

KMUp – Mittelstand trifft Start-Ups

Ganzheitliche Lebenszyklusanalyse in der Automobilindustrie

Gummersbach, 15. November 2023

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THE CHALLENGE OF SUSTAINABILITY MOBILISES PEOPLE



Photo: BZ Berlin

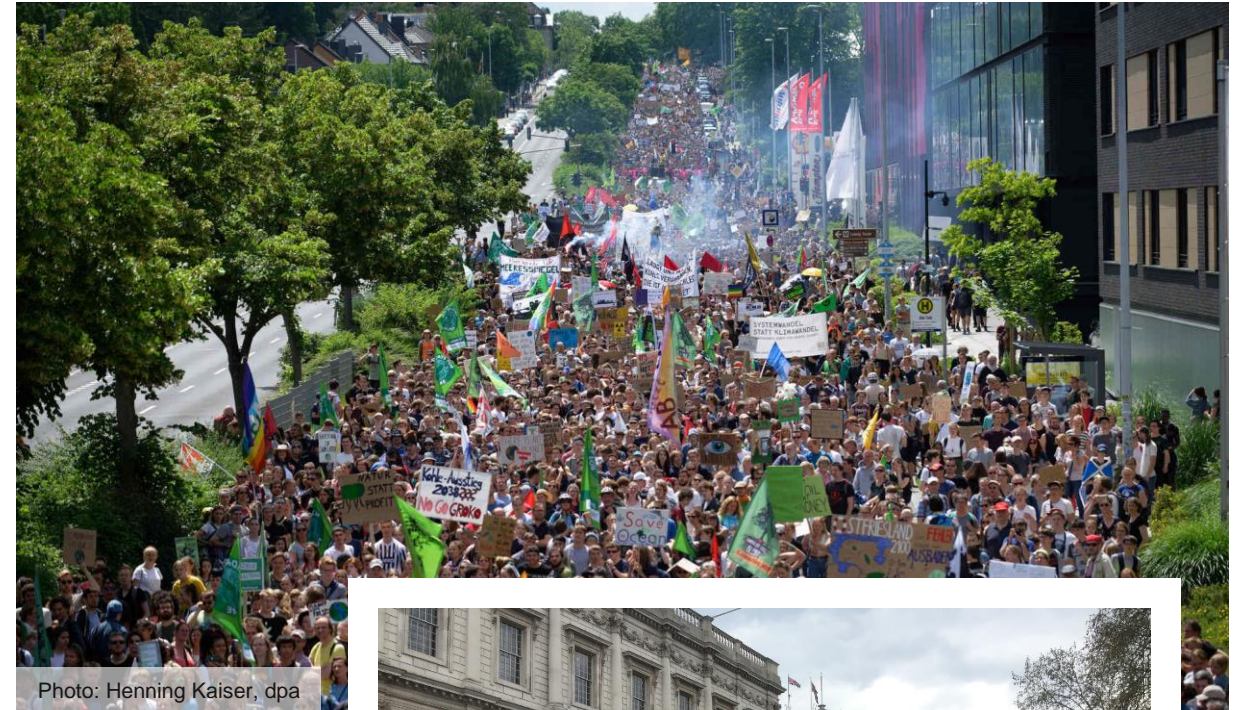


Photo: Henning Kaiser, dpa

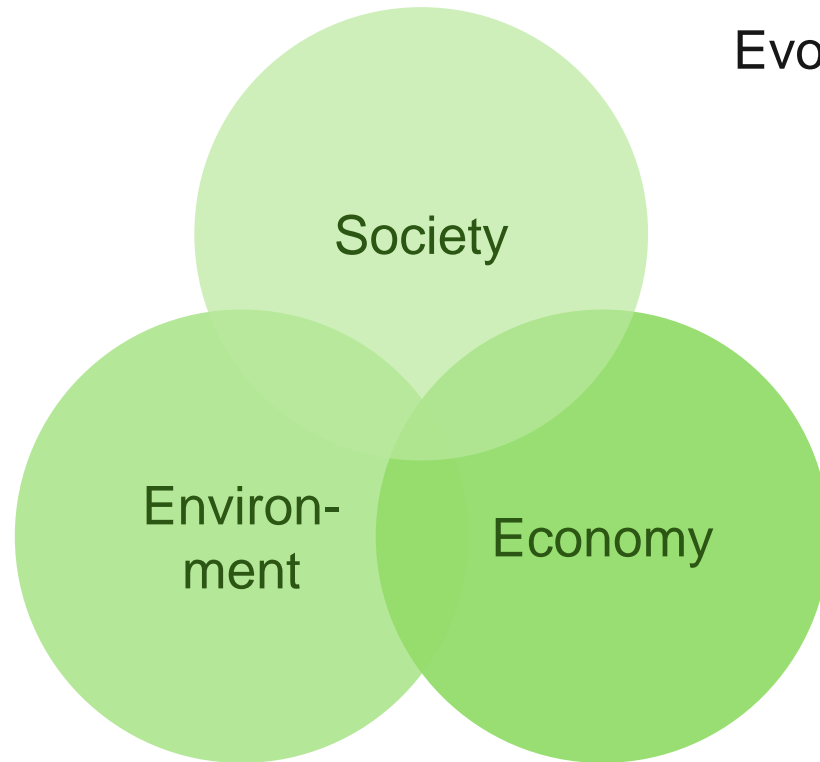


Photo: Georg Wendt, dpa



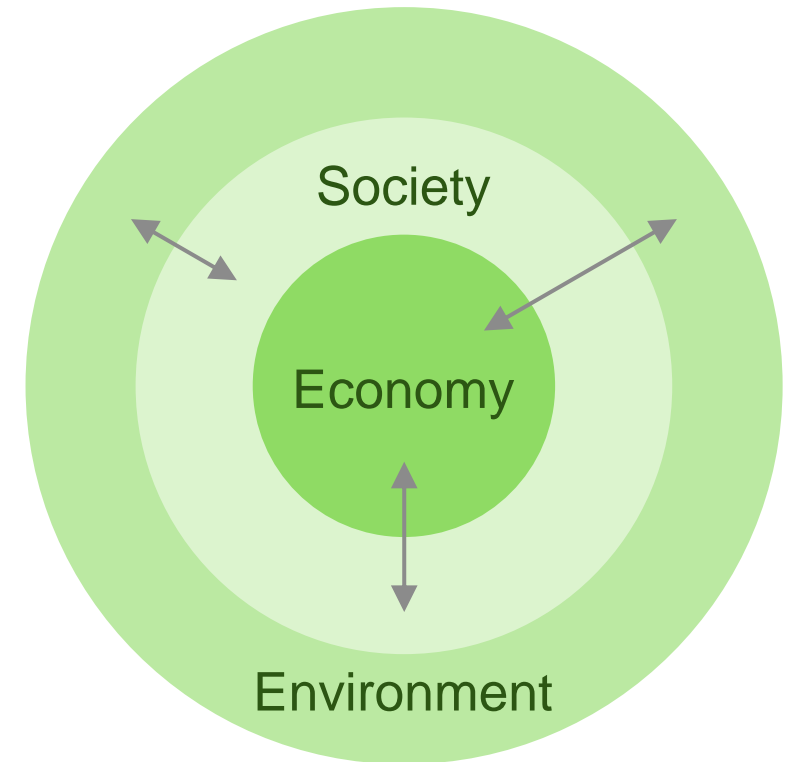
Photo: Lydia Greatrix, cbjspotlight

SUSTAINABILITY AT A GLANCE: MORE THAN CLIMATE ACTION ONLY



Balancing approach

Evolution of sustainability



Systems approach

SUSTAINABILITY AT A GLANCE: SUSTAINABLE DEVELOPMENT GOALS BY THE UN





