

Session 7: Sustainability



► Worldwide building activity

50% of raw material consumption



40% of energy consumption



Availability ???
Price ????

► Construction & demolition waste (CDW) ~ 20% of total waste in Belgium

► Worldwide building activity

50% of raw material consumption

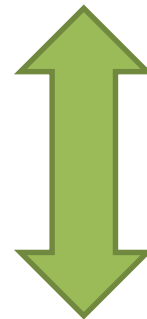


40% of energy consumption



Availability ???
Price ????

Recycling



Circular Economy



- Construction & demolition waste (CDW)
~ 20% of total waste in Belgium

Evaluation of the benefits of circular economy

–

Life Cycle Assessment of Derbigum recycling unit

Computer Aided Process Engineering FORUM

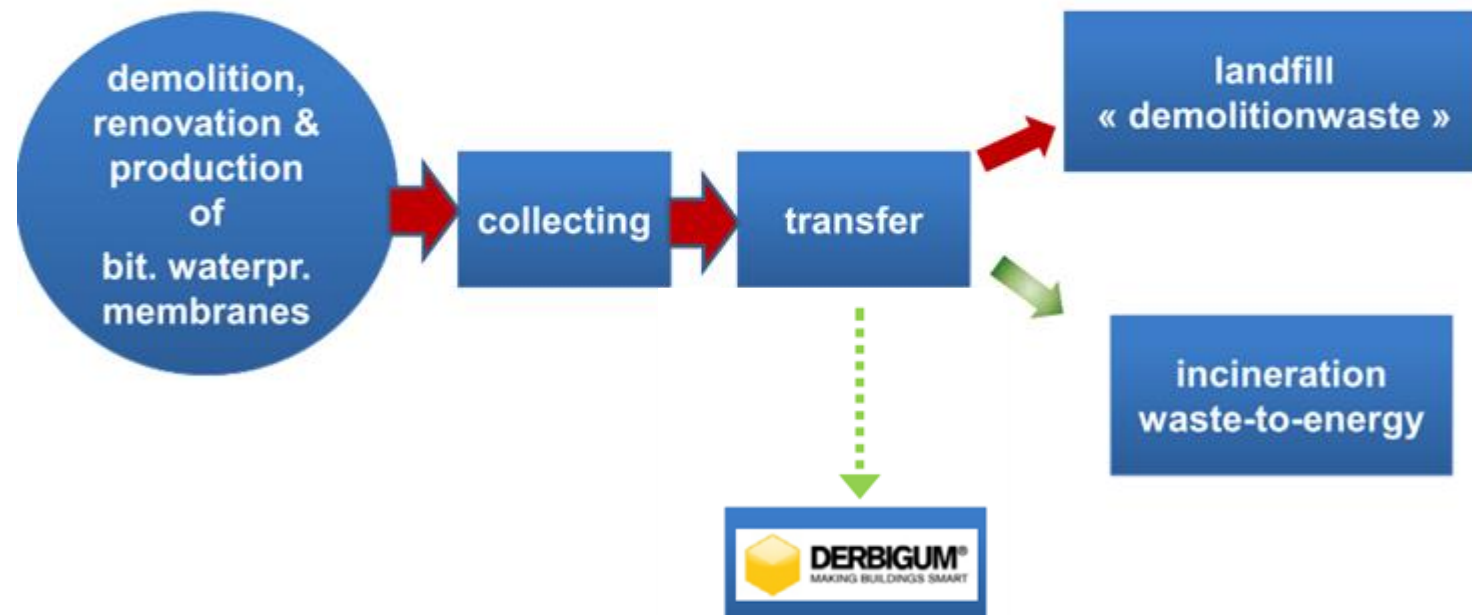
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Bituminous Waste BE



