



GreenDelta

sustainability consulting + software



Formulating lubricants for circularity, compliance and customer value

Dr. Jonas Hoffmann, GreenDelta GmbH, Berlin
on 17th September, 2026, Lubricant Expo

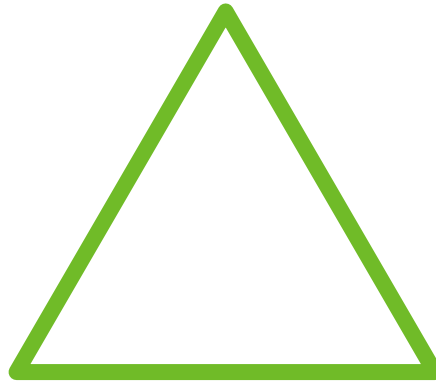
Picture: Julia Gierke / Shutterstock

‘The art of sustainability consulting’

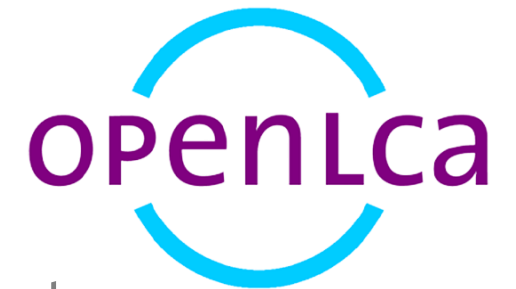
Sustainability consultancy and research
environmental LCAs, resource criticality, social LCAs, Life Cycle Costing,
Circular Economy



Database development and
distribution



Software development,
especially open source



SETTING THE SCENE

SSbD and ESPR are pulling ecodesign into the R&D phase. LCA is how you answer that brief.

Defossilization Efforts: Ecodesign Now Starts at R&D

The Clean Industrial Deal is pushing **defossilization** across EU industry. Policies such as **SSbD** and **ESPR** require **ecodesign** at the **formulation stage**

15%

of global energy-sector fossil emissions come from oil and gas operations

Is Bio-Based Actually Greener?

Bio-based materials raise their own questions: land use, biodiversity, feedstock competition. LCA is how you find out, rather than assume.

18%

of the EU's total lubricant consumption is bio-based

Circularity Is Already Here

Circular economy approaches like re-refining are already in place. This is current practice, not a future scenario.

61% → 85%

EU waste-oil regeneration rate today, versus the proposed 2030 benchmark

The Full Life Cycle Reveals the Gap

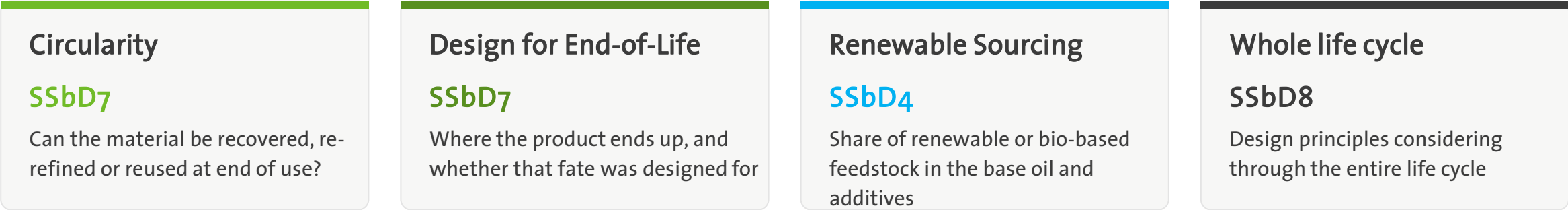
Emissions often peak at end of life, not at the factory gate. Yet **performance and end of life** are the two dimensions lubricant industry skips.

