

ZÉRÓ KIBOCSÁTÁSÚ GÉPJÁRMŰVEK FEJLESZTÉSE HARMONIZÁLT, KÖRFORGÁSOS KERETRENDSZER KIDOLGOZÁSÁVAL

2025. november 5.

XX. LCA Konferencia

Chrabák Péter
Bay Zoltán Kutatóközpont



Jelentésből érték, tudásból hasznosulás. 1993 óta.

A BAY ZOLTÁN KUTATÓKÖZPONT KOMPETENCIA-TERÜLETEI

Szakértő partner a kutatás-fejlesztéstől a gyártásig
az adott iparágakban

- 133 alkalmazott kutató
- 11.000 m2 kutatási laboratórium
- 42 együttműködő ország
- 200 vállalati partner évente
- 150 nemzetközi partnerintézmény
- 30+ év kutatás-fejlesztés
és innovációs tapasztalat

BAY MATERIAL

BAY WASTE

BAY AGRI

BAY VALID

BAY ENERGY

KÖRNYEZETI ÉLETCIKLUS ELEMZÉSHEZ KAPCSOLÓDÓ REFERENCIÁINK

Életciklus elemzés területei

- Életciklus elemzések
- Termék karbonlábnyom meghatározás
- EPD (környezeti terméknyilatkozat)
- Ökodizájn
- Szervezeti karbonlábnyom meghatározás

Szektorok

- Energia,
- Mezőgazdaság,
- Élelmiszeripar,
- Acélgyártás,
- Olajipar,
- Műanyagipar,
- Építőipar,
- Hulladékgazdálkodás

Partnereink

- D&D Drótáru Zrt.
- Kiswire Kft. Szentgotthárd
- Kiswire Cord Ltd Czech
- Xella Magyarország Kft.
- Quality Pack Zrt.
- Box-Print FSD Packaging Kft.
- IBV Hungária
- Protecta Kft.
- Ózdi Acélmű Kft.
- Adamhouse Kft.
- La Paloma Kft.
- Olivia Kft.
- Költözzma Kft.
- BC-Erőmű Kft.
- MOL NyRt.
- Knorr-Bremse Kft.
- Siemens Zrt.
- Bosch Kft.
- Edelholz faipari Kft.



BC-Erőmű



KNORR-BREMSE 

SIEMENS





Zero **E**mission electric **V**ehicles enabled by ha**R**monised circula**A**rity

Horizon Europe - CL5-2023-D5-01-04 - Circular economy approaches for zero emission vehicles (2ZERO Partnership)