Actual Waste-flow

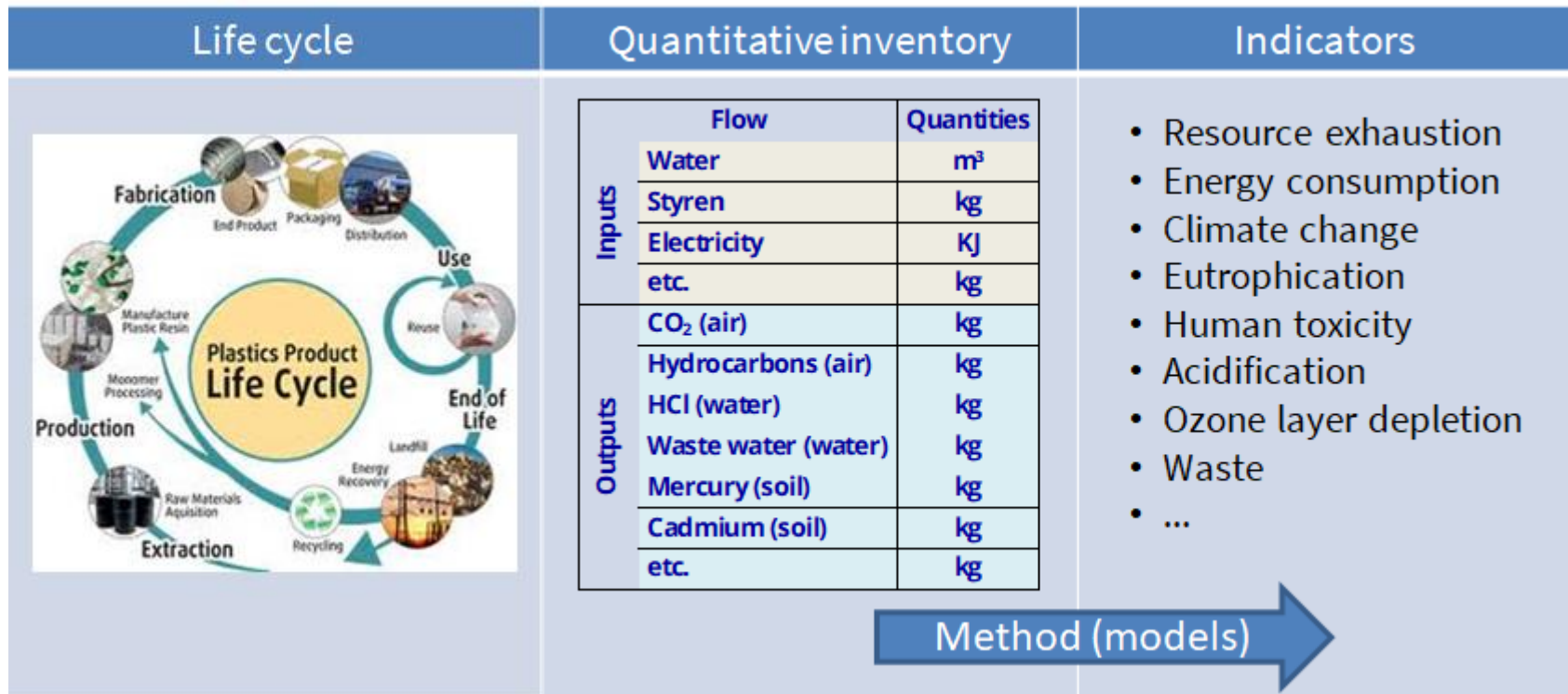




- ▶ Evaluation of benefits?
 - ⇒ Life cycle assessment

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) »



- ▶ Bituminous waterproofing membranes for roof:
 - ▶ reinforcing support + bituminous blend
 - ▶ 100% recyclable

- ▶ Patented process:
Macaluser



- ▶ Recycling unit
(Imperbel, Perwez, BE):
crushing, sieving, processing (Mac),
defibering, packaging



