

TOPGEAR Workshop: “Challenges and good practices for carbon footprint identification in very early development stages of automotive products”

March 2024, Hanno Bachler, Global R&D, Life Cycle Engineering

Agenda

- Intro - What are the current and future regulatory requirements of carbon footprint identification for companies?
- Q5 - What is the importance of LCA in product development from an industry perspective?
 - i. How can companies reduce CO2 in product development?
 - ii. What are the future challenges for companies in terms of product sustainability?

1. What are the current and future regulatory requirements of carbon footprint identification for companies?

TOPGEAR workshop, 14 March 2024



Circular Economy Action Plan

[CEAP – EC-Website](#)

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

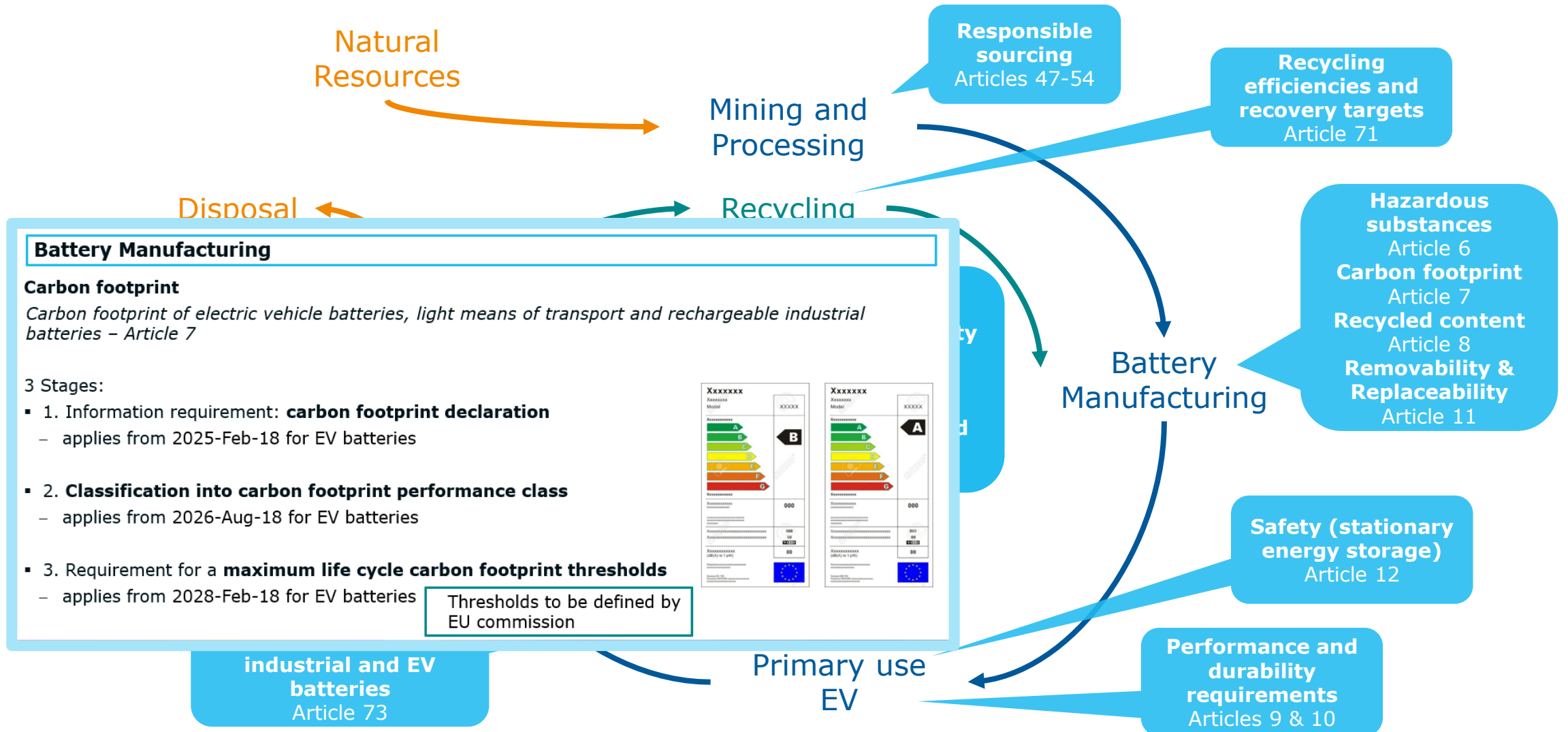
A new Circular Economy Action Plan - For a cleaner and more competitive Europe

