



## Valorisation of all fractions of CDW, a route to circular economy: LCA of Leroy Merlin project

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# What is Life Cycle Assessment ? (LCA) ?

- ▶ Standards: ISO 14040:2006 and 14044:2006
- ▶ « LCA addresses environmental aspects and **potential environmental impacts** (e.g. use of resources and the environmental consequences of releases) **throughout a product's life cycle** from raw material acquisition through production, use, end-of-life treatment, recycling and final disposal (i.e. cradle-to-grave) »

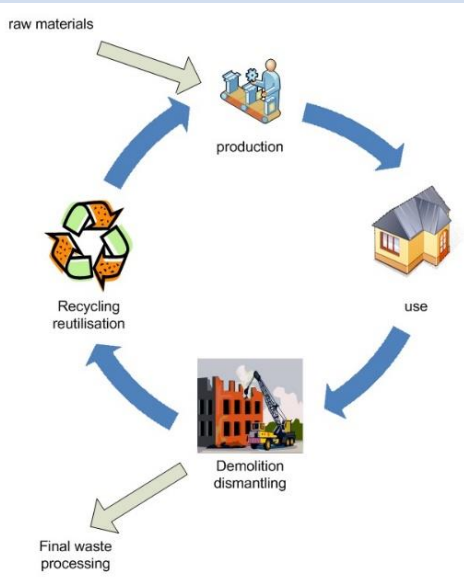
## Goal & Scope

**Primary data ↔ Operators**  
**Database : Ecoinvent (CH) (EI)**



## Life cycle

### FU - Boundaries



## Quantitative inventory

	Flow	Quantities
Inputs	Water	m <sup>3</sup>
	Styren	kg
	Electricity	KJ
	etc.	kg
Outputs	CO <sub>2</sub> (air)	kg
	Hydrocarbons (air)	kg
	HCl (water)	kg
	Waste water (water)	kg
	Mercury (soil)	kg
	Cadmium (soil)	kg
	etc.	kg

## Indicators

- **Climate change**
- Resource exhaustion
- Energy consumption
- Waste
- Eutrophication
- Human toxicity
- Acidification
- Ozone layer depletion
- ...

GIEC  
IPCC

CML IA v3.06  
(EN 15804)

Methods

Simapro

# Leroy Merlin

## The story of a recycled concrete



- **Demolition of Leroy Merlin store of Douai (59, FR)**  
[https://www.youtube.com/watch?v=2IRb7PDcl\\_4](https://www.youtube.com/watch?v=2IRb7PDcl_4)



- **Recycling of the waste - Recycled Aggregates (RA)**



# Leroy Merlin

## The story of a recycled concrete



0 – 4 mm

**Wasterial®**

→ Resin slabs – EtNISI  
<http://www.etnisi.com>



4 – 20 mm

**Concrete  
Eqiom**



New Leroy Merlin  
store (Tourcoing)  
concrete slab



# Inventory

- **RA: Leroy Merlin Douai demolition: 3100 tonnes of RA**



excavation

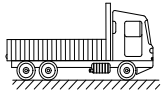
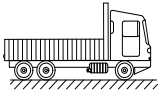


on-site transport



crushing

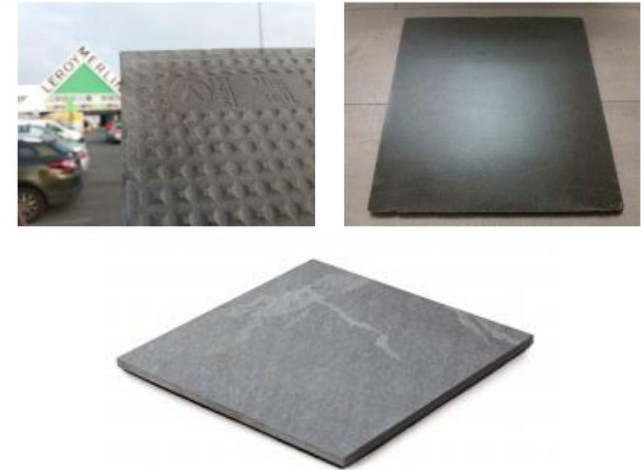
- **Transport of waste**

- **0-4 mm:** 1400 tonnes  Recynov sorting site, Santes, 39 km  
→ EtNISI Wasterial® / other "recycled sand" uses
- **4-20 mm:** 1700 tonnes  Eqiom concrete plants
  - 200 tonnes: Wambrechies, 50 km → **Leroy Merlin Tourcoing**
  - 1500 tonnes: Roost-Warendin, 4 km → other projects

