

When « circular economy » rhymes with profits

Focus on the construction and public works sectors

Project launched by the Association *RECORD*



Overview

- Context: circular economy in the construction and public works sectors
- Objectives of the study
- Main results
 - State of the art of circular economy in the CPW sectors
 - Analysis of three major projects in France & Europe
 - Presentation of three economic models
- Main conclusions

Context: circular economy in the construction and public works (CPW) sectors

- Since the 2010s, a transition from a linear system to a more **circular economy** has begun: « producing goods and services in a sustainable manner» (Ministry of Ecological Transition)
- Construction and public works (CPW) is the most **resource intensive** sector and **first waste producer** (81% of french waste)
- **Actual waste reuse/recycling**: 63% for public works, 46% for construction



- There therefore exists a strong potential to strengthen and develop new circular models, in addition to already mature loops in the sector
- There is a strong need to **industrialize circular economy initiatives and principles**, in order to structure them at a larger geographical scale

The stakes of transitioning to a CE

What does this transition imply?

- A **change in general practices**, at the technological organisational and social levels;
- A **shift in stakeholders' behaviour**;
- A change in **economic models**, and **financing schemes**;
- A necessary evolution of **public policies**.

Objectives of the project

- **Main goal:** To identify the main issues at stake with the development of CE in the CPW sectors
- More specifically, evaluate **circular economic models** that could emerge and become viable between today and 2025

Other goals:

- Carry out a state of the art of CE in the CPW sectors
- Bring to light, by analyzing different case studies in France and Europe, the many obstacles (of different nature) hampering CE initiatives, and the solutions that should be developed to lift them
- Analyze and present, in great detail, three major CE models

State of the art of CE in the CPW sectors (I/II)

- Analysis of how CE is put in place in the CPW sectors, using a material-based approach, and according to the **7 pillars of CE (ADEME)**
- CE models are already mature for public works and structural works materials