2024. January – 2026. December

Consortium with 28 partners

Five top EU OEMs



Suppliers/Manufacturers of materials, components, and systems



Research Organisations

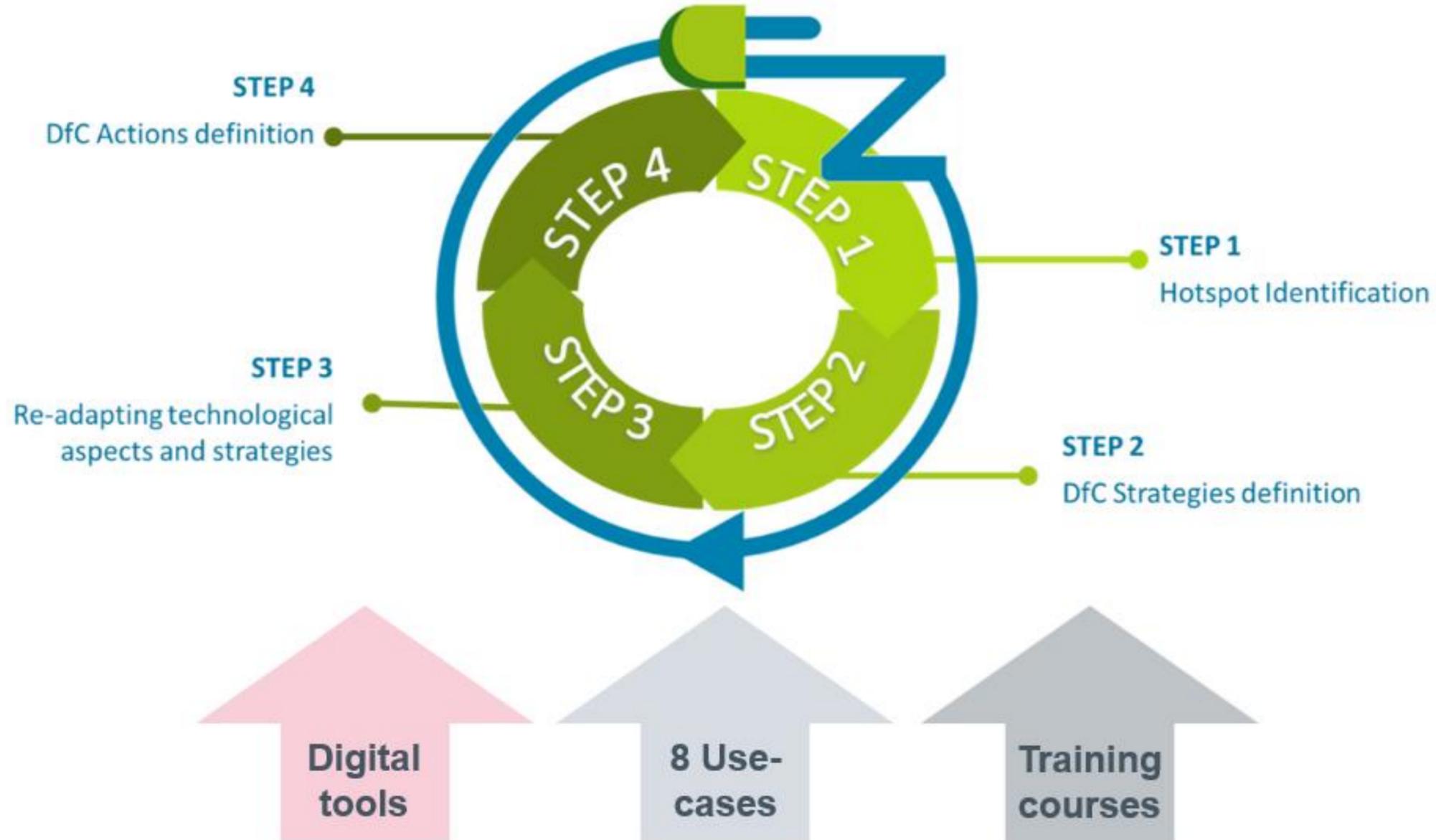


Communication, Exploitation



ZEvRA's main objective is to improve the circularity of light-duty EVs throughout their entire value chain, from materials supply and manufacturing to end-of-life processes, which aligns with the European Union's goal of achieving zero CO₂e emissions by 2035, particularly in the EV value chain.

Design for Circularity (DfC) & Life-cycle Thinking (LCT)



USE CASES OF ZEVRA PROJECT INCORPORATES

- modular design
- clearing the material mix
- design for dismantling: detachable joining technologies (i.e. de-bondable adhesives, form lock, planned second joining)



According to your opinion, which life-cycle stage (materials → manufacturing → use → EoL) is the most relevant from environmental aspect?