▶ Goal

- ▶ To assess the environmental impacts of the recycling unit of Derbigum

▶ Scope

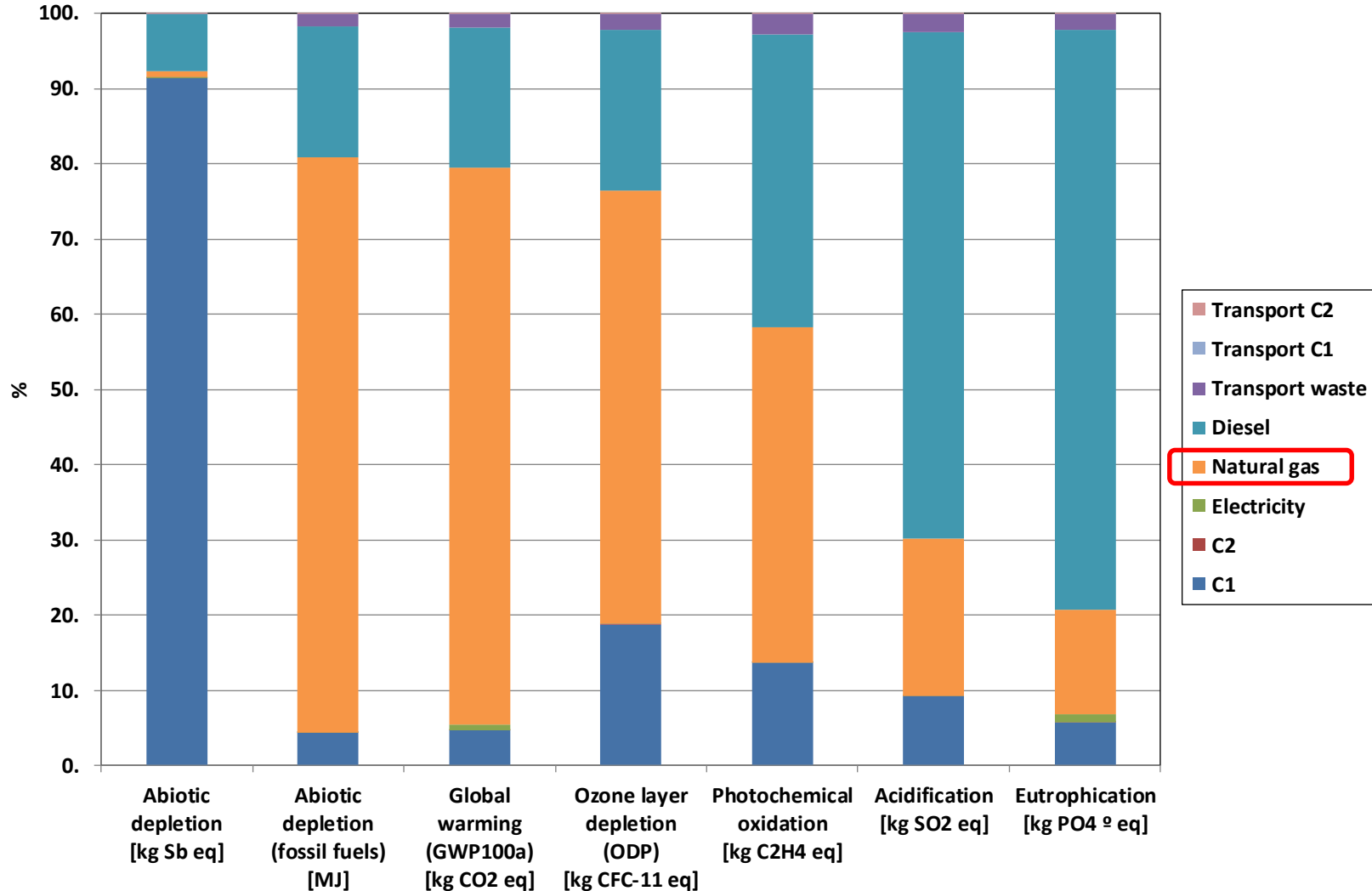
- ▶ Functional unit (FU): 1 kg of secondary raw material = Gumix (for gum mix)
- ▶ "Cradle-to-gate" LCA
- ▶ "Cut-off" perspective: waste are "free"
- ▶ Reference year: 2017

- ▶ Raw materials (additives): production and transport
- ▶ Bituminous waste transport
 1. (internal) production waste
 2. cut-offs waste
 3. demolition/renovation waste (sorting sites)
- ▶ Packaging (storage)
- ▶ Energy (gas, electricity, diesel)
 - ▶ Electricity: 100% "green mix" (hydraulic, FR)

