

Technical insights about the review of Environmental Footprint methods

Joint Research Centre

17th April 2026 – EF Technical Advisory Board meeting

** Disclaimer: These slides provide a preview of the expected content of the issue papers that will accompany the public consultation for the review of EF methods. Please provide your feedback based on the content of the final issue papers, once available.*

Topics

11:30 – 13:00 session

1. Applications of the EF methods and cross-cutting issues
2. Multifunctionality and allocation
3. End-of-life modelling and circularity aspects
4. Electricity modelling
5. Transport modelling
6. Chain of Custody approaches
7. Biogenic carbon and GHG modelling
8. Resource use impact categories
9. Land use impacts, biodiversity issues, and modelling of agricultural practices

14:00 – 15:15 session

10. Toxicity and chemical safety aspects (SoC)
11. Microplastics and microfibers impacts
12. Integrated environmental assessment
13. Product category and sectorial rules
14. Verification of EF studies and review of PEFCRs/OEFSRs
15. Data aspects
16. Quality and uncertainty aspects
17. Interpretation and communication

1 – Applications of the EF methods and cross-cutting issues



1. Current approach in EF methods

- EF studies are only EF-compliant studies
- The only difference is with and without PEFCR/OEFSR

CROSS-CUTTING TOPICS

CUT-OFF CRITERIA

3.0% (cumulatively) to material or energy flows, and to either the single overall score or all impact categories.

CAPITAL GOODS

Capital goods (and their EoL) and their EoL **should be excluded** unless it can be demonstrated they are relevant

EF study of similar product models

EF study refer to a specific product model.

OFFSETS

Not allowed in EF calculations but shall be reported as additional information.

CRADLE-TO-GATE EF STUDIES (intermediate products)

- A declared unit is used in place of a functional unit.
- The distribution, use, and end-of-life life cycle stages are excluded.
- The R1 is modeled with A factor = 1
- Additional mandatory technical information: biogenic carbon content, the recycled content, and LCIA results calculated with the application- or material-specific default A factor.

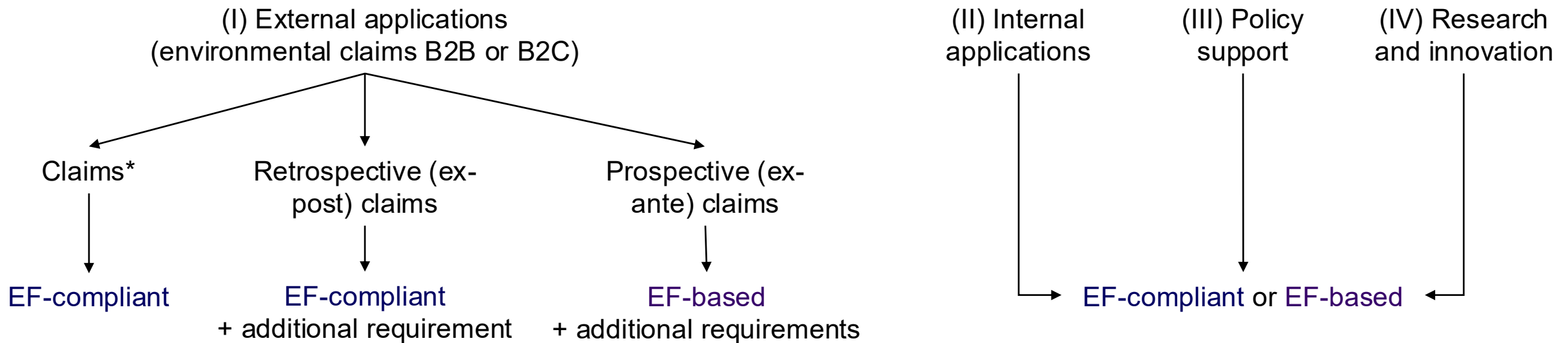
2. Issues and main developments

- Some concepts appear as potentially relevant for the EF methods from **scientific and policy perspectives**: prospective LCA, baseline, consequential LCA.
- Widespread agreement among TAB members on the need to clearly document the **purpose of an EF study and its intended use**.
- Divergent feedback on:
 - The introduction of the concept of **EF-based studies**
 - The inclusion of **capital goods** (with a "should" requirement rather than "shall")

3. Way forward

EF applications

- ❑ **EF-compliant study:** study developed in compliance with all EF modelling, reporting, and verification requirements, where available, to the relevant PEFCRs or OEFSRs.
- ❑ **EF-based study:** study developed in compliance with some EF requirements. EF-based incorporate elements of the EF framework but deviates from one or more EF requirements. All deviations from the EF methods should be transparently documented and justified.



3. Way forward

Cross-cutting topics (1)

CUT-OFF CRITERIA

1. Screening step (mandatory for the cut-off) → LCIA less than 3% of single score and most relevant impact categories
2. EF study
 1. **Per life cycle stage.** (if product/waste) < 1% of the sum mass of product and waste inputs. (if energy) < 1% energy inputs. (if elementary flow) < 1% mass in the reference flow
 2. **Cumulative** exclusions per life cycle stage < 3%

CRADLE-TO-GATE EF STUDIES (intermediate products)

- **Mandatory disclaimer**, stating that **the results are partial** and do not cover full life-cycle impacts.
- Declared unit (instead of a functional unit).
- Exclude distribution, use, and end-of-life life cycle stages.
- R1 is modelled with A factor = 1.
- **Mandatory sensitivity analysis:** EF LCIA results with i) application- or material-specific A values and ii) **including use and the EoL life cycle stages.**

For ALL EF studies:

- Company-specific R1 values and their data source.
- Biogenic carbon, fossil carbon, and direct air capture (DAC)-derived carbon content of the reference flow or product portfolio

3. Way forward

Cross-cutting topics (2)

CAPITAL GOODS

Capital goods (and their EoL) **should** be ~~excluded~~ **included** unless it can be demonstrated they are not relevant: e.g., sector-specific EU legislations, PEFCR/OEFSRs, consolidated scientific evidences, screening studies.

OFFSETS

Not allowed (as in current).

EF STUDY OF SIMILAR PRODUCT MODELS:

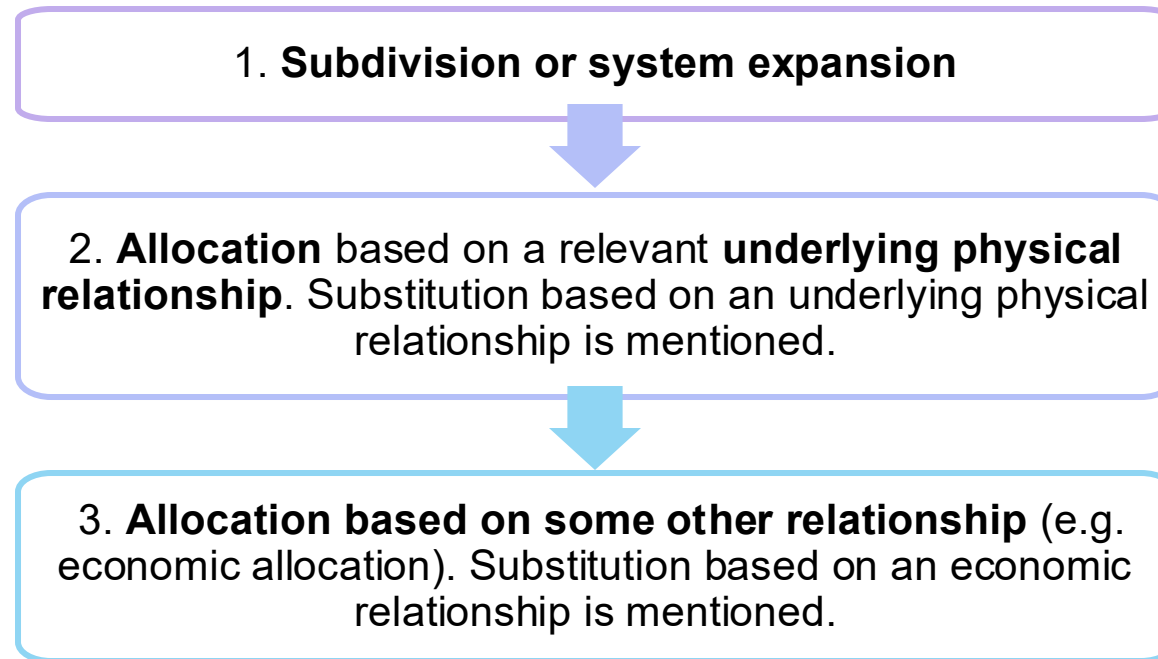
1. **Expanding EF results** for a certain product to different variations of the same product -> only with PEFCRs/OEFSRs
2. **EF studies for product families of similar products:**
 - a. Only allowed if the variation of the single score and of most relevant impact categories is **lower than 5%**.
 - b. LCI. Processes in situation 1 and 2 of the DNM may be modelled with a weighted average of profiles based on sales, median values between the lowest and highest results, or worst-case approach,
 - c. EF results. The EF results shall always be referred as the EF result of multiple products. A mandatory sensitivity analysis shall be performed to capture potential worst-case results.

2 – Multifunctionality and allocation



1. Current approach in EF methods

Multi-functional processes are handled according to the following **hierarchy**:



The **CFF** shall be used to model recycling, energy recovery, and disposal.

Specific instructions on the modelling of farm, slaughterhouse and rendering for cattle, pigs, sheep and goats (at farm and at slaughterhouse level).