- Adopted in 2020 and is one of the building blocks of the European Green Deal
- It targets how products are designed, promotes circular economy processes, encourages sustainable consumption, and aims to ensure that waste is prevented and the resources used are kept in the EU economy for as long as possible.
- Requirements on usage of „recycled material“

Key Points:

- **Battery Regulation**
- **End-of-Life Vehicles directive** → regulation
- Comprehensive European Strategy on Sustainable and Smart Mobility → applying **product-as-service** solutions to reduce virgin **material consumption**, use sustainable alternative **transport fuels**, optimise infrastructure and **vehicle use**, increase occupancy rates and load factors, and **eliminate waste** and pollution.

Battery Regulation Requirements





Ecodesign for sustainable products regulation (ESPR)

[ESPR – EC-Website](#)

Ecodesign for sustainable products regulation:







- The proposal for a new Ecodesign for Sustainable Products Regulation, published on 30 March 2022, is the cornerstone of the Commission's approach to **more environmentally sustainable and circular products**.
The proposal builds on the existing Ecodesign Directive, which currently only covers energy-related products.
- It sets ecodesign requirements for specific product groups to significantly improve their circularity, energy performance and other environmental sustainability aspects; performance and information requirements for almost all categories of physical goods placed on the EU market
- **DPP**: digital product passport → information about products' environmental sustainability;
- Scope: **e.g tyres, lubricants, trucks and sub-components**

Latest update:

→ The Council compromise text says that motor vehicles should not be regulated as a priority (Whereas 42 & 103):

"Product groups which under Union law are already subject to comprehensive provisions which also include specific environmental requirements, such as for example motor vehicles, should not to be prioritised for the establishment of ecodesign requirements."

REGULATION on circularity requirements for vehicle design and on management of end-of-life vehicles

1	2	3	4	5	6
					
Electric vehicle batteries	E-drive motors	Components, parts and materials containing fluids and liquids	Parts and components for mandatory removal	Parts and components containing critical raw materials*	Digitally-coded components and parts
Number	Number	For parts and materials, incl. airbags, tanks, air conditioning systems, and refrigerants:	For 19 parts and components, incl. Batteries, engines, wheels, headlights and dashboards:	Information requirements for critical raw materials (34 materials listed in the CRM Act) not further specified	Number
Location	Location	Presence of lead mercury, cadmium, or hexavalent chromium	Number		Location
Weight	Weight	Number	Location		Technical instructions on access, removal and replacement
Battery chemistry type	Type of permanent magnets	Location	Technical instructions on removal and replacement		Description on functionality, interchangeability with specific parts and components of other makes and models
Instructions for safe discharging	Technical instructions on removal and replacement	Weight			Contact point of the manufacturer for technical assistance
Technical instructions on removal and replacement	Tools required for access, removal and replacement	Technical instructions on removal			
Tools required for access, removal and replacement		Availability of best treatment techniques			

- **amending** Regulations (EU) 2018/858 and 2019/1020 and **repealing** Directives 2000/53/EC and 2005/64/EC (i.e. ELV Directive and 3R-type approval directive)
- Based on 2022 ESPR (ecodesign) and 2023 battery regulation
- Proposal issued in July 2023
- Start: 7 years after coming into force of the regulation (2031?)
- CVP, Euro7 might contain an EVP (environmental vehicle passport)
- (Likely) Content:
 - General vehicle information
 - Upstream information (e.g. Scope 3 emissions, supply chain due diligence, ...)
 - Vehicle use information
 - Downstream information

Source: WEF paper ,Enabling automotive Circularity through DVPs

Q5 - What is the importance of LCA in product development from an industry perspective?

