

VALDEM PROJECT: FROM LCA OF DEMOLITION WASTE TO CIRCULAR ECONOMY OF BUILDINGS

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Context:

- ❑ Building and construction sector:
 - more than 1/3 of global resource consumption
 - generation of solid waste: 40% of the total waste volume
 - EU: CDW = largest waste stream (1/3 of all EU waste)
- ❑ CDW (Construction & Demolition Waste): mostly not recycled
- ❑ Causes:
 - heterogeneity
 - dispersion
 - economic viability
 - (policy / inconsistencies, discrepancies)

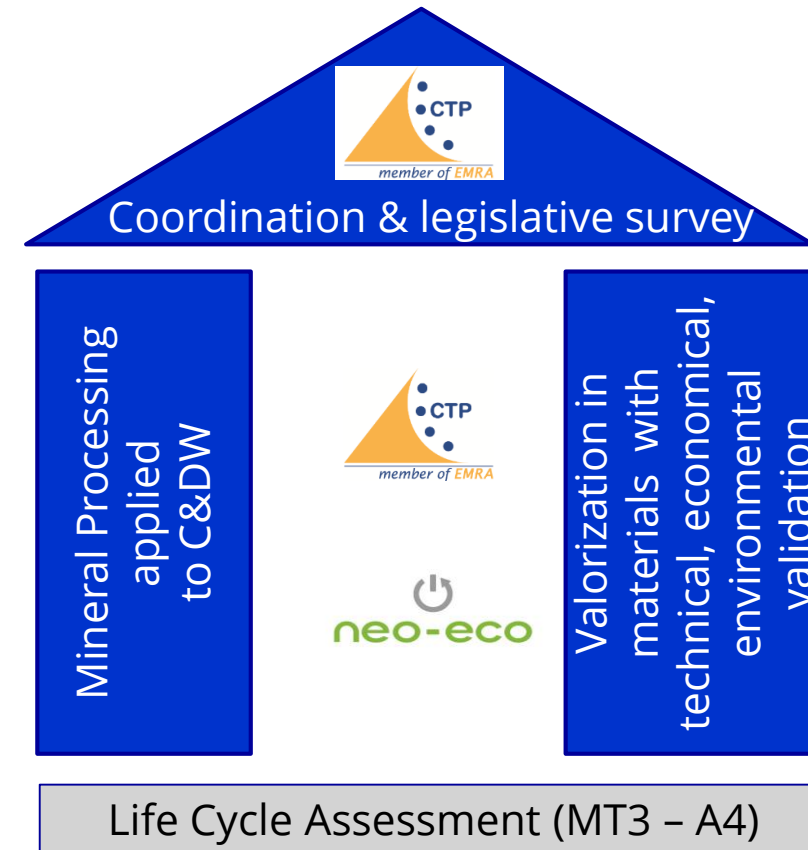
VALDEM project:

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 ans)