Mercedes-Benz announced to strive for **carbon-neutral car production in Europe in 2022**, in all plants by 2039. Transparency on CO₂ footprint and **CO₂ as an award criterion in the supply chain**.

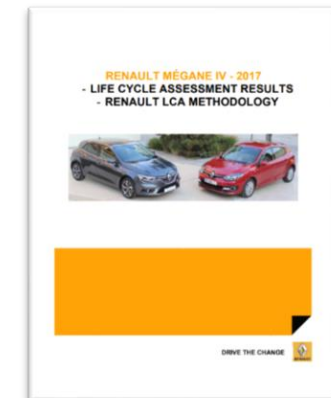
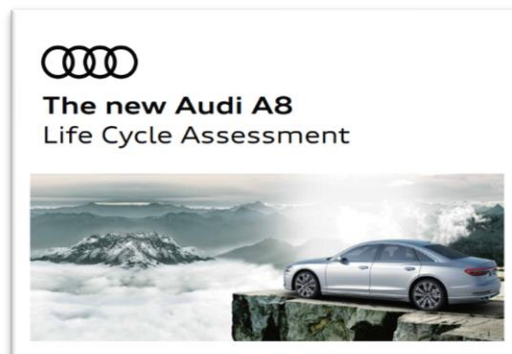
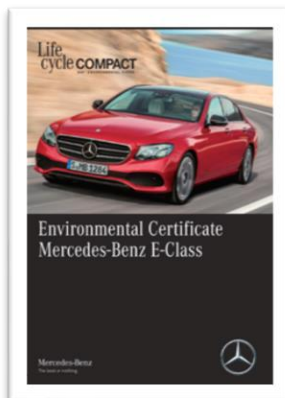


BMW Group is setting itself clear targets for **CO₂ reduction** until **2030**. For the first time, these cover the **entire lifecycle**: from **supply chain** through **production** to **end of the use-phase**. The aim is to significantly **reduce CO₂ emissions** per vehicle **by at least one third** across the entire portfolio.