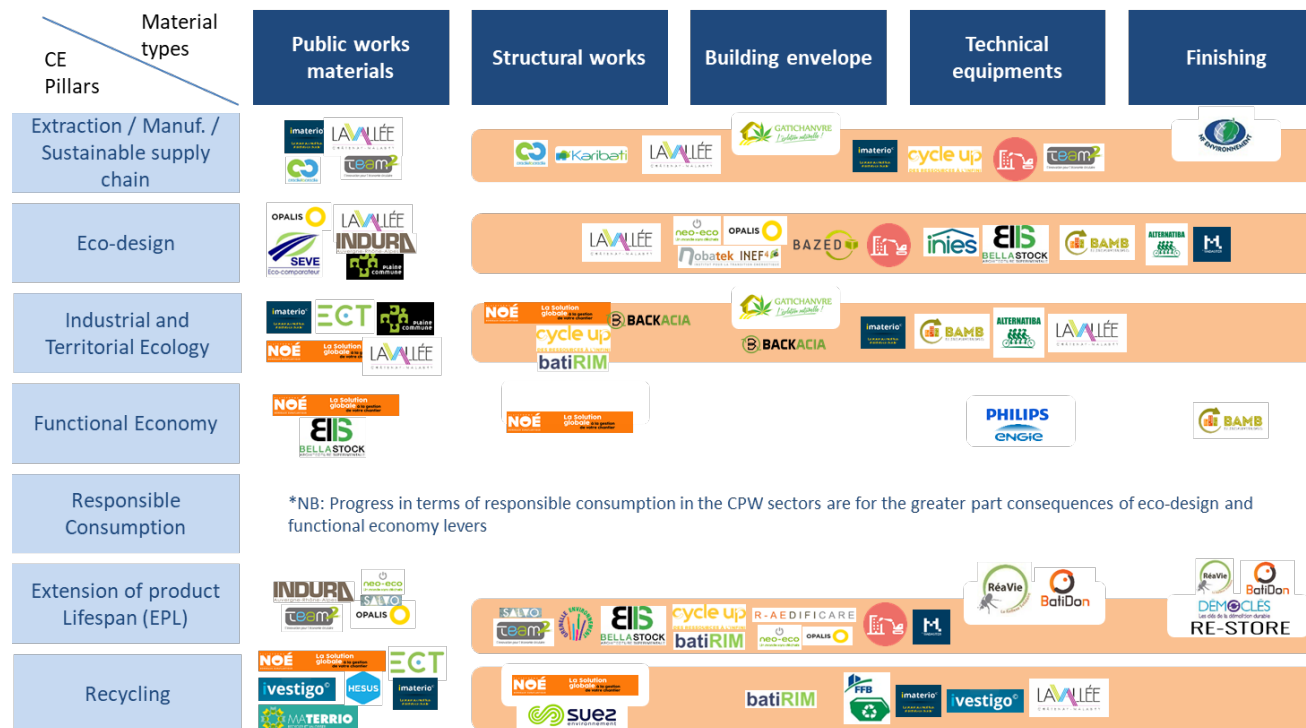
CE levers / Material types	Public works materials	Structural works	Building envelope	Technical equipments	Finishing
Extraction / Manuf. / Sustainable supply chain	Local supply in most cases and high proportion of recycled materials	Replacement with recycled materials (in accordance with the legislation). Local supply.	Use of natural insulating materials (ex: hemp)	Enabling networking between purchasers and sellers	There exist some natural products but there are poorly represented on the market
Eco-design	Numerous efforts of eco-design in different domains (climate, resources, ...)	Standards are being developed in order to make selective deconstruction buildings easier	Designs which make dismantling easier and using materials with a low carbon footprint	Manufacturing industries work on the eco-design of their products	Manufacturing industries work on the eco-design of their products
Industrial and Territorial Ecology	Synergies between quarries and constructors at the territorial level	Local supply in most cases	Initiative of industrial and territorial ecology with the development of the hemp industry	District heating	Some examples of deconstruction projects and local reuse of materials
Functional Economy	Material rental, pooling of premises	Material rental, pooling of premises	Non-identified at this point	Some services exist, for lighting and heat	Convertible buildings
Responsible Consumption	Non-identified at this point	Non-identified at this point	Non-identified at this point	Works on the optimizing of electrical equipment, heating, ventilation	Non-identified at this point
Extension of product Lifespan (EPL)	EPL of transport infrastructures with frequent refurbishing	Refurbishing projects of buildings exist, which maintain the main structure	Possible reuse of materials, but poorly developed	Legislation on warranties and on the display of information on replacement pieces of a product	Poorly developed reuse of materials, but in progress for some materials (furniture)
Recycling	Recycling of aggregates / integration in closed loops (in accordance with the regulations)	Some existing, quite well developed recycling channels	Some existing, but poorly developed recycling channels	Existing and functional « enlarged responsibility for the producer » schemes	Poorly developed recycling of materials, but in progress for some specific channels

LEGEND

- Non-existing loop, no identified initiative
- Non-mature loop but some existing initiatives
- Mature and operational loop




State of the art of CE in the CPW sectors (II/II)

- **Summary of EC initiatives** and tools already existing in France
- These are mainly tools developed to limit the amount of generated waste, or to improve the conception of buildings and construction



Circular Economy projects in France and Europe (I/II)

- EC in Europe today are still at an experimental stage
- The three selected projects for the study all present CE as a major aspect in the project, and integrate CE principles in an innovative manner
- CE elements integrated in the three projects:

<u>Pilier de l'économie circulaire</u>	1. Grand Paris 	2. La Maillerie 	3. Projet ZIN 
Extraction / Manuf. / Sustainable supply chain	X	X	X
Eco-design	X	X	X
Industrial and Territorial Ecology	X	X	X
Functional Economy	X	X	X
Responsible Consumption			X
Extension of product Lifespan (EPL)		X	X
Recycling	X	X	X

Circular Economy projects in France and Europe (II/II)

Origins and rationale of the project

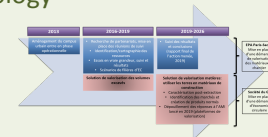
- General objectives
- Reasons for integrating CE principles