2. Issues and main developments

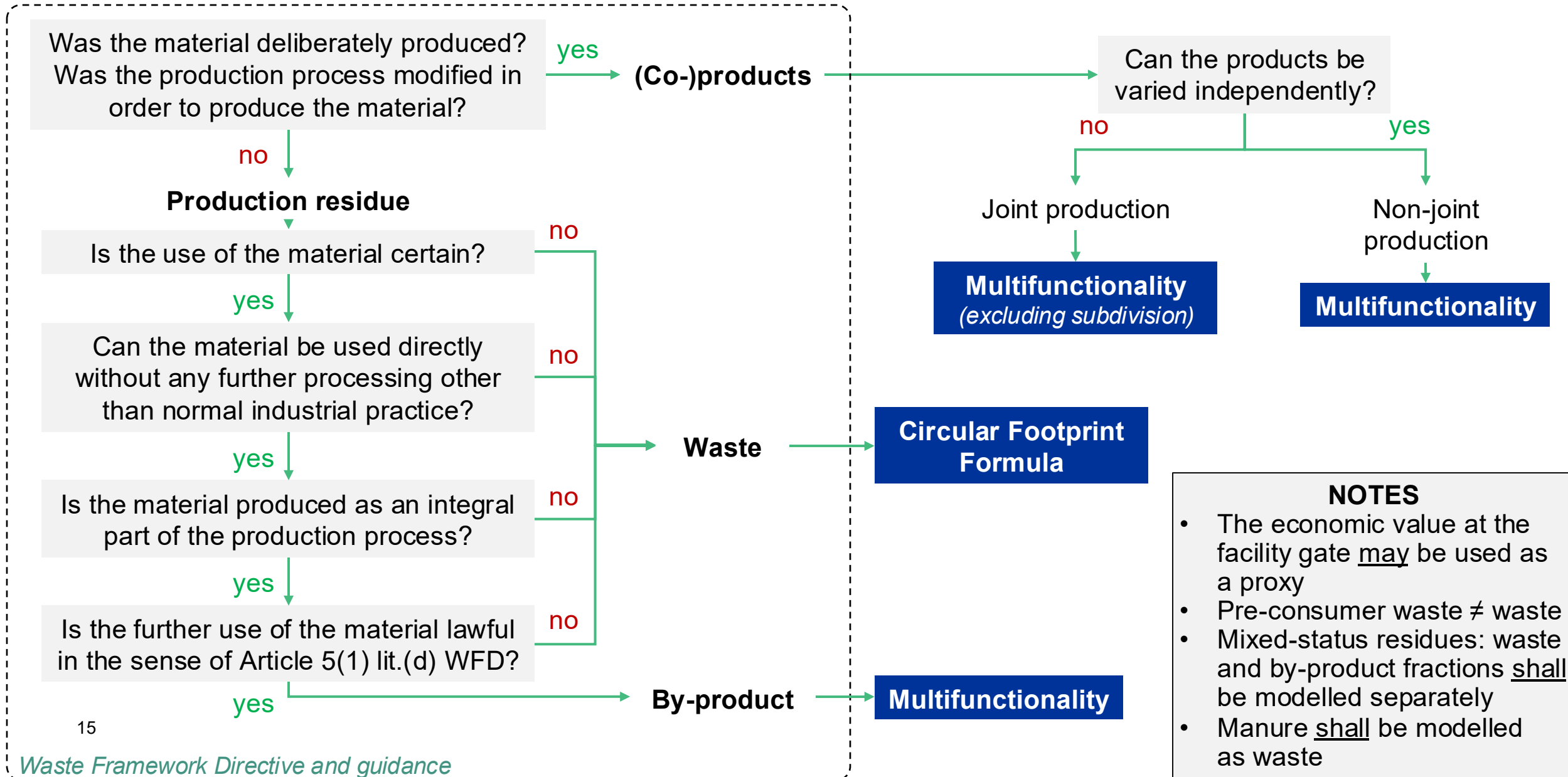
HIERARCHY AND GENERAL

- The current hierarchy was found unclear, especially regarding when and how to implement **system expansion**
- Missing definition between co-products, by-products, and waste → Lack of clarity of when to apply the **CFF** and the **allocation**
 - **Risk of deadlock** if PEFCRs/OEFSRs would be responsible of choosing the allocation approach
- Divergent feedback on whether **economic allocation** should be given greater prominence in the methodology
 - **CFF** introduces some consequential elements
- **Extend CFF** application to model co-products and by-products

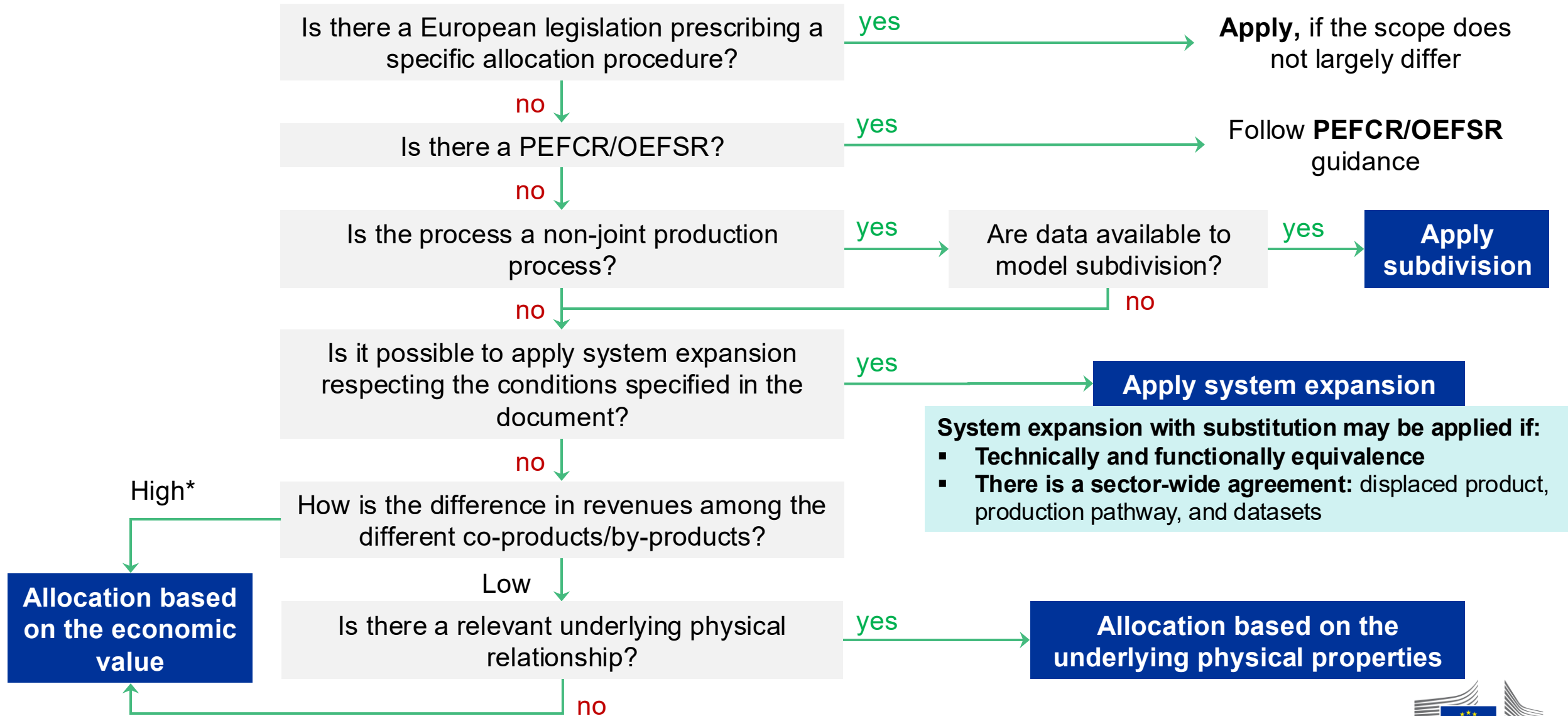
ALLOCATION FACTORS

- Concerns about outdated or missing default allocation factors
- Default allocation factors should only be developed by PEFCR TSs
 - Company-specific allocation factors should be allowed
- Several comments targeted specific allocation factors, e.g., wool, fish, milk, meat
- Different allocation methods are used for similar products: e.g., biophysical for dairy, economic for pork

3. Way forward - *STEP 1: Classification*



3. Way forward - *STEP 2: Multifunctionality*



3 – End-of-life modelling and circularity aspects



1. Current approach in EF methods

EC Recommendation 2279/2021 mandates the Circular Footprint Formula (CFF) to model circularity (e.g., recycled content and End of Life, including reuse).

- **The CFF** includes three parts: material, energy, and disposal. **Key functions of the CFF:**
 - Models recycled content and recyclability
 - Allocates impacts and credits between the waste-generating system and the next user of the recycled/reused material
 - Allows impacts and EoL recycling credits to be summed up
- **Beyond recycling:** The EF methods also introduces the extended product lifetime (e.g., reuse and refurbishment) as additional circularity aspects (modelled through the CFF, except for the reuse of packaging)

2. Issues and main developments

Stakeholder feedback (EF TAB & Interservice Group for simplification and harmonisation of carbon accounting)

- **Issues:**

- CFF is viewed as too complex, costly, and difficult to apply consistently
- Differing EU frameworks (e.g., CFF vs. Cut-off vs. EN 15804) create confusion and administrative burden for companies

Need for transitioning to a **simplified, tiered approach** with default values and module, preserving full accuracy when EoL impacts are highly relevant.

- **Recycling**

- Trade-off: Balancing simple methods (cut-off) against comprehensive ones (CFF / EN 15804).
- Updates: Call for updated parameters' values

- **Circularity beyond recycling (reuse & refurbishment):**

- Design for Reuse: Better recognition and rewards for lifetime extension by OEMs
- Second-hand goods: Lower environmental burdens assigned to reused parts and second-hand products

3. Way forward

Circular footprint formula - CFF

- **Modular & hybrid approach**

- **Alignment with the EN 15804** modular format and introduction of the End-of-waste (EoW) criteria
- The **cut-off module** is made explicit
- "**Correction modules**" (that include factor A) are defined to capture recycling burdens/credits
- **Simplification elements** also addressed (see next slide)

- **Key changes**

- **Allocation factor A** differentiated between input and output (A=1 and A=0 are now allowed, when justified)
- Default **factor B**: B=0 for incineration, landfilling and anaerobic digestion, B=0.5 for secondary recovered fuels
- CFF factors (i.e., A, R2, R3, Qout) can be **periodically updated** and suggested by PEFCR (applied consistently)
- **Pre-consumer waste**: when production residue modelled as waste, CFF applies (R1&Erec pre/post are specified)
- **R1** refers to the recycled material input, not necessarily to the recycled content (It shall be a company specific)
- Quality factors linked to **replacement rates** (Qin = 1 by default; Qout = replacement rate)
- The **PoS** refers to the point where a recycled material replaces a primary (virgin) material in a process

- **Tiered application**

- Intermediate products: Use the cut-off module
- Final/Generic products: Mandate correction modules if they significantly change results

3. tiered Way forward

CFF – Tiered application (Simplification)

$$\begin{array}{lcl} \text{Material input} & \left\{ \begin{array}{ll} \text{Cut-off module} & (1 - R_1)E_v + R_1 E_{rec} \\ \text{Correction term} & R_1(1 - A_{in})(E_v - E_{rec}) \end{array} \right. & \end{array} \qquad \begin{array}{lcl} \text{Material output} & \left\{ \begin{array}{l} R_2(1 - A_{out})(E_{recEoL} - E_v^* Q_{out}) \end{array} \right. & \end{array}$$

- **Cut-off module only**

- For intermediate products used in final products: $R_1 \ll$ (depending on the A factor)
- For final products: when *i*) material recycling at EoL is not meaningful due to material dissipation, or *ii*) when the simplification does not affect the results (e.g., non-most relevant processes)
- When no EF-compliant datasets are available and alternative datasets are used (where cut-off is applied)

- **Full CFF – "closed loop"**

- a "closed loop" recycling scenario can be applied. A sensitivity analysis can be conducted in case it is a proxy.

