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Sustainability reporting and compliance within the EU: opportunities and challenges of LCA assessments in the copper, nickel, zinc and precious metals industry

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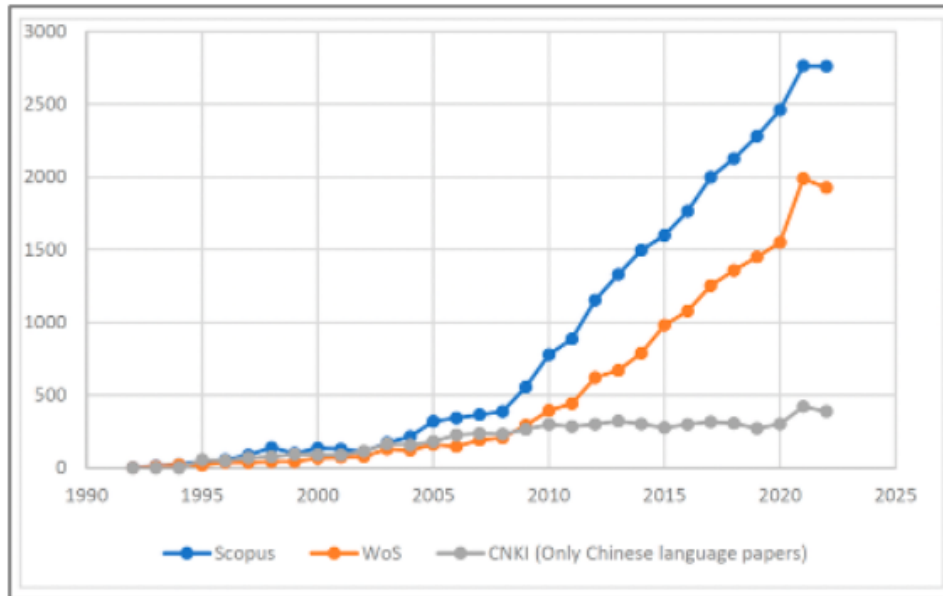
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LCA evolution: scientific publications and funding



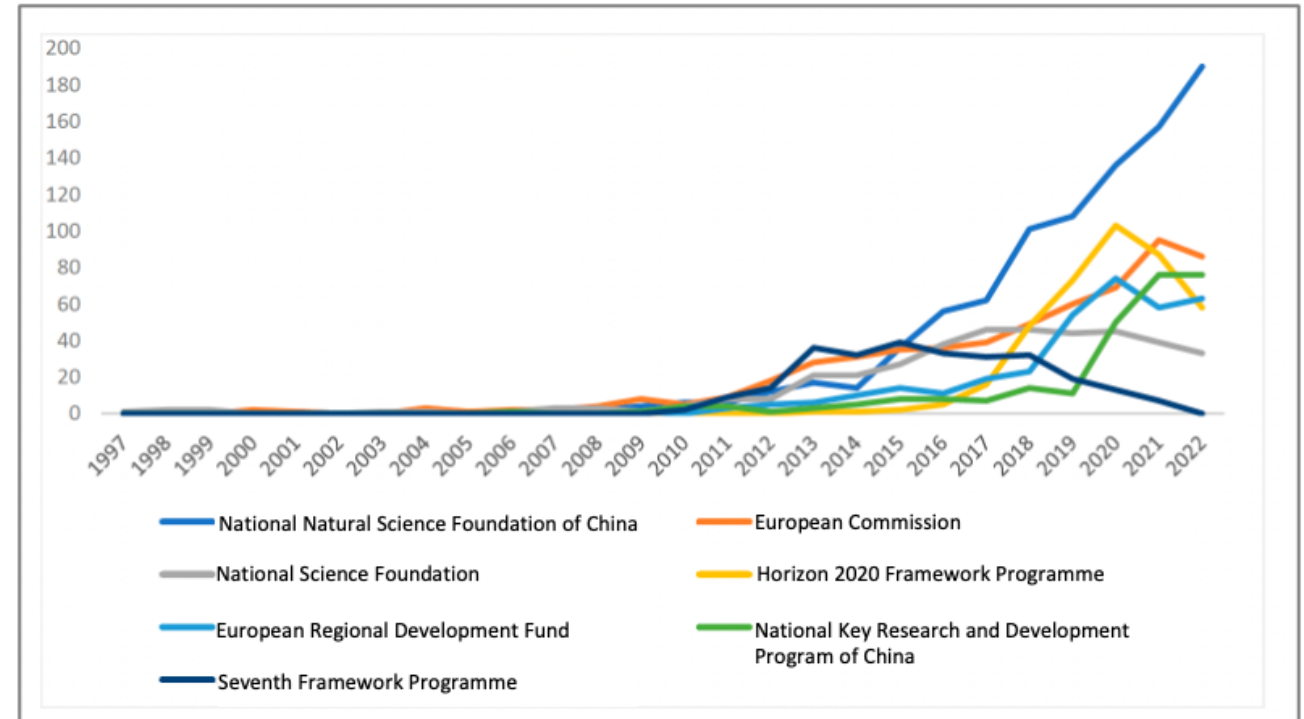
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Evolution of LCA publications (1991–2022)