Our analysis of the project

- Innovative aspects
- Economic benefits
- Profitability and replicability
- Obstacles and levers

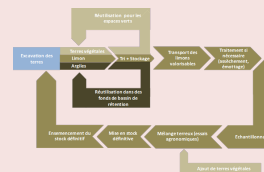
General presentation of the project

- Perimeter
- Chronology
- Actors



Integration of CE principles

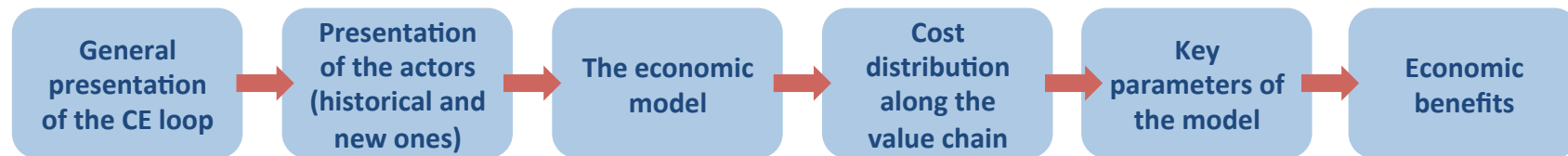
- Presentation of the linear vs circular flows



Circular economy loops

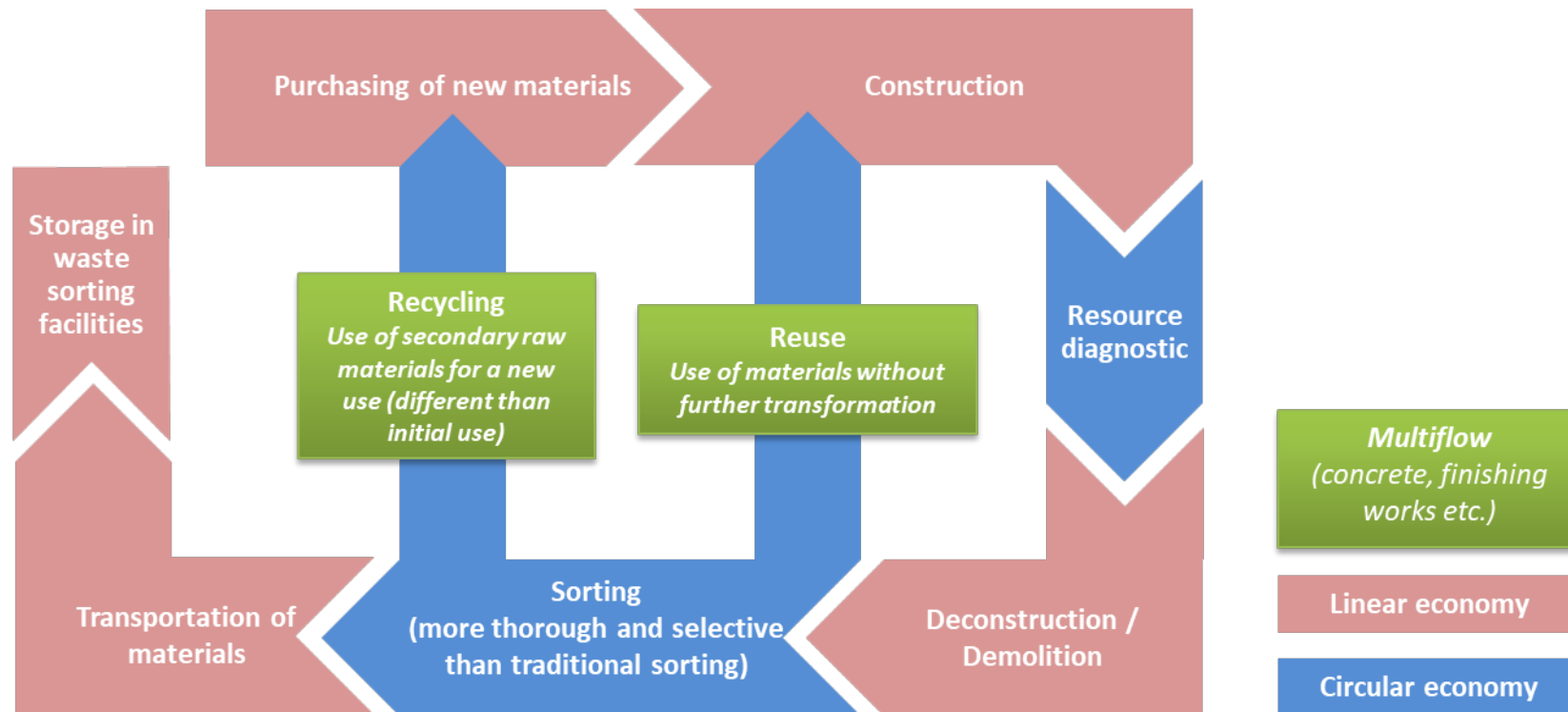
- **Main goal:** To develop economic models on three major CE topics in the C&PW sectors
- Determine the necessary conditions for these models to become mature (in a 3 to 5 years horizon)