- **Factor A**

- Open to $A=1$ for specific materials (When the supply of recycled material is higher than the demand or when set by stakeholders and EC agreement). When $A=1$, the cut-off module only is applied.
- $A=1$ for exceptional modelling issues:
 - When a recycled material does not substitute a primary material (since products can be only made by recycled materials due to technical reasons).
 - When no primary material exists.

3. Way forward

Circularity beyond recycling

- **Core Shift**

- The **CFF is strictly for material recycling**. Product reuse/refurbishment will now be modelled via the Functional Unit (FU) and system boundaries
- For **reused packaging or components** with the same function (e.g., “refillable packaging”), the number of reuses can be included within the modelling through the FU

- **Key Definitions**

- **Reconditioned**: discarded products/components (starts a separate lifetime) - based on "preparation for reuse"
- **Second-hand**: Used goods, not classified as waste (shares lifetime with original product) - based on “used goods” in EU customs code

Scenario	Modelling rule
Reconditioned & Remanufacturing (Refurbisher perspective)	<ul style="list-style-type: none">• Reused parts: burden-free (cut-off)• New parts: full LCA (cradle-to-grave)
Second-hand products (Reseller perspective)	<ul style="list-style-type: none">• Lifetime not extended: PEF = original product• Lifetime extended: proportional impacts (based on residual lifetime) of manufacturing and EoL + refurbishment burdens and use phase• Residual lifetime ≈ 0 (e.g., charity, fast replacement): burdens due to material extraction, product manufacturing, and EoL = 0 (cut-off)

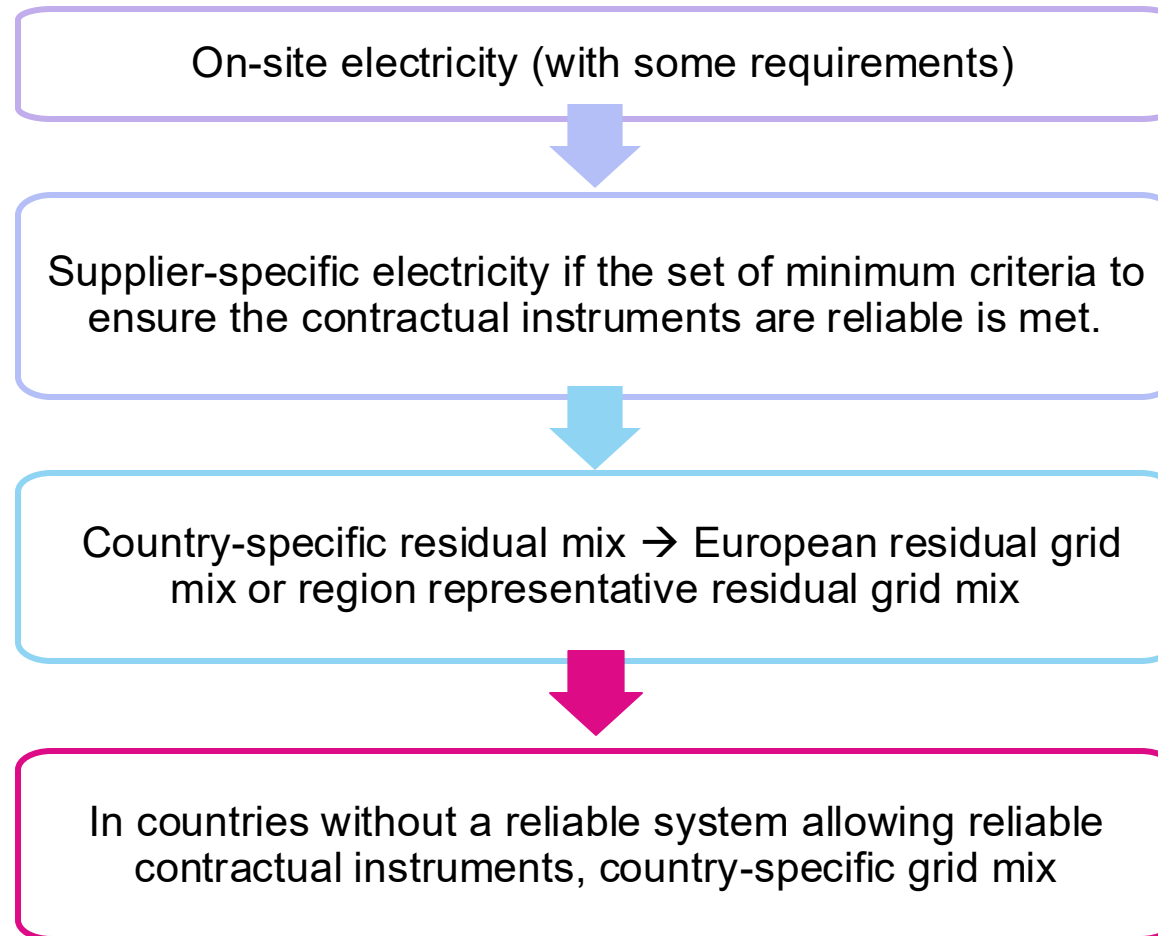
Variability: Sensitivity analysis of parameters (e.g., lifetime extension)

4 – Electricity modelling



1. Current approach in EF methods

Current hierarchy

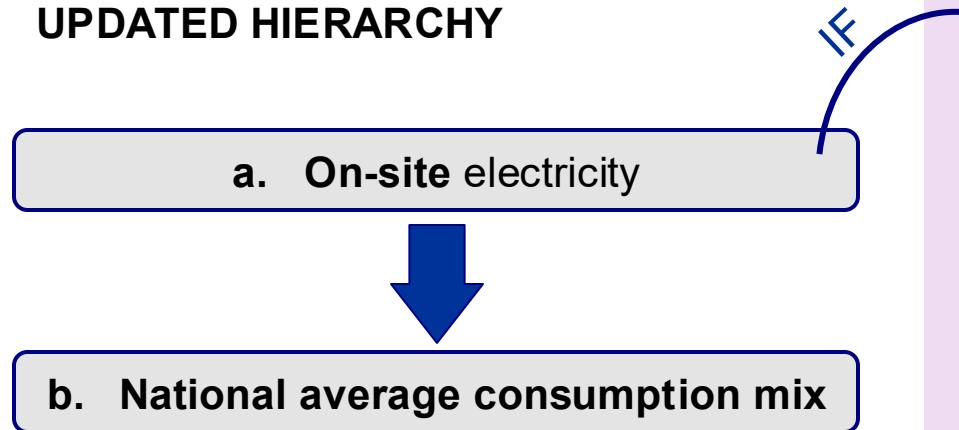


2. Issues and main developments

- There is a **fragmentation** in EU legislation, where different policies use divergent methods implementing both location-based (i.e., average consumption mix) and/or market-based (relying on contractual instruments, with or without the residual grid mix) approaches.
- It was found difficult to verify the **reliability** of market-based instruments outside the EU,
- **Stricter criteria** for the contractual instruments have been proposed, e.g., monthly/hourly time-matching, minimum price thresholds, and exclusion of older plants.
- The **European average grid mix** was discussed to be used as default. However, most EF stakeholders argue this discourages low-carbon investments and flattens regional differences, contradicting the promotion of best practices through LCA.

3. Way forward

UPDATED HIERARCHY



- The on-site electricity is supplied from a production asset **within the same facility**.
- If the plant also draws power from the grid → the claimable on-site amount equals annual production minus electricity injected and sold to the grid.
- Electricity sold to a third party → national average consumption mix
- **Excess electricity sold to the grid:**
 - PEF studies: no credit unless it brings a relevant source of revenue to the product under study (→ by-product)
 - OEF studies: modelled either as in the PEF or added to the product portfolio.

❑ The electricity modelling shall include both direct and indirect emissions.

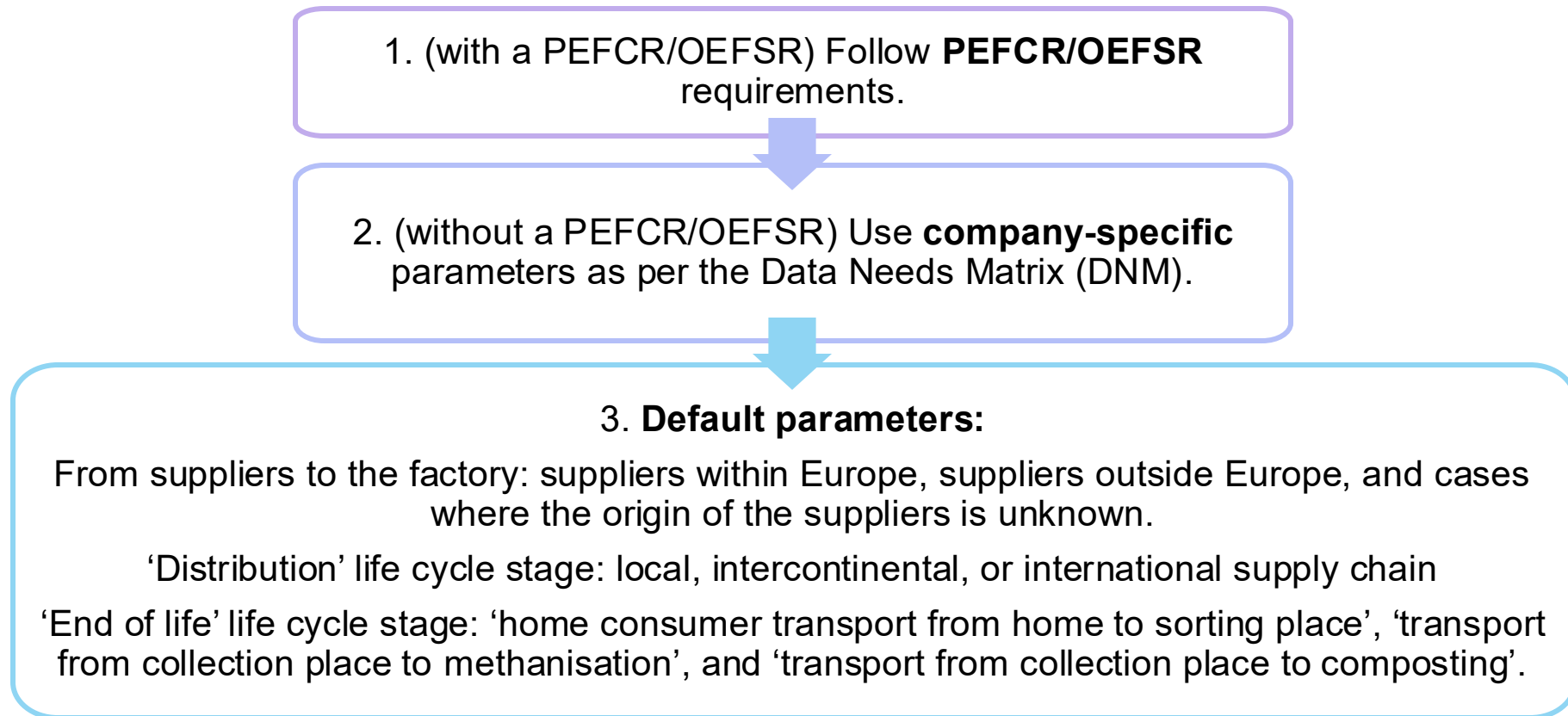
Note: Where relevant European legislation and related frameworks provide guidance on modelling electricity consumption for a specific product, process, or sector, those requirements shall apply in that context (e.g., EU consumption mix instead of the national average consumption mix; permission to use certain types of Power Purchase Agreements (PPAs))

5 – Transport modelling



1. Current approach in EF methods

To model transport processes, several parameters are to be considered: **transport distances**, **transport type** (e.g. by land (truck, rail, pipe), water (boat, ferry, barge), or air (airplane)), vehicle type, loading rate, and number of empty returns.