- Significant increasing in research and knowledge on LCA in past 20 years

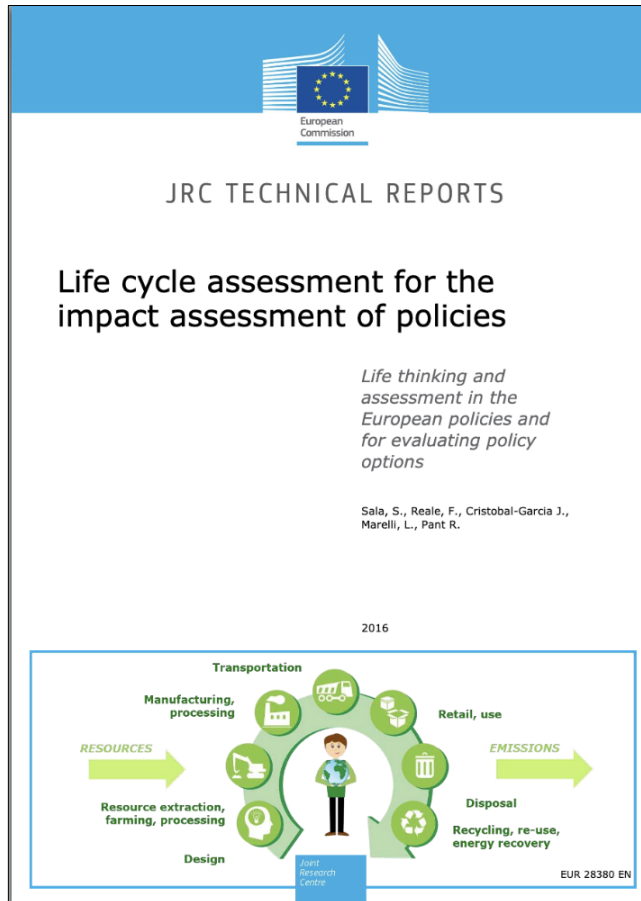
Evolution of LCA Funding by top funding sponsors (1997–2022)



- Significant increase in investments in LCA research and implementation in past 15 years

Moutik et al., 2023

Reports and recommendations on LCA & policy



Sala et al., 2016

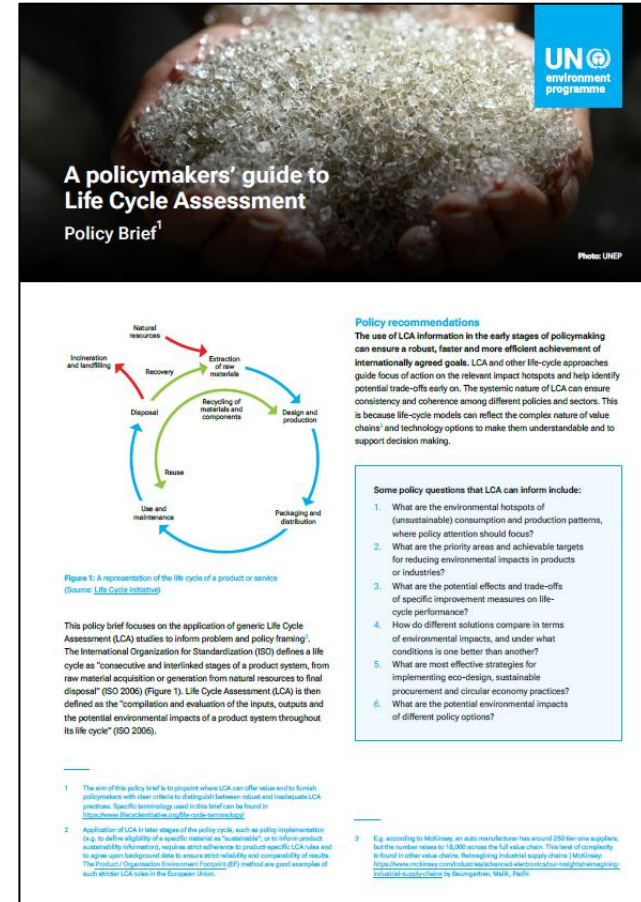
2016

JRC report on LCA in policy

*“the use of LCA for supporting the impact assessment of policies is still **relatively limited**. A broad and international discussion on the need of a **guidance for the application of LCA in the policy is ongoing.**”*

Recommendations for improvement:

- Improving data quality
- Providing guidance on modelling approaches and methodological choices
- Coherence of methodologies



UNEP, 2024

2024

UNEP report on use of LCA in the early stages of policymaking

Includes a 4-point checklist for policymakers to distinguish high vs low quality LCA studies:

1. **Adherence to recognized standards and methods:** such as ISO14040/44 and EF methods
2. **Goal and scope alignment**
3. **Comprehensiveness:** includes all relevant life cycle stages and impact categories
4. **Critical review and transparency**

Recent large review study on LCA in policies

2021

The International Journal of Life Cycle Assessment (2021) 26:2295–2314
https://doi.org/10.1007/s11367-021-01893-2

POLICIES AND SUPPORT IN RELATION TO LCA



The evolution of life cycle assessment in European policies over three decades

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Abstract

Purpose Life cycle thinking (LCT) and life cycle assessment (LCA) are increasingly considered pivotal concept and method for supporting sustainable transitions. LCA plays a relevant role in decision support, for the ambition of a holistic coverage of environmental dimensions and for the identification of hotspots, possible trade-offs, and burden shifting among life cycle stages or impact categories. These features are also relevant when the decision support is needed in policy domain. With a focus on EU policies, the present study explores the evolution and implementation of life cycle concepts and approaches over three decades.

