

Circular economy of buildings: Leroy Merlin case study

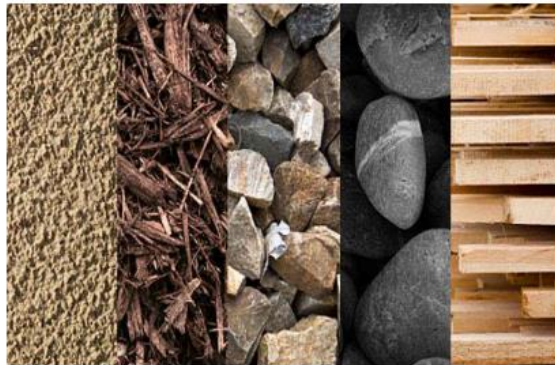
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Context:

- ❑ Building and construction sector: 1/3 of global resource consumption

50% of raw material consumption



40% of energy consumption



- ❑ Construction & demolition waste (CDW)
 - EU: CDW = largest waste stream (1/3 of all EU waste)
 - ~ 20% of total waste in Belgium

Context:

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Recycling



Circular Economy

- ❑ Construction & demolition waste (CDW)
 - EU: CDW = largest waste stream (1/3 of all EU waste)
 - ~ 20% of total waste in Belgium (40% in the world)

Context:

- ❑ CDW (Construction & Demolition Waste): mostly not recycled

- ❑ Causes:
 - heterogeneity
 - dispersion
 - economic viability
 - (policy / inconsistencies, discrepancies)



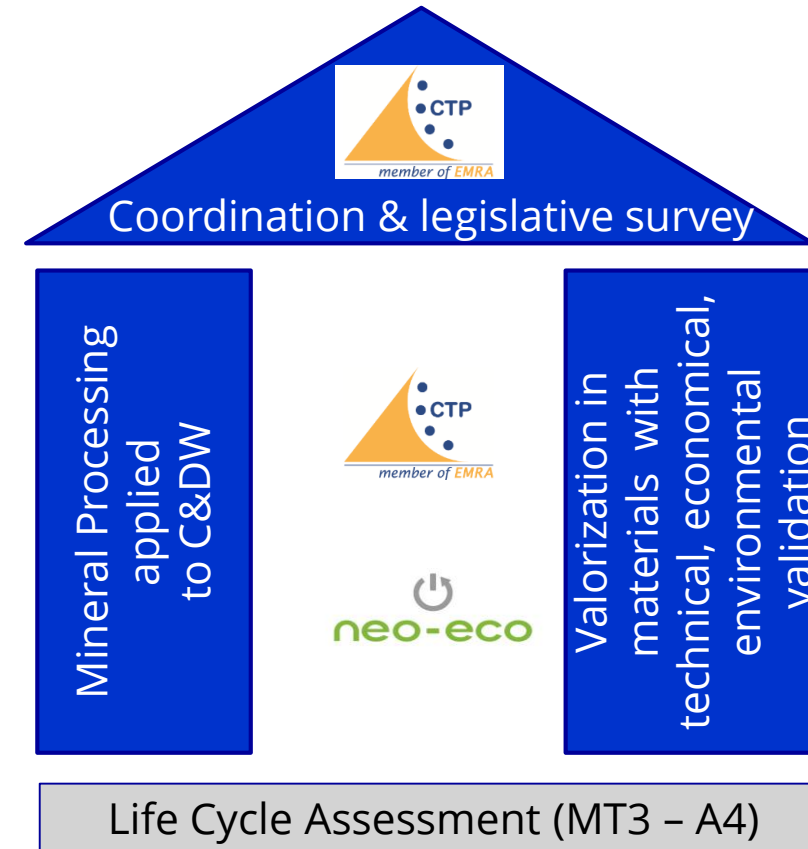
VALDEM project:

VALDEM aims to improve demolition waste treatment to reach a circular economy in North of France and Wallonia (BE) (and Vlanderen, BE) (01.07.2016 – 4 years)

General information:

<http://www.valdem-interreg.eu/>

Co-founders:



Leroy Merlin

The story of a recycled concrete



- Demolition of Leroy Merlin store of Douai (59, FR)
- Recycling of the "waste" (recycled aggregates, RA)
- Construction of the new store in Tourcoing/Neuville-en-Ferrain (59, FR)
⇒ substitution of a part of natural aggregates (NA) in the concrete slab
- Valorization of all the fractions
 - 4-20 mm in concrete (Eqiom)
 - 0-4 mm in pavement (EtNISI)
- https://www.youtube.com/watch?v=2IRb7PDcl_4



Goal and Scope

Goal

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

Scope

- FU: 1 m³ of concrete
- Cradle-to-gate (comparative) LCA
- 2 scenarii : 100% NA ↔ 20 RA + 80% NA (= RA20)
- Boundaries: raw materials, transport, production