Join at

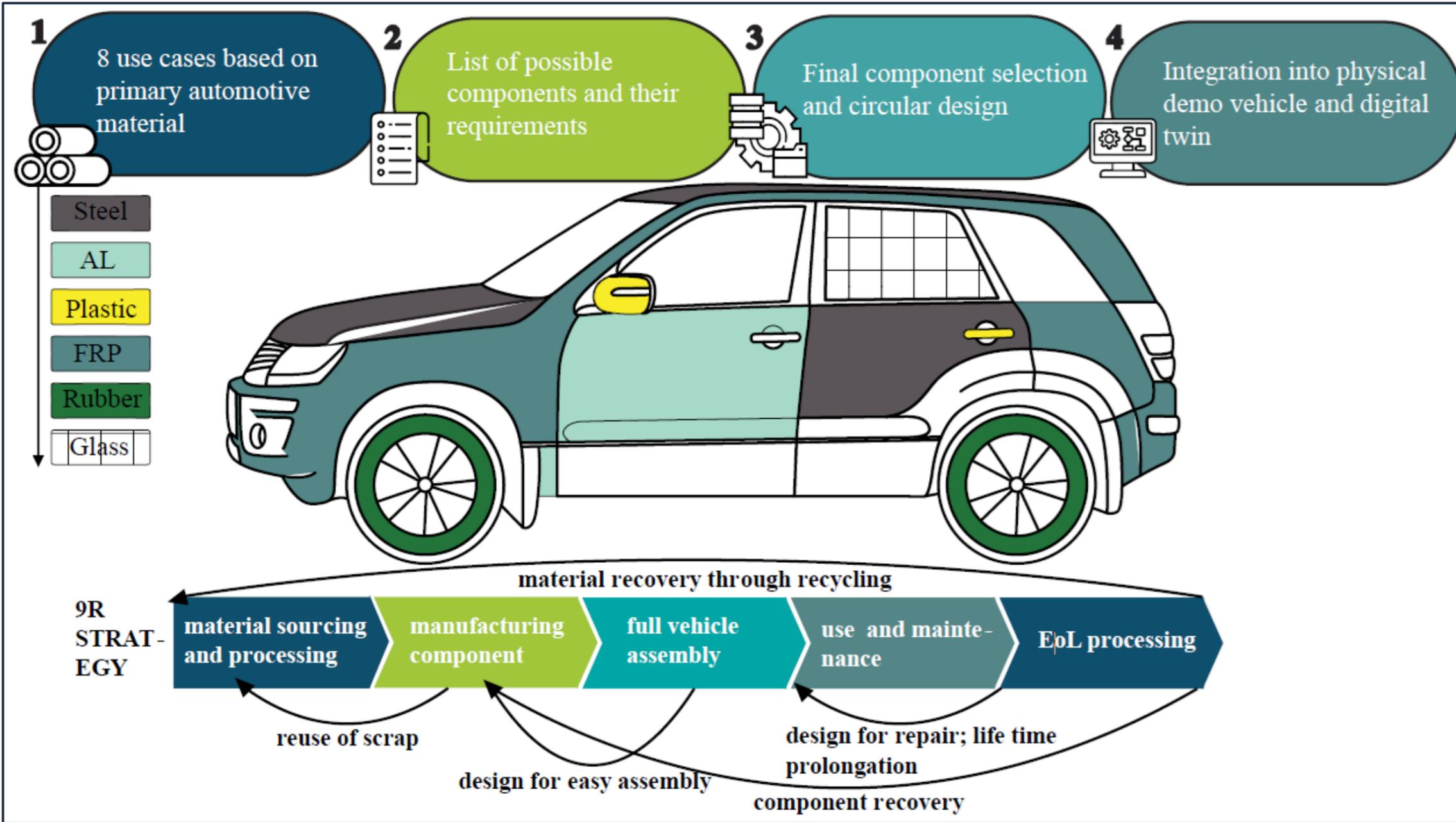
www.slido.com

#2250881

Or scan the QR-code
with your mobile

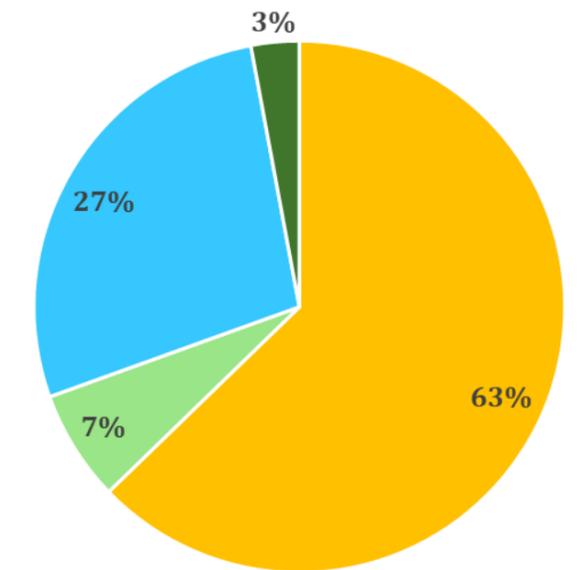


Sustainability assessment: baseline evaluation - definition and quantification LCT results for Skoda Enyaq