2. Issues and main developments

- The current text may be perceived as **discriminatory towards non-EU countries**, as it applies different default factors to EU and non-EU countries
- The current text does not clearly define **local, intercontinental, and international supply chains** and leaves open how to choose between transport by plane or ship in the default transport scenario
- There is a need to **update the default transport distances and means of transport**
- The tool mentioned in the current EF methods to calculate distances (i.e., “[Searates](#)”) has limited free access
- The suggested conservative values (i.e., 1 000 km by truck + 10 000 km by plane) in case the distance is unknown were criticised because this would cause transport to be a recurring hotspot
- Capital city is not always the largest population centre

3. Way forward

1. (with a PEFCR/OEFSR) Follow **PEFCR/OEFSR** requirements.

2. (without a PEFCR/OEFSR) Use **company-specific** parameters as per the Data Needs Matrix (DNM).

4. In case the company-specific **distance** is not known:
- If the place of origin and/or destination are known → use distance calculator(s).
 - Selecting the longest route if multiple exist
 - Add 1 000 km (100 km in the EoL*) by truck if the distance calculator(s) does not include the road transport from the harbour/airport and if may not estimated
 - Use capital cities (in different countries) or maximal distance (if in the same country).
 - Market or statistical data for the specific product category.

3. In case the company-specific **type of transport** is not known → use market or statistical data for the specific product category.

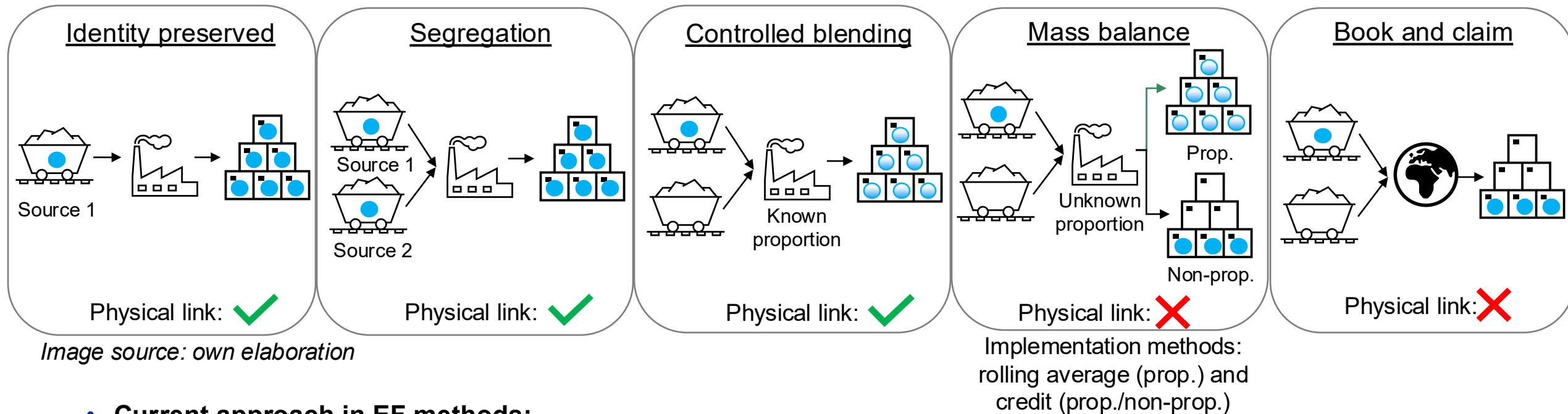
5. **No information:** 1 000 km by truck (only 100 km in the EoL*) + 10 000 km by plane (in general)
Note: This default worst-case scenario is unlikely to be used frequently in EF studies and should serve as an incentive to use better information.

6 – Chain of Custody approaches



1. Current approach in EF methods

- **Chain of Custody (ISO 22095:2020):** five models to transfer, monitor and control information on inputs and outputs with **specified characteristics** (e.g. recycled content) in the supply chain



- **Current approach in EF methods:**

- product and process specific flows are requested, as far as possible;
- Identity preserved, Segregation and Controlled blending aligned with EF requirements;
- Mass balance and Book and claim perceived as not suitable, although some approaches* in current EF methods may resemble these models

2. Issues and main developments

- Discussion with experts of EF TAB on 7 October '25 focused on Mass balance model
- Analysis of ISO standards*, technical studies** and feedback from experts of EF TAB
- Criticalities of Mass balance and Book and claim against EF requirements:

Mass balance – rolling average
<ul style="list-style-type: none">• The physical link between inputs with specified characteristics and outputs may not be real for all products• Not ensured that inputs with specified characteristics are physically present for all outputs

Mass balance - credit
<ul style="list-style-type: none">• Same criticalities of rolling average are amplified by:• Non-proportional attribution of credits (high risk of greenwashing)• Transfer of credits (among periods and sites) when not linked to physical transfer

Book and claim
<ul style="list-style-type: none">• Trading credits can be irrespective of the physical connection (among organizations) with materials and products (high risk of greenwashing)

Increasing disconnection from physical flows

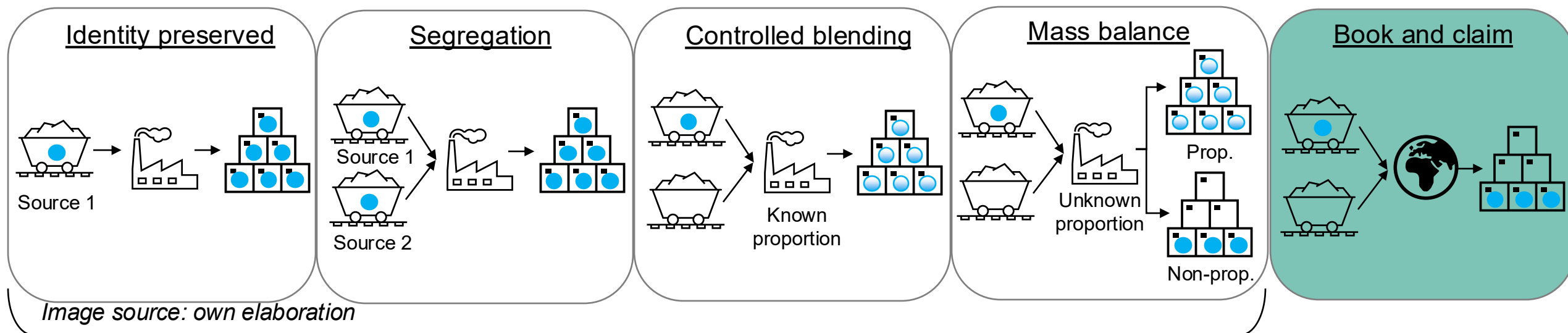
*ISO 22095:2020, ISO/FDIS 13662:2025

**Pierri et al., 2025 (work in progress), Hann et al (2022), EU policies (Regulation (EU) 2025/40, Directive (EU) 2018/2001, draft Commission Implementing Decision (EU) 2025 on laying down rules for the application of Directive (EU) 2019/904 of the European Parliament and of the Council)



3. Way forward

Applicability of CoC models in EF methods



are allowed in EF methods

(when additional **modelling** and **reporting requirements**** are met), to ensure:

- consistency with EF requirements on process and product representativeness and
- transparency in communication among actors of the supply chain and with consumer

shall not be used*
in EF methods

**unless explicitly permitted by requirements of the EF (e.g. related to electricity modelling), EU legislations or PEFCRs/OEFSRs (in this case, when justified and agreed with the European Commission). **the same requirements apply to all actors of the supply chain*



3. Way forward

Applicability of Mass balance in EF methods

Hierarchical approach for implementation methods:

- A **rolling average-based method*** **SHOULD** be applied by default;
- A **proportional credit-based method*** **MAY** be applied;
- A **non-proportional credit-based method*** **SHALL NOT** be applied unless PEFCRs/OEFSRs or specific legislative applications allow for it.

Depending on the versions of rolling average and proportional credit-based implementation methods (due to modelling requirements on boundaries), a slight different hierarchy shall be preferred among the two implementation methods.



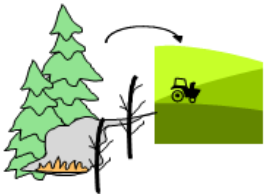
7 – Biogenic carbon modelling and GHG accounting



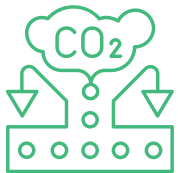
1. Current approach in EF methods



- **In term of LCI**, the plant CO₂ uptake and biogenic CO₂ emissions shall be modelled but a simplified approach is allowed in e.g., food PEF studies.
- **In terms of LCIA**, they are characterised with a characterisation factor (CF) **equal to 0**, while biogenic emissions of CH₄ are assessed with a reduced CF compared to fossil emissions of CH₄.



- **Land use change** emissions shall be modelled based on the PAS2050.



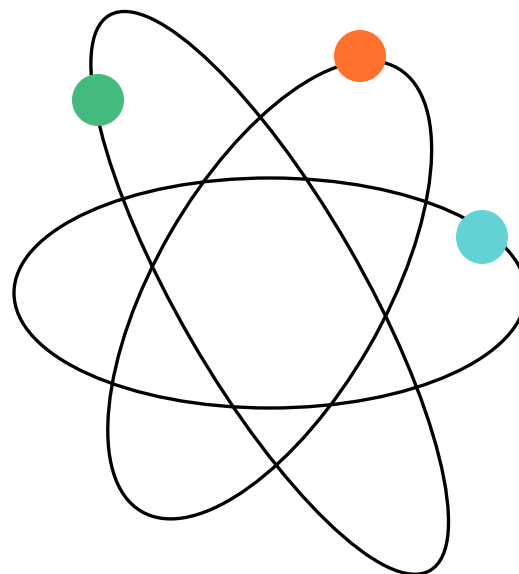
- **No removals** allowed: Removals due to storage of biogenic carbon, soil carbon uptake from improved land management, or other carbon removals shall not be modelled in the climate change but may be included as additional environmental information.