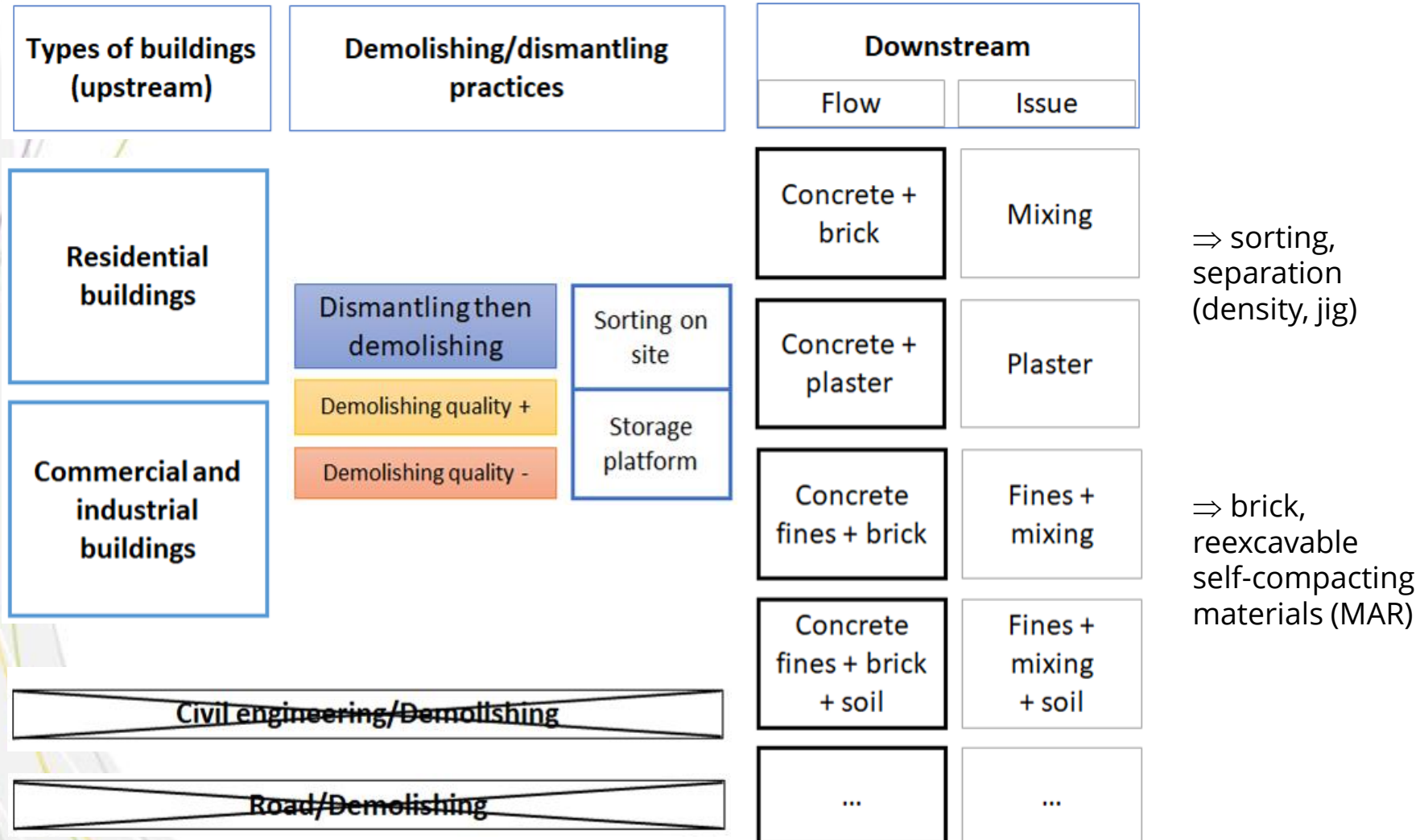
General information:

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

Co-founders:



Life Cycle Management: detailed scope



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:

- Cradle-to-gate (comparative) LCA
- Substitution of 20 % of natural aggregates (NA) with recycled concrete aggregates (RA)
- FU: 1 m³ of concrete

System boundaries

- 1. RA:** demolition of Leroy Merlin store of Douai (59, FR)
 - Excavation, on-site transport, crushing and sieving
 - 4-20 mm: transport to Eqiom concrete plants
 - Wambrechies (→ Leroy Merlin Tourcoing)
 - Roost-Warendin (→ other projects)
 - 0-4 mm: transport to Recynov site, Santes
 - EtNISI in pavement
- 2. NA:** production and transport to the site of use (Eqiom) or distribution (Recynov)



Inventory

1. RA:

- Excavation, on-site transport, crushing: adaptation of generic entries to the French case
- Transport distances: primary data