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Sustainability = LCA?

LCA = Circular Economy?

LCA

ISO14040, 14044, ff

GHG

GWP

S-LCA

LCSA

EPD

EN15804

PEF/PEFCR

ESPR

eco-labelling

eco-design

design4R

SPI

REACH

sustainable

sourcing

CO2 Standards

CRMA

Euro7

NZIA

CBAM

ETS

Sustainable Batteries

Regulation

Circular Economy

ISO59000 ff

c2c

CEAP

Green Deal

Fit for 55

Review on HD LCA Studies

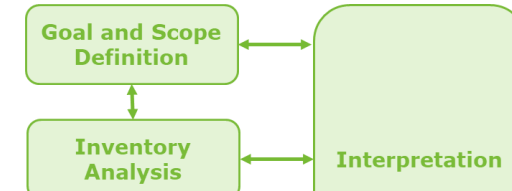
HDV LCA figures

	Typical ranges of global warming potentials for HDVs <small>Based on literature research, values rounded</small>	
Production	ICE powertrain	(9 –) 20t - 25 ¹ CO2e
	HEV/PHEV powertrain	(15 –) 25t - 30 CO2e
	BEV powertrain	(45 –) 100t - 150 CO2e
Use phase	Diesel truck	1.000 – 2.000t CO2e
	BEV	450 – 1.000t CO2e (optimization due to energy mix not considered)
Optimization potential	BEV potential (until 2040)	40 – 60% CO2e (due to production processes, technology and energy mix)
	Alternative fuels potential	0 - 25% (50%, 90%) CO2e (depending on fuel and production pathway)
	Hybrid powertrain potential	5 - 15% (25%) CO2e

Source: AVL, HD-LCA study

1...values rounded, values in brackets show outlier values

LCA Methodology



- A Life Cycle Assessment is a methodology, defined in ISO14040 and 14044, to assess the environmental impacts for various environmental categories associated with all stages of the entire life cycle of a product, a process, or a service.

- A LCA material value

➤ Hence, a LCA can

- **support** in **avoiding burden shifts**
- **identify** environmental or energy consumption **hotspots**

- The first include bound

requirements and limitations, allocation method, impact categories.

- The Interpretation should include the identification of significant issues, evaluation of the study reg. completeness and sensitivity, and conclusions, limitations and recommendations.