3.5 kg CO₂ eq

are the emissions of a single liter of lubricant generates **cradle-to-gate**

There is no one-fits-all solution

DESIGN



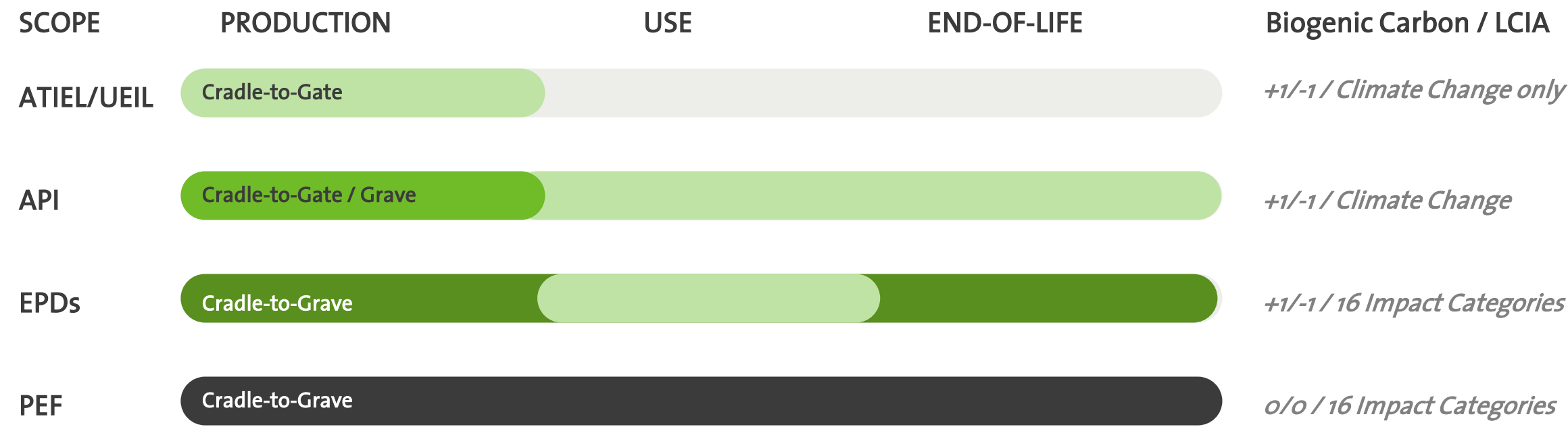
RAW MATERIAL



Limited availability

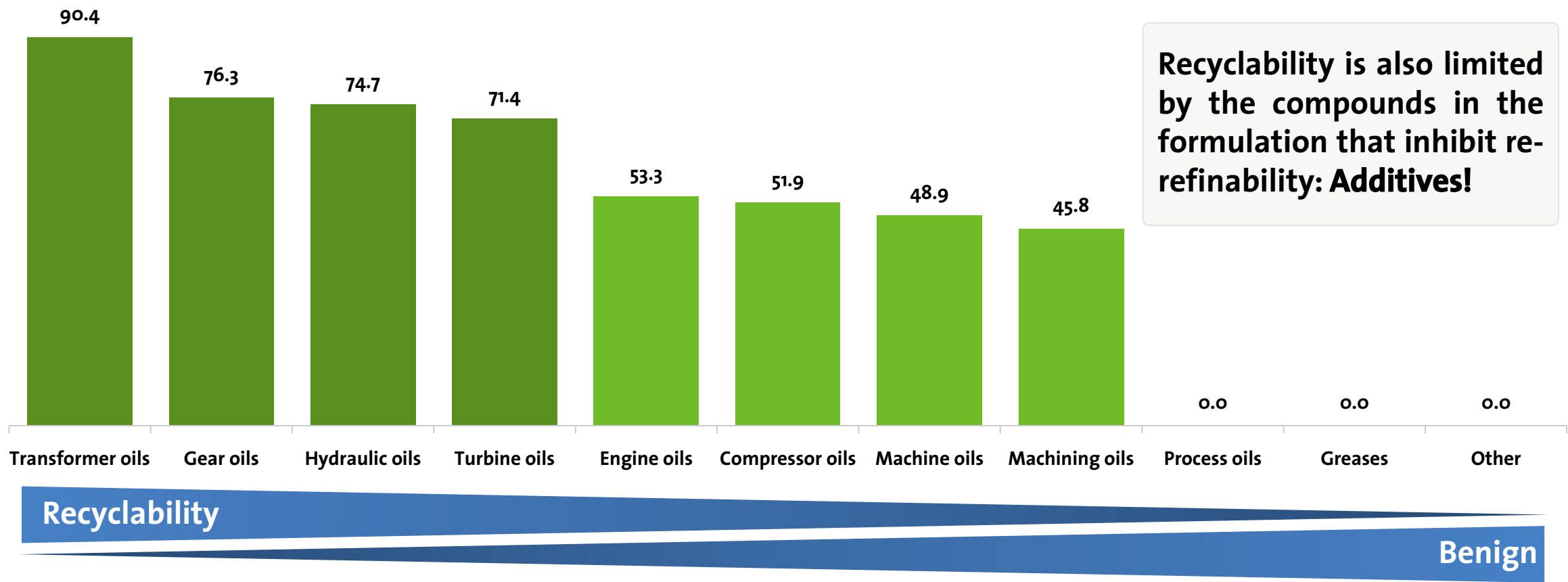
THE ASSESSMENT LANDSCAPE

Not every framework looks at the same slice of the life cycle.



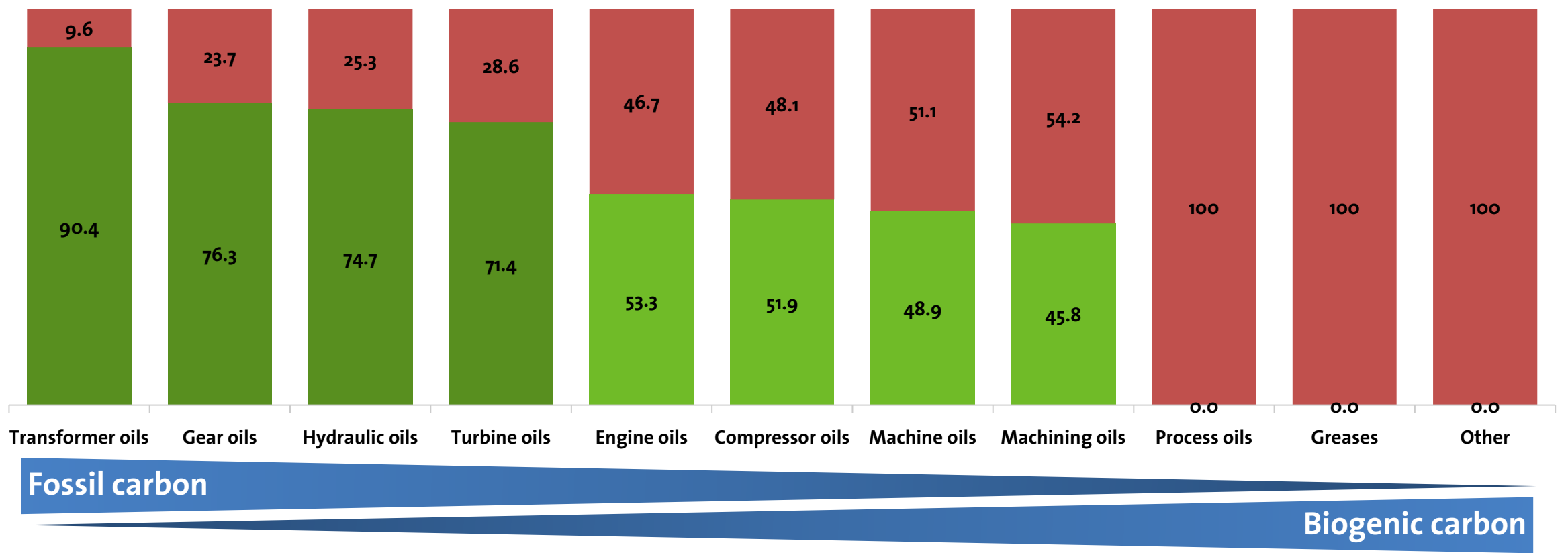
THE EVIDENCE

EoL Recoverability varies enormously by application (recyclability)



Study to support the Commission in gathering structured information and defining of reporting obligations on waste oils and other hazardous waste

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Study to support the Commission in gathering structured information and defining of reporting obligations on waste oils and other hazardous waste

How about formulations that are lost?