1. Excavated soil
2. Selective deconstruction
3. Recycled concrete



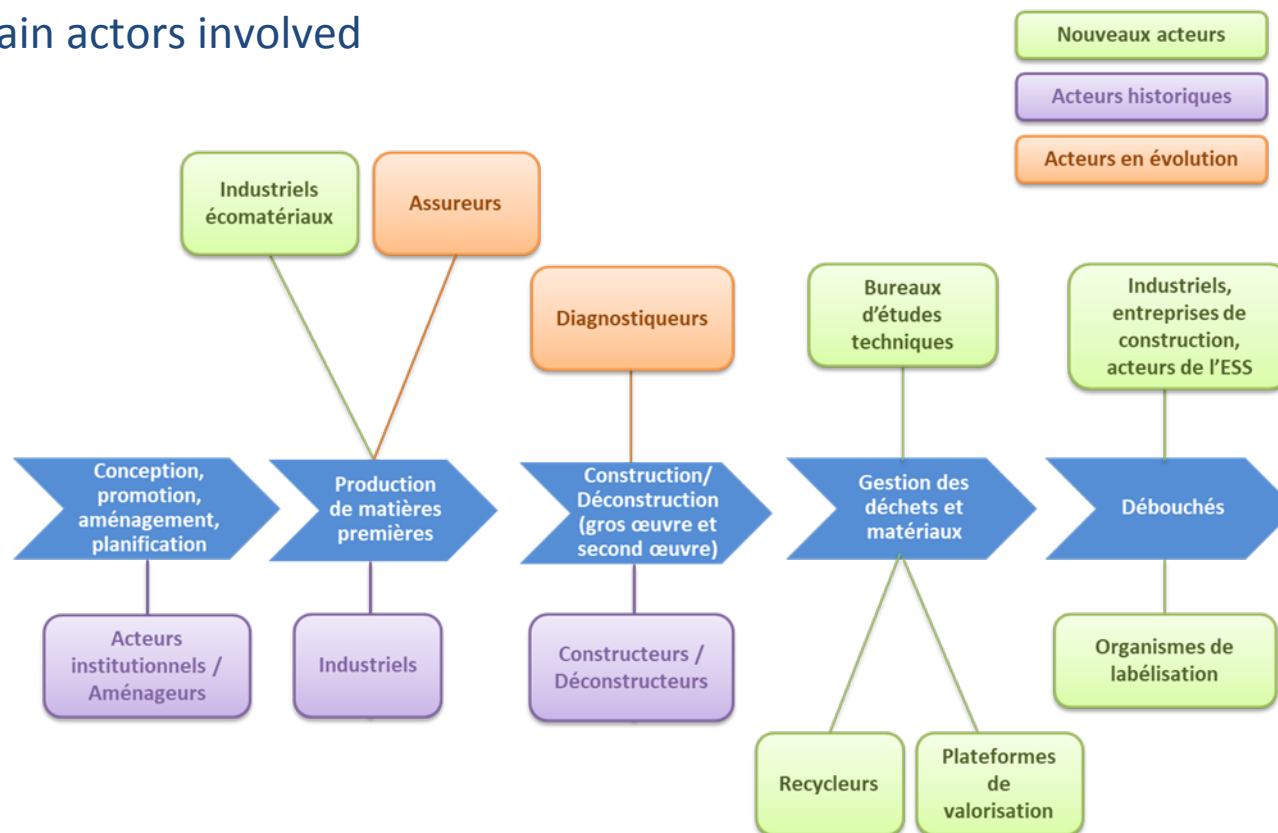
Example: selective deconstruction (I/V)