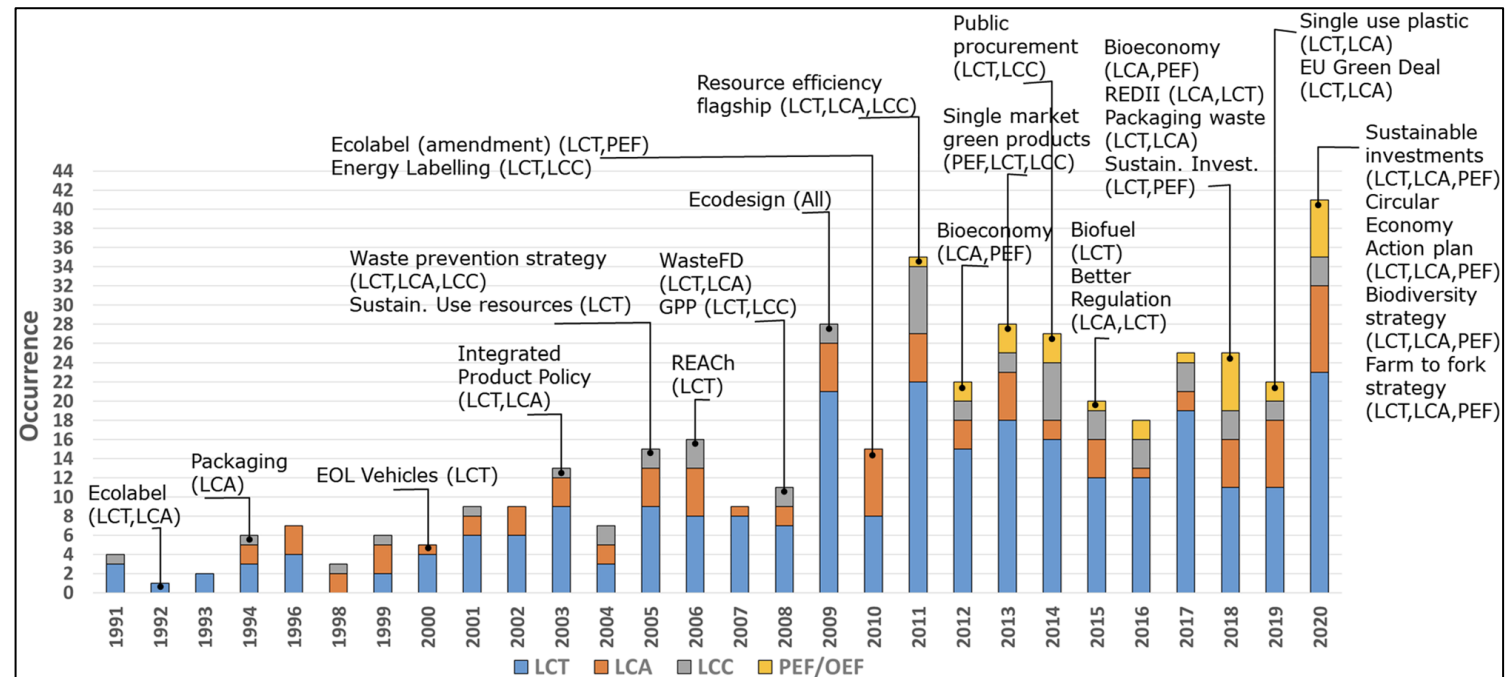
Methods Adopting an historical perspective, a review of current European Union (EU) legal acts and communications explicitly mentioning LCT, LCA, life cycle costing (LCC), and environmental footprint (the European Product and Organisation Environmental Footprint PEF/OEF) is performed, considering the timeframe from 1990 to 2020. The documents are categorised by year and according to their types (e.g. regulations, directives, communications) and based on the covered sectors (e.g. waste, energy, buildings). Documents for which life cycle concepts and approaches had a crucial role are identified, and a shortlist of these legal acts and communications is derived.

Results and discussion Over the years, LCT and life cycle approaches have been increasingly mentioned in policy. From the Ecolabel Regulation of 1992, to the Green Deal in 2019, life cycle considerations are of particular interest in the EU. The present work analysed a total of 159 policies and 167 communications. While in some sectors (e.g. products, vehicles, and waste) life cycle concepts and approaches have been adopted with higher levels of prescriptiveness, implementation in other sectors (e.g. food and agriculture) is only at a preliminary stage. Moreover, life cycle (especially LCT) is frequently addressed and cited only as a general concept and in a rather generic manner. Additionally, more stringent and rigorous methods (LCA, PEF/OEF) are commonly cited only in view of future policy developments, even if a more mature interest in lifecycle is evident in recent policies.

Conclusion The EU has been a frontrunner in the implementation of LCT/LCA in policies. However, despite a growing trend in this implementation, the development of new stringent and mandatory requirements related to life cycle is still relatively limited. In fact, there are still issues to be solved in the interface between science and policy making (such as verification and market surveillance) to ensure a wider implementation of LCT and LCA.