Inventory

1. RA

- Production



excavation



on-site transport



crushing

- Adaptation of generic entries to the French case

Inventory

1. RA

- Leroy Merlin Douai demolition: 3100 tonnes of RA
 - 4-20 mm: 1700 tonnes: 200 tonnes to Wambrechies
1500 tonnes to Roost-Warendin
 - 0-4 mm: 1400 tonnes to Recynov - Santes
- Transport
 - 4-20 mm: transport to Eqiom concrete plants
 - Wambrechies, 50 km (→ Leroy Merlin Tourcoing)
 - Roost-Warendin, 4 km (→ other projects)
 - 0-4 mm: transport to Recynov site, Santes, 39 km
 - EtNISI in pavement



Inventory

2. NA (4-20 mm); sand (0-4 mm)

- Production: adaptation of generic entries to the Belgian case (Gaurain quarry, BE)
- Transport distances: 55 km (Eqiom), 47 km (Recynov, Santes)

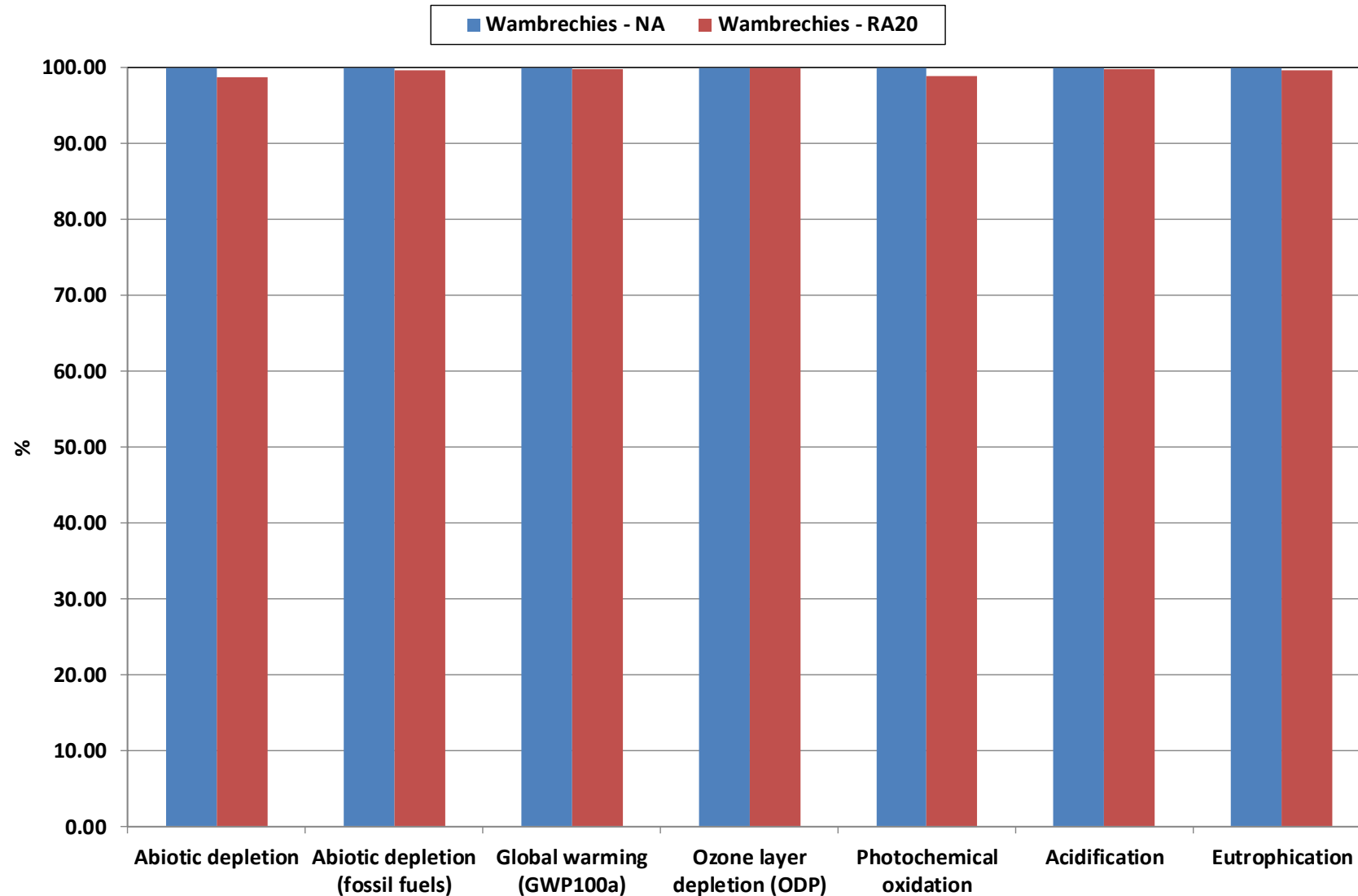


3. Concrete

- Eqiom formulation: adaptation of generic entry (concrete, sole plate and foundation, + FR)