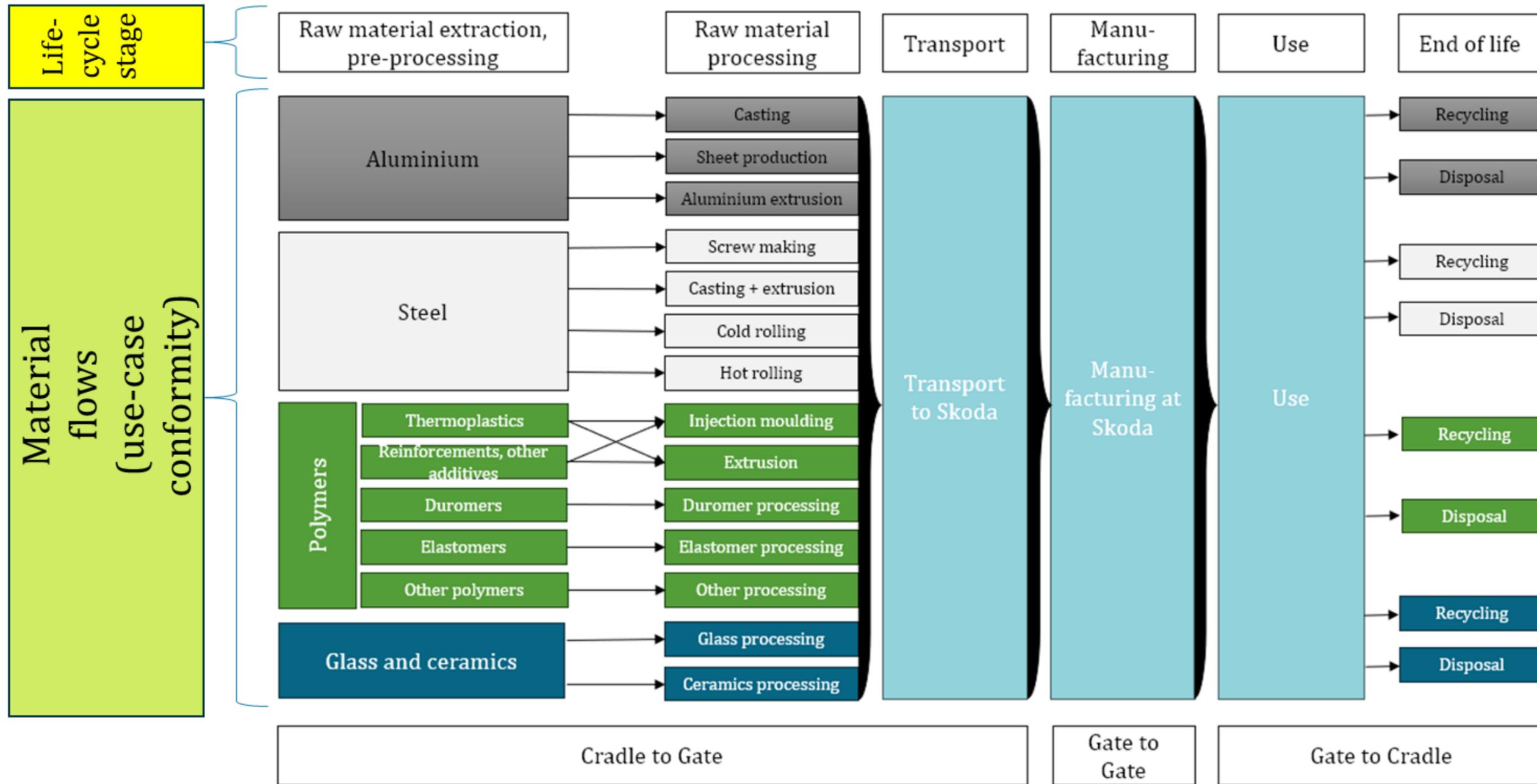


Baseline vehicle:
Skoda Enyaq EV SUV
Excl. Powertrain / Battery-Components

■ Steel ■ Aluminium ■ Polymers ■ Glass and ceramics



Sustainability assessment: baseline evaluation - definition and quantification LCT results for Skoda Enyaq