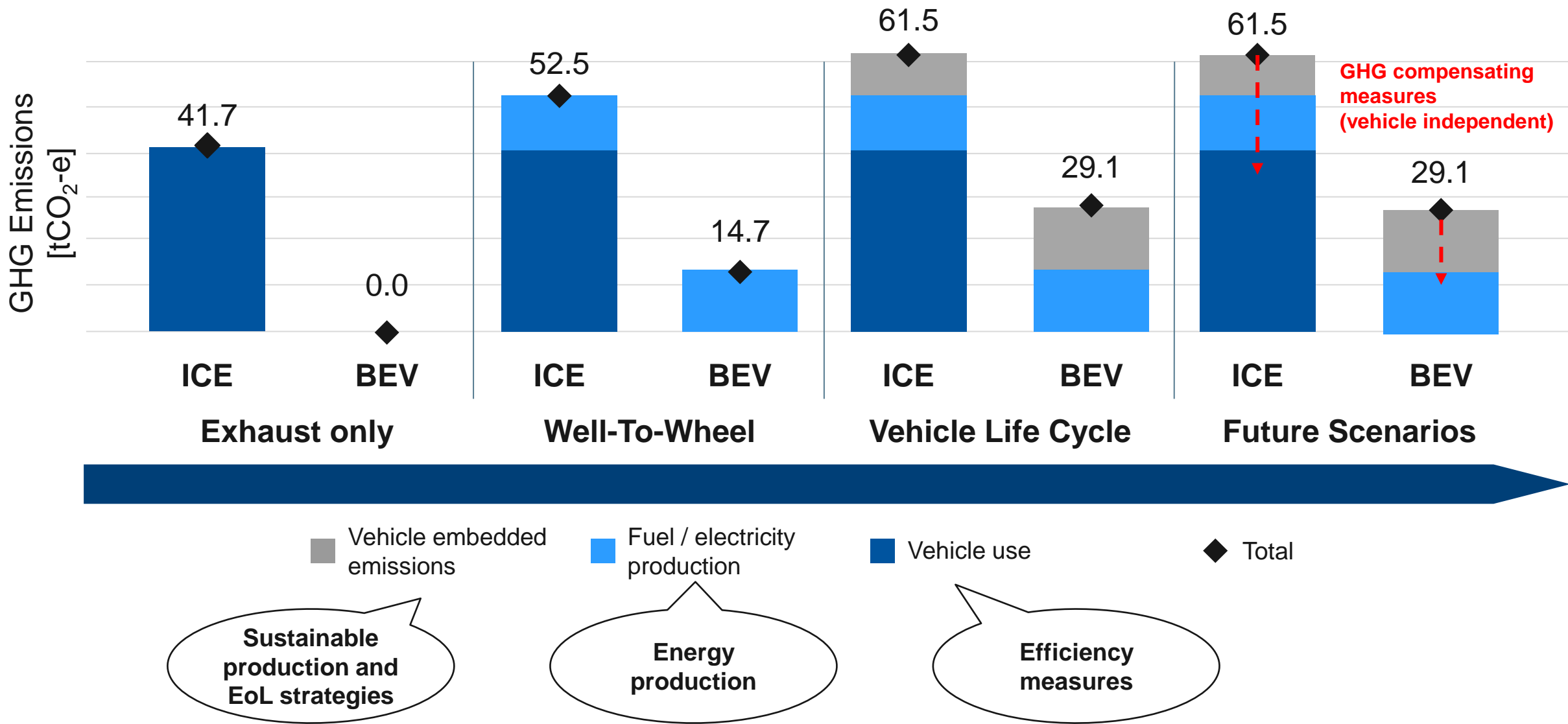


Volkswagen announced to **introduce a mandatory environmental ranking system for their suppliers**, which requires full transparency about lifecycle emissions.