2. Issues and main developments

Many **parallel initiatives** are (still) ongoing, including:

- the EU Carbon Removal Certification Framework (CRCF) working groups
- the GHG Protocol Land Sector and Removals (LSRS) Guidance
- the review of ISO-GHG Protocol and ISO14064 for GHG accounting of products and organisations, respectively.
- the Biogenic Carbon Project within the Life Cycle Initiative hosted by UNEP

Ongoing debate about in terms of **which reference land** should be chosen and difference between anthropogenic/non-anthropogenic emissions.



Long process. Discussion started in 2022.

Difficult to find consensus. Stakeholders had very different perspectives, especially related to the assumption of the **climate neutrality** of biomass and the way of including and modelling **temporal dynamics**.

3. Way forward

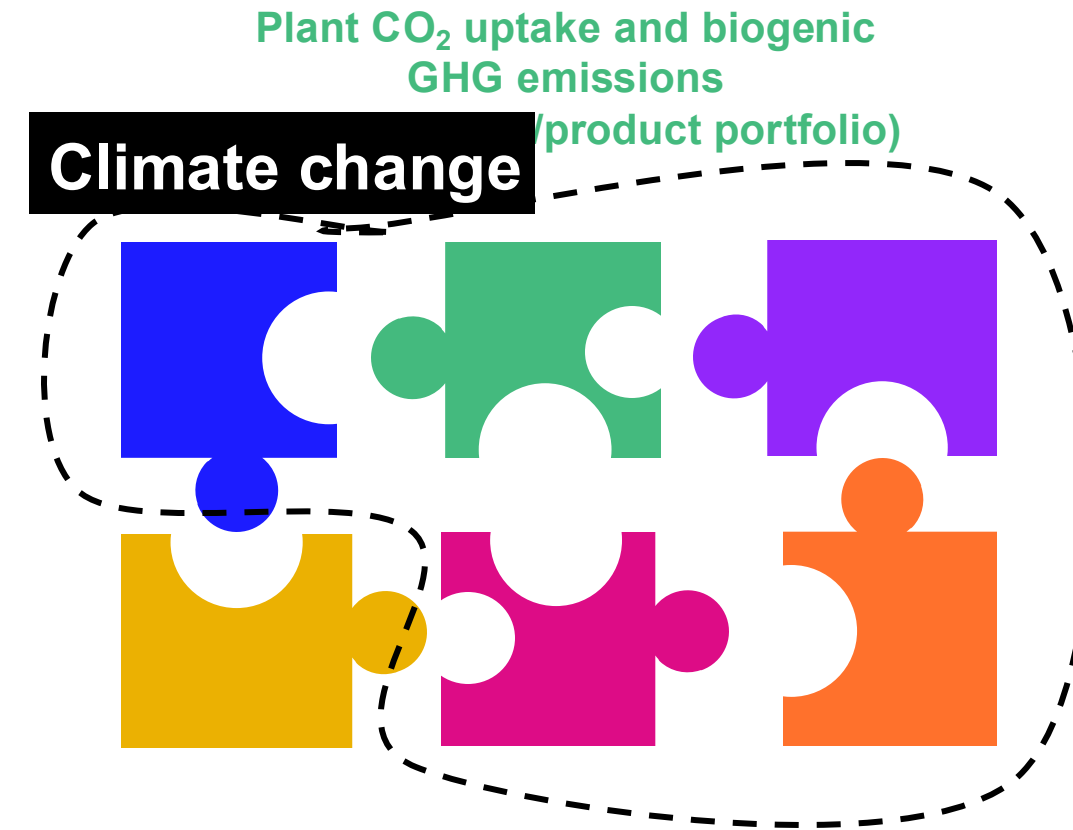
Classification

Fossil GHG emissions

- Includes fossil fuels, calcination, peat combustion and decomposition.

GHG emissions due to indirect land use change (iLUC) and carbon opportunity cost (COC)

- May be modelled as elementary flows
- May be included as **additional information**



Net removals

- Only based on **CRCF methodologies**: net removal → CRCF methodologies to be adapted in the EF
- e.g., DACCS, BECCS, carbon farming, temporary product carbon storage
- Added CCS capturing fossil CO₂ as permanent removal

CO₂ from direct air capture (DAC) and DAC-derived GHG emissions

- For simplification, modelled as plant CO₂ uptake and biogenic GHG emissions

GHG emissions dLUC/sLUC

- Hierarchy depending on data:
 1. dLUC based on data from the land where the product is sourced
 2. dLUC based on spatial data for a given jurisdiction
 3. sLUC – more detailed guidance on how to calculate sLUC

- **Linear discounting** over 20 years
- Should include conversions of forests, grasslands, and wetlands

+ GHG emissions land management

- If the carbon stock changes result in positive results

3. Way forward

Plant CO₂ uptake and biogenic CO₂ emissions + wood products

LCI (Plant CO₂ uptake and biogenic GHG emissions)

4 types of GHG flows shall be quantified **based on the biogenic carbon content** of the reference flow / product portfolio

- a. Plant CO₂ uptake into biomass
- b. GHG biogenic emissions
- c. Transfers of biogenic carbon into a subsequent product systems (e.g., during recycling or carbon utilisation)
- d. Transfer of biogenic carbon from previous product system (e.g., recycled material)

LCIA (CF)

- a. -1
- b. +1 (CO₂) ; + 29.8 (CH₄)
- c. +1 (CO₂) ; + 29.8 (CH₄)
- d. -1

- Clarified when biogenic carbon flows may be excluded from LCIs
- These flows should not be included in secondary datasets
- Other plant CO₂ uptakes and biogenic CO₂ emissions should not be modelled in the LCI (CH₄ always included) → 0/0 approach
- Suggested **simplification for CH₄ emissions in EoL waste management processes** to avoid correcting secondary datasets
- **Landfilling** → landfilled carbon has an infinite timeframe

WOOD PRODUCTS

1. Wood products from **primary and naturally regenerating forest**? → 0/+1 (for all carbon stock changes)
2. Otherwise, forest **carbon stock** is decreasing? → 0/+1 calculated over the carbon content in the reference flow
3. Forest carbon stock stable or increasing or post-consumer wood waste? → -1/+1

3. Way forward

Other requirements

Carbon content (*biogenic, fossil or DAC-derived*)

Carbon content (biogenic, fossil or DAC-derived) in the reference product and in the packaging shall be declared as additional information (both intermediate and finale).

Land flows:

- **Land occupation** elementary flows shall be modelled with a minimum disaggregation.
- **Land transformation** elementary flows shall be consistent with how the land use change is modelled.

Cradle-to-gate EF studies

- Shall be accompanied by a statement clearly indicating that obtained results are partial
- Shall be accompanied with a sensitivity analysis including use and EoL life cycle stages.

Interpretation

- Hotspot analysis shall be carried out both including and excluding the plant CO₂ uptake, the biogenic CO₂ emissions, and the carbon transfers.
- If net removals are included, a sensitivity analysis without the net removals shall be calculated.

8 – Resource use impact categories



1. Current approach in EF methods

The ADP methods (based on van Oers et al., 2002) have been recommended in the EF methods for the resource use impact categories:

Resource use, minerals and metals

- Resources **valued by humans for their functions**
 - The **potential decrease of accessibility** on a long-term
 - The function of **accessible stock** considers the environment and annual extraction

Resource use, fossils

- All resources have the same **function as 'energy carriers'** and are **mutually substitutable**
- The **stock of fossil fuels** is formed by the total amount of fossil fuels in Megajoules (MJ)
- **Uranium energy content** of 544.284 MJ/kg (Sala et al., 2019)

2. Issues and main developments

Resource use, minerals and metals

- The current name of the impact category can mislead interpretation of the impact.
- The transition from 'resource depletion' to 'dissipation' model was explored.
- The list of elements is limited and not reflecting current developments in the literature.
- Alternative approaches to calculate CFs were explored with extensive testing:
 - P/R versus P/R^2 characterization model
 - Long-term versus short-term perspective

Resource use, fossils

- The current name of this impact category can mislead interpretation of the impact.
 - The allocation of uranium under non-renewable energy versus elements stirred debate.
- The evolution of technologies for nuclear energy and the uranium energy content was debated.
 - This aspect is not influencing the LCIA method, while it is relevant at the level of LCI
- Experts were divided on including or not the use of non-renewable biomass (e.g., primary forest)



3. Way forward

“Extraction of abiotic primary resources (elements)”

- The category is renamed as **“Extraction of abiotic primary resources (elements)”** to reflect the focus on “extraction” rather than “depletion”.
- The approach of the **“ADP-elements”** is still preferred.
- The **long-term scope is kept**, while the **short-term** can be used for sensitivity analysis.
- Data used for characterization are based on cumulative extraction.
 - Additional information on **mineral configurations** is recommended (based on MFA, non-characterised).

“Non-renewable energy use“

- This category is renamed as **“Non-renewable energy use“**.
 - **Uranium is kept** within the “Non-renewable energy use” impact category.
- The **energy content** of uranium is slightly revised (i.e. 560,000 MJ/kg) to align to literature. This should be considered at LCI level.
 - The inclusion of **non-renewable biomass** is recommended.
- Different types of non-renewable energy **contributors** may also be shown **separately**, to improve interpretation.