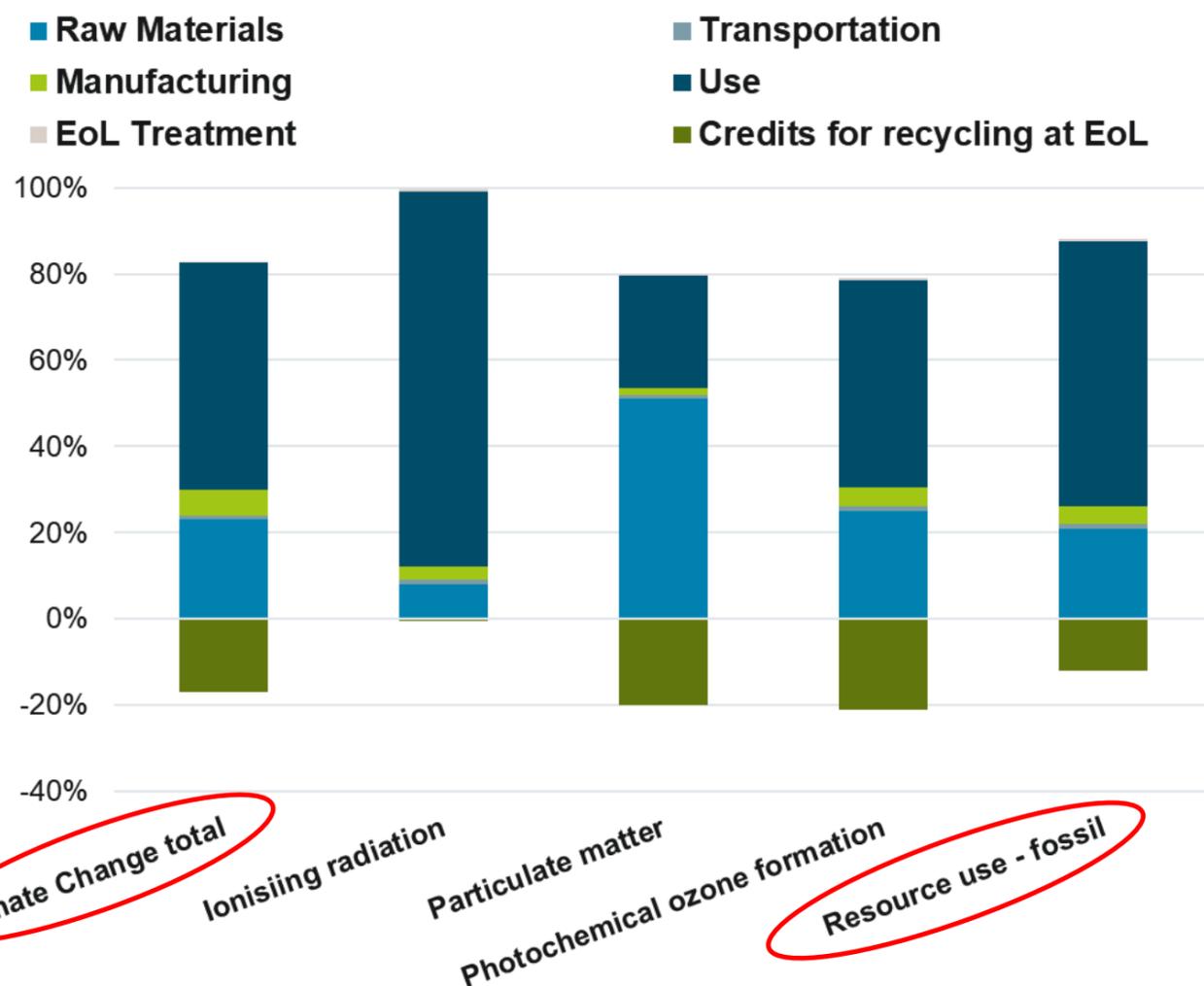


- **Extraction and Manufacturing:** main material flows
- **Use phase:** fuel consumption (electricity) and main replacement of worn parts
- 200.000 km/15-year use phase duration
- **EoL:** data based on an extensive literature review of ELV treatment practices