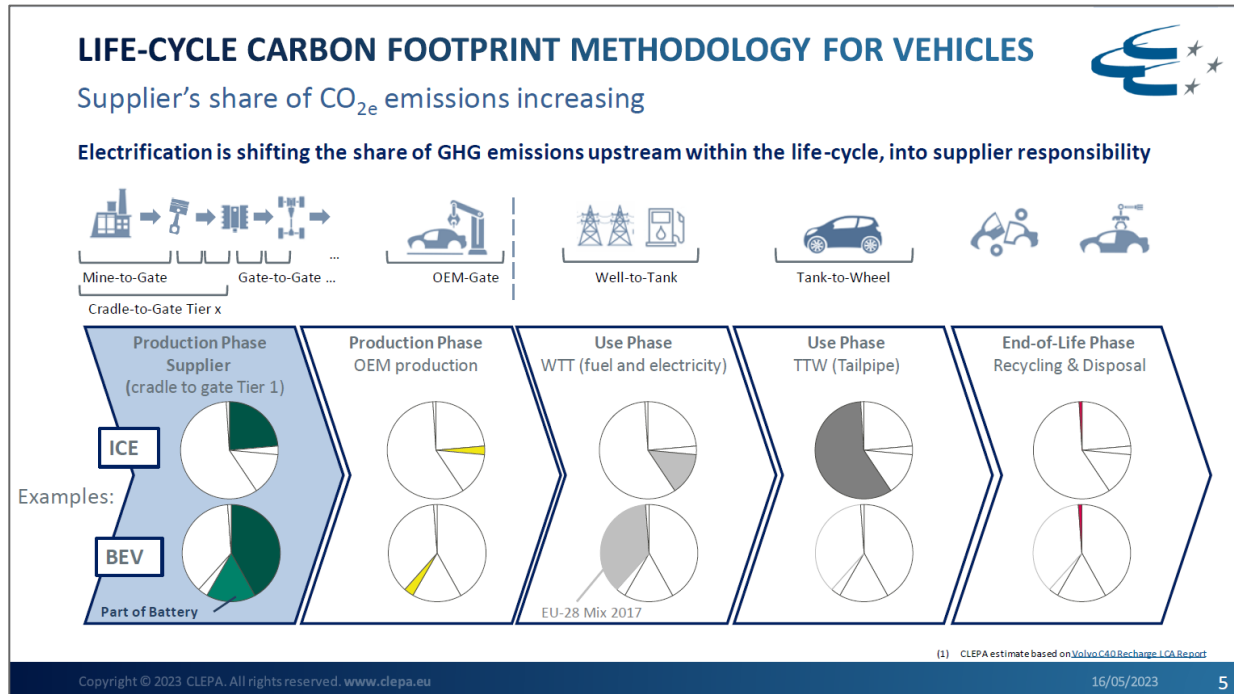
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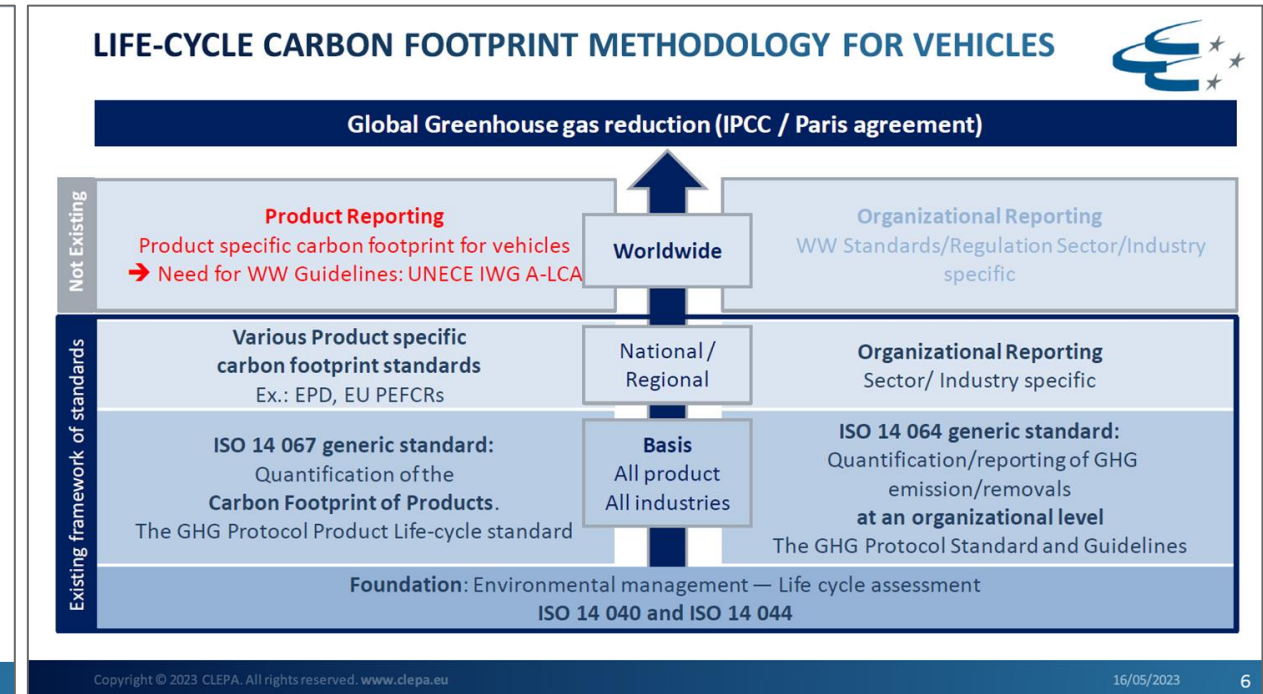
- **Eutrophication Potential:** expressed as PO4 equivalents [kg]; → Over-fertilization of the soil or water;
- **Ozone Depletion Potential:** expressed as R11 equivalents [kg]; → Thinning of the ozone layer in the upper atmosphere;
- **Photochemical Ozone Creation Potential:** ("Summer Smog"), expressed as ethene equivalents [kg]; → Ozone formation in the lower atmosphere;
- **Human toxicity**
- **Ecotoxicity** (water, marine, terrestrial)
- **Energy consumption**, e.g. Primary energy: [MJ], renewable and fossil energy sources (on the input side)
- **Depletion of abiotic resources:** elements and fossil fuels