9 – Land use impacts, biodiversity issues and modelling of agricultural practices



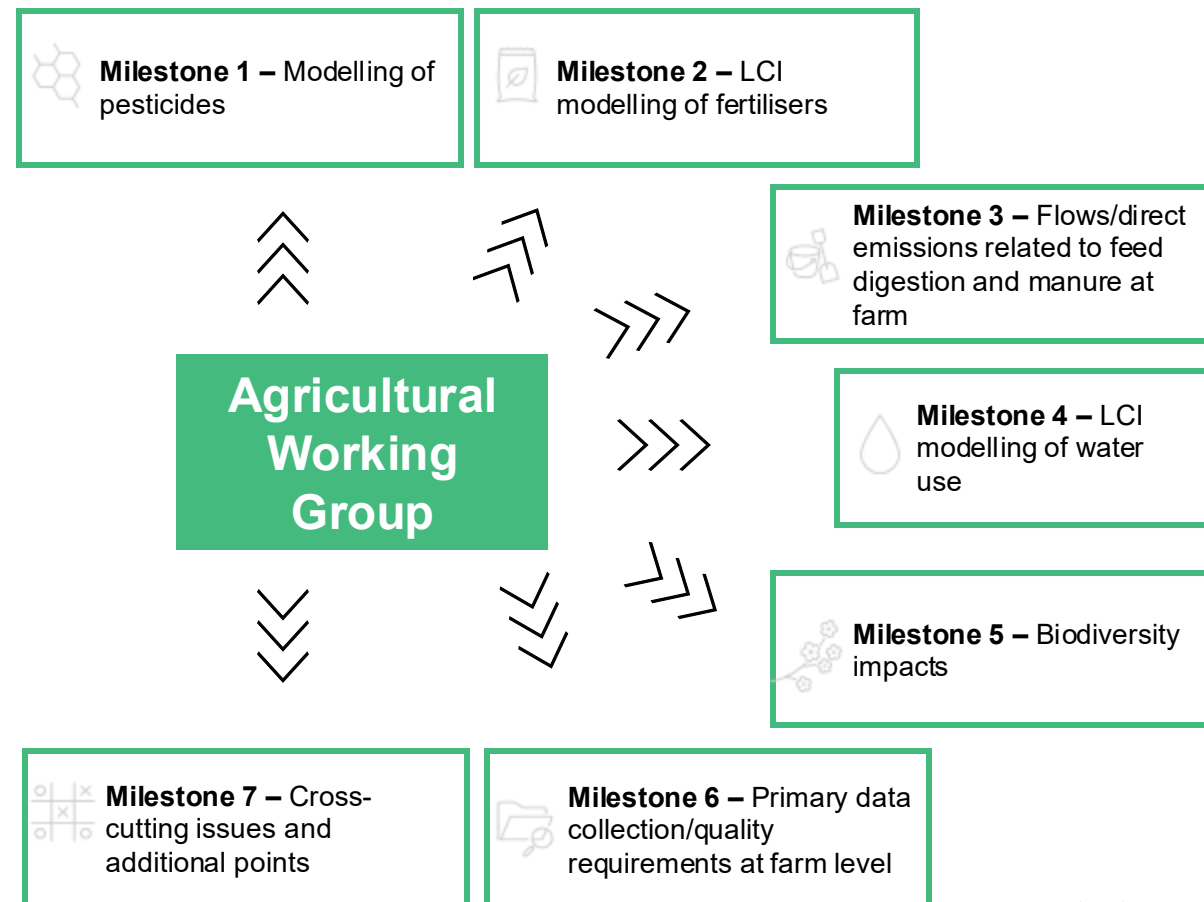
1. Current approach in EF methods

The EF 3.1 version of the methods addresses some relevant elements of agricultural practices, although presents some limitations:

- Covers **the modelling of agricultural production inputs** (e.g., fertilisers, pesticides) and associated impacts, but the **approach is not sufficiently accurate for certain aspects** (e.g., modelling of fertilisers emissions during application)
- Covers **impacts on soil quality** due to land occupation and transformation (based on the LANCA model, considering erosion resistance, mechanical filtration, biotic production and groundwater regeneration), but **does not integrate soil organic carbon**
- Covers **some drivers of biodiversity loss** (e.g., climate change, soil quality, pollution), but does **not integrate direct impacts to biodiversity due to land use**
- Furthermore, EF methods **do not address other specificities of conventional and organic farming**

2. Issues and main developments

- Revise the current land use impact category to also account for Soil Organic Carbon (SOC)
- Include a new impact category for assessing the impacts on biodiversity due to land use activities
- Enhance the modelling of **pesticides, fertilisers, and manure management**
- Set the ground for the potential modelling, assessment and reporting of impacts at a more **granular level**
- Revise the **integration** approach and identify relevant (additional) **information** (#12)
- Revise the modelling of **toxicity impacts** associated to the use of pesticides (#10)
- Revise the temporal and geographical resolution of the modelling of **impacts due to water use** (#12)



3. Way forward

Agricultural modelling

Pesticides

- **OLCA-PEST model** for pesticides emissions in the field
- LCI modelling guidance for the cases where the **composition of pesticides** is unknown



Fertilizers

- Both **Tier-1 and Tier-2 approaches** are allowed – e.g. advanced methodologies as Tier-2, like the IPCC 2019 guidelines for nitrous oxide emissions and the use of the N-balance method for nitrate leaching
- For PEFCR, only Tier-2 approaches are recommended
- Specifically for manure: refinement in the modelling of heavy metals emissions from manure application (#10)

3. Way forward

Land use-related impacts

Land use - soil

- Revision of the Soil Quality Index
 - Updates of the LANCA model
- Replacement of the 'biotic production' indicator of the SQL with the new indicator on Soil Organic Carbon (SOC)
- Further work: potential revision of regeneration times used to calculate CFs linked to land transformation in alignment with GLAM

Land use - biodiversity

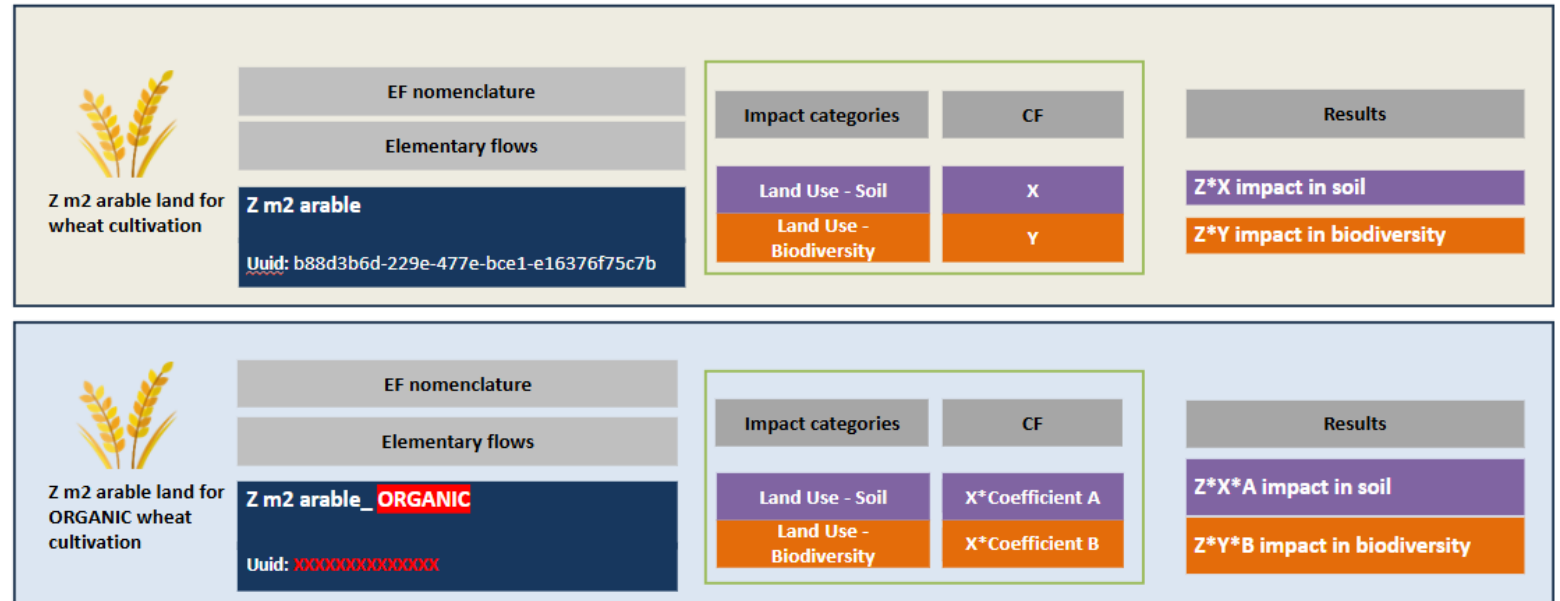
- BioMAPS impact assessment model
- Biodiversity loss due to land occupation and transformation



3. Way forward

Agricultural practices

- Inclusion of new land use elementary flows to model organic farming
- Adapted characterisation factors based on evidence-based data (metanalyses from the JRC evidence library)
- Derivation of scaling coefficients considering benefits of organic farming on:
 - Soil organic carbon (land use – soil)
 - Species richness and abundance (Land use – biodiversity)



10 - Handling toxicity and chemical safety aspects (SoC)



1. Current approach in EF methods

- **USEtox**® considers only the potential toxicological (HTOX C and HTOX NC) and ecotoxicological (ECOTOX) impacts related to the **indirect exposure of chemicals emitted along the life cycle of products**. Characterization Factors (CFs) are provided for chemical emissions with toxic effects, *i.e. for the elementary flows emitted in the different environmental compartments (air, soil and water)*
- In the **current EF 3.1 reference package**, the EC-JRC adapted the USEtox 2.1 model to address limitations associated to its robustness and uncertainty, including **new data sources from EU policy and data curation**, new toxicological effect data for the ecotoxicity and the introduction of **robustness factor** to mitigate the dominance of metals in the overall toxicity contribution (*Saouter et al., 2018; Sala et al., 2022; Andreasi Bassi et al., 2023*)
- Some **methodological limitations** remained, for example:
 - the direct chemical exposure is not covered
 - the terrestrial ecotoxicological impact is not considered
 - the estimation of the fate factors (FFs) for both organic and inorganic substances are based on an infinite time horizon

2. Issues and main developments

Toxicity impacts

- Concerns about the **higher scores in Human toxicity impact categories for organic agrifood products** when compared to conventional ones
- Specifically, for the **contribution of the Heavy Metals (HMs) to the overall human toxicity impact** as consequence of manure application on soil



Source: <http://ipelc.org/>

- JRC carried out different tests to understand better the role of HMs in human toxicity impacts, focussing on manure application for the different agricultural practices
- Based on the obtained results, JRC conceived a two-stage approach to address these concerns

2. Issues and main developments

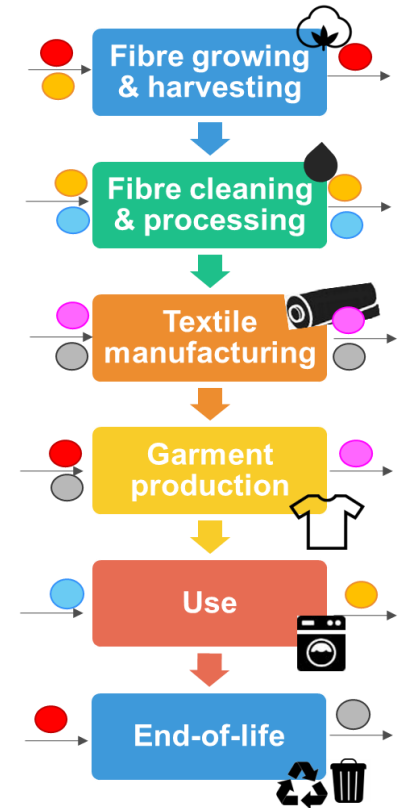
Safety aspects

Currently, in EF studies:

- Neither datasets nor the CFs are requested or are currently available to consider direct toxicological impact
- Information about the hazards of chemicals that are contained in products or used as input in processes that ultimately may constitute (part of) the product are not requested
- Similarly, such information is not directly available for the elementary flows characterised in the LCIA step, either for background or foreground processes

Contradicting results have been observed when chemicals are ranked based on their available CFs (which embed the fate, exposure and toxicological properties) compared to their hazard classification or associated risk

The integration of **qualitative safety information**, e.g., presence of the chemicals listed in specific regulatory list or their hazard classification, can partially address this gap



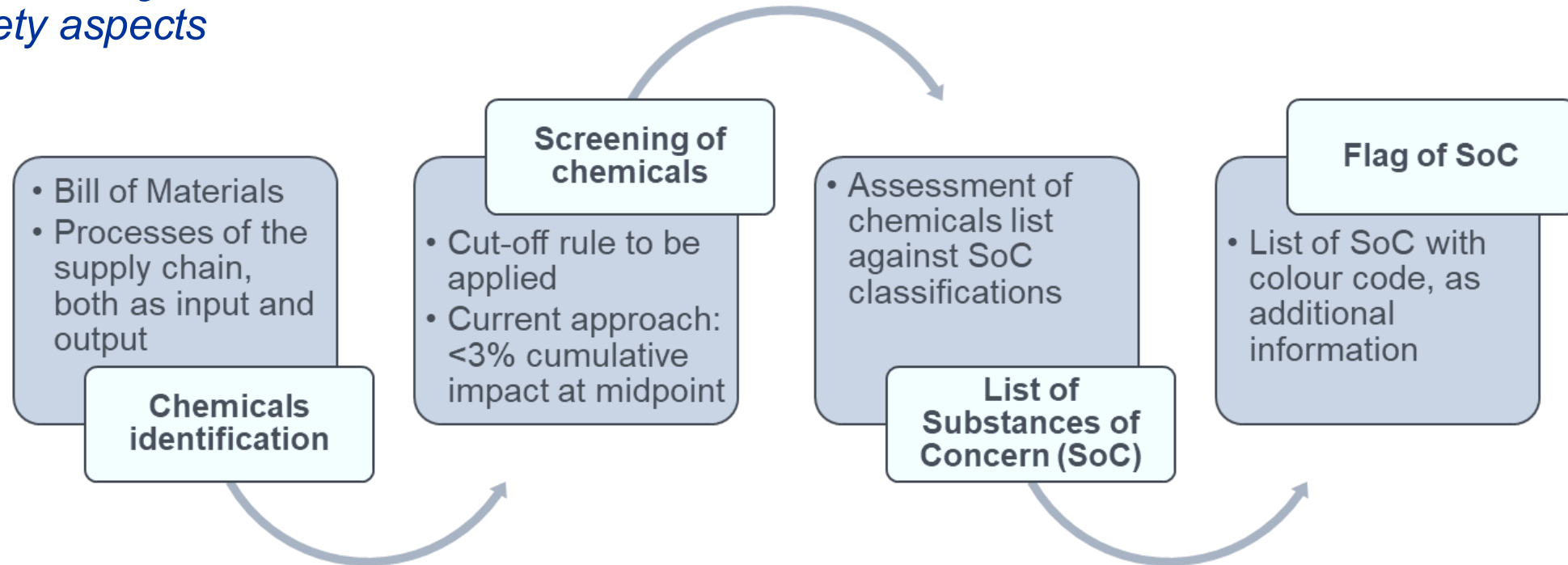
3. Way forward

Toxicity impacts

1. Introduce a **mandatory sensitivity analysis**, where **virtual negative flows** are introduced to subtract HMs emissions from manure for all agricultural practices (i.e. both conventional and organic) in foreground system only
2. Towards the creation of the EF4.0 reference package to accompany the EF Recommendation review, the JRC will conduct **further testing and consider the possibility of updating CFs**:
 - New extrapolation factors for the ECOTOX impact category (for all type of substances)
 - New fate factors, based on time horizon of 100 years (limited to HMs)
 - Correction of proxy derivation rules for specific group of chemicals (including CFs of chlorides, which has been strongly downsized)
 - Adoption of ToxValDB (EPA, 2025) as data source to include the new CFs for 23 Perfluoroalkyl substances (PFAS)

3. Way forward

Safety aspects



Criteria	<u>SoCa</u> / H1	<u>SoCb</u> / H1 + H2	H3	SoCc
Regulatory List	SVHC (Candidate List REACH) Hazard classes (Annex VI - CLP)	Hazard classes (Annex VI - CLP)	Hazard classes (Annex VI - CLP)	POP (Annex I-III POP Regulation)
ESPR Art 2(27)	●	●		●
<u>SSbD</u> H - criteria	●	●	●	

11 – Microplastics and microfibers impacts



1. Current approach in EF methods

- Microplastics (MPs) are associated with **long-term persistence** in the environment, if released, and **high resistant to (bio)degradation**. They are grouped in:
 - primary microplastics, i.e. intentionally added microplastics to products that are progressively released during the life cycle (e.g. pellets)
 - secondary microplastics, i.e. generated from the wear of larger items (e.g. textile fiber fragments)
- The European Chemicals Agency (ECHA) has limited through **specific restriction** (*COMMISSION REGULATION (EU) 2023/2055*) synthetic polymer microparticles added in products because of concern on persistence and on human health and environment
- Currently, the environmental effects of microplastics are not accounted for in the EF methods

In this work we refer to primary and secondary:

- MPs as synthetic polymer microparticles (≤ 5 mm) and
- microfibers (MFs) as fiber fragments of natural and synthetic origins (≤ 5 mm)*



2. Issues and main developments

PEFCRs addressing MPs and MFs

- Synthetic turf sports and landscapes (ESTC, 2024)*: total mass of microplastics and microfibers lost in the environment (as minimum metric to be displayed)
- Apparel and footwear (TS, 2025)**: characterized results using Saadi et al. (2025)*** method (MarILCA)

Discussion with experts of EF TAB on 7 October '25

- Life Cycle Inventory (LCI): accounting guidelines and default values (when primary data are not available) to estimate MPs and MFs emissions at the foreground along the life cycle of any product
- Life Cycle Impact Assessment (LCIA): impact category “Physical effects on biota” following Saadi et al. (2026, expected), most comprehensive available LCIA method, based on USEtox framework and aligned with GLAM recommendations

Concerns from EF TAB experts

- Novelty of the category, limited testing and unavailable public documentation
- Absence of chemical toxicity of additives in MPs/MFs and of effects on human health
- Missing coverage of emission sources from agricultural sector and from the mechanical recycling
- Suggested renaming of the category in “Physical effects of microplastics and microfibers on biota”

70 *EMEA Synthetic Turf Council (ESTC), 2024, https://www.estc.info/wp-content/uploads/2024/05/PEFCR-Synthetic-Turf_Ver.01-2024-05-20.pdf

**Technical Secretariat of the Product Environmental Footprint Category Rules (PEFCR), 2025, <https://pefapparelfootwear.eu/>

*** Saadi et al., 2025, <https://doi.org/10.1016/j.jclepro.2025.146037>



3. Way forward

Scope

- **Category renamed:** «Physical effects of microplastics and microfibers on biota»
- **Flexibility in application:** mandatory assessment for relevant product groups* in environmental claims and other relevant applications, additional environmental information for other applications
- **Level of application:** foreground only

LCI

- **Update** of accounting guidelines and default secondary data to include emissions from agricultural sector** and mechanical recycling of plastics – further refinement for EF Recommendation
- **New model for fragmentation** of macroplastics in MPs (Tang and Boulay, 2025, submitted)
- **JRC technical report** will detail LCI modelling guidelines and default secondary data

LCIA (Saadi et al. 2026, expected)

- **Fate:** regionalized flows, emissions compartments adapted from USEtox
- **Effects:** assessed fraction of affected species (PAF) on 3 ecosystems (freshwater, marine, terrestrial)
- **Unit of measure:** PAF * d (adapted from USEtox since more compartments are aggregated)
- **Time-horizon:** 100 years CFs (as default), infinite CFs (for sensitivity analysis)

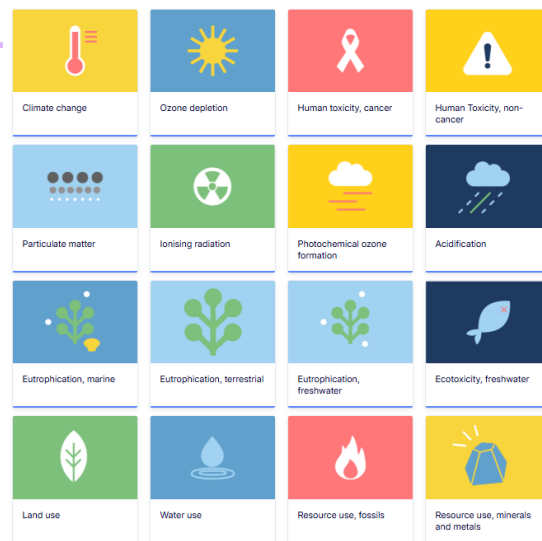
12 – Integrated environmental assessment



1. Current approach in EF methods

EF impact categories

- 16 impact categories (shall): EF 3.1 version
- Normalisation + Weighting (with robustness factors) = single score (shall, for communication)



Additional information

- Additional information may be provided, including either environmental or technical information
- No overlapping with EF impact categories
- Environmental information: biodiversity impacts (shall) + e.g. Offsets, noise impacts (may)
- Technical information, e.g. Bill of materials
- For intermediate products (shall): biogenic carbon content, R1, CFF sensitivity (A values)

2. Issues and main developments

EF impact categories

- Proposed updates: climate change, land use-soil, freshwater ecotoxicity, non-renewable energy use, and water use
- Two new impact categories: land use-biodiversity, and physical effects of microplastics and microfibres on biota
- Exploring alignment of normalisation inventory with GLAM
 - Criticism to weighting set

Additional information

- Specific work on fish stock depletion and seabed impacts with experts
 - Possibility to link LCA results with ecosystem services and natural capital accounting
 - Flagging of substances of concern
 - Mineral configurations
- Other additional information discussed with TAB, e.g. circularity

3. Way forward

EF impact categories

- Set of 18 EF impact categories
- Updated normalisation inventory for 2022
(further work expected on toxicity, ionising radiation and microplastics)
- Updated weighting set to integrate new impact categories and considering the role of the three different areas of protection (in alignment with GLAM) *(further work expected on microplastics)*
- Possibility for integration with non-LCA
 - Adapted single score (PEFCRs, #17)

Additional information

- No distinction between environmental and technical
- Shall – e.g., biogenic, fossil and direct air capture (DAC)-derived carbon content; R1
 - May – e.g. indirect land use change (iLUC), noise impacts, mineral configurations, substances of concern
- No inclusion of sensitivity analyses as additional info*
- Additional information may be added in the EF-compliant dataset