Current voluntary OEM reports on vehicle LCA



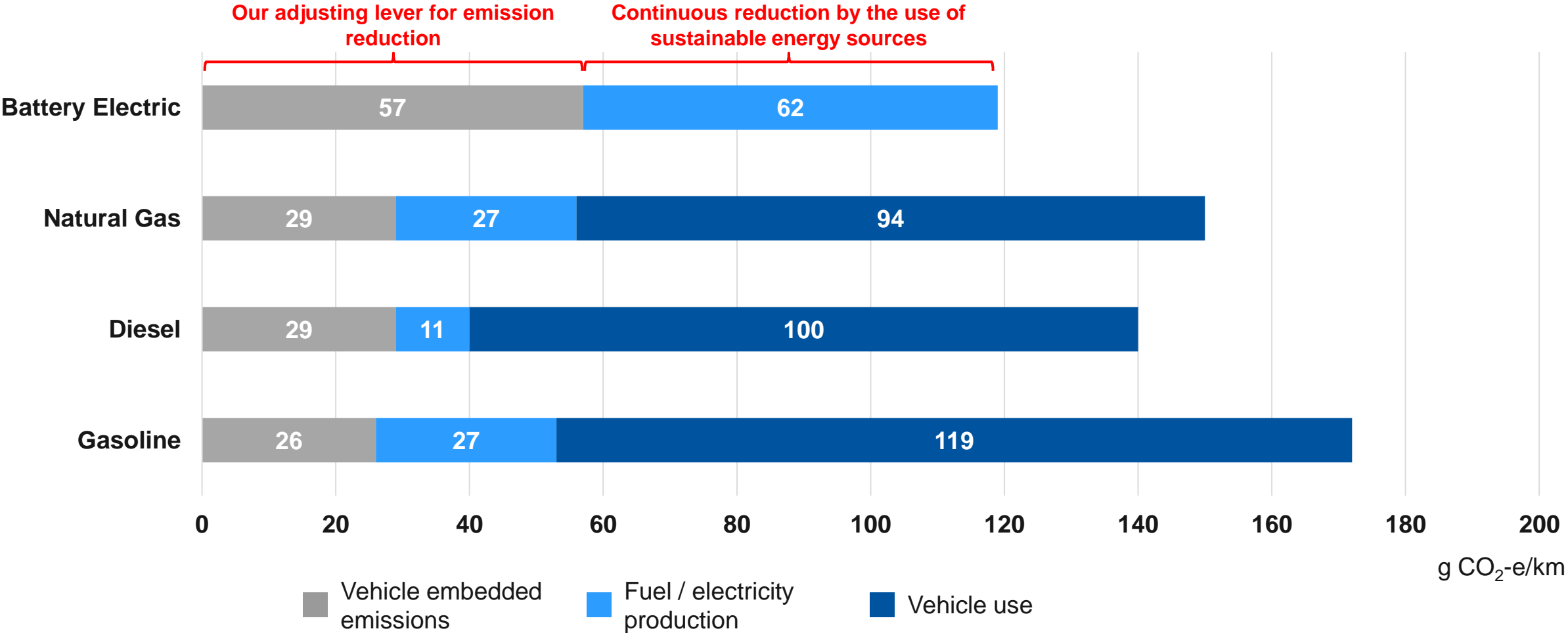
THE EVOLUTION OF THE ASSESSMENT SCOPE NEED FOR STANDARDISATION



Assumption: 225.000 km (real-world fuel consumption), EU Grid-Mix

Data Source: Nicolas Hill, Ricardo, 2020 [HIL20]

THE DRIVETRAIN IMPACT AND THE ROLE OF VEHICLE EMBEDDED EMISSIONS

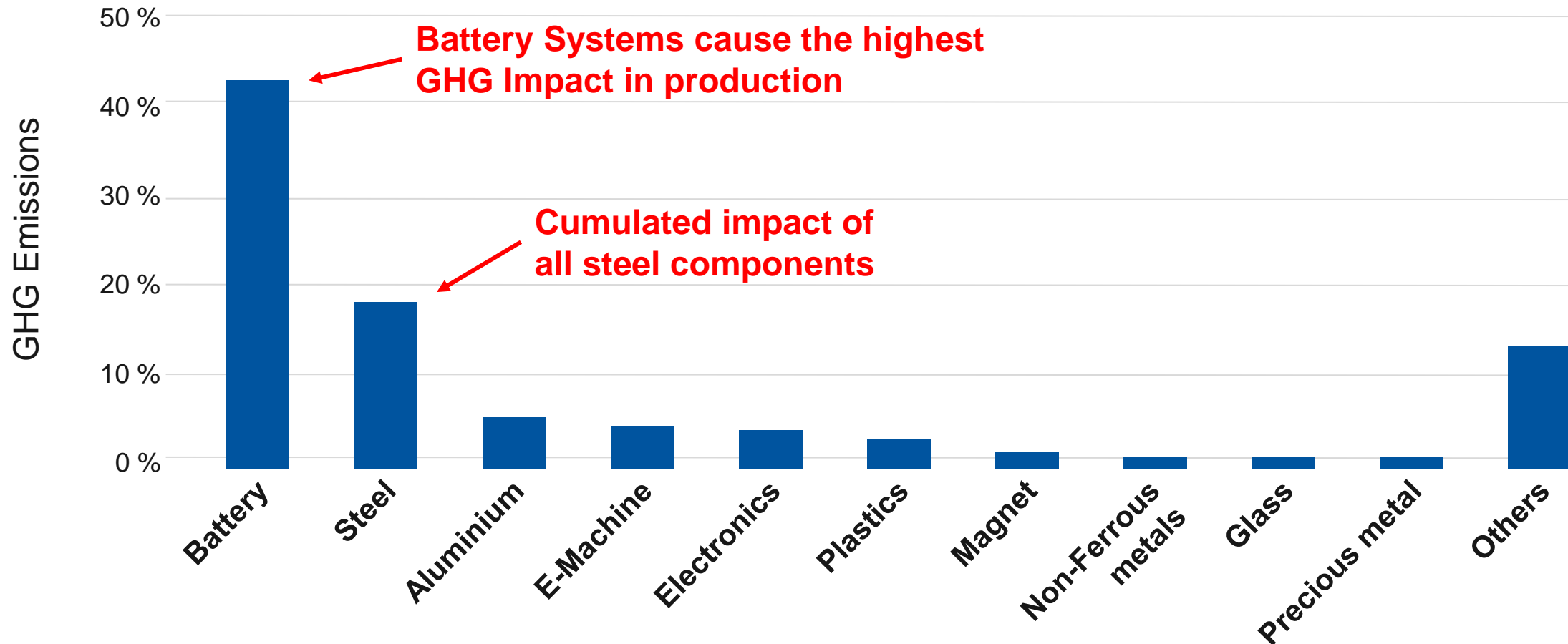


Assumption: 200.000 km (WLTC), EU Grid-Mix

Data Source: Volkswagen AG, 2019 [VOL19a]