Sustainability assessment: baseline evaluation - definition and quantification LCT results for Skoda Enyaq

LIFE CYCLE ASSESSMENT

Applied software and database: LCA for Experts by SPHERA (former GaBi), Ecoinvent 3.10, Managed LCA Content (by SPHERA)



KEY TAKEAWAYS FROM LCA:

Two dominant life cycle phases:

- raw material extraction & processing (refining)
- use phase: electricity is the largest contributor (compared to the replacement parts).

Materials:

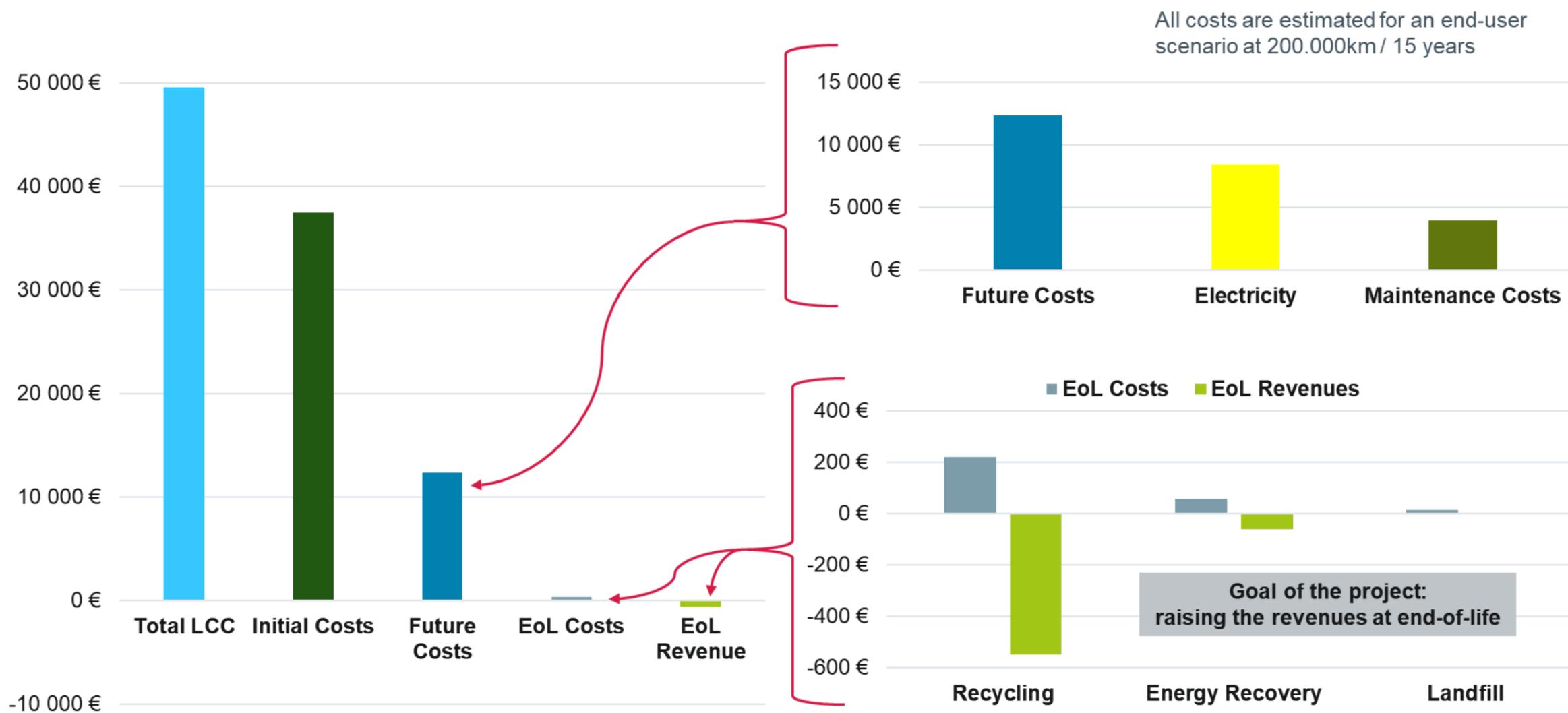
- Polymers are the most relevant contributors
- Steel also has significant effect
- Aluminium and glass show smaller contributions