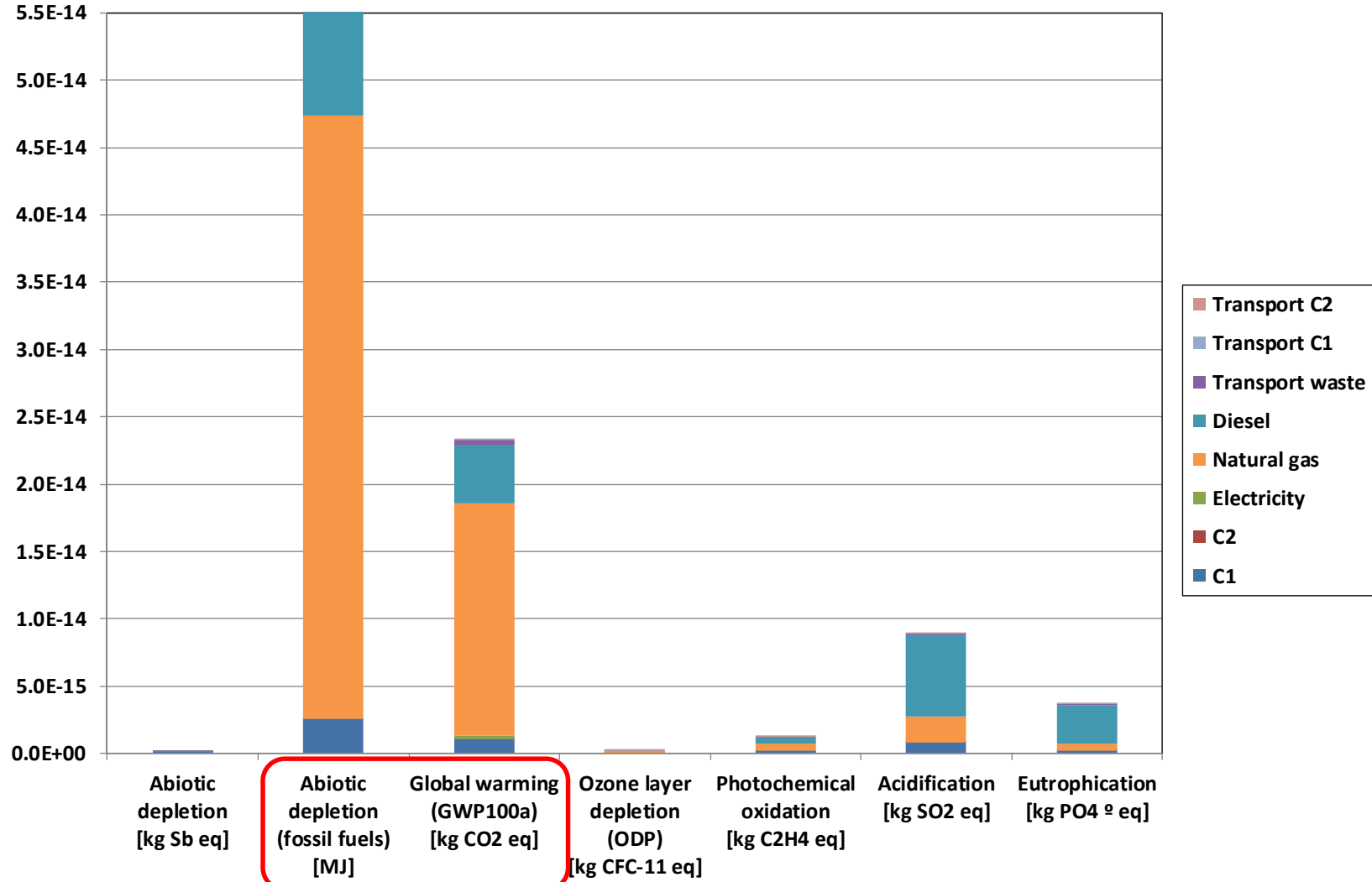


- ▶ Product Category Rules (PCR) for Environmental Product Declaration (EPD)
- ▶ EN 15804: construction works and products
- ▶ Method: CML-IA baseline 3.05
- ▶ Database: Ecoinvent 3.5
- ▶ Simapro 9.0