Sala et al., 2021

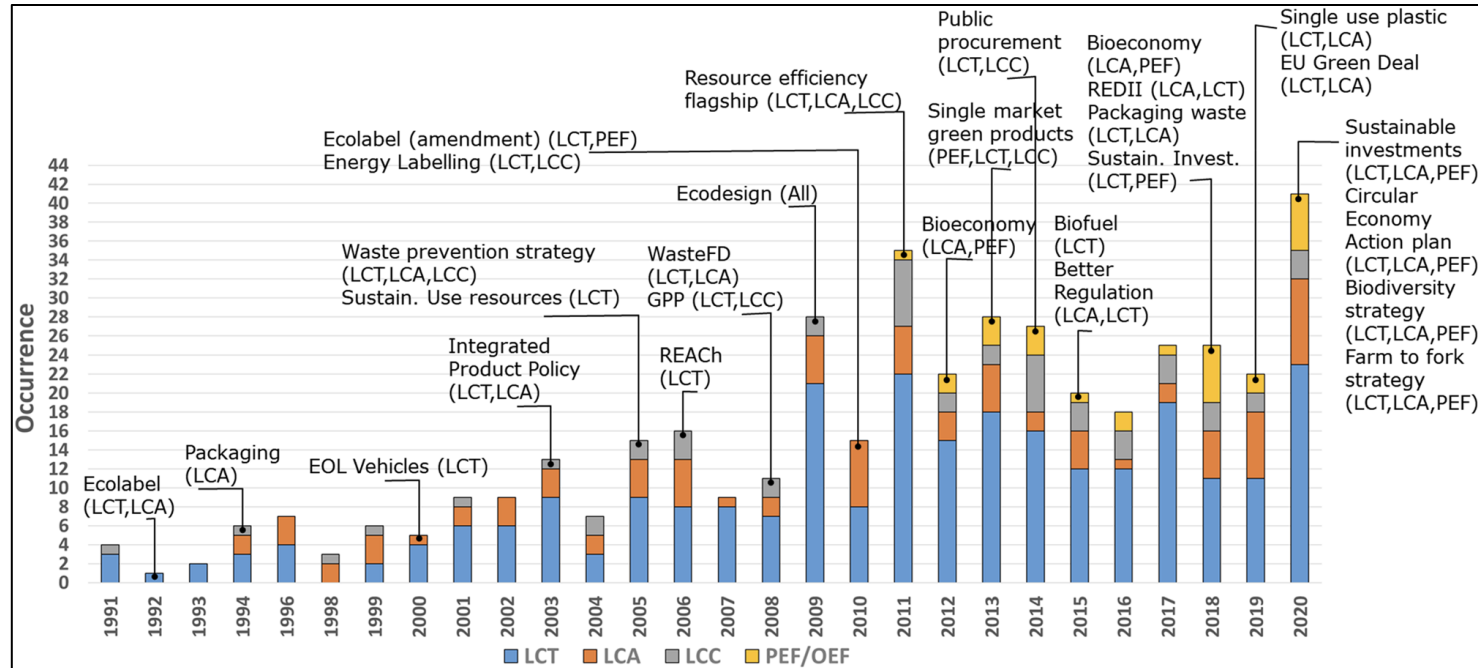
Reviewed documents: 159 policies + 167 communications
LCA-related: 60% policies and 45% communications



Policies applicable to metals



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Sala et al., 2021

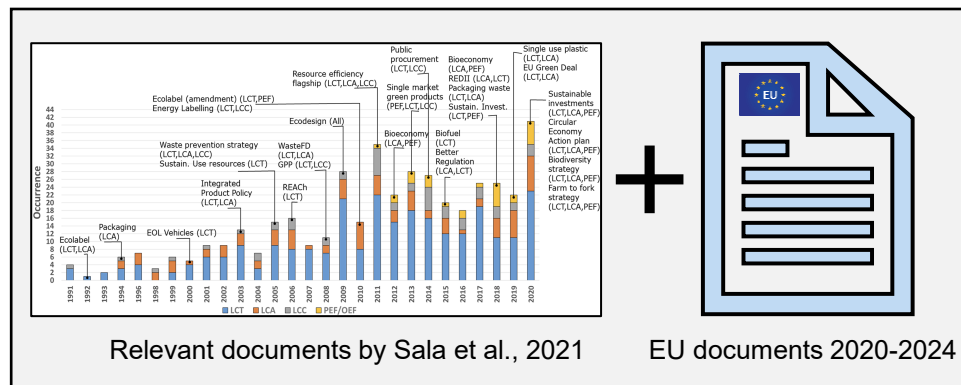


The background is a monochromatic blue-toned abstract image. It features several large, dark, branching structures that resemble coral, seaweed, or perhaps mineral formations. These structures are set against a lighter blue, textured background that looks like a cloudy sky or a deep-sea environment. The overall composition is vertical and has a sense of depth and organic growth.

LCA in EU policies for metals: study approach and results

Review of EU policies related to LCA and metallic materials

Selection of documents



Selected relevant documents:

- 11 Regulations (or proposal)
- 5 Directives
- 4 Guideline / Standard / Recommendation



European Precious Metals Federation





International Copper Association



Count	Type of document	Document name	Reference year
1	Guideline	Updated PEF/OEF	2021
2	Regulation	Critical Raw Materials Act	2024
3	Regulation	Ecodesign for Sustainable Products Regulation (ESPR)	2024
4	Regulation	REACH	2006
5	Regulation	Batteries regulation	2023
6	Regulation	Construction Products Regulation	2011
7	Regulation	Carbon Border Adjustment Mechanism (CBAM)	2023
8	Regulation	EU Taxonomy	2020
9	Regulation	European Climate Law/ Framework for achieving climate neutrality	2021
10	Regulation	Ecolabel	2010
11	Regulation proposal	Net Zero Industry Act	2023
12	Regulation proposal	Proposal for a Regulation on circularity requirements for vehicle design and on management of end-of-life vehicles	2023
13	Directive	Corporate Sustainability Reporting Directive (CSRD)	2024
14	Directive	Corporate Sustainability Due Diligence Directive (CS3D)	2024
15	Directive	Green Claims Directive	2023
16	Directive	End-of-life vehicles	2000
17	Directive	Industrial and Livestock Rearing Emissions Directive (IED 2.0)	2024
18	Communication	Global Battery Alliance (GBA) / Battery Passport framework	2019
19	Standard	EN 15978:2011 Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method	2011
20	Recommendation	Safe and sustainable by design (SSbD)	2022

Scope of the review

20 selected documents



Review focused on:

- Copper
- Nickel
- Precious metals
- Zinc

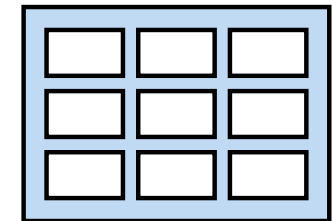
General aspects

Name of the regulation/directive/initiative
Context
Type
Reference year of publication
Status
Application regime
Field regulation applies to
Reference to specific metal/material or supply stages
Reference to other regulations/communications