Impact category	Contribution (%)
Climate Change - total	35,98
Resource use - fossils	31,02
Particulate matter	6,21
Ionising radiation	5,58
Photochemical ozone formation	3,31

82,1% of the overall impacts (EF 3.1)

Sustainability assessment: baseline evaluation - definition and quantification LCT results for Skoda Enyaq

LIFE CYCLE-COSTING – Cost of Carbon Emission



KEY TAKEAWAYS FROM LCC:

Material-related reductions:

- Lightweighting
- Increase of circularity (especially for polymers and steel)

Energy-related reductions:

- Increase the use of renewable/low-carbon energy sources
- Use of more energy-efficient manufacturing technologies

Sustainability assessment: baseline evaluation - definition and quantification LCT results for Skoda Enyaq

SOCIAL LIFE CYCLE – Risk Assessment

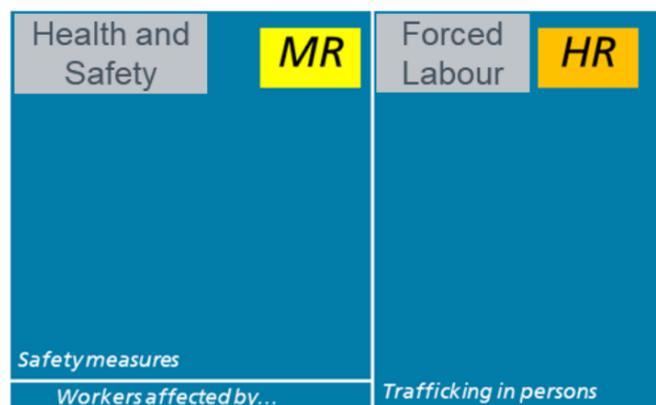
- OpenLCA v1.9 software, PSILCA model and database



Expression in Form of Risk and possible Impact



Stage:
Raw Materials
extraction and
processing



■ Forced labour ■ Health and Safety



■ Promotion of social responsibility ■ Fair competition



■ Safe and healthy living conditions

Risk level	Factor
VLR	0,01
LR	0,1
MR	1
HR	10
VHR	100
NR/NO	0



■ Contribution to economic development

KEY TAKEAWAYS FROM THE SLCA:

most critical social risks occur in the raw material extraction:

High risk: trafficking of persons primarily driven by cotton (China) and copper production (China and Congo)

Moderate risk: cotton production (India, China) and copper production (Congo):

- health and safety risks by inadequate safety measures and natural disasters;
- for local communities, safe and healthy living conditions, particularly drinking water and sanitation coverage;
- for value chain actors, anti-competitive behavior or violation of anti-trust and monopoly legislation linked to copper production (China).

According to your opinion, which life-cycle stage (materials → manufacturing → use → EoL) is the most relevant from environmental aspect?