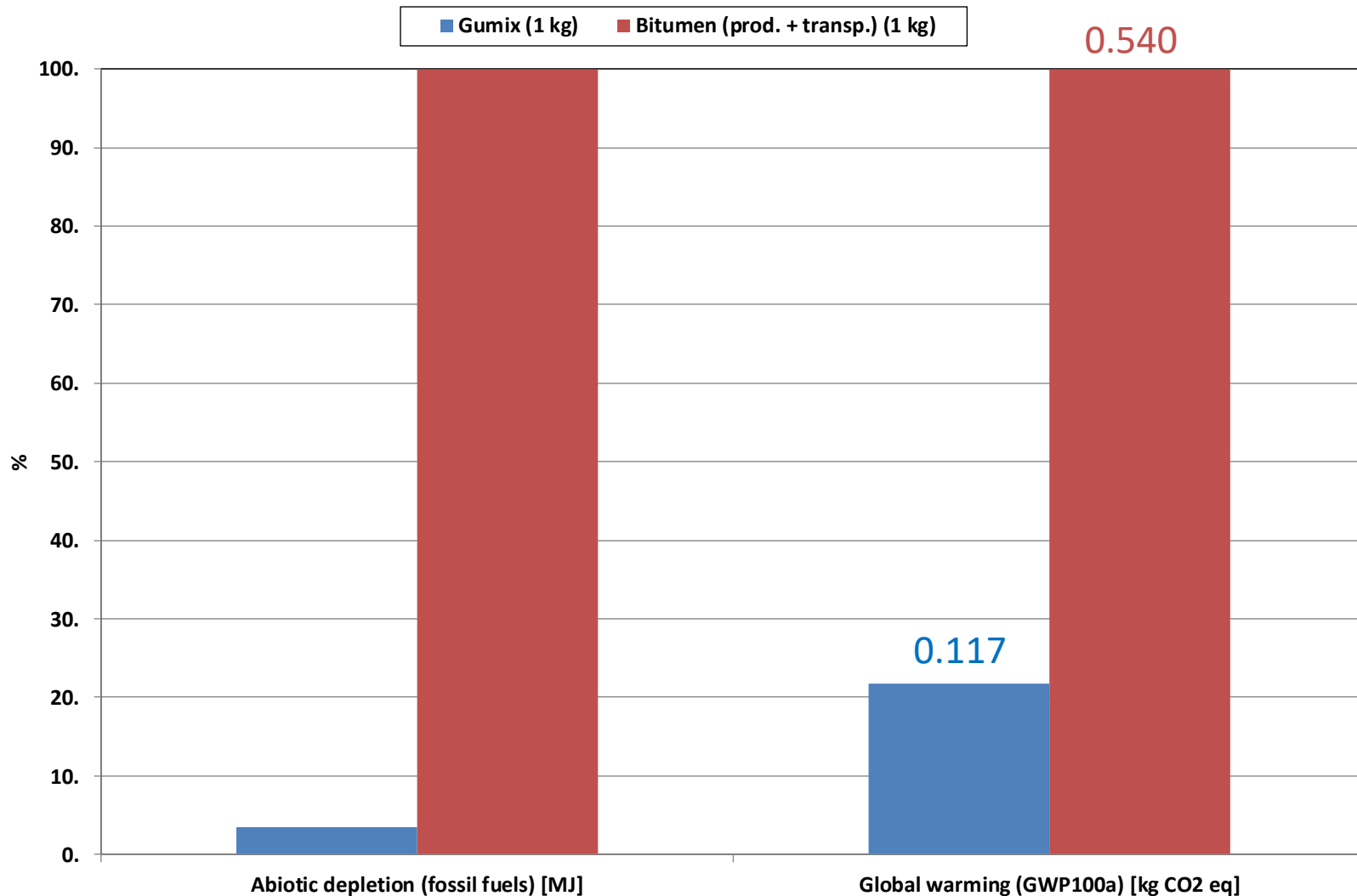
► Characterisation – 1 kg of Gumix



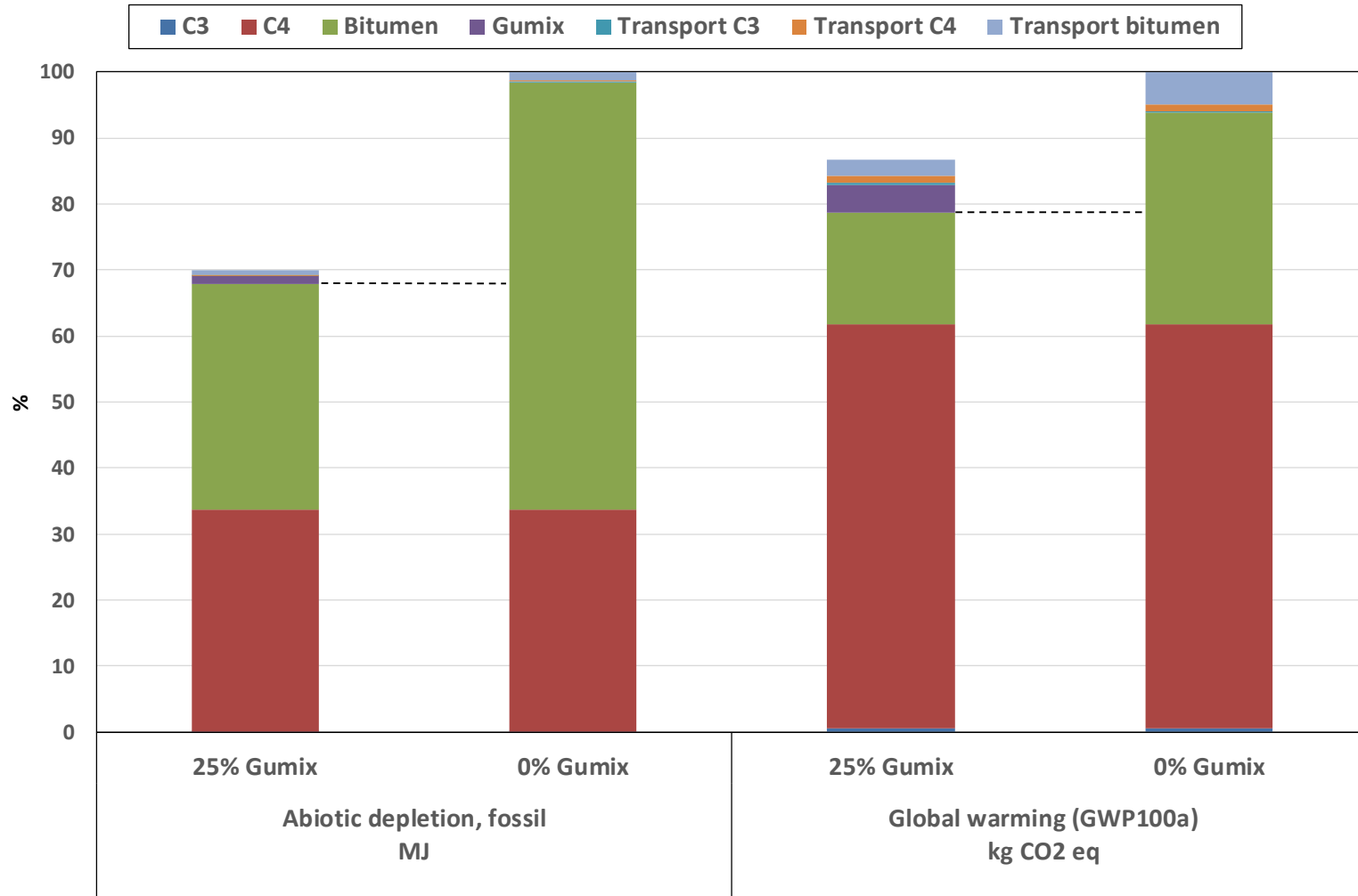
► Normalisation (EU25+3, 2000) – 1 kg of Gumix



► Comparison with (virgin) bitumen (characterisation)



- ▶ Comparison: 1 kg of binder
25% Gumix (+ 28% bitumen) ↔ 53 % of bitumen



- ▶ Recycling hot spot: natural gas consumption
- ▶ Recycling of bituminous membrane waste: environmental benefits in all the impact categories
- ▶ Main categories: AD-FF and GWP
- ▶ Gumix ↔ Virgin bitumen
 - ▶ GWP - CO₂ emission: 5 x lower
 - ▶ Fossil fuels consumption: 20 x lower
- ▶ "Gumix based binder" (25%):
 - ▶ GWP - CO₂ emission: gain = 13%
 - ▶ Fossil fuels consumption: gain = 30%

Recycling
of bituminous roof membrane waste
=
FF saving and CO₂ emissions reduction

Let's get circular !