Filled for Life $\approx$ no loss

Loss is limited enough that durability can lead

FORMULATION PICK

**Bio-based, non-biodegradable,
Less focus on toxicity**

e.g. greases in gear box



Accidental Loss $\approx$ partial

Low share of material lost during operation

FORMULATION PICK

**Bio-based, less recyclability focus
Medium focus on toxicity**

e.g. hydraulic, engine oils



Total-Loss $\approx$ all

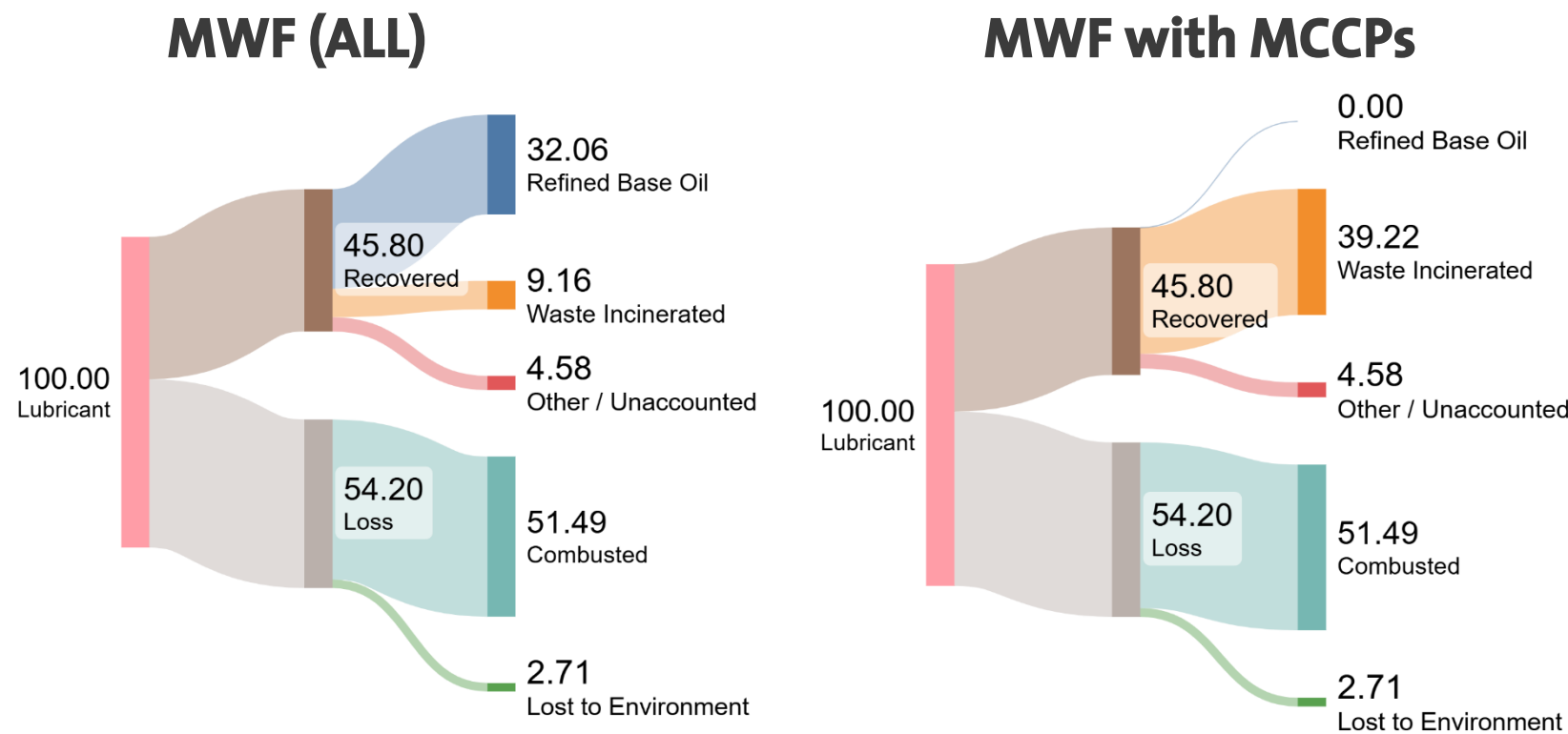
Lost to environment by design degradation matters