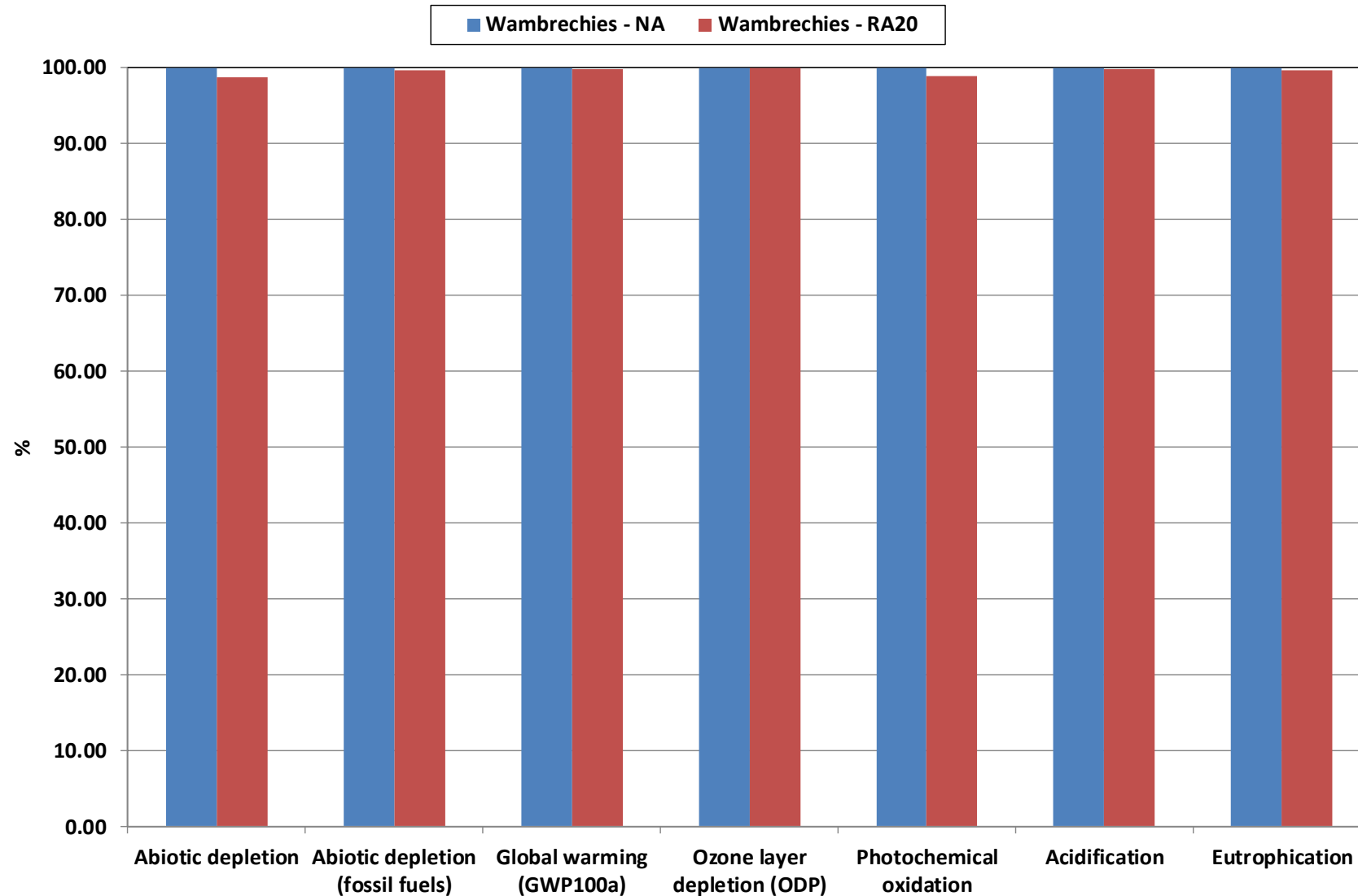


2. NA:

- Production: adaptation of generic entries to the Belgian case (quarry in Belgium)
- Transport distances: primary data