# RA 0-4 mm Wasterial® - Goal and Scope

## Goal

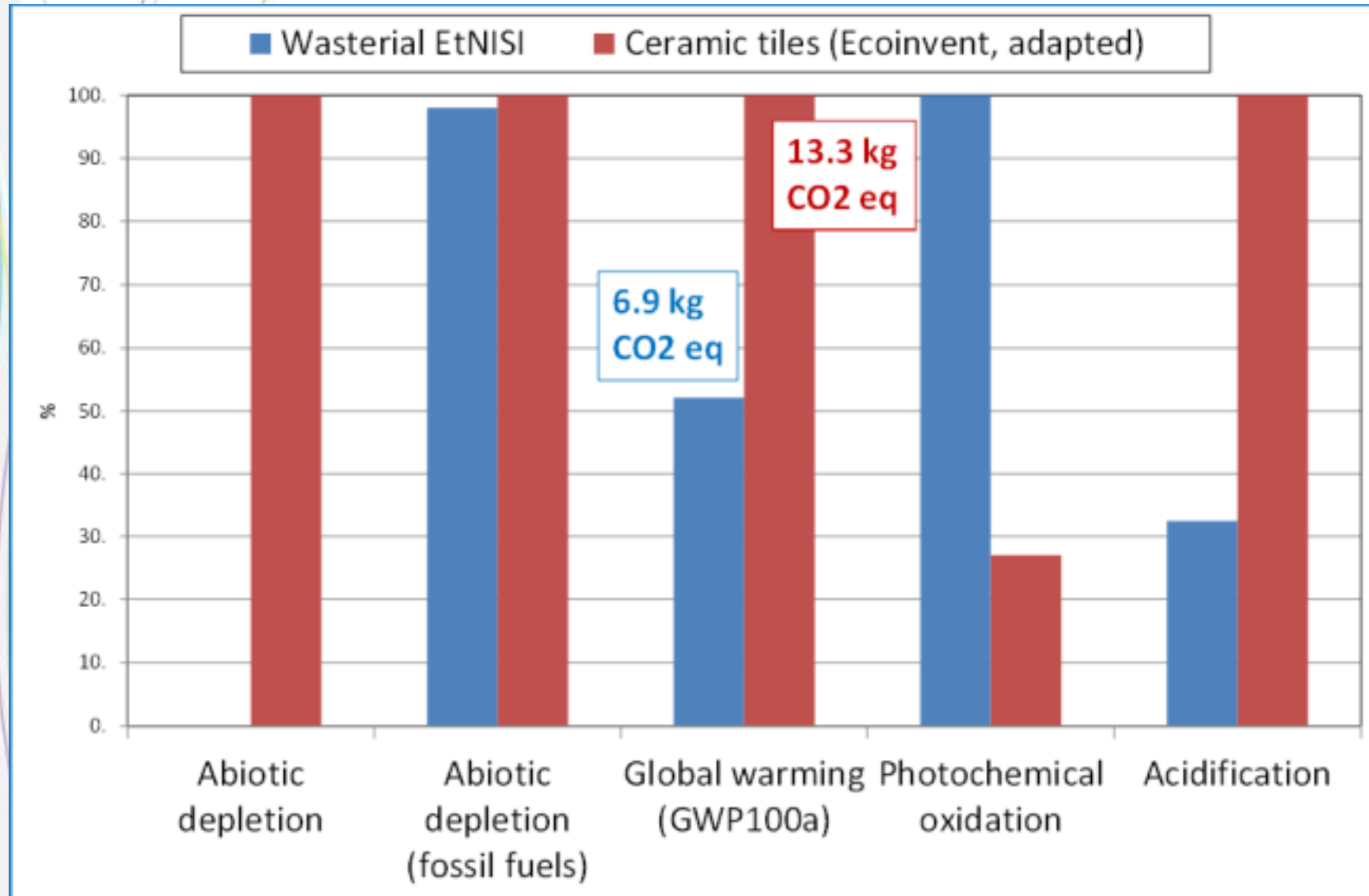
- Comparison for the same function: **floor covering**
  - Wasterial® resin slabs (RA 0-4 mm + limestone + binder)
  - Italian ceramic tiles (Ecoinvent generic CH, adapted IT)



