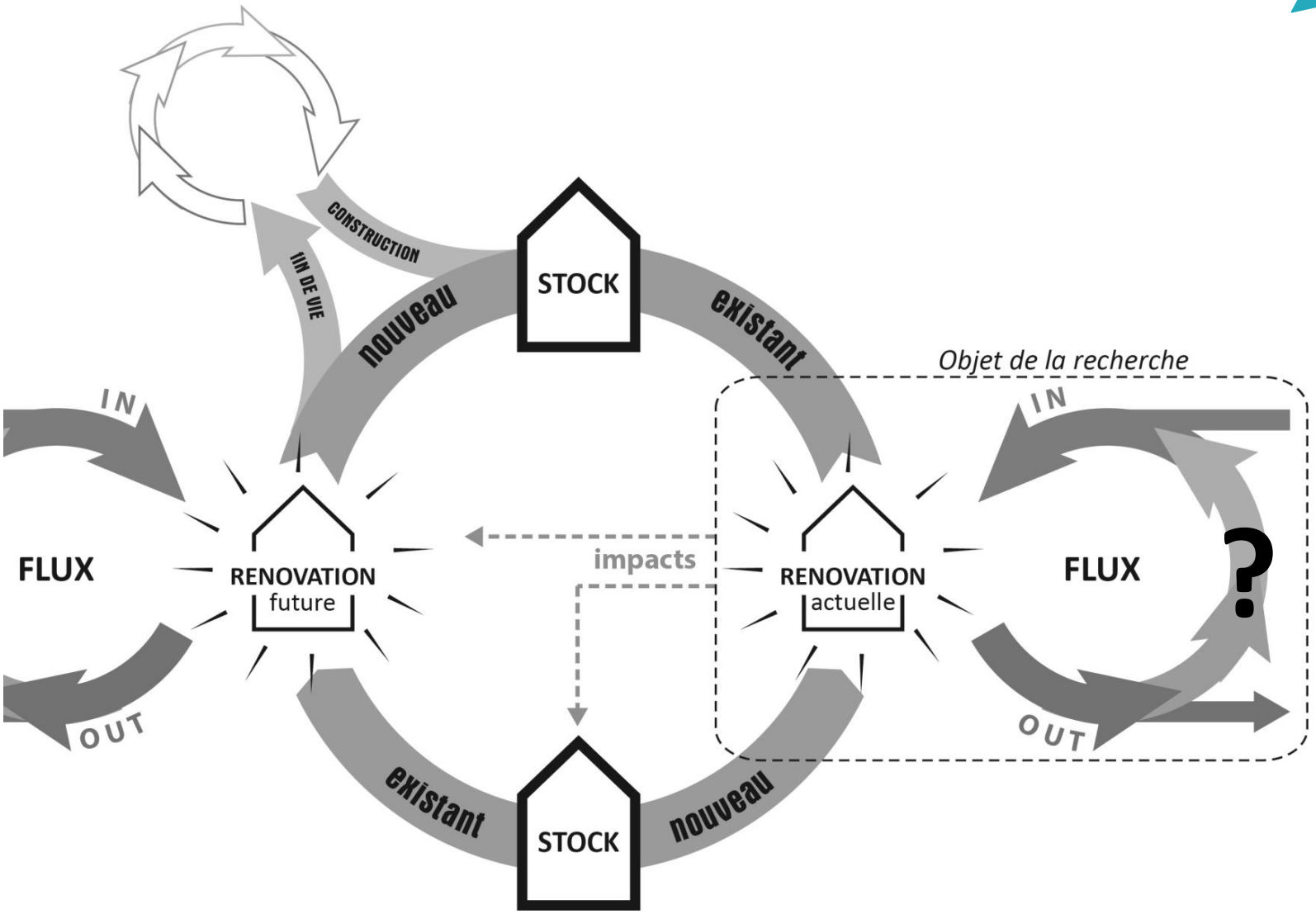
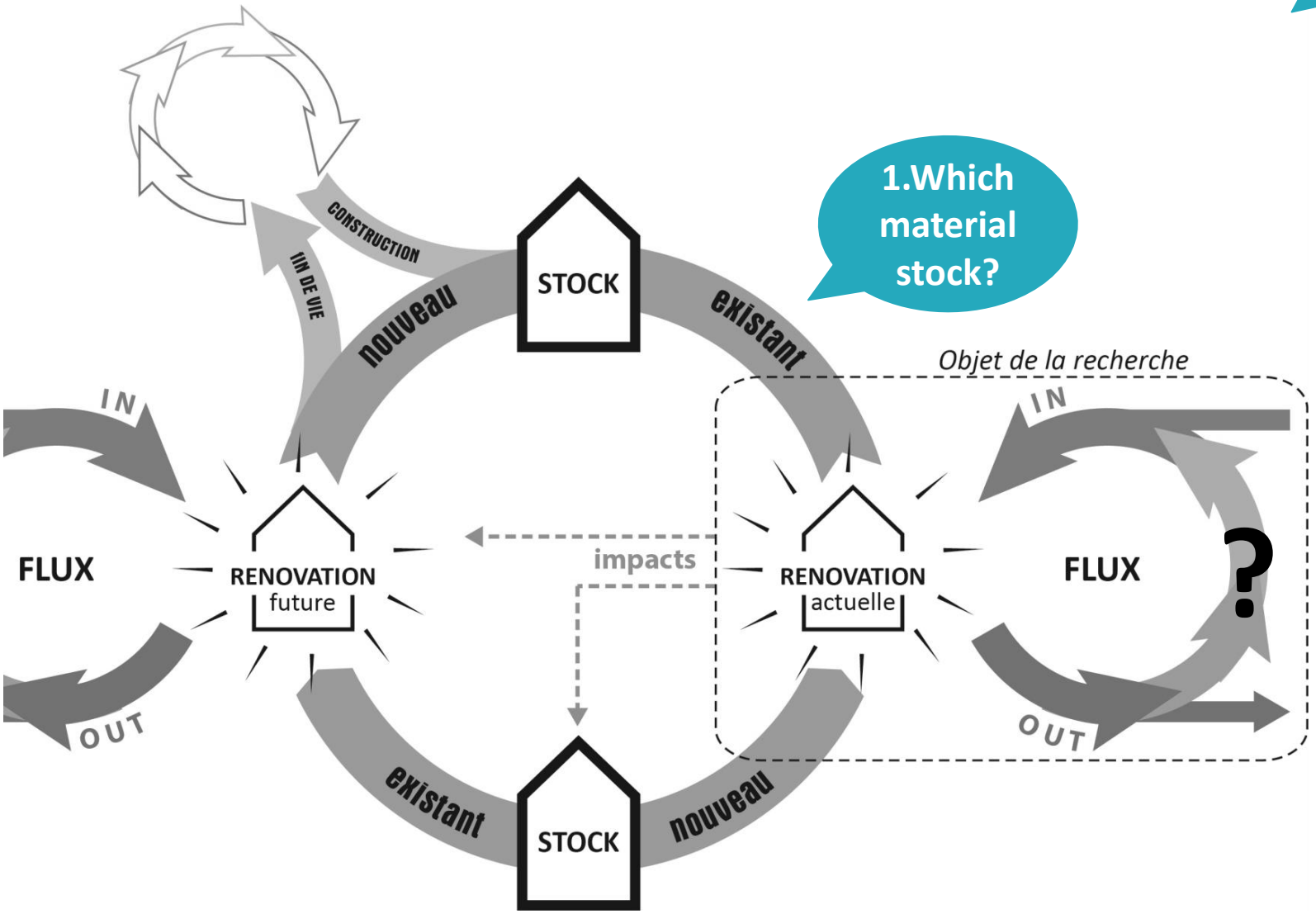


Illustration: E.Gobbo ©

2

BBSM Project

Circularity in Energy Retrofit processes?