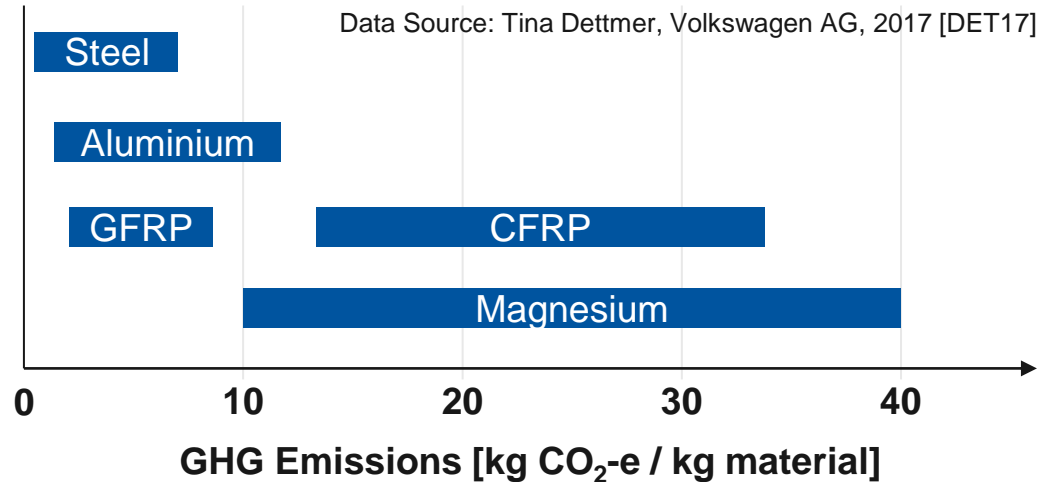
HOT-SPOTS IN BEV-PRODUCTION

EXAMPLE VOLKSWAGEN ID.3



Data Source: Volkswagen AG, 2019 [VOL19b]

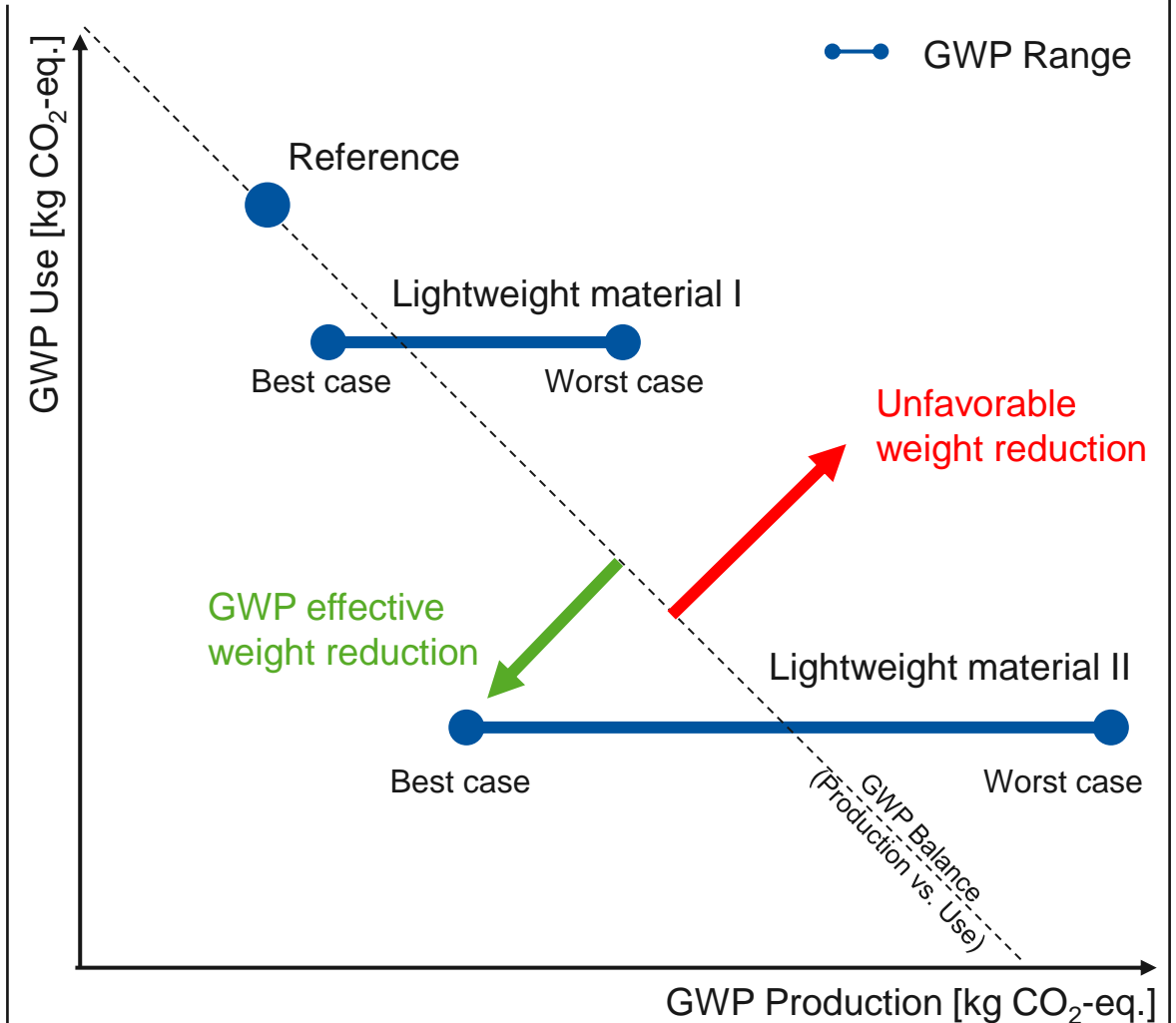
The environmental footprint of materials is highly dependent on the production scenario



Desired direction – but how to get there?

- Use of sustainable energy sources
- High share of recycling content
- Modern facilities
- etc.

