



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) »

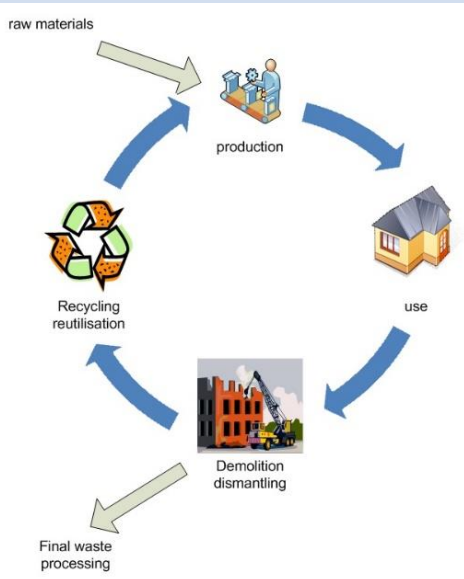
Goal & Scope

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



Life cycle

FU - Boundaries



Quantitative inventory

	Flow	Quantities
Inputs	Water	m ³
	Styren	kg
	Electricity	KJ
	etc.	kg
Outputs	CO ₂ (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



- **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

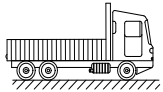
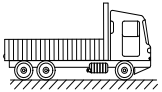