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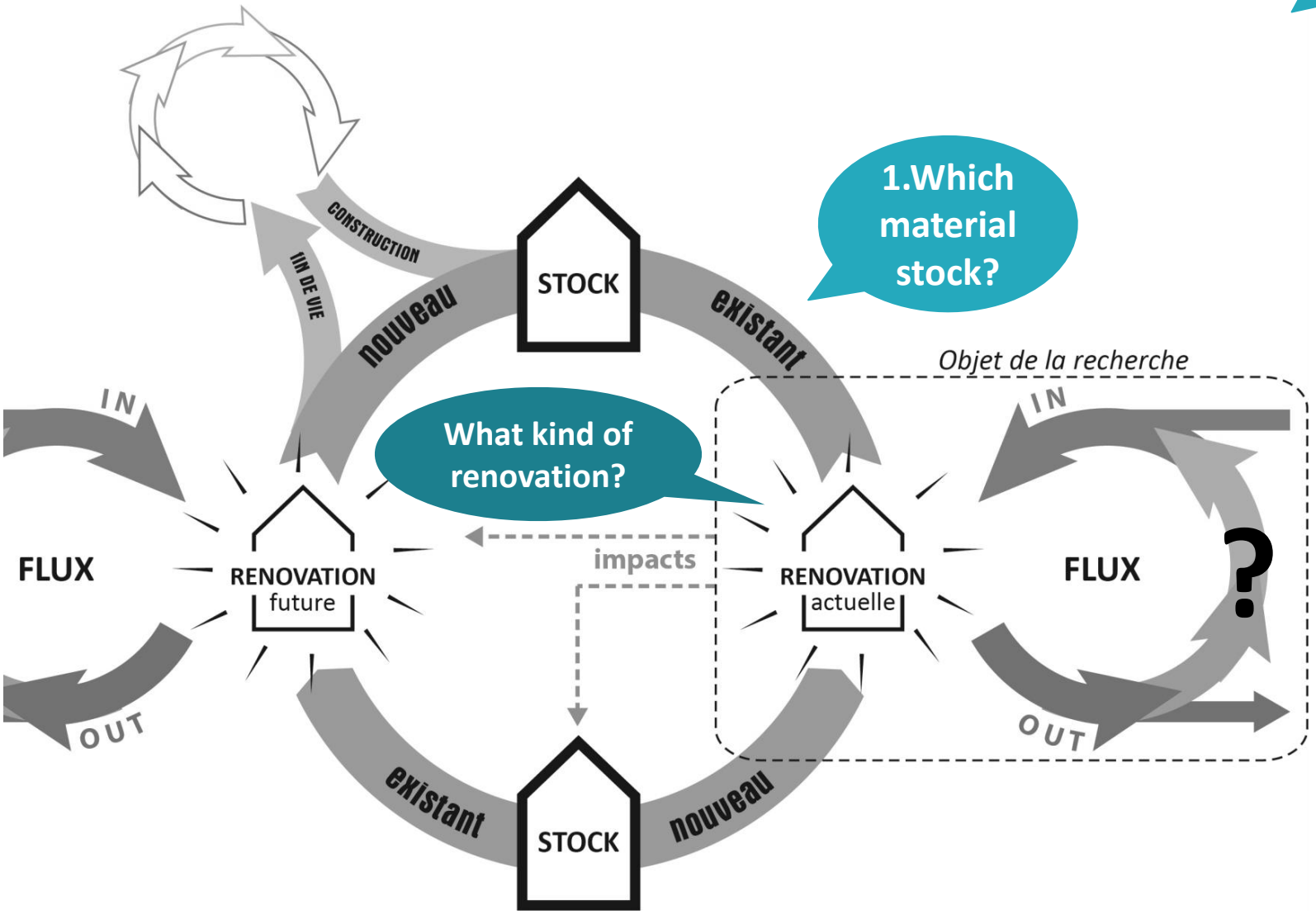
Circularity in Energy Retrofit processes?



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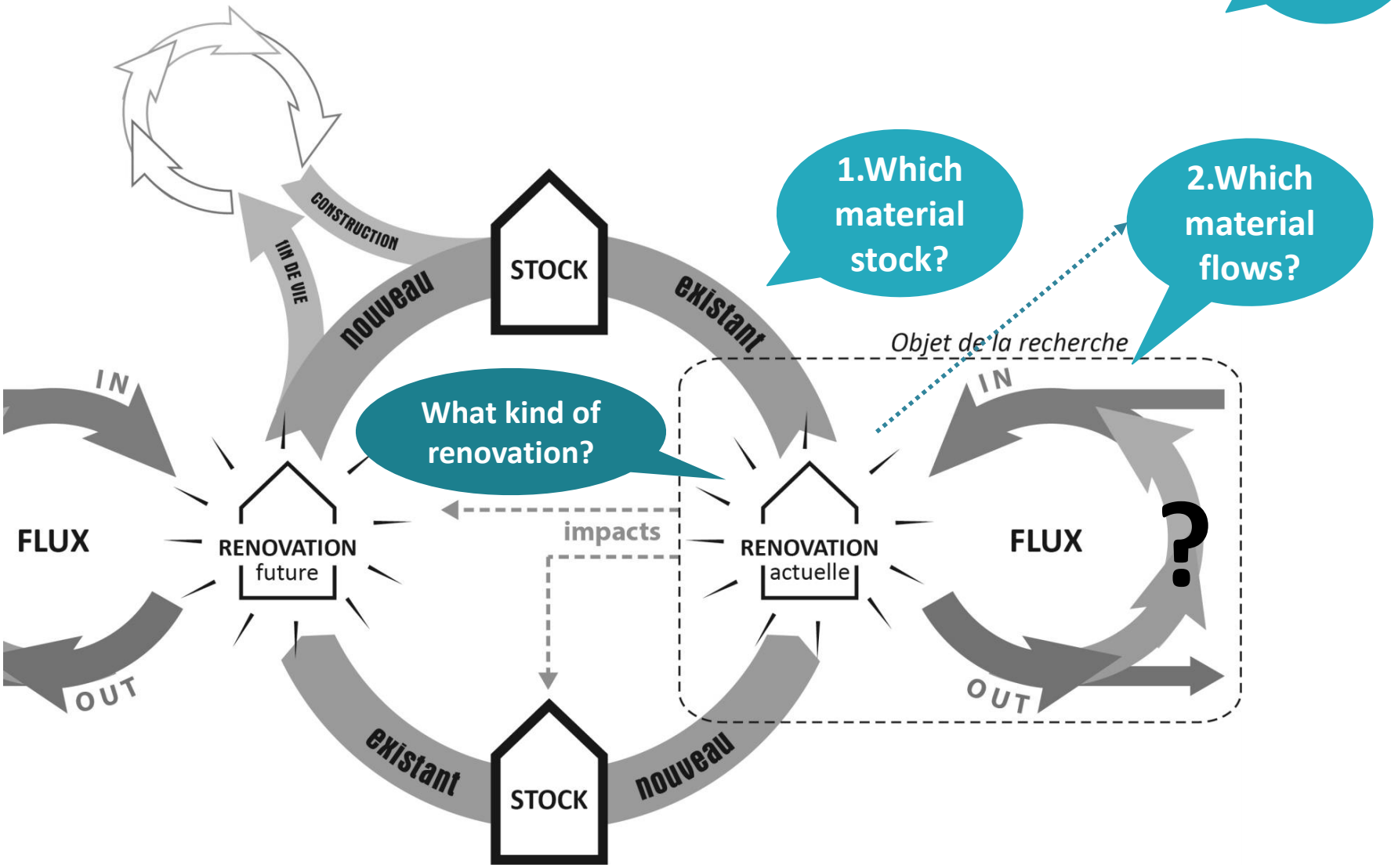
Circularity in Energy Retrofit processes?