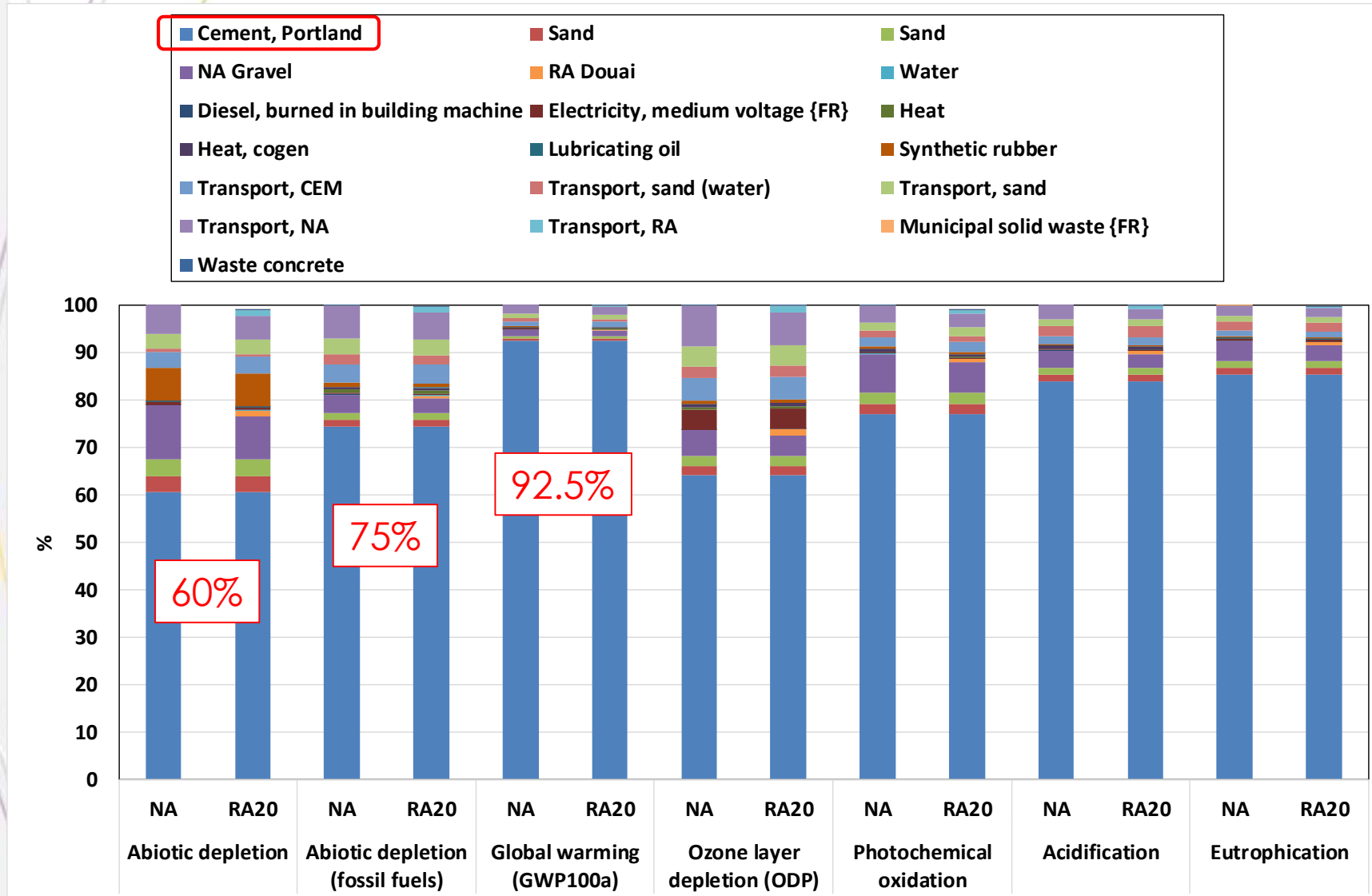
LCA Results – FU = 1 m³ Concrete, Wambrechies