CO2-
equivalents

UN ECE GRPE IWG Vehicle LCA

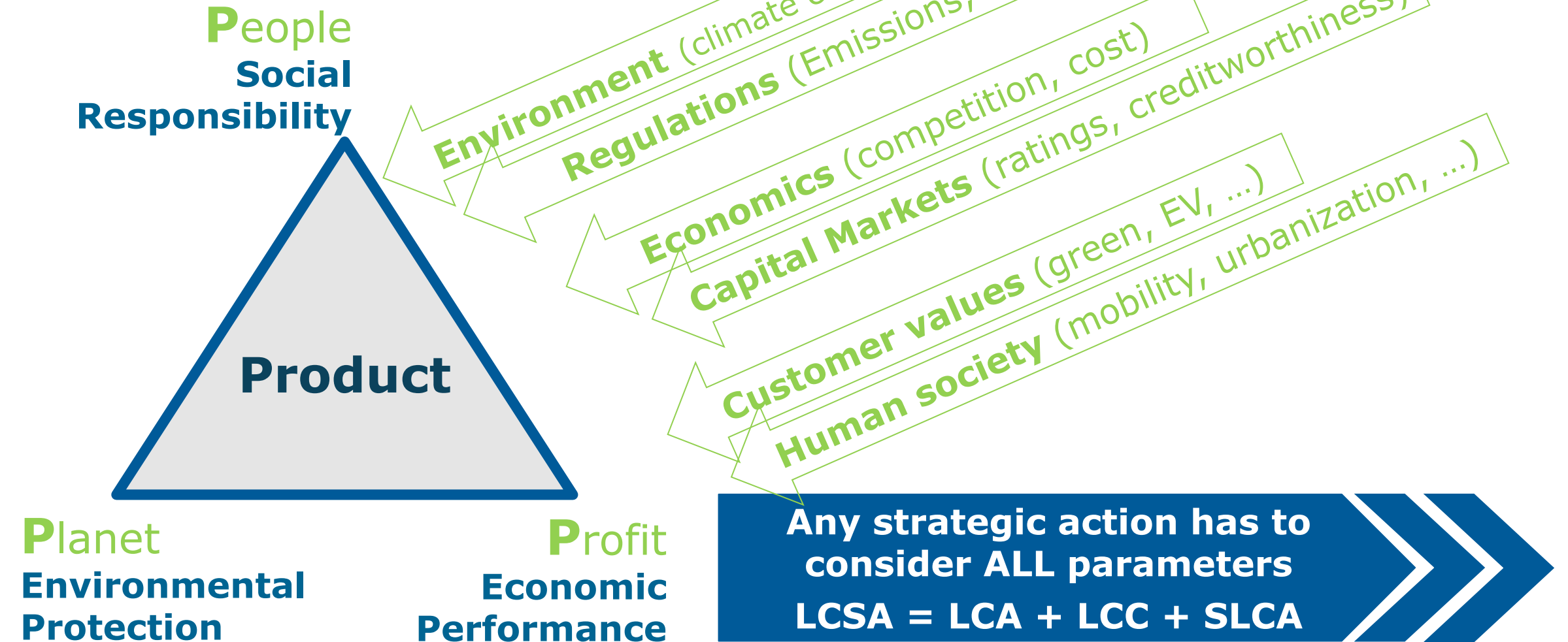


- Initiated by the UN
- Supported by EC, US, China, Japan, South Korea
- Strong cross-industry alliance including major OEMs, associations
- Life cycle carbon footprint methodology for vehicles



- Sub-groups for production (materials, parts, assembly), use phase (WTT for fuels & energy, TTW for vehicles), end-of-life
- Quantify & verify actual CO_{2e} emissions, considering existing norms and methodologies, creating standard inventories, set of rules & guidelines

Sustainability has 3 aspects ... and MANY influencing factors

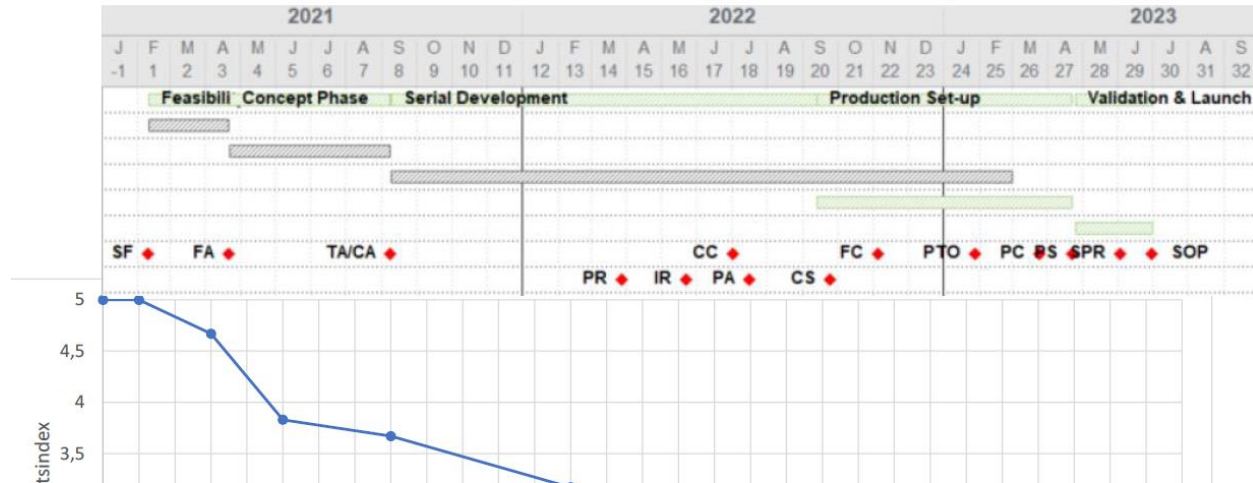


Future challenges for companies in terms of product sustainability?