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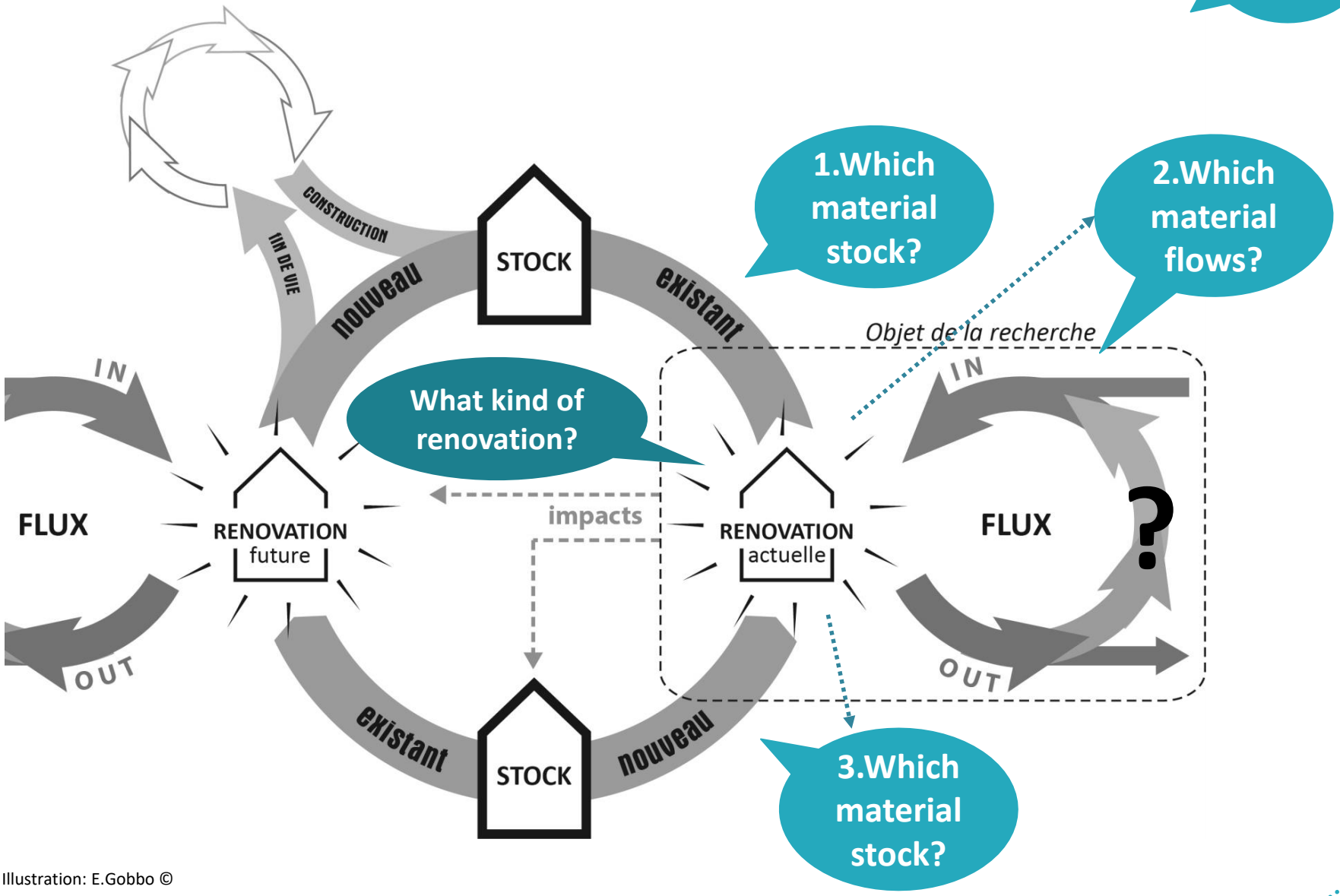
Circularity in Energy Retrofit processes?



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Circularity in Energy Retrofit processes?