on-site transport



crushing

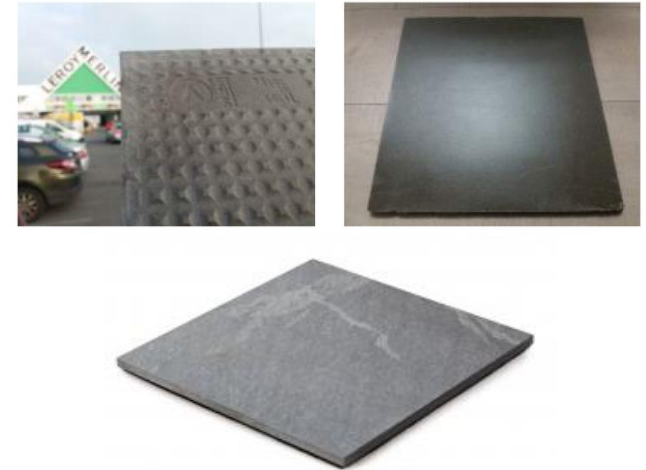
- **Transport of waste**

- **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

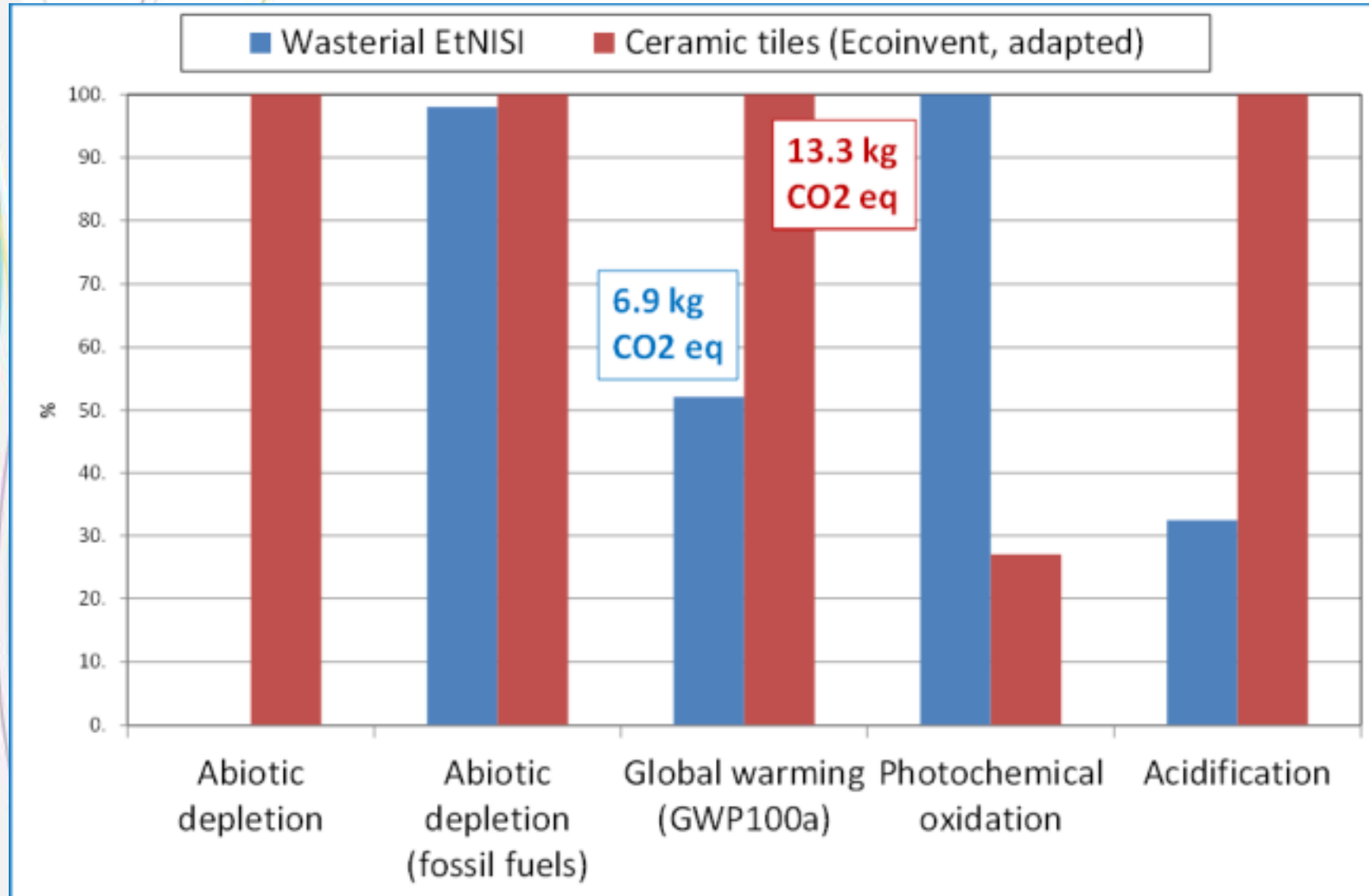
- Comparison for the same function: **floor covering**
 - Wasterial® resin slabs (RA 0-4 mm + limestone + binder)
 - Italian ceramic tiles (Ecoinvent generic CH, adapted IT)



Scope

- **FU: 1 m² of "pavement"**
- Cradle-to-gate (comparative) LCA
- Boundaries: raw materials, transport, production

RA 0-4 mm Wasterial® - Results: characterisation



SimaPro

ecoinvent

CML
Institute of Environmental Sciences

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% TiO₂)

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 m³ of concrete**
 - Eqiom formulation: adaptation of generic entry (concrete, sole plate and foundation, + FR)
- Cradle-to-gate (comparative) LCA
- Boundaries: raw materials, transport, production