- General presentation of the loop:



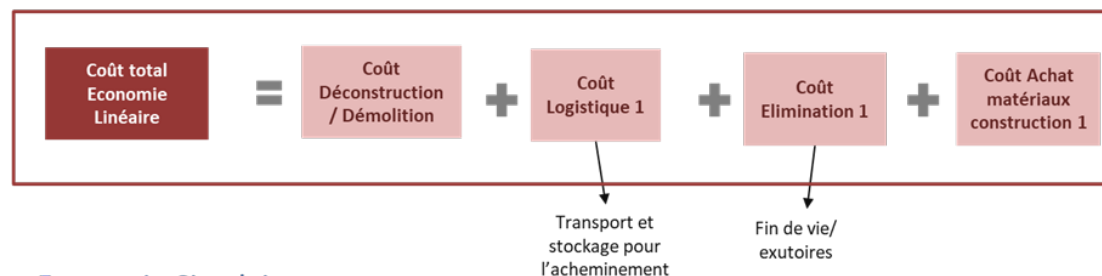
Example: selective deconstruction (II/V)

- Main actors involved

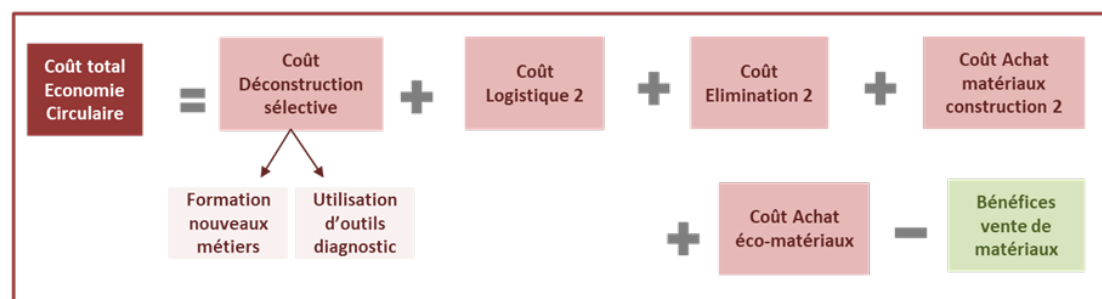


Example: selective deconstruction (III/V)