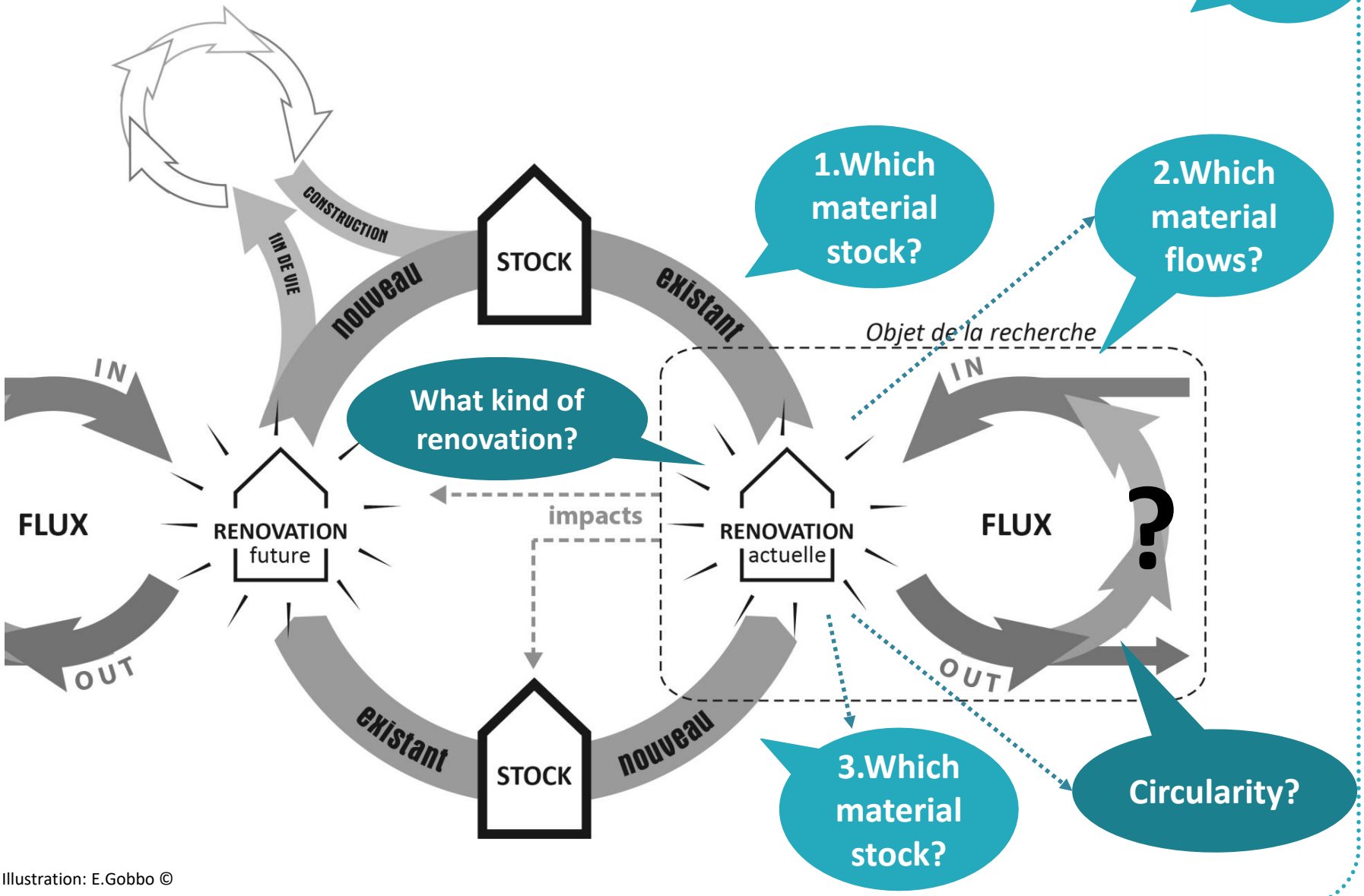
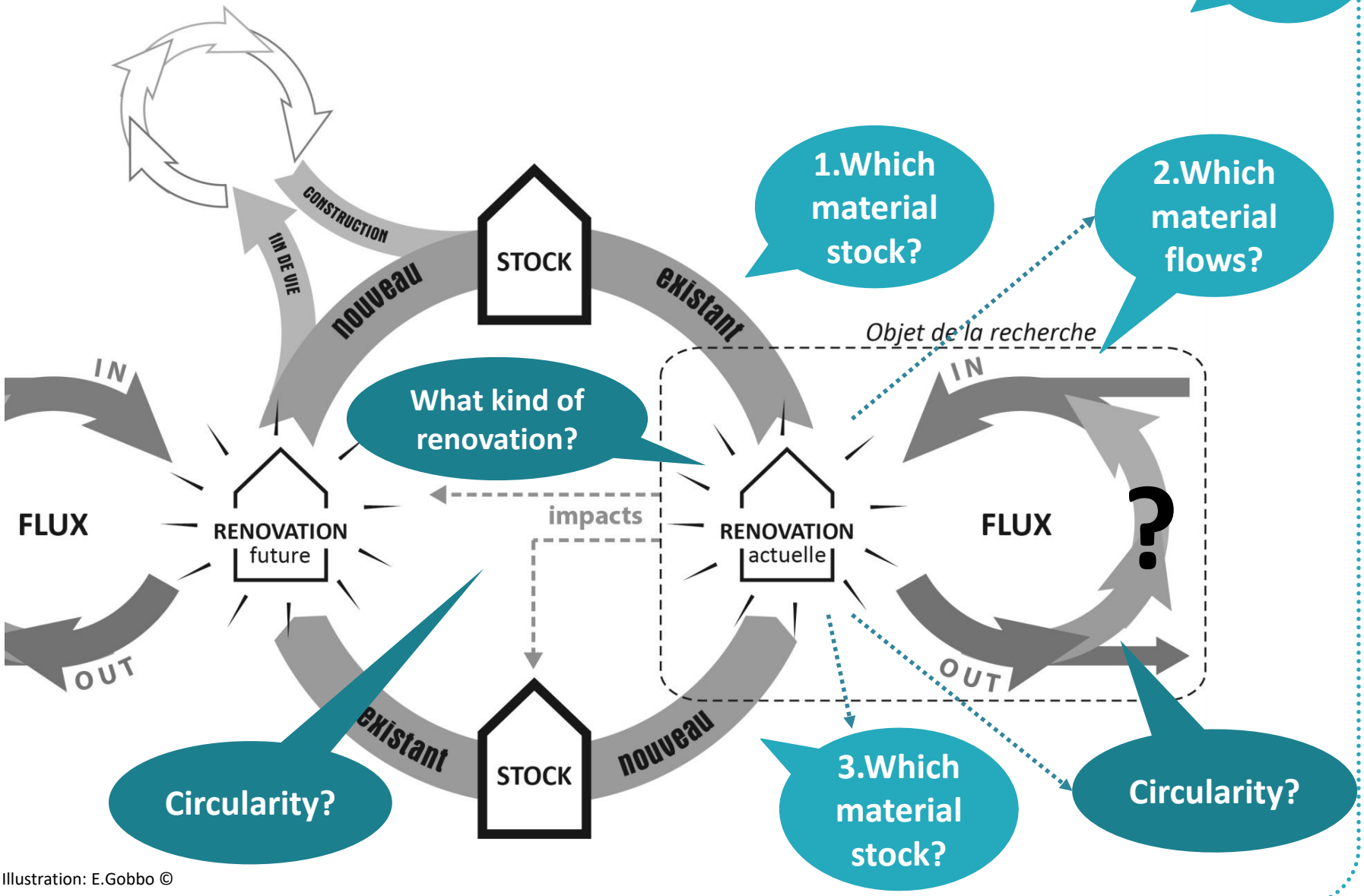


Illustration: E.Gobbo ©

Circularity in Energy Retrofit processes?



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The BBSM Project: what / who?

Your region and Europe invest in your future!

BRUSSELS-CAPITAL REGION

EUROPEAN UNION
European Regional Development Fund

LE BATI BRUXELLOIS SOURCE DE NOUVEAUX MATERIAUX

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BATIGROUPE
BATISSEURS D'AVENIR
TOEKOMSTBOUWERS

Confédération Construction Bruxelles-Capitale
Construction, énergie & environnement