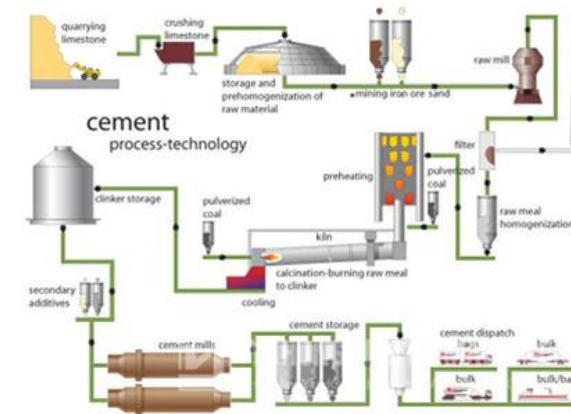
RA 4-20 mm Concrete - Goal and Scope

Scope

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

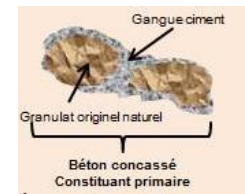
LCA Results

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

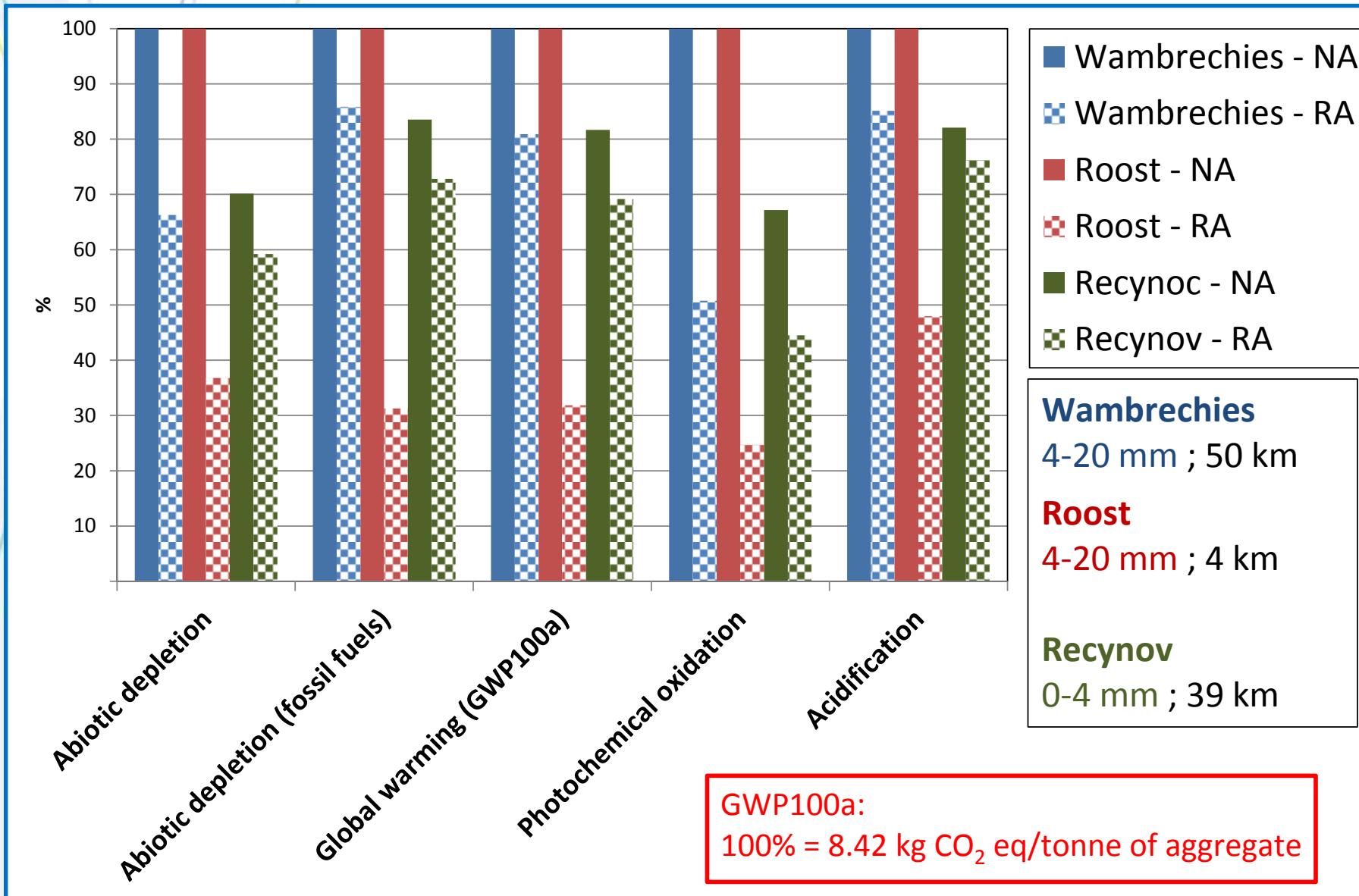


New Scope

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



RA 4-20 mm / NA – Results: characterisation



SimaPro



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 – CO₂ saving using RA

- Recynov - Santes: 1 kg CO₂ eq / tonne ("NA" = sand)
- Eqiom - Wambrechies: 1.6 kg CO₂ eq / tonne
- Eqiom - Roost: 5.7 kg CO₂ eq / tonne

RA 4-20 mm Concrete - Discussion

- Gain for the construction of the new store in Tourcoing/Neuville-en-Ferrain : 322 kg CO₂ eq
- Global gain if total reuse of the 3100 tonnes of RA (0-4 and 4-20 mm):
10 400 kg CO₂ eq
- 4-20 mm RA: 8500 m³ 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 !



Thank You!