Results

<https://wall.sli.do/event/czoDj1i58SMGwiekv4eEaK?section=67047785-e746-4bb3-8ba4-d166669f6889>

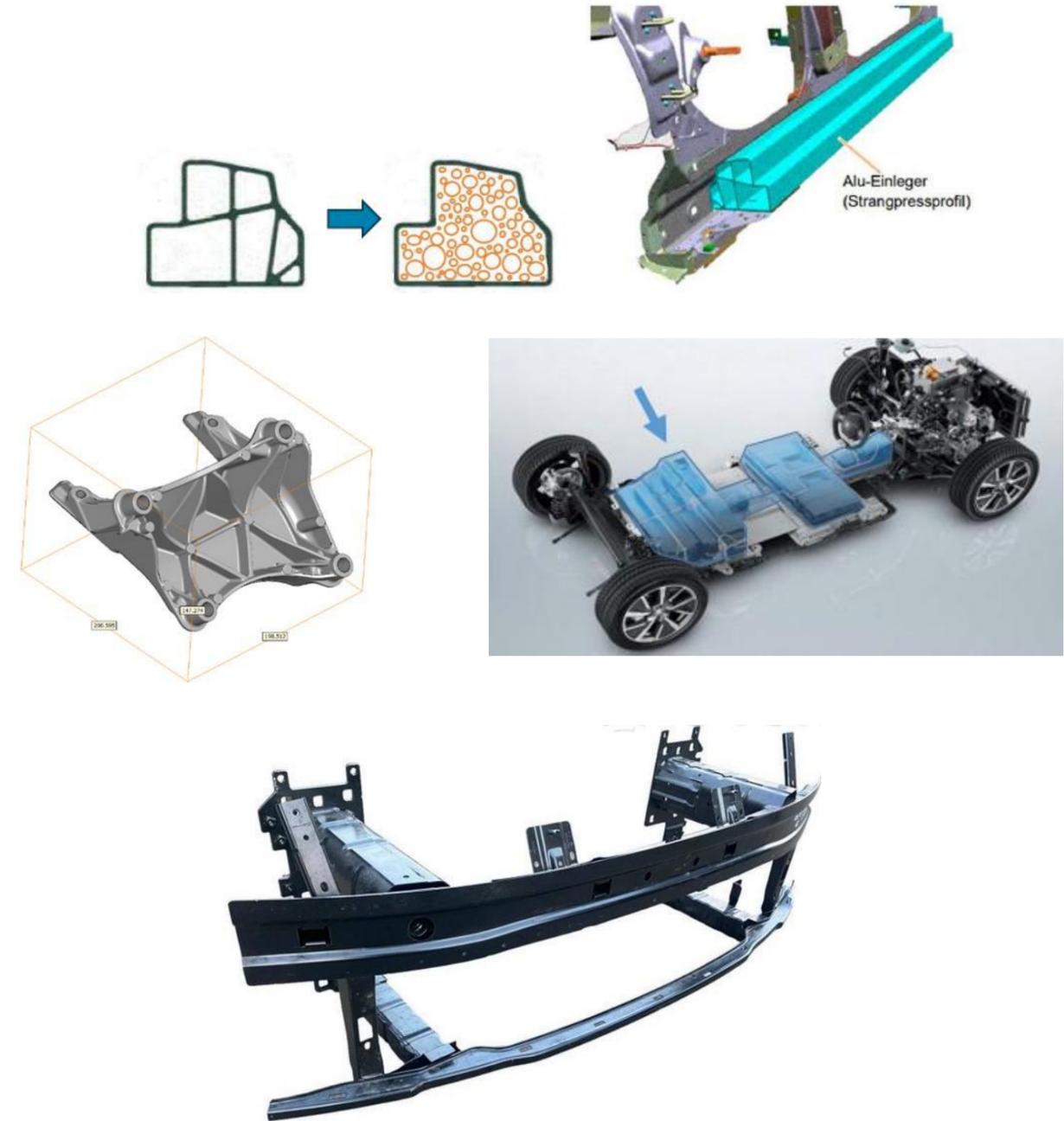
Next step: conclusive LCA, LCC, SLCA analysis of developed technologies

NEXT STEPS

- Synthetising the results of the use cases – challenging!
- Development of the system boundaries for sustainability assessments
- Conducting LCA, LCC and SLCA
- Comparison of the results to baseline outcomes

For more details visit:

<https://zevraproject.eu/>





Köszönöm a figyelmet!

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