VUB

ROOT

LES PETITS RIENS
SPULLEN HULP

CDR Construction
BRC Bouw

cstc.be
wtcb.be

BAMB
BUILDINGS AS MATERIAL BANKS

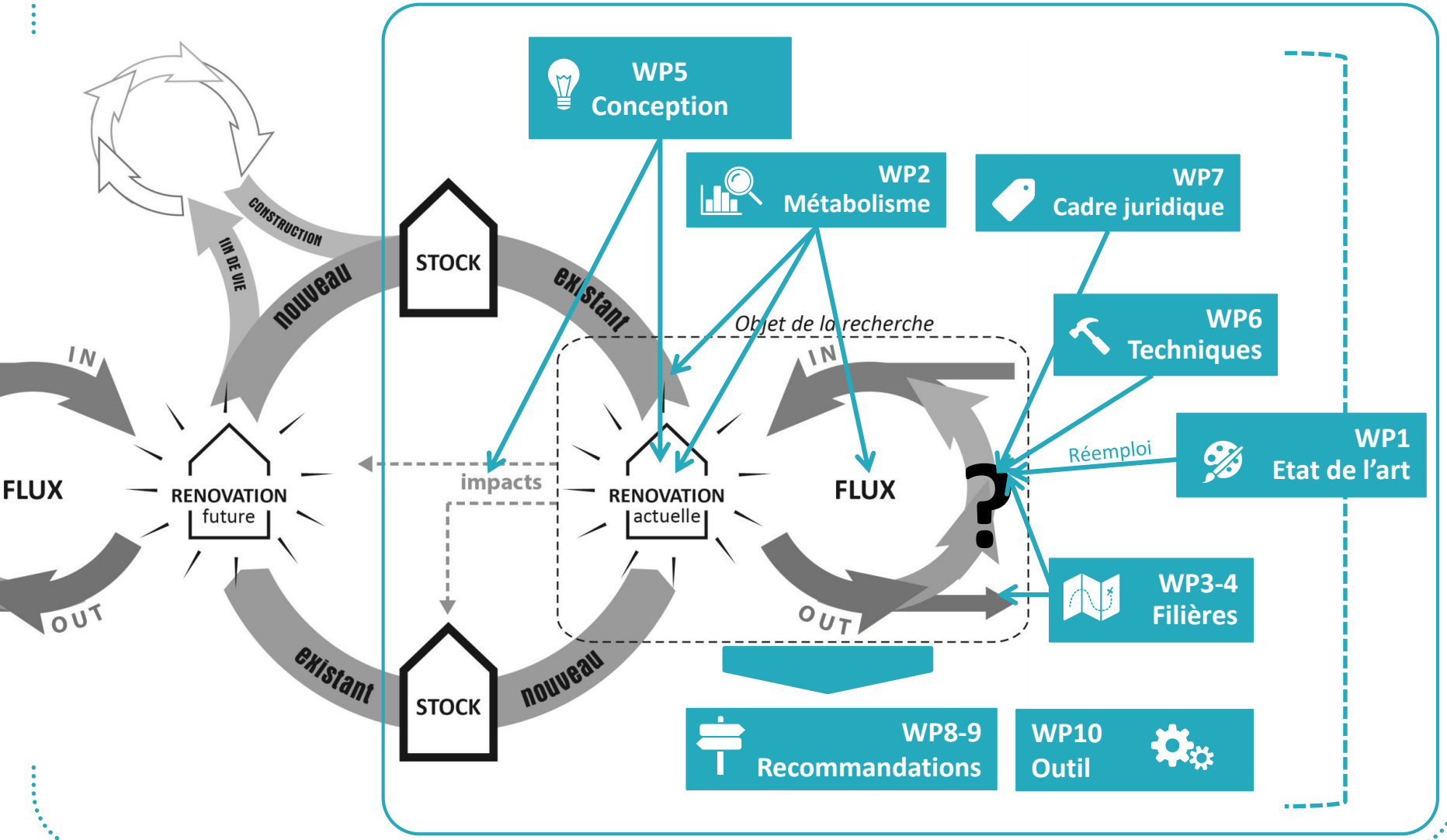
be circular
be.brussels

totem
CREATE | EVALUATE | INNOVATE

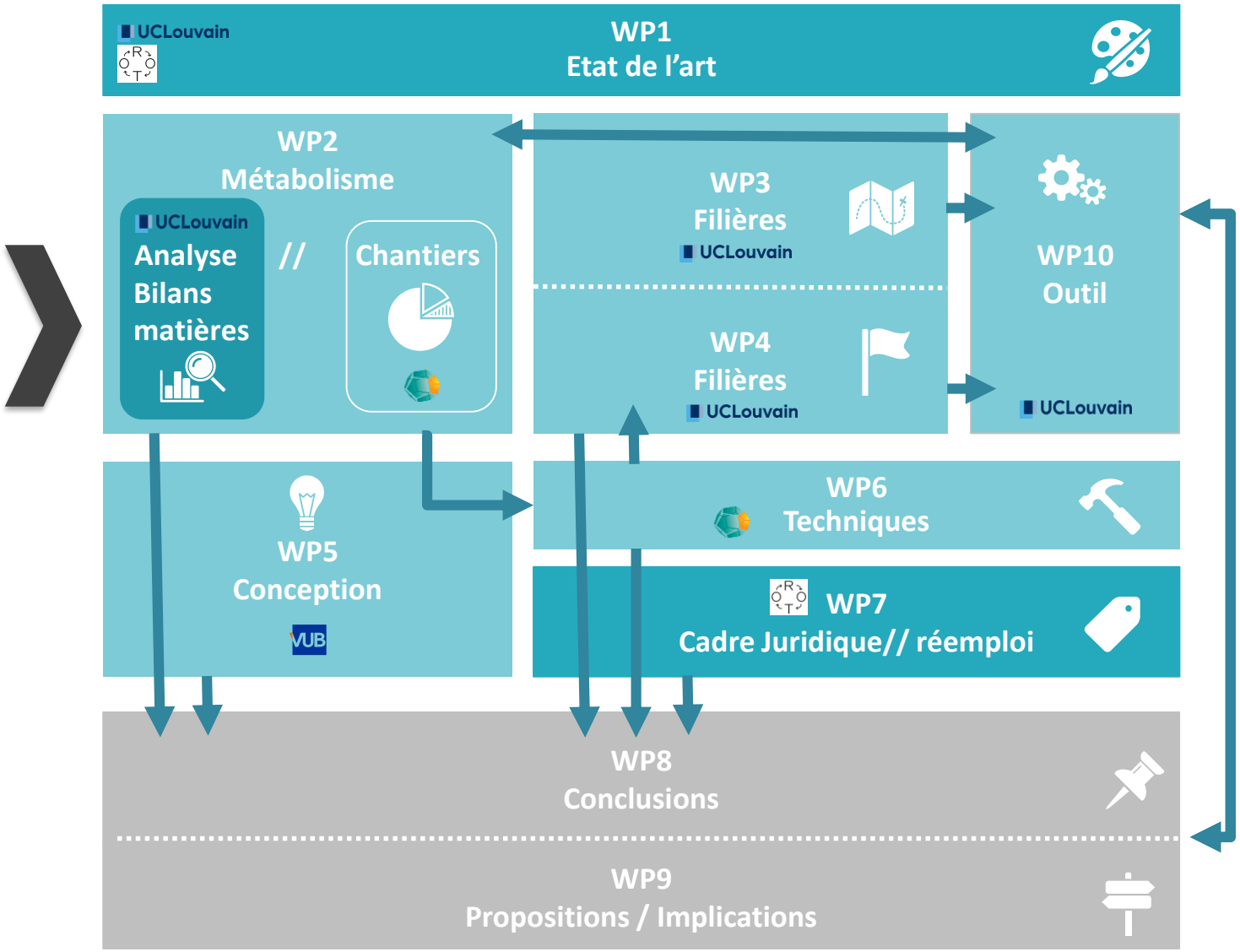
...

metro lab. brussels

WorkPackages



WorkPackages



3

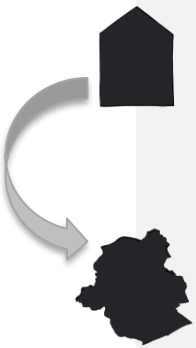
Material Balances

Zoom on WP2

What?

- To achieve a better kwowledge of the deposits of material contained in the Brussels's Building stock
- To evaluate and anticipate the impact of the energy retrofit processes on these deposits and on the IN & OUT flows
- To achieve a better knowledge of the practices of sorting and waste management and the possibilities of valorization

How?