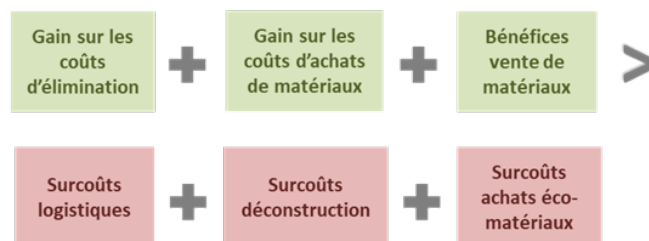
Economie Linéaire



Economie Circulaire

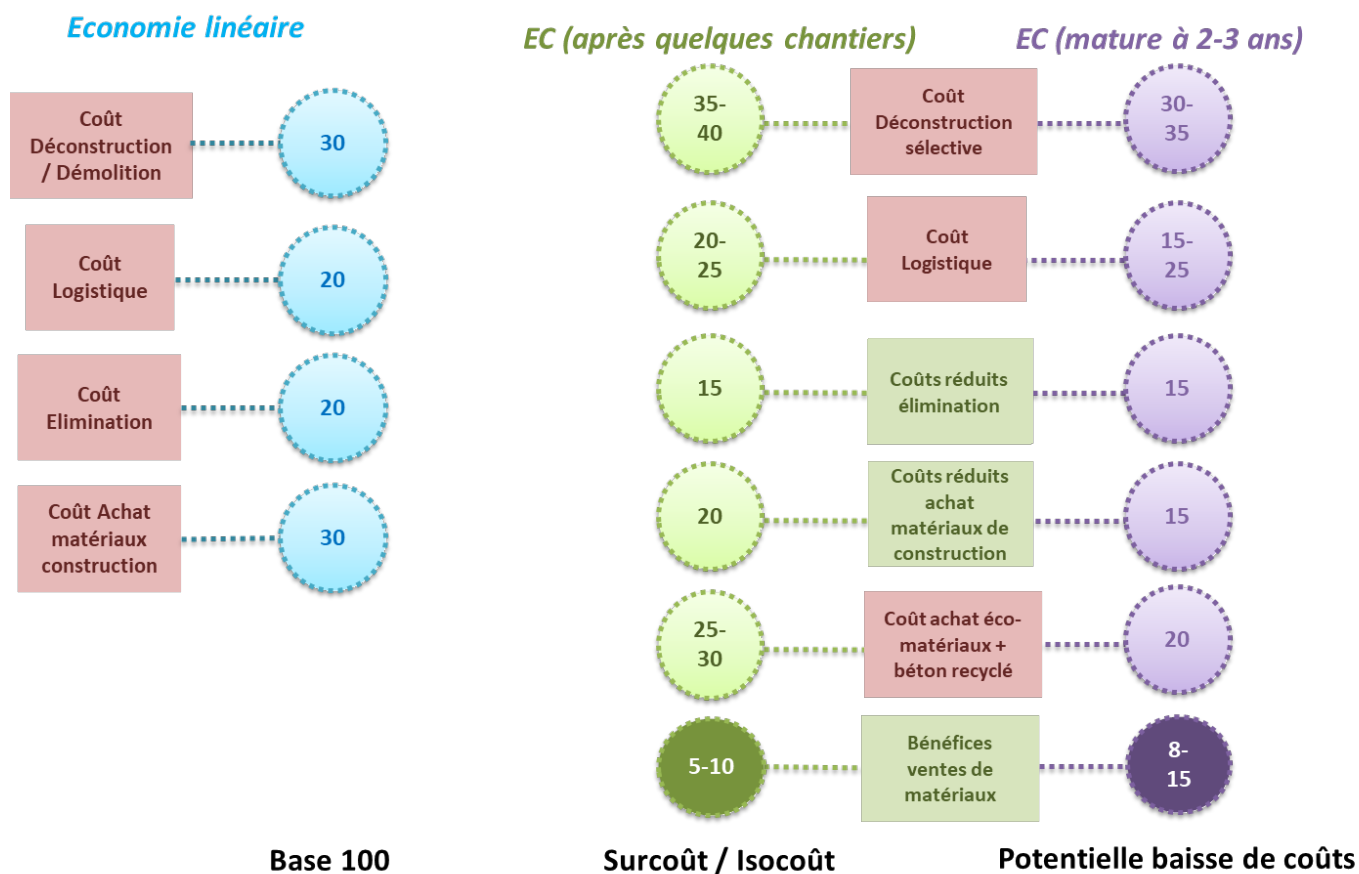


Condition nécessaire de faisabilité économique:



Example: selective deconstruction (IV/V)