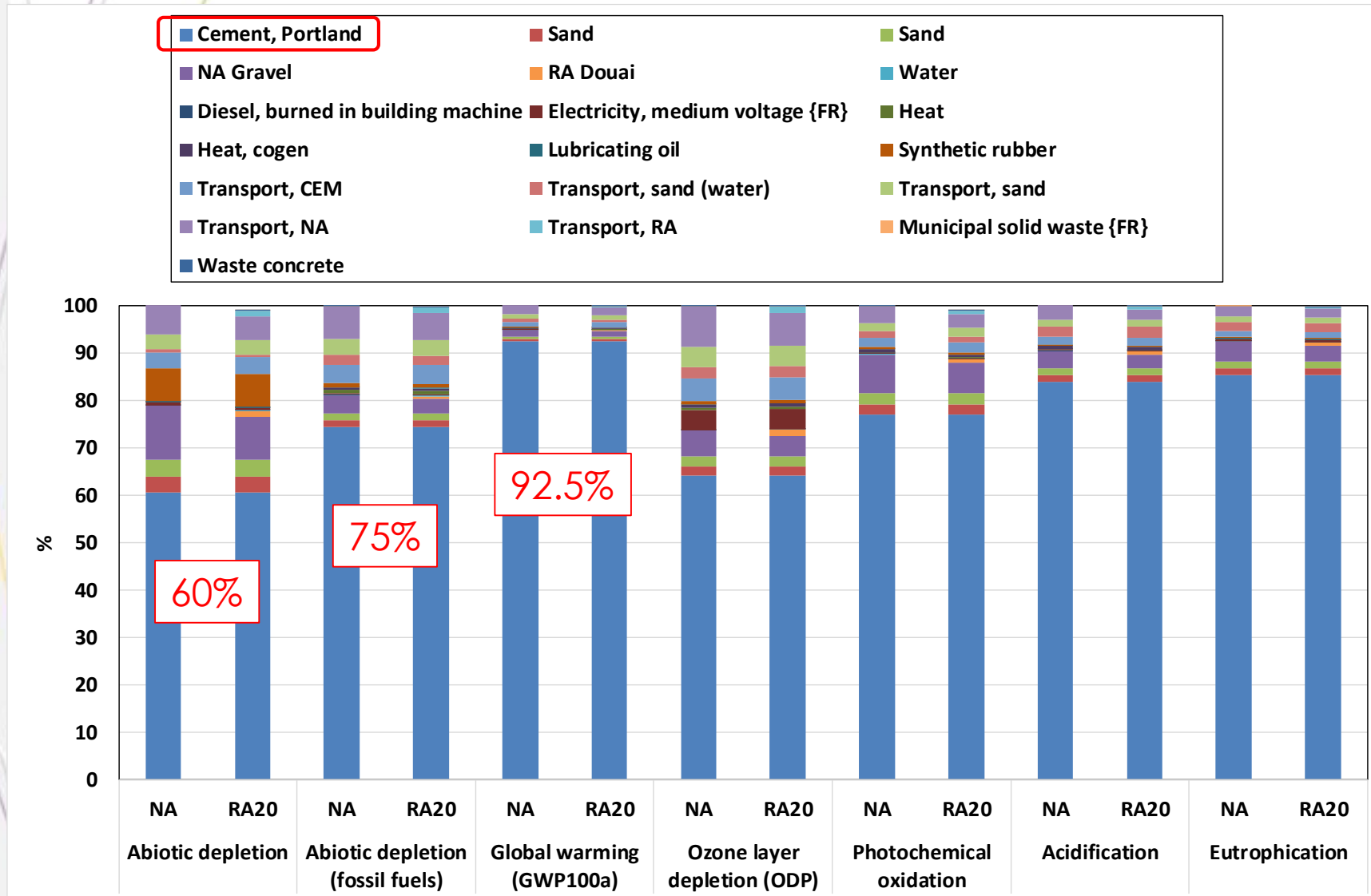
LCA Results – FU = 1 m³ Concrete, Wambrechies