By developping a bottom-up approach

A. UM > development in 3 steps:
   1. typologies> existing deposit
   2. Energy retrofit scenarios (D / R, Reno) > IN / OUT flows & impacts
   3. extrapolation to the region (in WP9- implications)

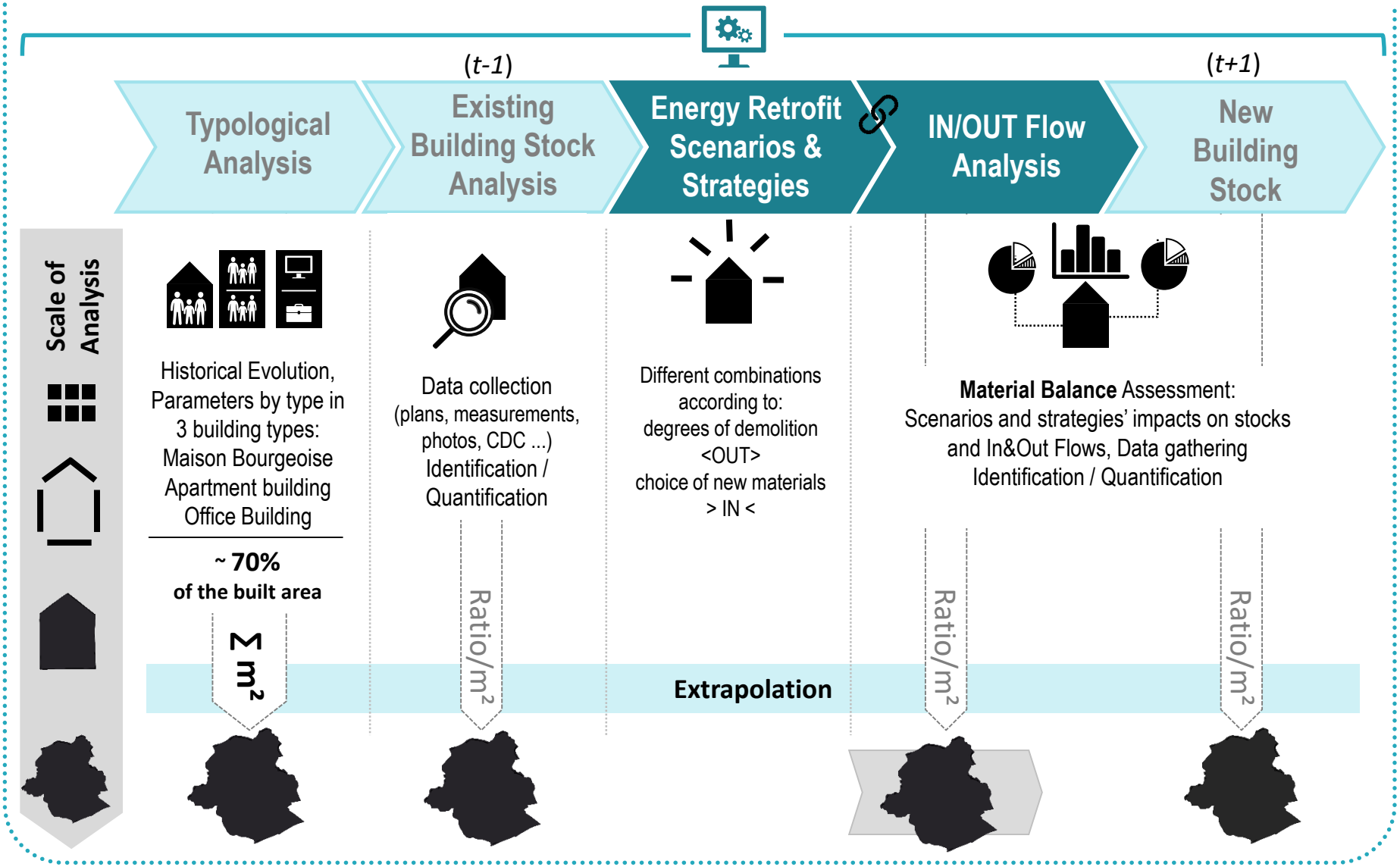
B. Site monitoring (D / R, C, R):
   1. inventories
   2. waste management on site
   3. valorization opportunities

Why?

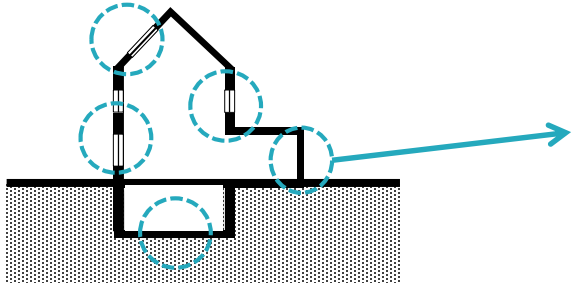
To reach a more efficient management of materials consumed (materials) and rejected (waste) by the activity of the Brussels's construction sector in a circular economy approach > **Urban Mining**

Key Material Flows Anticipation

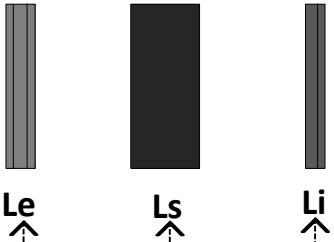
Methodology



Energy retrofit scenarios: principles



Wall decomposed into layers

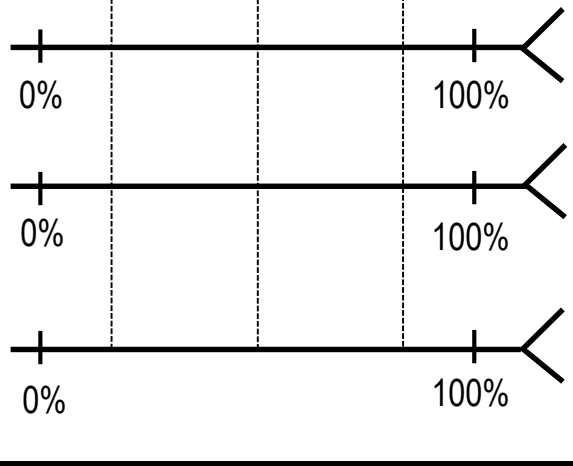


Demolition degrees
Combination of % demolition per layer

Minimum Demolition – **D1**

Partial Demolition – **D2**

Maximum Demolition – **D3**



New materials & Implementation

C1 « Classic »
C2 « Alternative »

C1 « Classic »
C2 « Alternative »

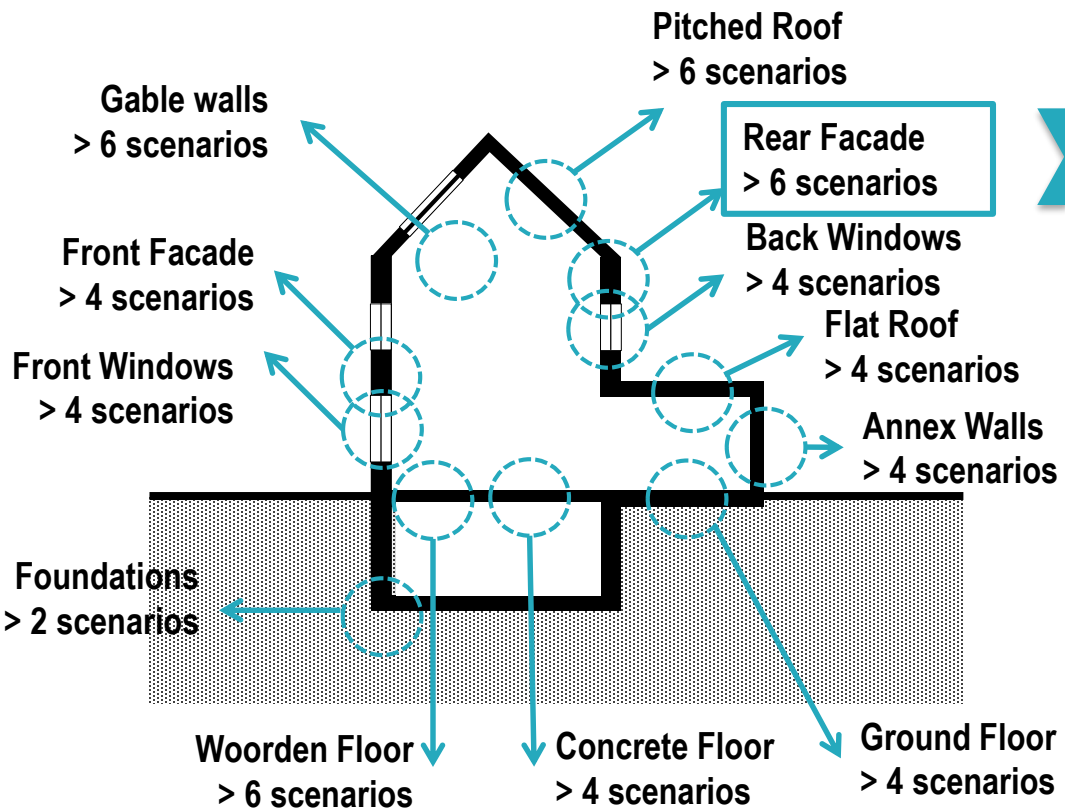
C1 « Classic »
C2 « Alternative »