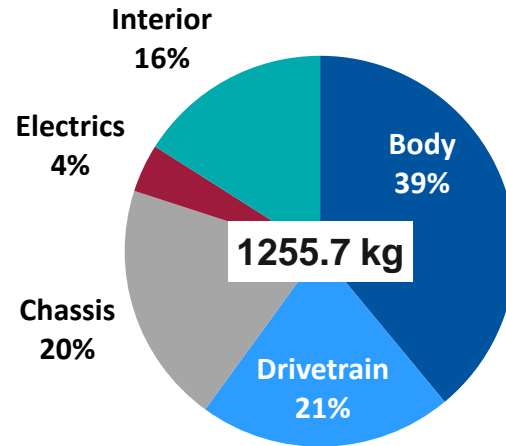
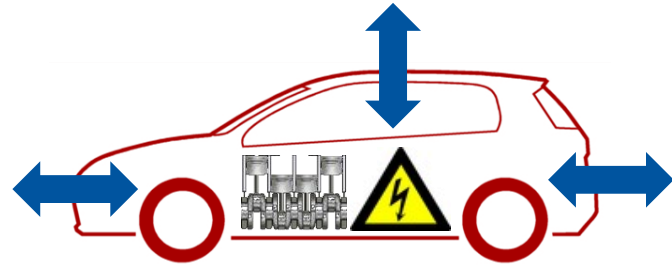
Material light weighting is not always environmentally reasonable – choose carefully!



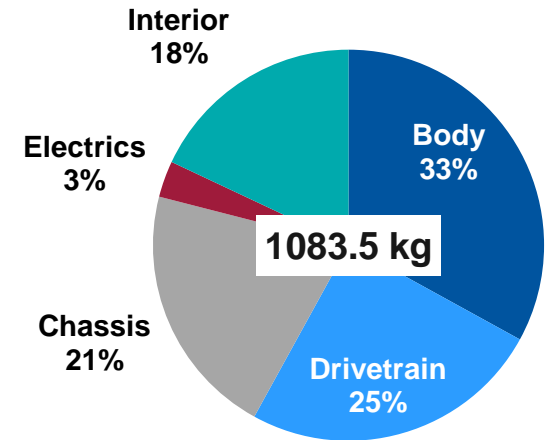
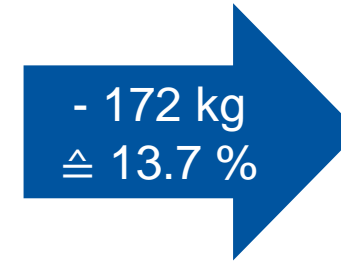
LIFE CYCLE ENGINEERING AND SUSTAINABILITY