LCA-related aspects

Reference to LCA, life cycle thinking, footprint...
Multi-functional processes and Allocation approach/Allocation hierarchy
Data quality and data source requirements (primary/secondary)
Recommended or obligatory background databases (if any)
Functional unit
System boundaries (cradle-to-gate, cradle-to-grave)
Cut-off criteria
Electricity methodology (Market or Location based or both)
End of life and recycled content allocation methods
Impact indicators or preferred LCIA
Classification, characterization, normalization and weighting
Reporting/compliance and verification requirements

Summarizing table (matrix)



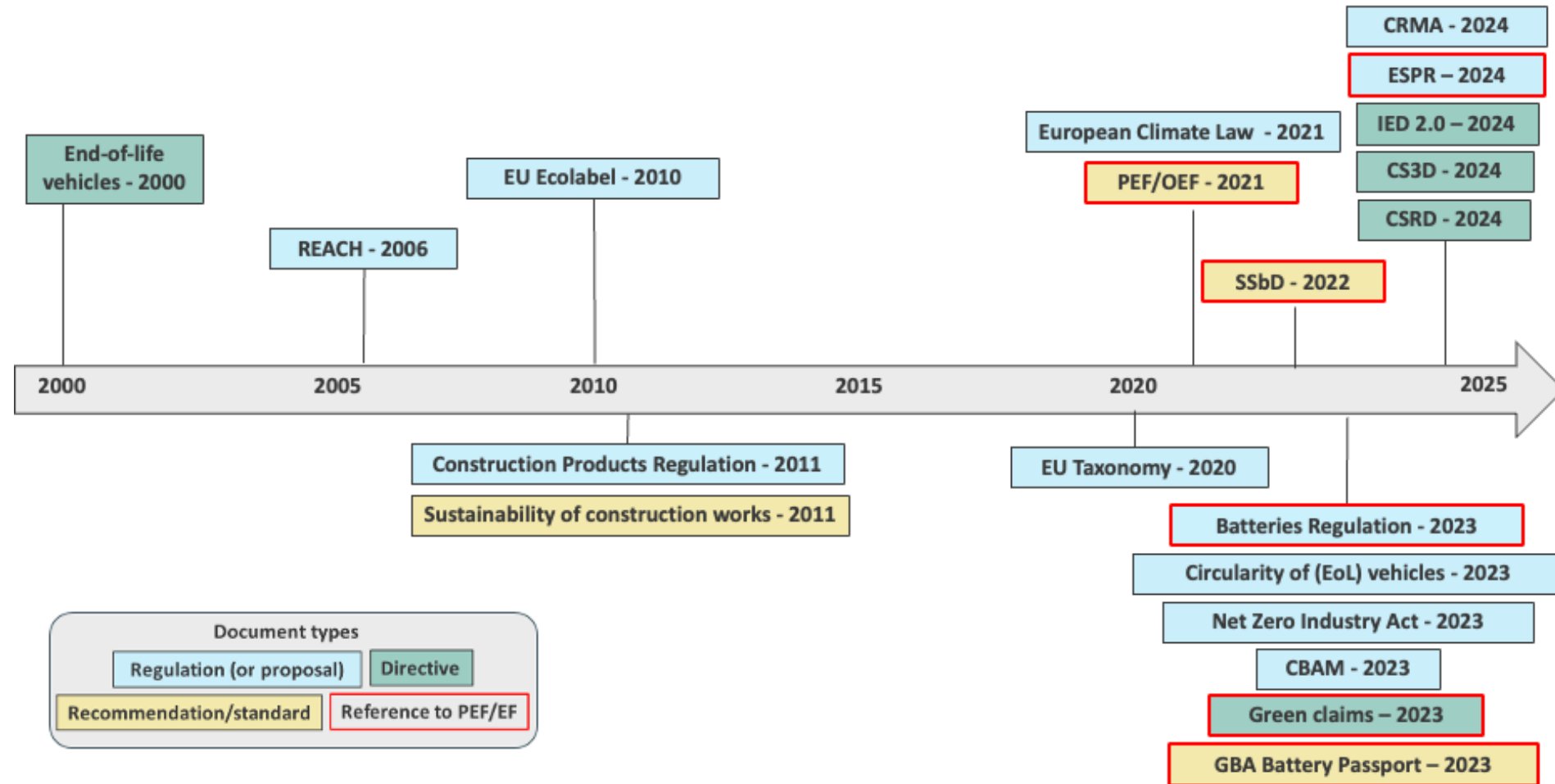
Used to understand:

- Timeline
- Well-covered aspects
- Focus on specific issues
- Alignments/misalignments
- Missing information