Different combinations according to: degrees of demolition <OUT> & choice of new materials >IN<

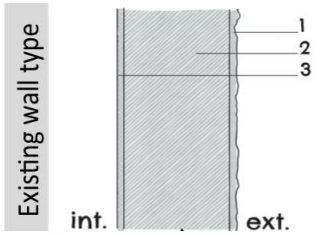
Influence the **OUT-flows**

Influence the **IN-flows**

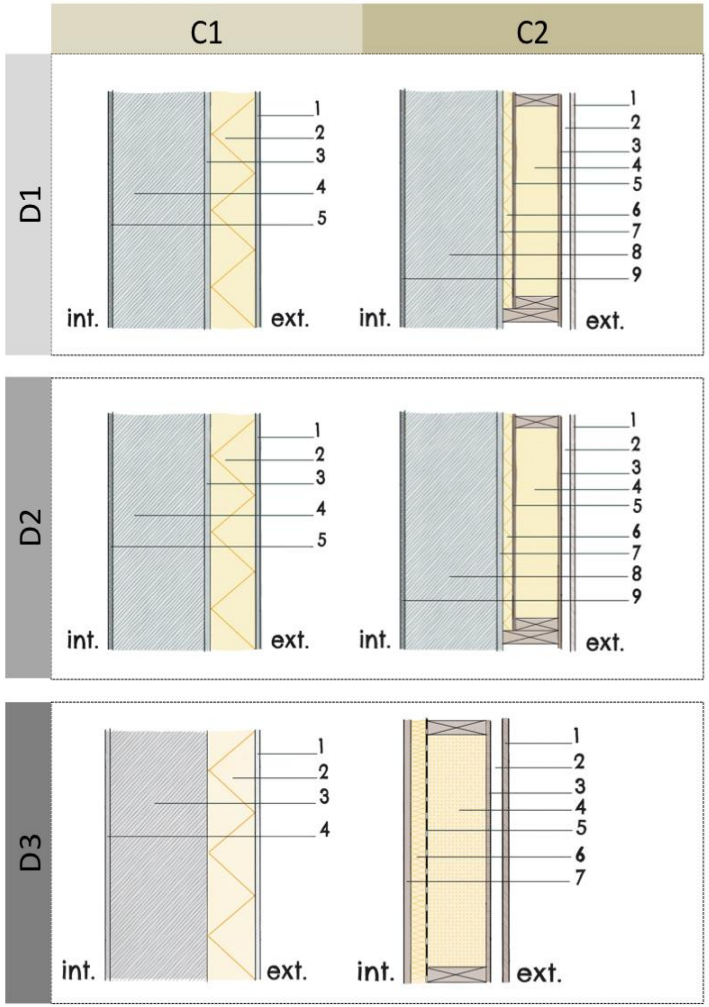
Energy retrofit scenarios: Maison Bourgeoise



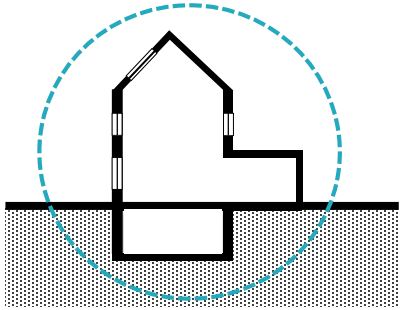
Resulting on ~ 54 energy retrofit scenarios (at the wall scale)



Demolitions: Rear Façade	Li	Ls	Le
D1	10 %	10%	10%
D2	20%	20%	100%
D3	100%	100%	100%



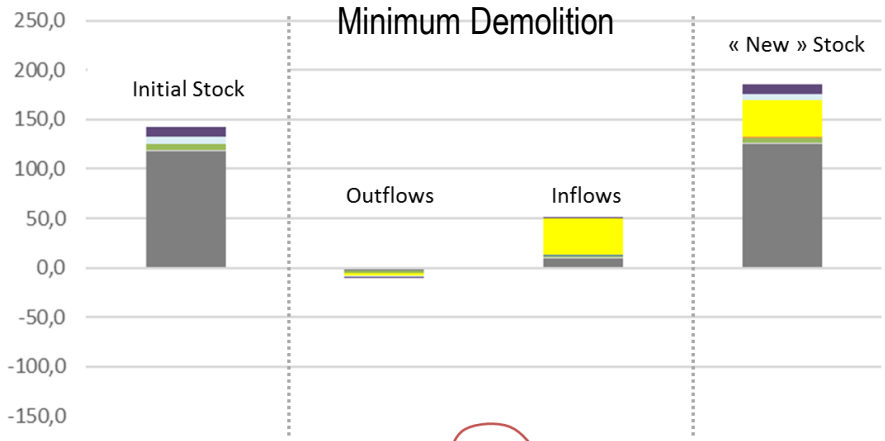
First Results



scénario X	
Facade avant	D1C1
Facade arrière	D1C1
Mitoyen / facade laterale 1	D1C1
Mitoyen / facade laterale 2	D1C1
facade secondaire	D1C1
Menuiseries extérieures	D1C1
Toiture en pente	D1C1
toiture plate	D1C1
dalle de sol	D1C1
Fondations	D1C1

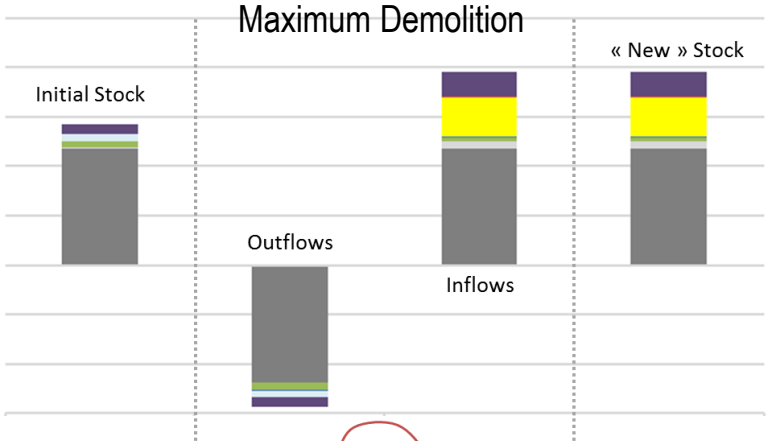
scénario Z	
Facade avant	D3C1
Facade arrière	D3C1
Mitoyen / facade laterale 1	D3C1
Mitoyen / facade laterale 2	D3C1
facade secondaire	D3C1
Menuiseries extérieures	D3C1
Toiture en pente	D3C1
toiture plate	D3C1
dalle de sol	D3C1
Fondations	D3C1