FORMULATION PICK

**Bio-based, biodegradable
strong focus on toxicity**

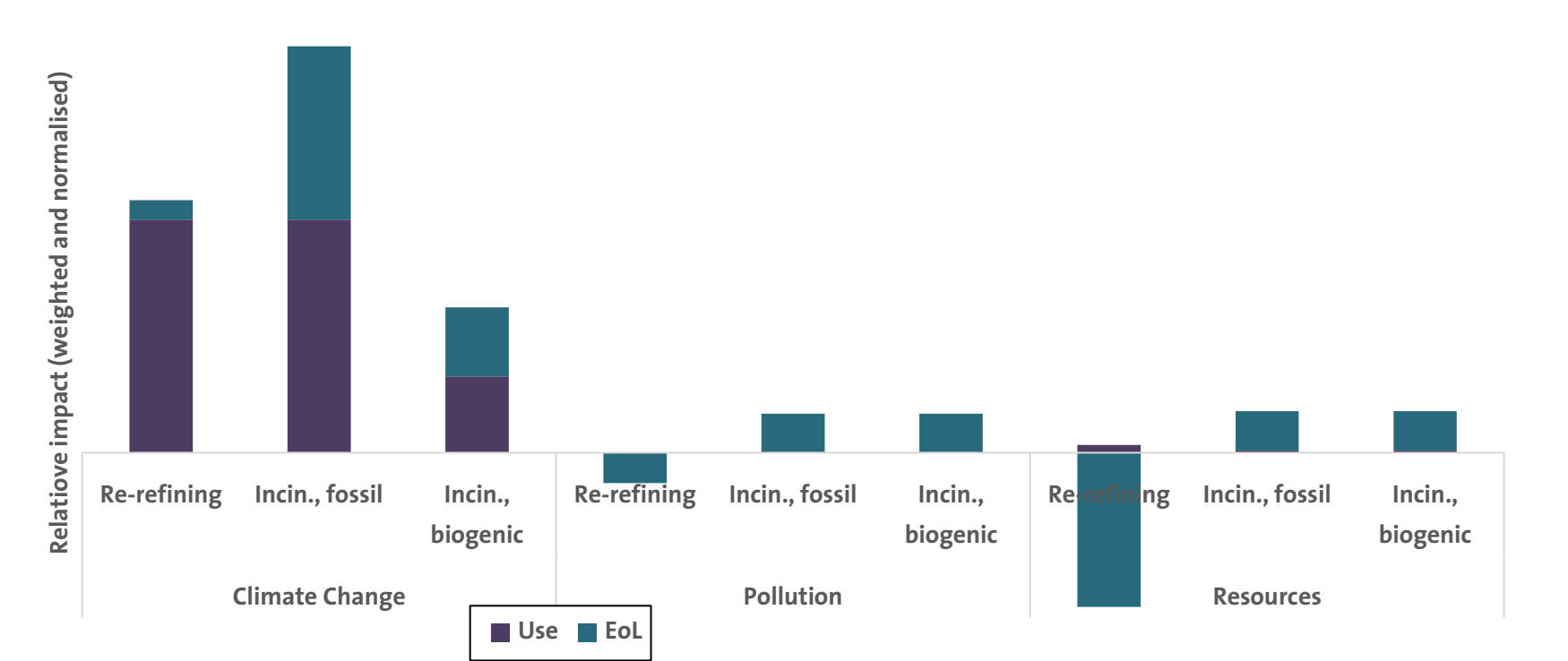
e.g. chainsaw oils, greases

Example of Design for End-of-Life for:



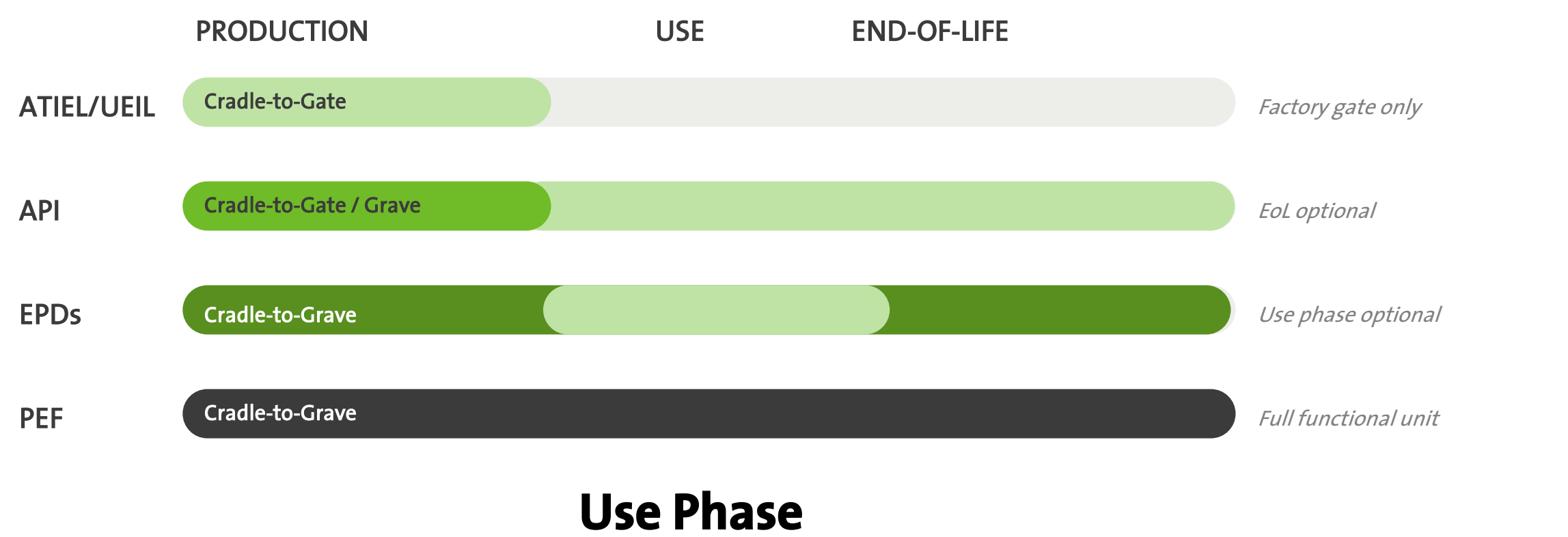
Because the additive interferes with the recycling process, most of the material must be incinerated. Therefore, biogenic carbon should be used instead

Example of Design for End-of-Life:



Because the additive interferes with the recycling process, most of the material must be incinerated. Therefore, biogenic carbon should be used instead

Not every framework looks at the same slice of the life cycle.



The functional unit decides what “improvement” actually means

15 – 30K km vs. 5–10K km but LCA?

OEM-approved drain intervals with Gr. III/IV base oils vs. legacy formulations

LUBRICANT-FOCUSED DECLARED OR FUNCTION UNITS

Drain oil interval and component service-life extension both stay within a lubricant-focused DU, even under cradle-to-grave

Cradle-to-Gate

Declared Unit:
1 kg of lubricant,
delivered

Cradle-to-Gate, adjusted

Declared Unit:
1 kg of lubricant,
delivered (adjusted)

Cradle-to-Grave

Declared Unit:
1 kg of lubricant,
consumed (adjusted)

Cradle-to-Grave incl. oil change

Declared Unit:
1 kg of lubricant,
consumed

Cradle-to-Grave

Functional Unit:
Provision of work

Lubricant

System level

Why lubricant formulators should invest in LCA

1 Get Ahead of Regulation

As defossilisation is a formulation target, SSbD and ESPR push ecodesign decisions into R&D. Assessing the full life cycle with LCA is the common tool that satisfies all three. And EPDs are the way to communicate the results.