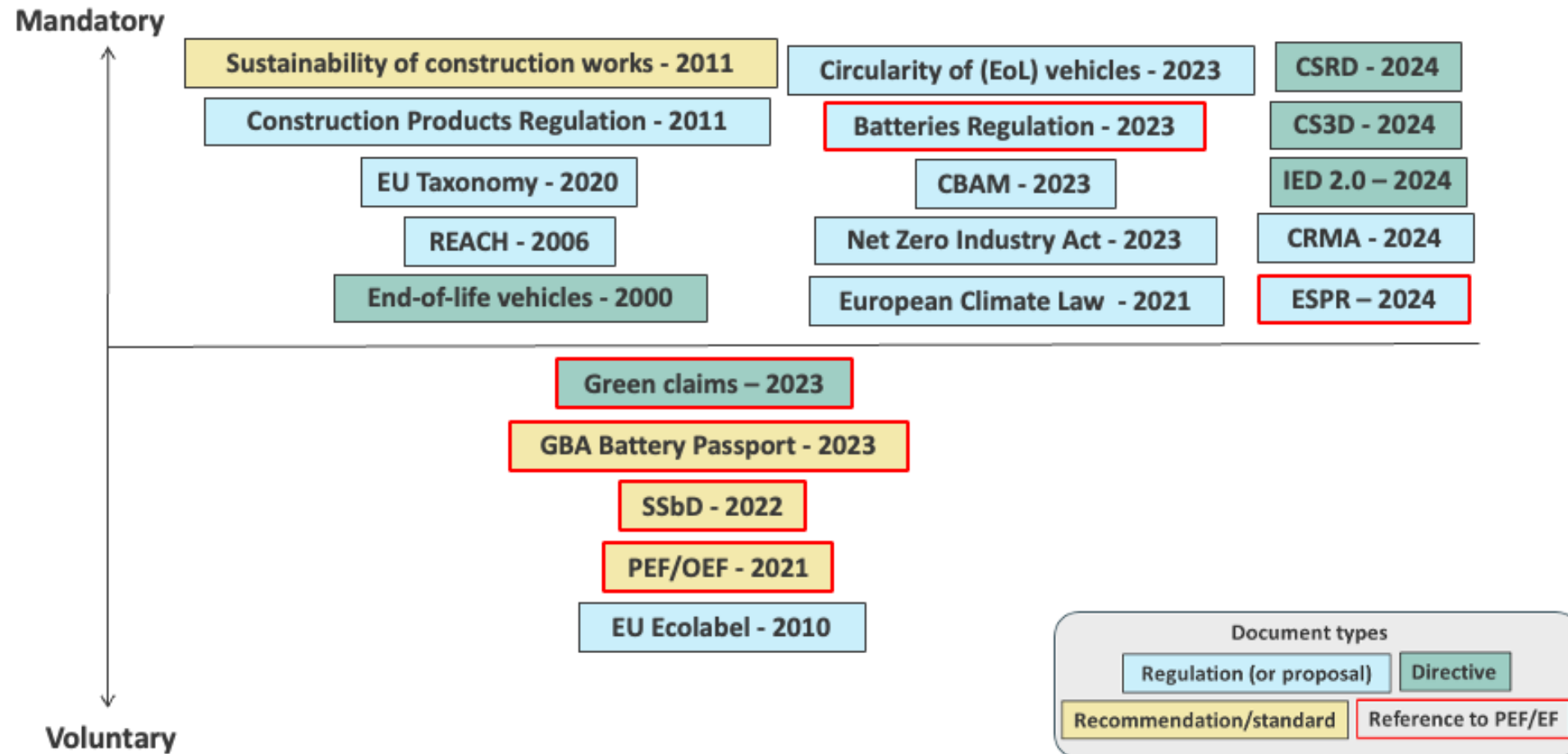
Timeline of reviewed policies



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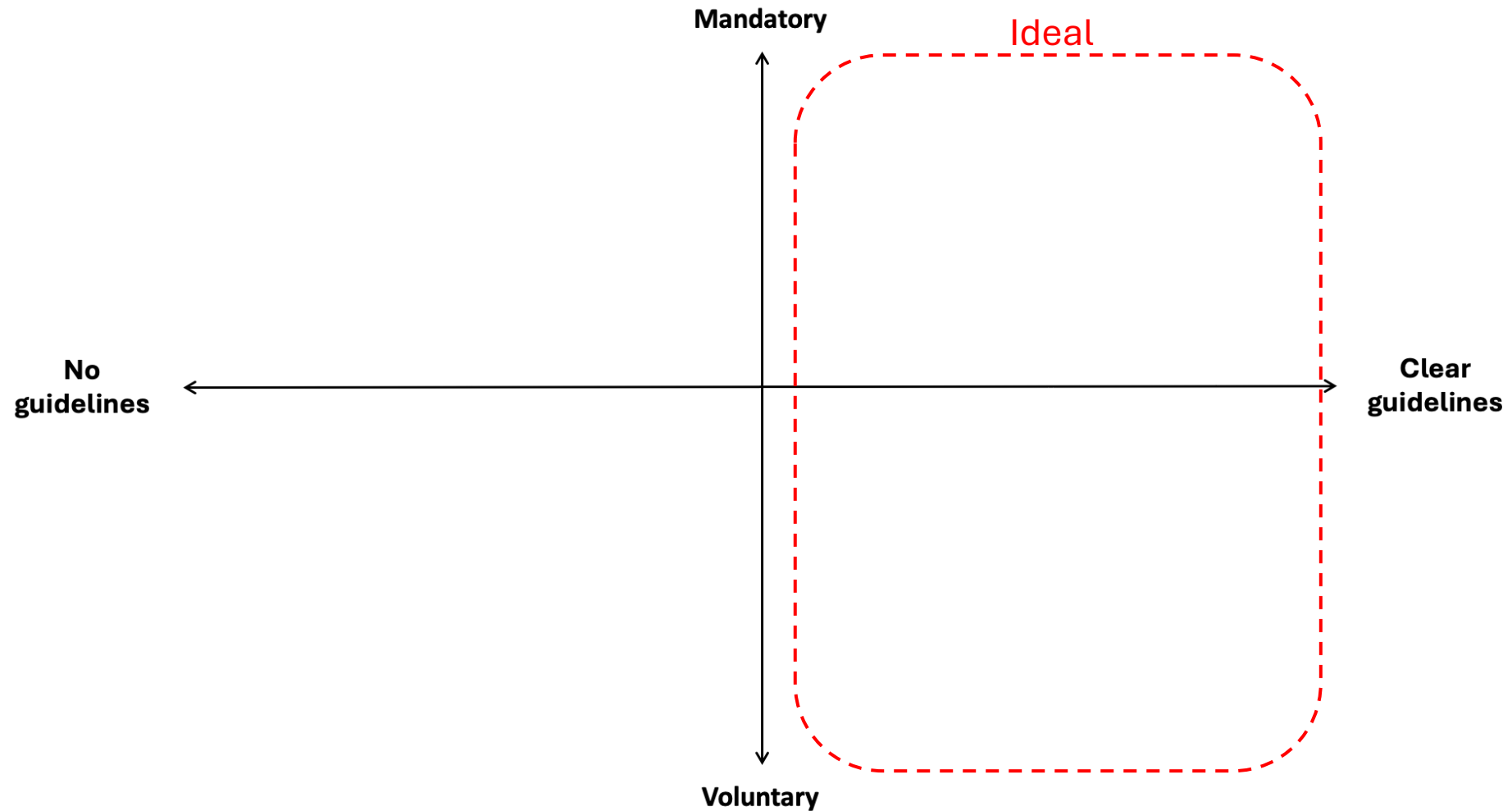
Application regime