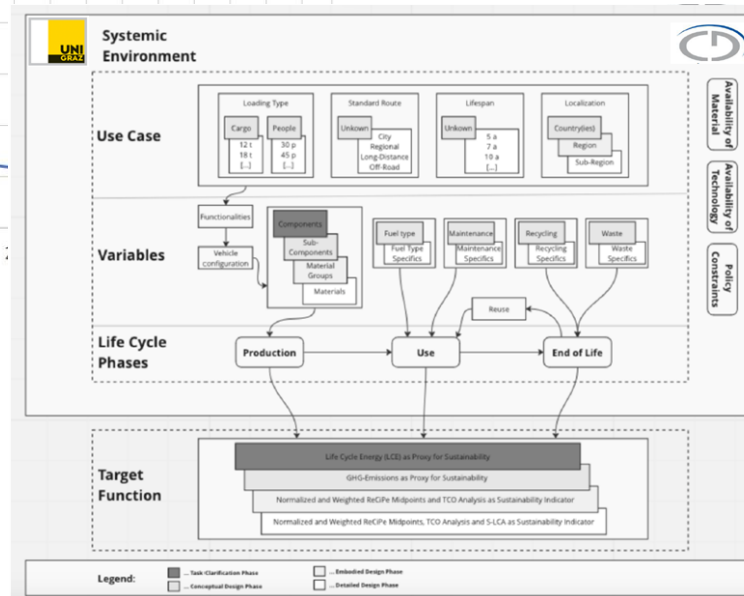
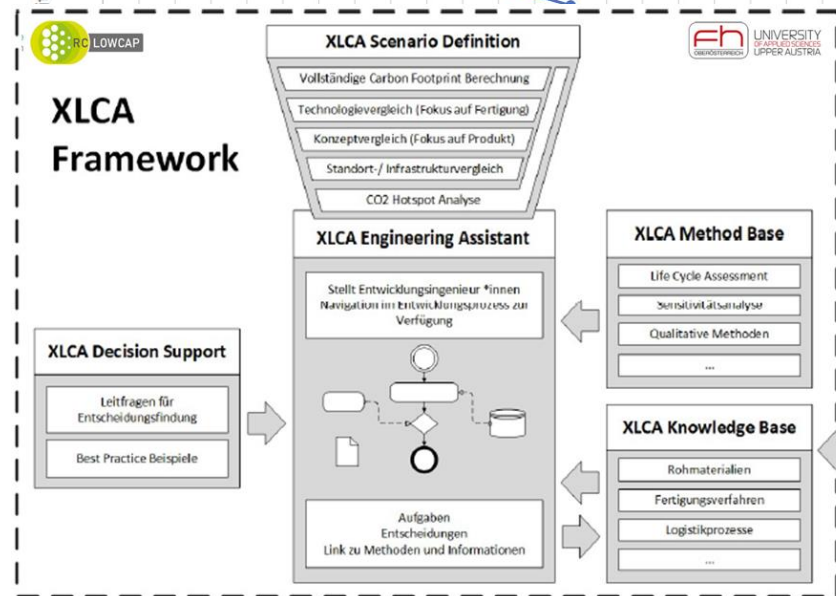


- Offer phase: CO2-production phase requested
- Carbon footprint on company level vs. on product level
- LCI, database
- SW for as-far-as-possible automated PEF/LCA calculation
 - Materials unknown in early development phase
 - Production processes unknown for long, energy sources?
 - Production location
- Awareness of the importance for sustainability (IP, KPI, existence/measurement of data)
- Sustainability vs. cost
- Global supply chain, multiple suppliers for one part
- Carbon footprint is only a very first step

Uncertainty score and implementation of LCA in early development phase



- Decision possible and feasible for earliest meaningful calculation of LCA
- Consideration of uncertainty score of environmental footprint, depending on product maturity



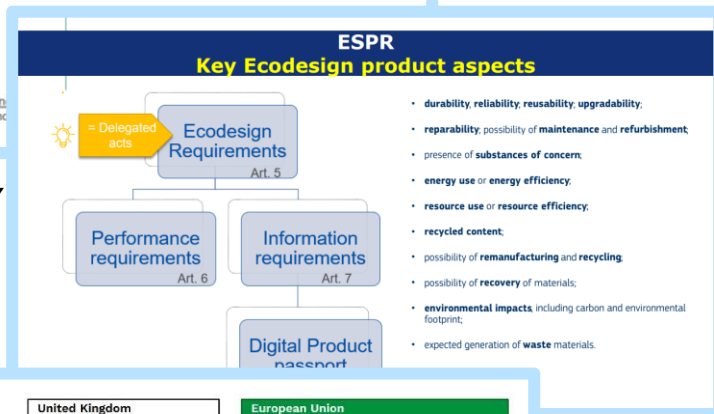
- ✓ Covering the entire life cycle
- ✓ BoL (production, materials, manufacturing, energy demands, location)
- ✓ MoL (usage profiles, lifespan, maintenance)
- ✓ EoL (SoH, recycling/refurbishment, location)