## Scope

- **FU: 1 m<sup>2</sup> of "pavement"**
- Cradle-to-gate (comparative) LCA
- Boundaries: raw materials, transport, production

# RA 0-4 mm Wasterial® - Results: characterisation



SimaPro



# RA 0-4 mm Wasterial® - Discussion

## Results

- LCA: **Wasterial® better than ceramic tiles**
- Wasterial®: binder (> 90% ! ) and electricity (FR)
- Ceramic tiles: energy (for firing)  
(GWP : 49% heat, 23% electricity, 16.5% TiO<sub>2</sub>)

## Improvement

- "Greener" binder



# RA 4-20 mm Concrete - Goal and Scope

## Goal

- To assess the environmental impact of the **substitution** of a part of natural aggregates (NA) by recycled aggregates (RA) in the case of the demolition-construction of Leroy Merlin store in the Hauts de France

## Scope

- **FU: 1 m<sup>3</sup> of concrete**
  - Eqiom formulation: adaptation of generic entry (concrete, sole plate and foundation, + FR)
- Cradle-to-gate (comparative) LCA
- Boundaries: raw materials, transport, production

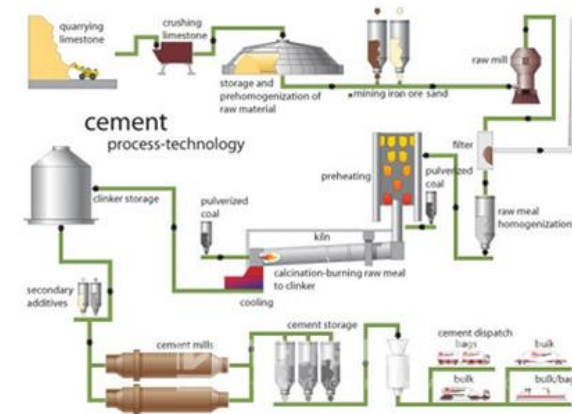
# RA 4-20 mm Concrete - Goal and Scope

## Scope

- 2 scenarii:
  - 100% NA (Belgian quarry: 55 km from Eqiom)
  - 20 RA + 80% NA

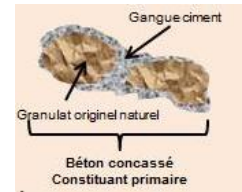
## LCA Results

- No significant difference  
⇒ major impact = cement (not RA/NA)