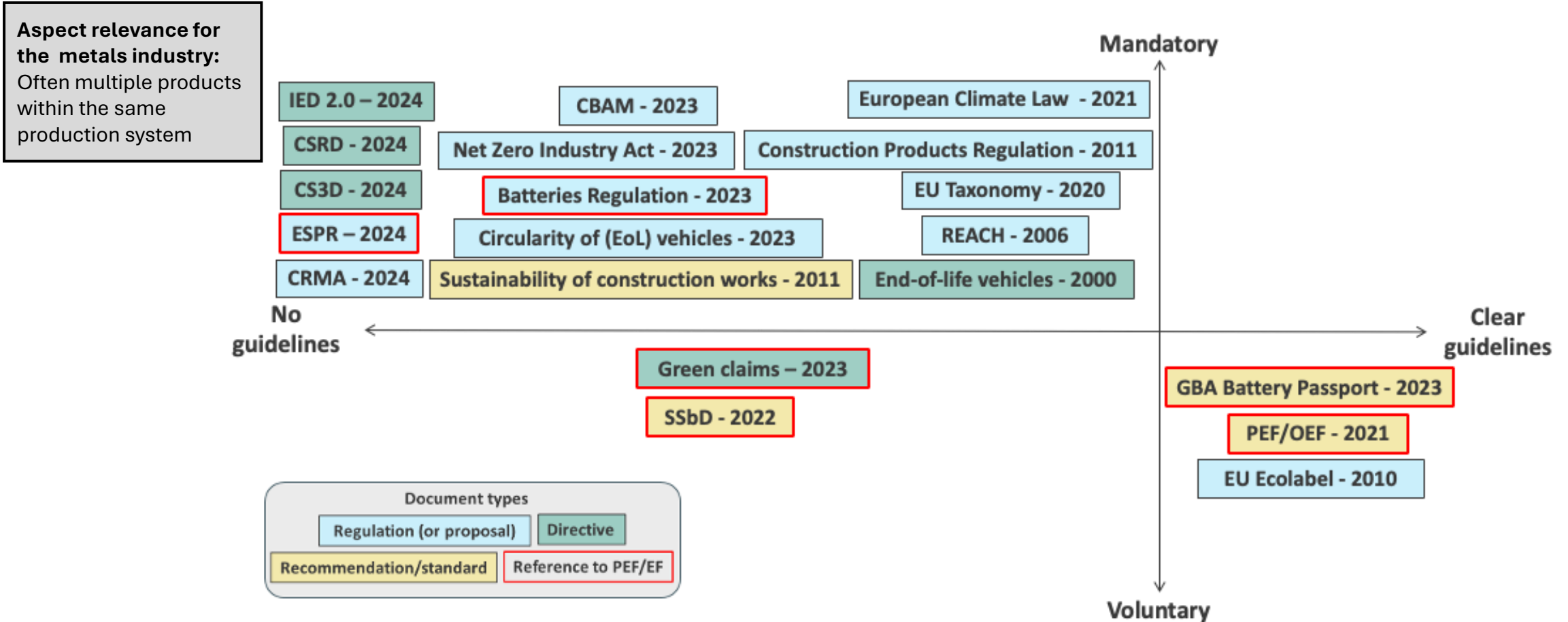
Application regime vs. clarity of information (LCA-specific)



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Multi-functional processes & allocation approach



Examples of alignments/misalignments: cut-off

Policy/guideline	Carbon footprint	Cut-off criteria (negligible impacts)
Updated PEF/OEF	✓	Processes and elementary flows may be excluded up to 3.0% (cumulatively) based on material and energy flows and the level of environmental significance (single overall score)
Critical Raw Materials Act	✓	
Ecodesign for Sustainable Products Regulation (ESPR)	✓	
Corporate Sustainability Reporting Directive (CSRD)	✓	
Corporate Sustainability Due Diligence Directive (CS3D)	✓	
Batteries regulation	✓	
Carbon Border Adjustment Mechanism (CBAM)	✓	
Net Zero Industry Act	✓	
Proposal for a Regulation on circularity requirements for vehicle design and on management of end-of-life vehicles	✓	
Green Claims Directive	✓	
Safe and sustainable by design (SSbD)	✓	
European Climate Law/ Framework for achieving climate neutrality	✓	
EU Taxonomy	✓	
Global Battery Alliance (GBA) / Battery Passport framework	✓	The cut-off criteria allow for the exclusion of a maximum of 3% of greenhouse gas emissions across processes when calculating the carbon footprint (CF) of a product.
EN 15978:2011 Sustainability of construction works	✓	The assessment shall represent accurately the quantification of the building and scenarios used at the time of the assessment. The criteria for the exclusion of inputs and outputs for the environmental indicators based on this description of the object of assessment shall follow the rules according to EN 15804.
EU Ecolabel	✓	Caution should be applied when using the so-called '5% rule'. According to this rule, the input and output streams which contribute to less than 5% are excluded. Tins can only be valid after ensuring that the contribution of these streams to the environmental impact is not disproportionate to their mass, for example, by checking that they contain no hazardous substances.
REACH	X	
End-of-life vehicles	~	
Industrial and Livestock Rearing Emissions Directive (IED 2.0)	~	
Construction Products Regulation	~	

Clear parameters/guidelines.