Each Challenge offers an opportunity

The political context

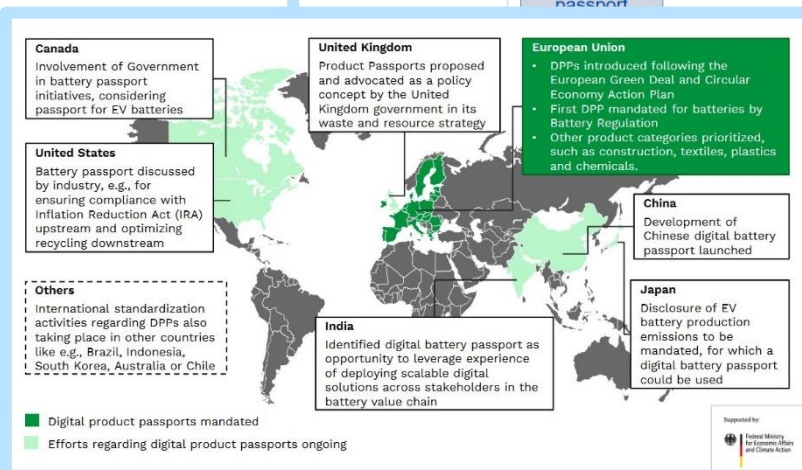
- The DPP is an important deliverable in the Commission strategy to digitalise our economy (green & digital). Many DGs are actively contributing to its design and deployment (CNECT, DIGIT, ENER, ENV, GROW, JRC, TAXUD)
- The objective of the DPP is to simplify digital access to relevant product-specific information in the area of **sustainability, circularity, and legal compliance**. It is **not** a track & tracing tool, but it will allow to also include traceability information when appropriate.
- There is a (growing) number of EU policies which will rely on DPP or element of it in order to make digitally available product related information:
 - ESPR
 - Batteries Regulation
 - Toys regulation
 - Detergents regulation
 - Construction Products Regulation
 - Critical Raw Material Act
- The DPP-system shall build on **existing** possibility of using new technologies and

- Legal requirements are a challenge
- Globally: many more, and different requirements have to be taken into account

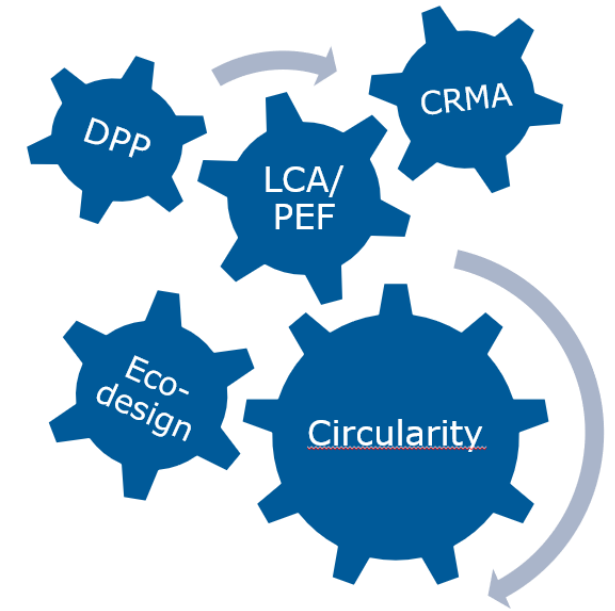


Source: M. Galatola, EC, DG GROW

- The effect of ecodesign, battery regulation, CRMA can be evaluated via LCA/PEF
- LCA/PEF results will be documented & visualized via DPP/DBP



Source: Batterypass



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Thank you



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