Simapro 9.0; Ecoinvent 3.5; CML-IA 3.05



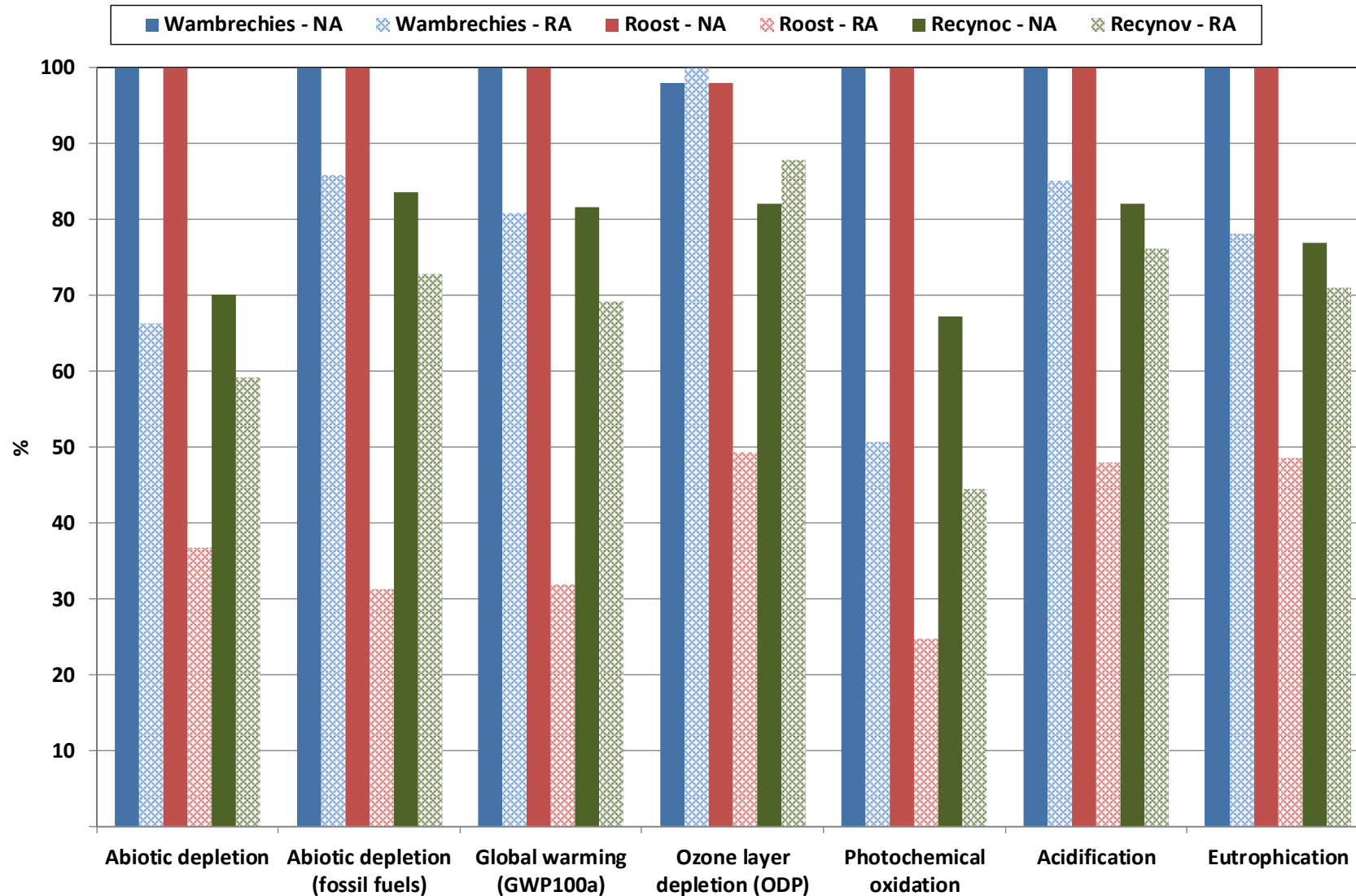
LCA Results – FU = 1 m³ Concrete, Wambrechies

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

- 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
- 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

Globally, and in a circular economy perspective, the valorization of the demolition waste from Leroy Merlin Douai store provides a significant environmental gain compared to the use of natural aggregates only.

Acknowledgment:

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