Simapro 9.0; Ecoinvent 3.5; CML-IA 3.05



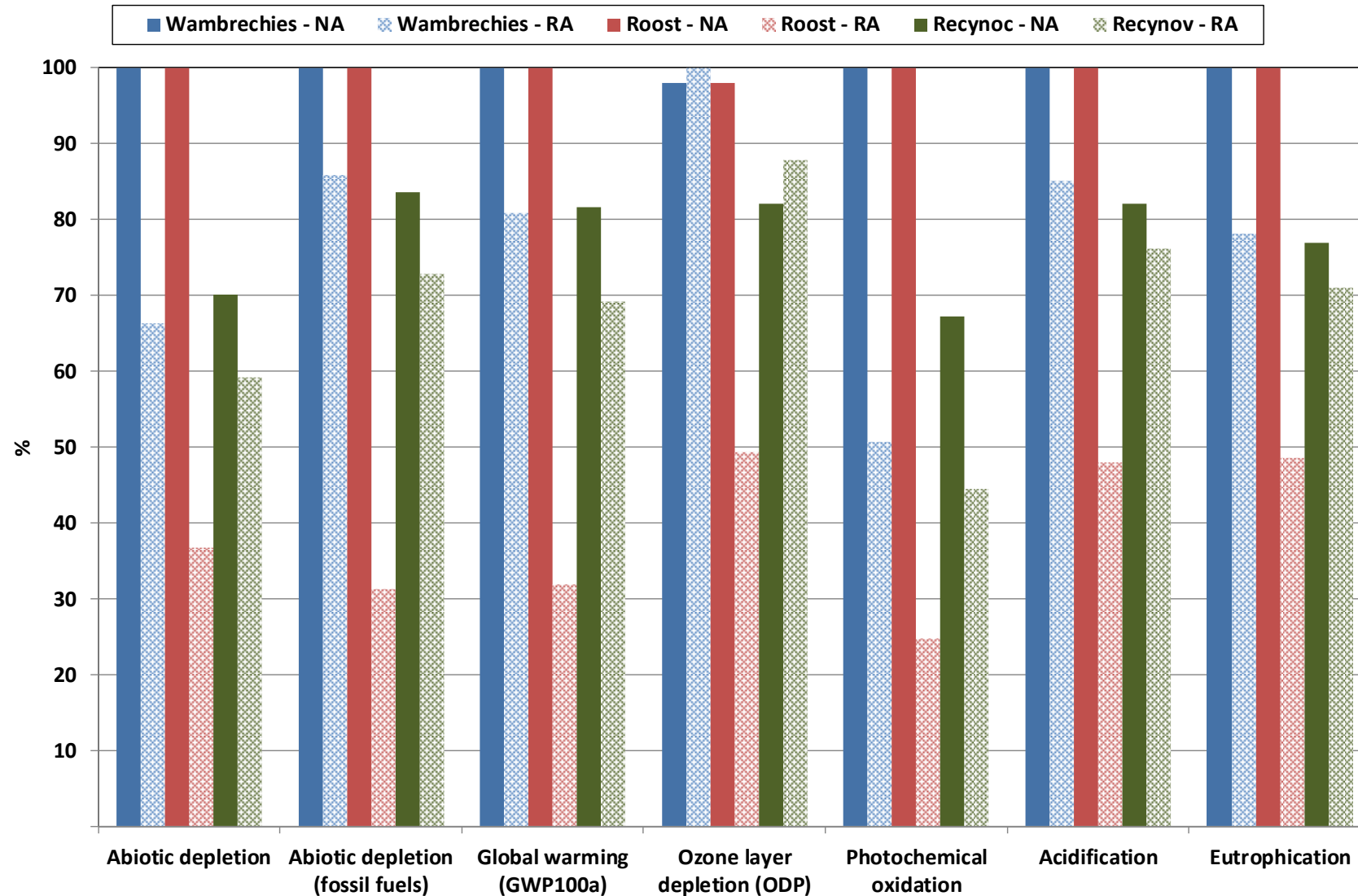
LCA Results – FU = 1 m³ Concrete, Wambrechies

Simapro 9.0; Ecoinvent 3.5; CML-IA 3.05



LCA Results – NA / RA production and transport

Simapro 9.0; Ecoinvent 3.5; CML-IA 3.05



Conclusions

- **Substitution of 20% of NA with RA in concrete**

No significant impact difference on 1 m³ of concrete because cement is the most impacting element

- **NA / RA production and transport**

GWP100a: gain depending on distance between the demolition and the valorization sites

- Recynov - Santes: 1 kg CO₂ eq / tonne
- Eqiom - Wambrechies: 1.6 kg CO₂ eq / tonne
- Eqiom - Roost: 5.7 kg CO₂ eq / tonne

Conclusions

- 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 t of RA (0-4 and 4-20 mm):
10400 kg CO₂ eq
- 4-20 mm RA: 8500 m³ of concrete
- EtNISI pavement: to be continued...

Take home message

The valorization of the demolition waste from Leroy Merlin Douai store provides a significant environmental gain compared to the use of natural aggregates only

Let's get circular !



Acknowledgment:

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