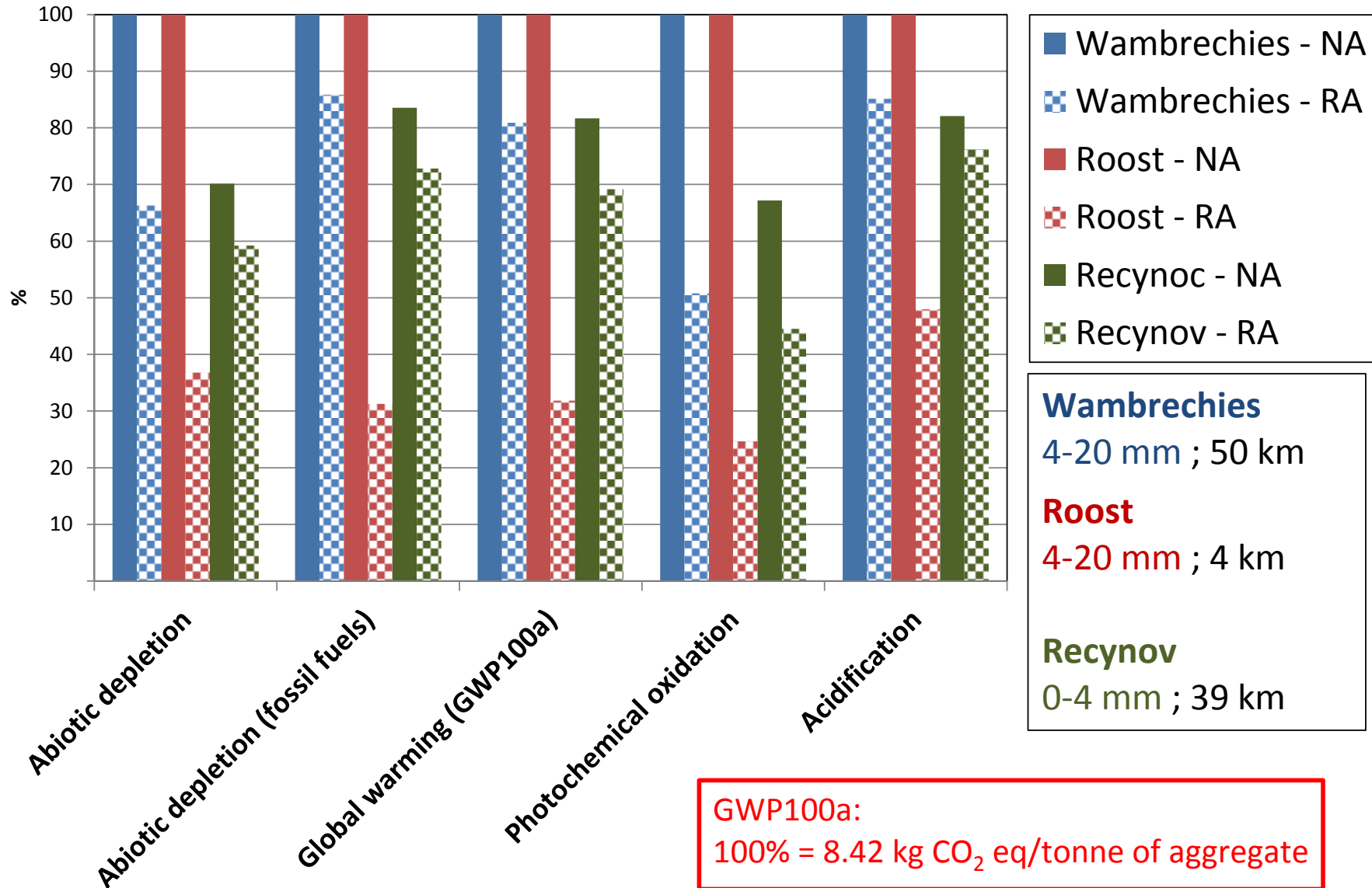


## New Scope

- **FU: 1 kg of aggregate production (including transport)**
- Comparison: NA ↔ RA



# RA 4-20 mm / NA – Results: characterisation



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ecovent

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# RA 4-20 mm Concrete - Discussion

## Results

- LCA: RA (dashed) better than NA (plain)
- Difference depends on distance (between demolition and valorisation sites): **the closer, the better**

## GWP100a – CO<sub>2</sub> saving using RA

- Recynov - Santes: 1 kg CO<sub>2</sub> eq / tonne ("NA" = sand)
- Eqiom - Wambrechies: 1.6 kg CO<sub>2</sub> eq / tonne
- Eqiom - Roost: 5.7 kg CO<sub>2</sub> eq / tonne

## RA 4-20 mm Concrete - Discussion

- Gain for the construction of the new store in Tourcoing/Neuville-en-Ferrain : 322 kg CO<sub>2</sub> eq
- Global gain if total reuse of the 3100 tonnes of RA (0-4 and 4-20 mm):  
**10 400 kg CO<sub>2</sub> eq**
- 4-20 mm RA: 8500 m<sup>3</sup> of concrete

# Take home message

The valorisation of the demolition waste from Leroy Merlin Douai store provides a significant environmental gain

Let's get circular !