Generic or unclear parameters/guidelines

No parameters/guidelines identified



Carbon footprint is important

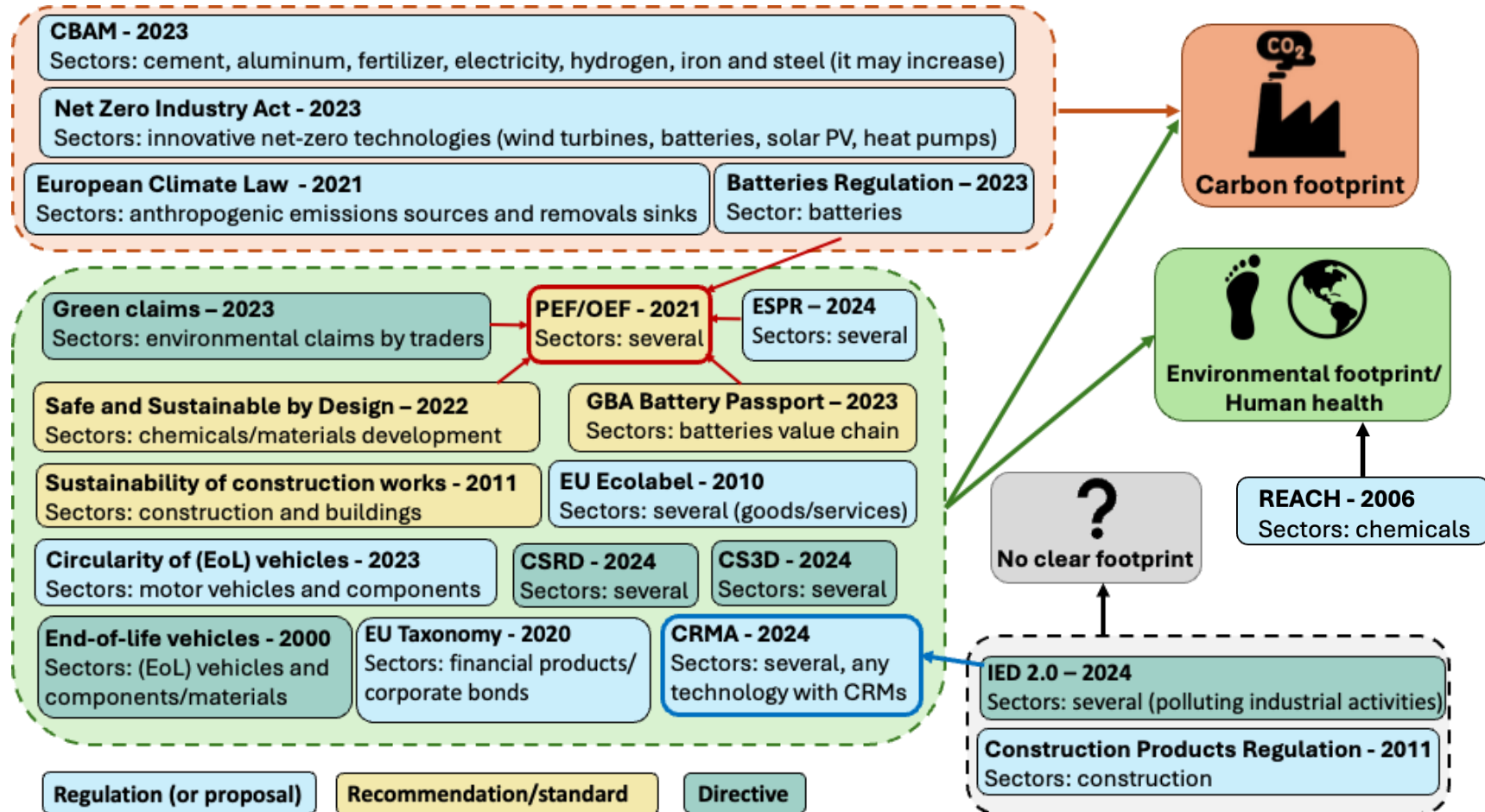


Which cut-off criteria to be used?

Links with life cycle impact categories



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The background is a monochromatic blue-toned abstract image. It features several large, dark, branching structures that resemble coral, seaweed, or perhaps stylized human figures reaching upwards. These structures are set against a lighter blue, textured background that looks like a cloudy sky or a deep-sea environment with light rays filtering through. The overall composition is vertical and has a sense of depth and upward movement.

Limitations, conclusions and recommendations

Limitations & points of attention

- **Scope:** limited number of policies reviewed → many others may be relevant for the metals sector
- **Rapid policy evolution:** some of the policies are currently ongoing updates (e.g. PEF/OEF, CSRD, CS3D, REACH, Green Claims...)
- **Implementation not evaluated:** work based on policy texts not actual application or industry uptake
- **Interpretation variability:** policy language on LCA can be subjective
- **Purpose-driven Scope:** many policies do not fully elaborate on all LCA aspects, as providing detailed methodological guidance is not their primary objective

Conclusions & recommendations

- **Policy development ↔ LCA development**
 - PEF & PEFCRs development for new sectors: **an opportunity** for industrial expertise implementation
- **Lack of clear guidelines** for important parameters (e.g. allocation, cut-off) in mandatory documents is a **challenge** → indirect guidelines by reference to voluntary documents (e.g. PEF)
- **Alignment** of the information provided and compliance requirements in policies is needed
 - To minimize misunderstandings by the supply chain actors while determining their footprint
 - To allow better comparability of LCA results (where useful)
- **Impact categories**
 - Recommendation to include other categories than carbon footprint to avoid burden shifting

Thank you!



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