SCENARIO X (m³)



other	10,18	-0,23	0,01	9,97
lime	6,636276195	-1,0738044	0	5,56
cement fiber	0	0	0	0,00
composite	0	0	0	0,00
insulation	0	-1,853985328	37,07970655	37,08
plastic	0,1388172	-0,009394059	0,562946171	0,70
metal	0,32166592	0,00	0,30882096	0,63
wood	6,6	-3,224178499	1,56	5,02
gypsum	0,0	-0,13	1,640175	1,64
inert	118,4	-2,50	8,86	124,86

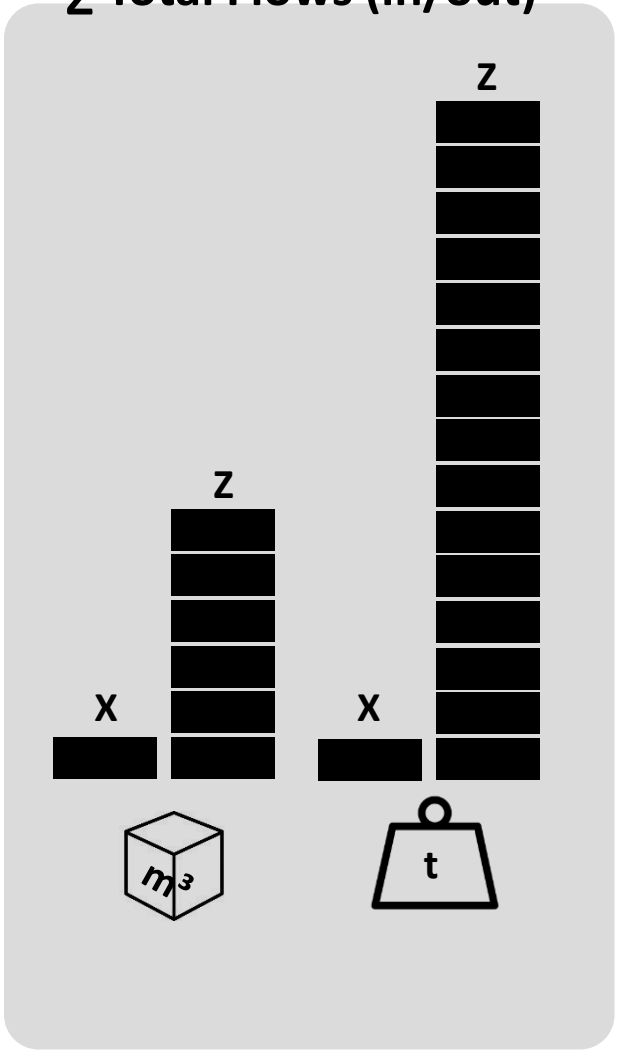
SCENARIO Z (m³)



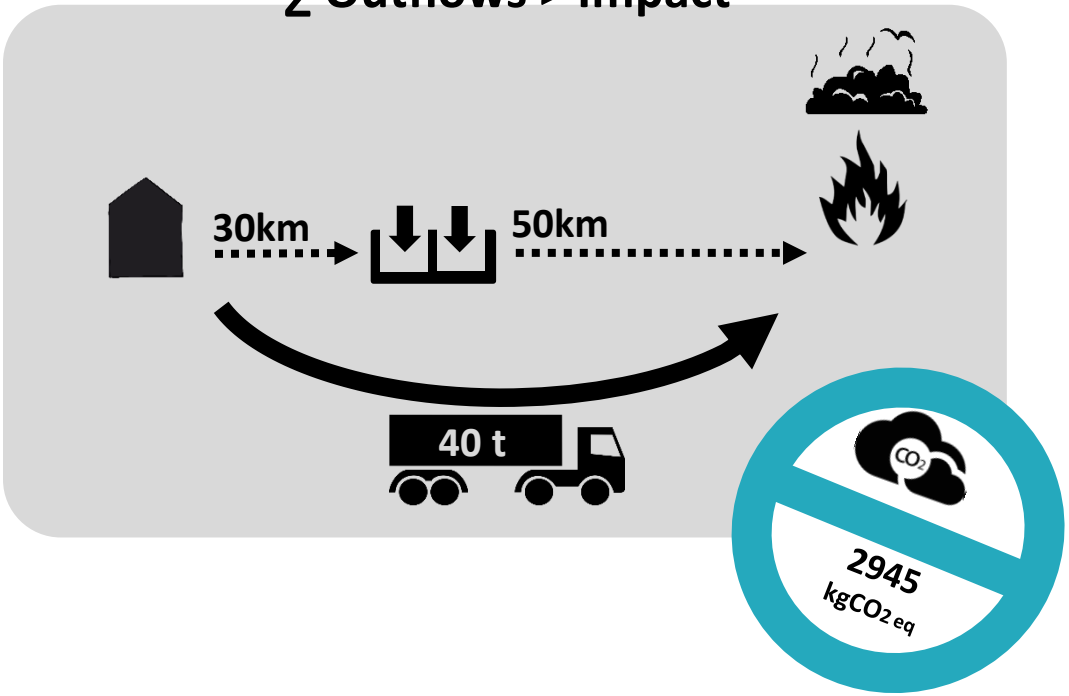
10,18	-10,18	24,89	24,89
6,636276195	-6,636276195	0	0,00
0	0	0	0,00
0	0	1,15191455	1,15
0	-0,00174875	39,83624333	39,84
0,1388172	-0,46393131	0,9899921	0,99
0,32166592	-0,32	0,63048688	0,63
6,6	-7,142824011	3,72	3,72
0,0	-0,24	7,123976195	7,12
118,4	-118,80	117,53	117,53

First Results

∑ Total Flows (in/out)



∑ Outflows > Impact



	Volume [m³]		Weight [t]	
Scenarios	X	Z	X	Z
∑Outflows	9	143	1,880	247,338
∑Inflows	50	196	26,272	184,967
∑Total Flows	59	339	28,152	459,305
Difference Δ	280		431,153	
Multiplicative factor	6		15	

4

Conclusions

Conclusions

- Lack of quantitative and qualitative data > ongoing research
- Existing / new: specificities
- Change of practices
  - > Deconstruction
  - > Sorting at the source
  - > Design
- Awareness-raising and training of actors in the sector (all of them)
- Change of labor costs / materials
- Adaptation of legislation
- Market maturity
- New professions? (valuers, site guard, design offices ...)
- Pilot projects …

The research project proposes:

- To anticipate, measure and compare the impact of energy retrofit solutions on material flows, and the opportunities in terms of circularity
- A replicable methodology

But…

- Not exhaustive and to be continued…
- It's the beginning of a real application of Urban Mining but it will take some time

A potential for a better material stocks and flows management: to reach a circular economy in the construction sector

UCLouvain

www.bbsm.brussels

Merci pour votre attention

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Architecture et Climat

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