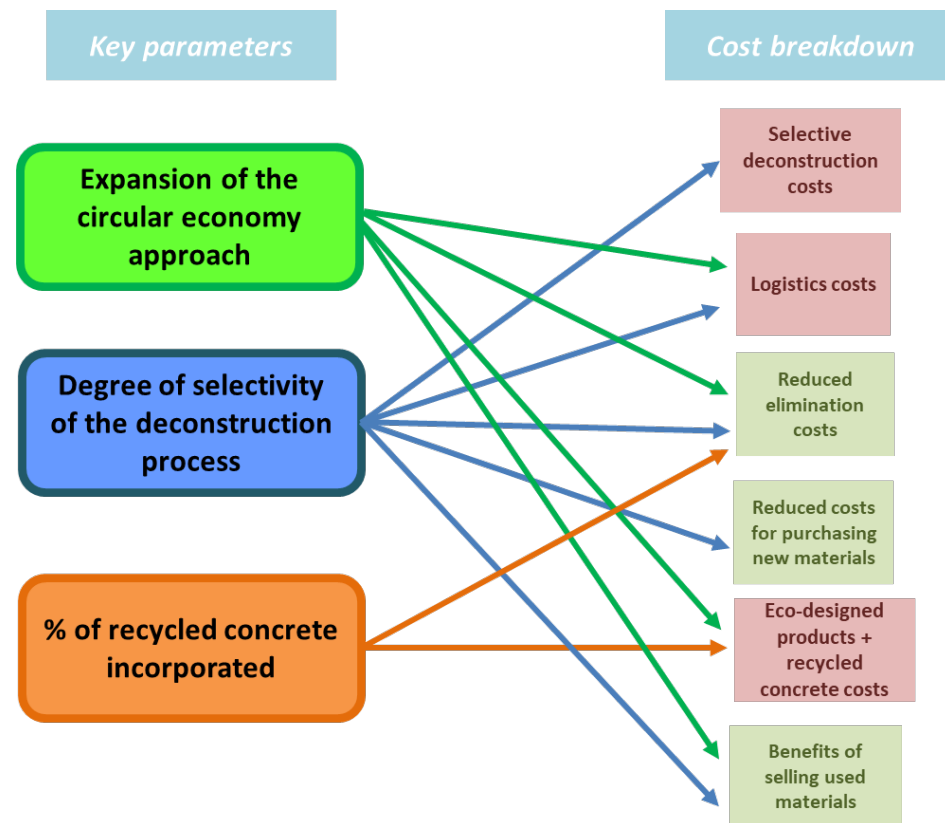
- Cost distribution



Example: selective deconstruction (V/V)

3 main conclusions:

1. If the **CE approach becomes more widespread**, this could lower the costs of the project of 3-5% with respect to a traditional linear deconstruction project.
2. **Increasing the selectivity** of the deconstruction could lower the general costs of 2-20%.
3. Introducing a **large proportion (eg: over 40%) of recycled concrete aggregates** can render the project economically viable.



Main conclusions

Obstacles hampering CE initiatives in the CPW sectors

- There still exist strong **logistical constraints** due to the **weak degree of industrialization** of CE initiatives in the CPW sectors
- Insurances and legislation are still not entirely adapted to CE models, and to the use of new materials (eg: recycled concrete, some excavated soils...). This is directly related to the reluctance of certain actors.
- One notices a **lack of skilled labor** (and training) in specific fields, particularly for newly-developed CE jobs (eg: resource diagnosticians or eco-designed product suppliers)
- **Economic and financial aspects** represent potentially limiting factors to the development of CE innovative initiatives: the CPW sector comprises a lot of small and medium companies

Main conclusions

Lessons and opportunities

- The **industrialization of CE initiatives** must be considered as the main goal to achieve, in order for CE approaches to become the reference principles in the CPW sectors
- The **large-scale diffusion of numeric tools** (eg: market places) will enable potential logistical and financial obstacles to be lifted
- Other numeric tools, relating to **selective deconstruction** will enable product and material inventories to become systematic within construction projects
- **Integrating CE principles in public and private bills of specifications** (eg: promoting the use of recycled or eco-designed materials) may represent a pull factor for actors of the CPW sectors and lead to an evolution of the
- The need to **develop training schemes** adapted to new CE-related jobs
- Contracting authorities should adopt a **holistic vision** of the projects (accounting for economic and environmental consequences of the project)

Any questions?