2 Avoid Costly Missteps

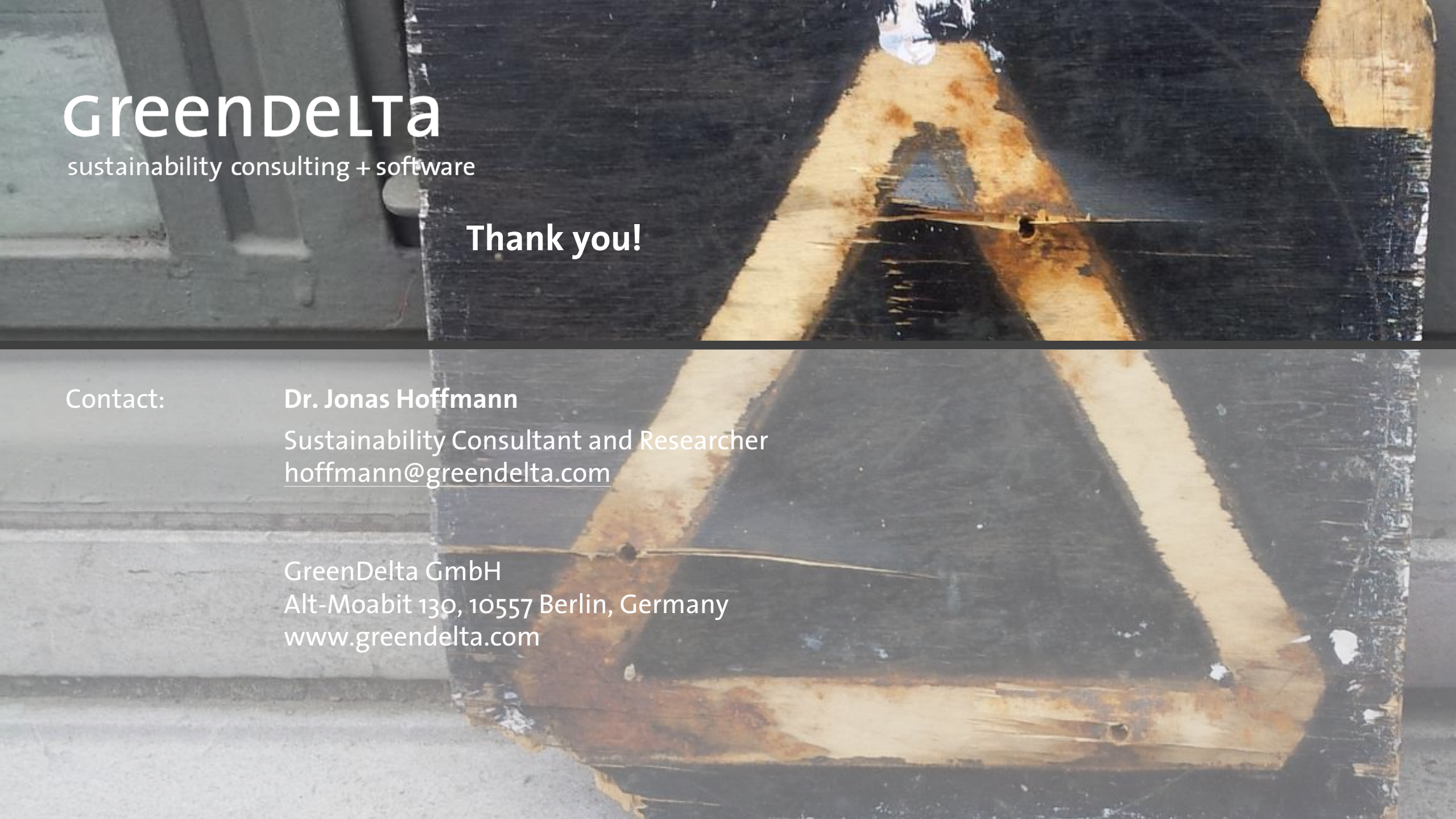
Formulation choices carry hidden trade-offs in particular in **times of limited supply**. LCA catches this before it's locked into a formulation. Moreover, it helps you to **identify your hotspots and supply chain dependencies**.

3 Win on Substantiated Claims

"Greener" claims are under growing scrutiny. LCA gives sales and marketing defensible, quantified evidence instead of assumptions competitors can challenge. In particular for performance criteria/claims.

4 Unlock Circular Value

LCA identifies which formulations capture that value and which forfeit it. This can pave the way to **circular business opportunities, lowering your customers footprint**.



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Thank you!

Contact:

Dr. Jonas Hoffmann

Sustainability Consultant and Researcher
hoffmann@greendelta.com

GreenDelta GmbH

Alt-Moabit 130, 10557 Berlin, Germany

www.greendelta.com

Sources

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