REFERENCES - LCA ANALYSIS OF “GREEN” RAW MATERIALS

1 Generic Baseline Vehicle



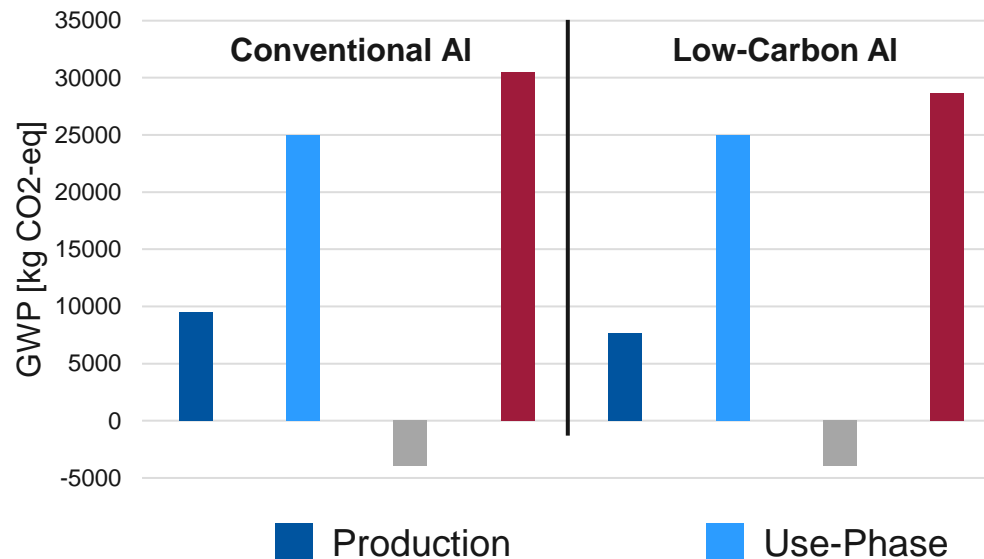
2 Lightweight Variant



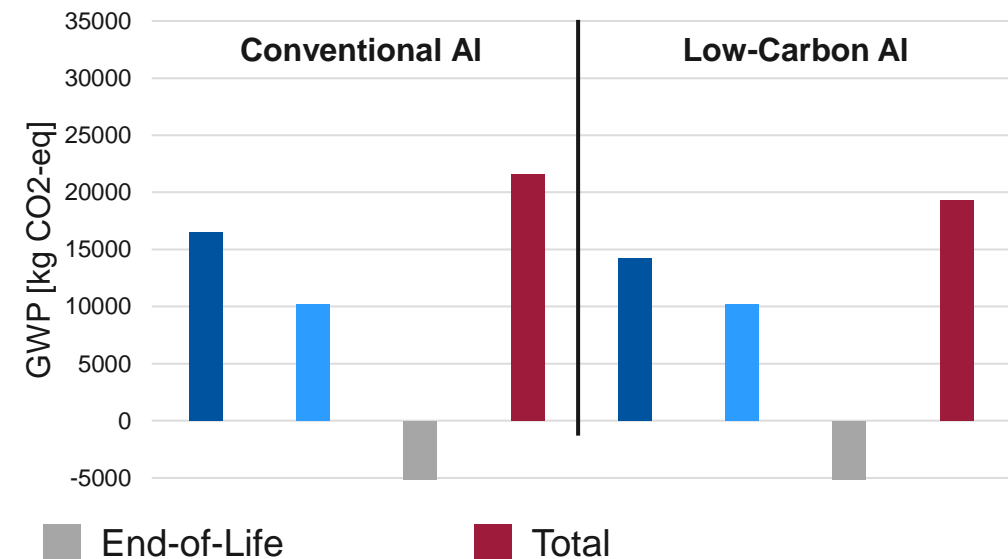
3 LCA Assessment

150.000 km (WLTC)
 German Grid-Mix

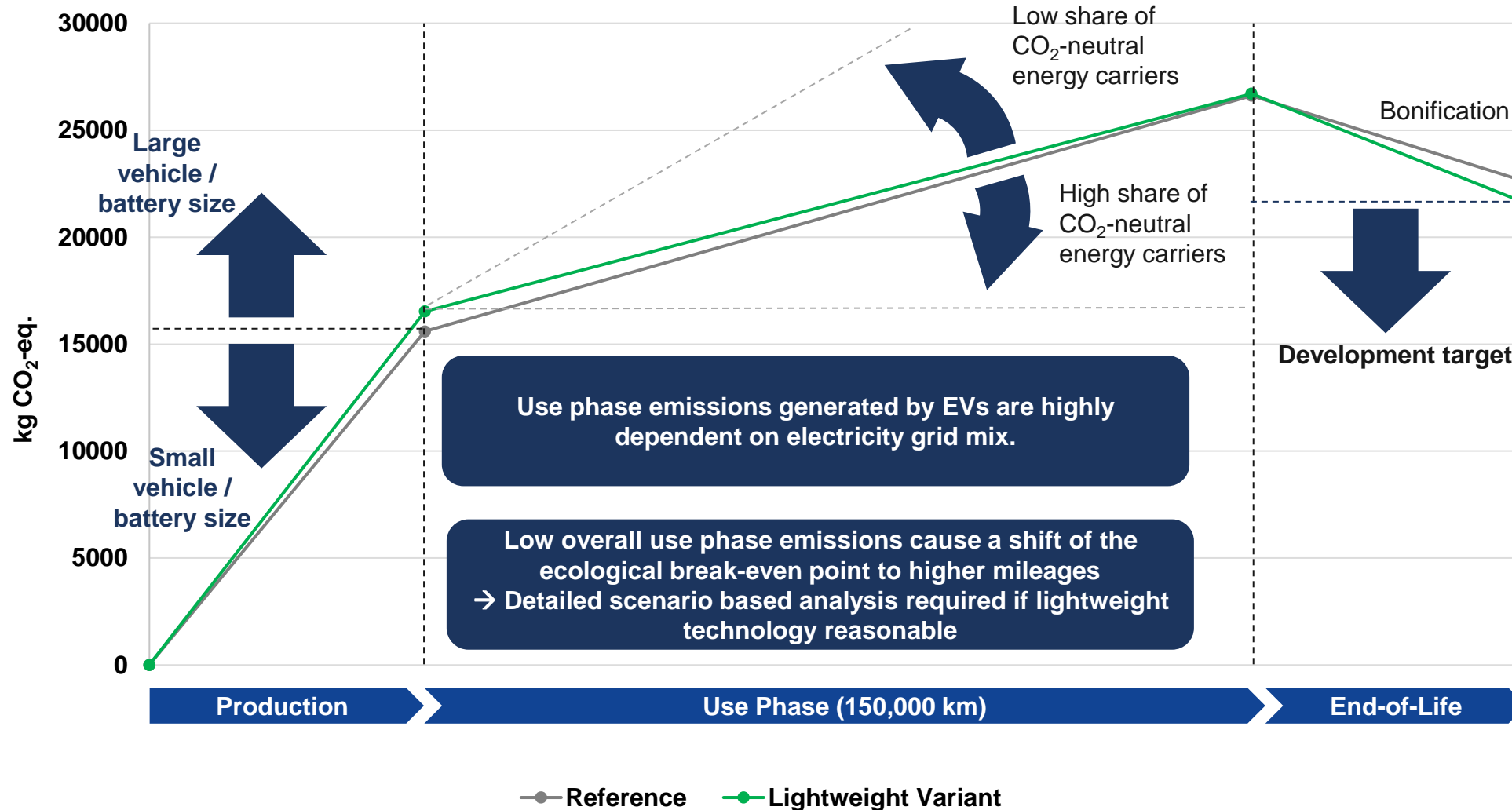
C-Class ICEV



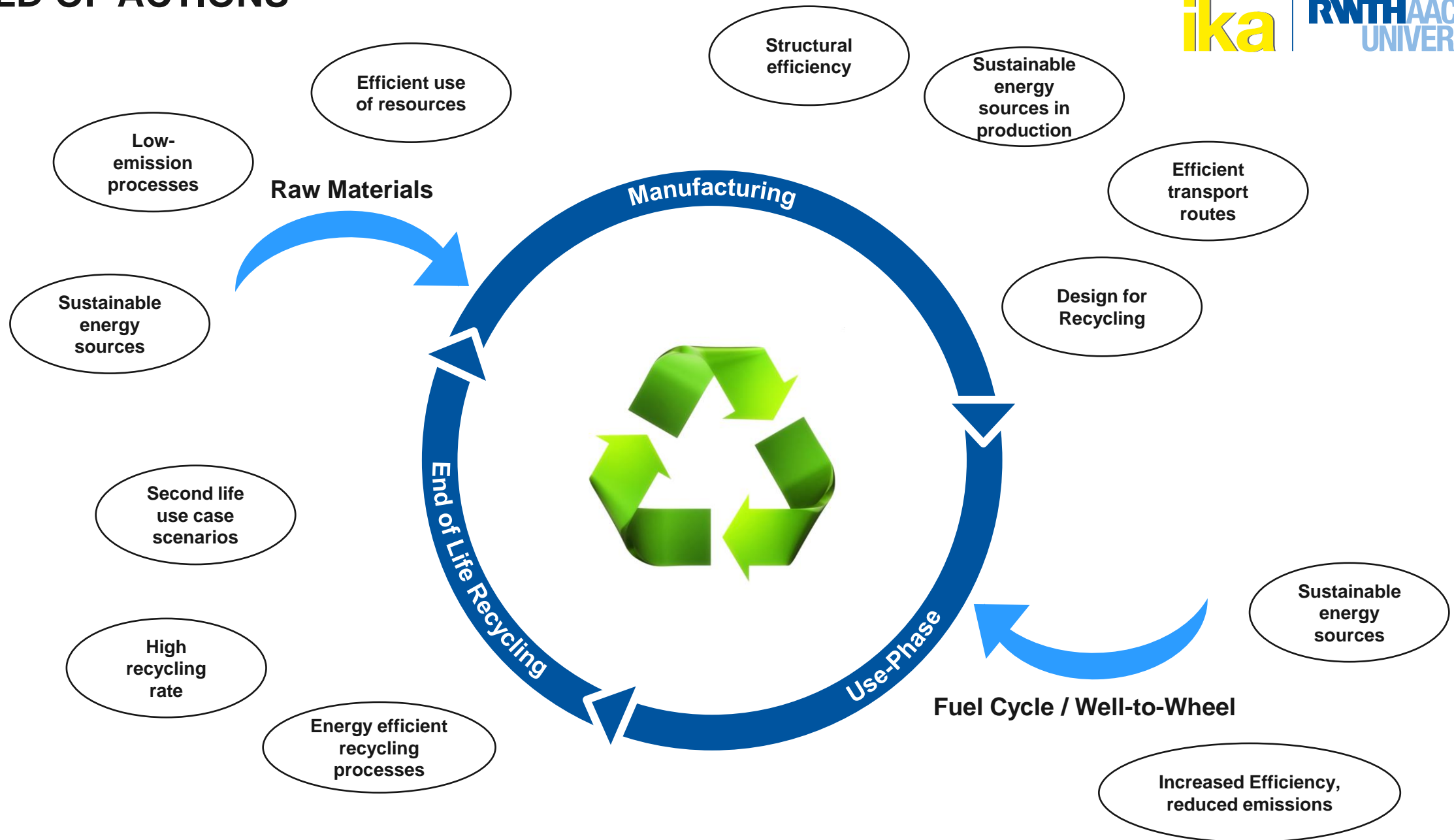
C-Class BEV (Range: 400 km)



TYPICAL RESULTS OF AN LCA STUDY



FIELD OF ACTIONS



Proposal for a

REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on circularity requirements for vehicle design and on management of end-of-life vehicles, amending Regulations (EU) 2018/858 and 2019/1020 and repealing Directives 2000/53/EC and 2005/64/EC



Moving from Directives (95 % should be reused/ 85 % recycled at End-of-Life) towards Regulations

Why?

- Foster the implementation of circularity in vehicle design
- Optimize the End-of-Life vehicle treatment
- Implement new strategies to close the product life cycle by systematically collecting and dismantling vehicles

How?

- Provide circularity strategies in so called circularity passports
- Consequent implementation of 3R: Reuse, Remanufacture, Recycle
- ...



- » Analysis of the decision environment
- » Definition of the specific OEM or end customer requirements



- » Identification of performance indicators
- » Systematic determination of a weighting



- » Life cycle analysis (LCA), e.g. determination of GWP / CO₂ footprint
- » Cost analysis
- » Quantification of the technological performance



- » Calculation of indicator values
- » Transparent comparison of all weighted performance indicators



- » Development of a technology strategy
- » Strategic recommendations for action

- **The importance of sustainability is increasing and will affect the entire automotive value chain.**
- **Future regulations might shift from assessing use phase emissions to full life cycle emissions.**
- **Holistic assessment of technologies necessary in order to evaluate the life cycle impact.**
- **Standardisation required in order to achieve a profound assessment basis.**
- **Meaningful system boundaries are crucial.**
- **E2P can help to get a holistic understanding in the early concept phase.**

Kontakt

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