13 - Product category and sectorial rules



1. Current approach in EF methods

- **PEFCR – Product Environmental Footprint Category Rules** >> Set out in Annex I & II of the EF Method (objective, approach, templates)
- **OEFSR – Organisation Environmental Footprint Sector Rules** >> Same structure as PEFCR, detailed in Annex III & IV

Phase	Years	What was delivered
Pilot	2013–2019	19 PEFCRs + 2 OEFSRs
Transition	2020–2022	4 new PEFCRs (A&F; flowers; marine fish; synthetic turf) 6 updates of existing rules (others non-updated considered obsolete)
Current / Ongoing	2023–present	Official work on 3 new sectors:• Touristic services• Space activities• Aircraft, drones + “Shadow PEFCRs” developed by private actors

- All existing and in-progress PEFCR/OEFSR were considered for the **revision of the EF methods**

2. Issues and main developments

General burdens		Target through EF methods review
Too expensive (up to ~EUR 1M cost)		Reduce costs
Long developments (up to 5 years development time)		At least halve timeline
High procedural/document complexity		Streamlined procedures + more flexibility
General issue	Topic	Summary
Comparative assertation among products	1. Umbrella PEFCRs	<ul style="list-style-type: none"> • Robust governance. • Allow cross-comparability between product categories and provide common rules.
Development	2. Development and update	<ul style="list-style-type: none"> • Definition of the phases • Clarify how and when to update of PEFCRs
Complexity and length of procedures	3. Information required and outputs of PEFCRs	<ul style="list-style-type: none"> • Data requirements • Representative (and reference) products • Supporting studies • Benchmarks and classes
	4. Communication and EF based PCRs	<ul style="list-style-type: none"> • Communication chapter • Role of shadow PEFCRs

3. Way forward

Umbrella and Specific PEFCRs

Topic	Summary
1. Umbrella PEFCR	<ul style="list-style-type: none">• Distinction between Umbrella (broad, horizontal rules across clustered sectors) and Specific PEFCRs (vertical, product/sector-specific rules).• Hierarchy of the rules: EF methods --> Umbrella PEFCRs --> specific PEFCRs.• Top-down (to initiate the sector) or bottom-up (by clustering specific PEFCRs) development;• EC can initiate, monitor, and participate to their development.
2. Development process	<ul style="list-style-type: none">• A common 4-phase process applies to both Umbrella and specific PEFCRs: Preparation → 1st draft development → Revision (consultation + review + testing) → Finalisation.• The SG/TAB shall be consulted at the beginning and at the end of the process• Indicative duration: ≤24 months (derogations possible for complex products).• Required outputs include market analysis and summary of supporting studies• After validity expiration, PEFCRs may undergo full update, partial update, or validity extension.

3. Way forward

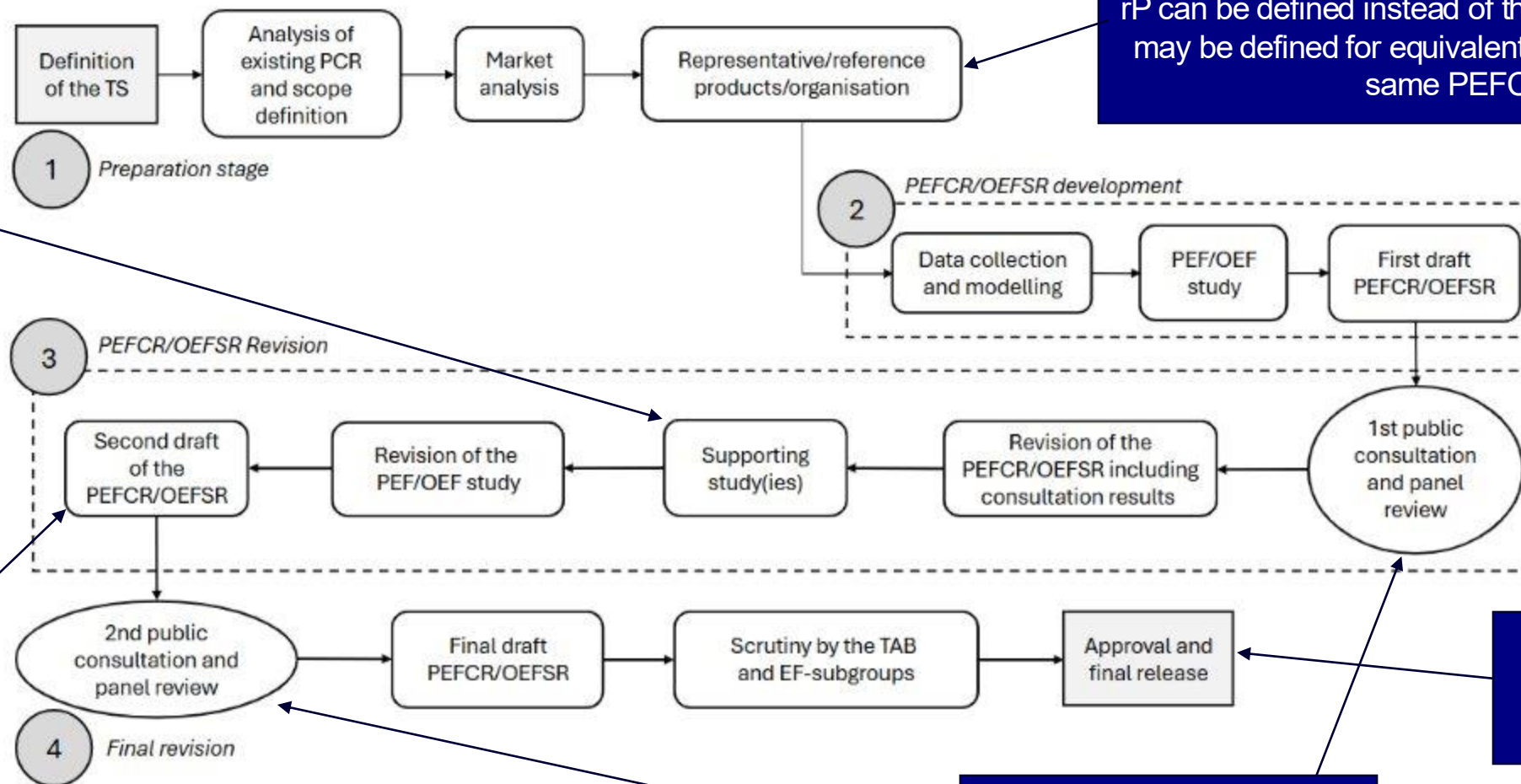
Umbrella and Specific PEFCRs

Topic	Summary
3. Information required and outputs of PEFCRs	<ul style="list-style-type: none">• Representative Product (RP) / reference Products (rP): RP can be defined based on representativeness of the real or virtual product; rP are products that are used for testing purposes (not representative).• Supporting studies: at least one per RP/rP group; a public summary is always requested;• Criteria of the descriptors of the DQR can be added by the TS.• Benchmarks not mandatory in the first version of the PEFCR. They can be calculated based on RP or based on the average rP or EF studies conducted during the PEFCR validity period.• Recommendation can be given by the TS about how to develop Classes.
4. Communication and EF based PCR	<ul style="list-style-type: none">• PEFCRs include communication rules, requiring specifications about LCIA communication (including additional mandatory information).• EF-based PCR (“Shadow PEFCRs”) may be formalised if agreed on the content and after consulting SG/TAB at the beginning and end of the process. They can follow a fast-track procedure (Phase 3–4 of the full development).

3. Way forward

Main changes in the development phase

Estimated PEFCR development cost **for a single product group**: about 250k-580k €
Estimated possible savings: up to 40%
Estimated cost changes: 150k-350k €



rP can be defined instead of the RP. A single RP/rP may be defined for equivalent products under the same PEFCR

A single supporting study is required.

Fast track for 'shadow' PEFCRs

Benchmark not mandatory defined (for the first release).

Validity can be extended after expiration

Consultation and panel review conducted at the same time

14 - Verification of EF studies and review of PEFCRs/OEFSRs



1. Current approach in EF methods

Recommendation (EU) 2021/2279 establishes verification and validation procedures for EF studies and the review of category rules:

- **Verification (of EF studies)** outlined in Chapter 8 and Annex II.A.8: requires independent verification of PEF/OEF studies
- **PEFCR/OEFSR Review** follows Annex II.A.2.9: structured review process for Category/Sector Rules

Issues identified by the members of the TAB

General consensus achieved on the need for **clarification and simplification**

2. Issues and main developments

Topic	Key point
Verification & Validation	EF-compliant calculation tools : independent verification needed
	On-site visits : Needed for the <u>first verification of company-specific data</u>
	Surveillance period (during the validity period): clarification about the requirements
PEFCR Review	Supporting studies : Verification considered an unnecessary cost
	PEFCR validity : clarification about the validity period
	Panel composition : Minimum 3 members: Requirements apply to the team, not to individuals

3. Way forward

Verification and Validation

- **Verification and validation of EF studies:**
 - EF-compliant studies shall be verified, while EF based or for internal uses may not be verified
 - Activity data and datasets are validated requiring a generic revision (through software and tools)
- **EF Calculation Tools:**
 - Must be verified/validated by a verification team
 - Benefit: EF studies using pre-verified tools only require a "light verification"
- **On-Site vs. Remote verification:**
 - On-site verification is mandatory for company-specific data of most-relevant processes. Derogation can be given by PEFCRs
 - Remote verification allowed for "other" background/non-relevant processes
- **Validity Period and follow-up:**
 - 5 years by default. If an update version of the PEFCR is published, the expiration date can be specified by the PEFCR (at least 2 years)
 - Must be updated (Surveillance period or follow-up) if "substantial modifications" occur in the supply chain or technology. The update is agreed with the commissioner of the study



3. Way forward

PEFCR/OEFSR Review/Reporting

Verification team/review panel:

- Verifiers/Reviewers must meet **minimum thresholds** (revised table based on Eynard et al., 2025).
- EF Studies: Can be done by a Single Verifier (if they meet all criteria) **or a team** (idependent/external).
- PEFCRs & Datasets: Must be revised by a **Review Panel**. For PEFCR review panel coordinator, stringent requirements have been added.

Supporting Studies:

- Should be conducted by independent third parties.
- Full verification is not requested. Only a Technical Summary is provided.

PEFCR/OEFSR Validity:

- 5 years by default. Can be extended for stable technologies or reduced for fast-developing ones.

Review reporting:

- The internal exchange between the review panel and the TS are set as confidential “internal” reporting.
- Public reports shall be provided about: i) PEFCR/OEFSR reports (Draft 1, and 2), ii) EF studies (study 1, and 2) of representative/reference products or organisation, iii) Public summary of the supporting study.

15 – Data aspects



1. Current approach in EF methods

EF Recommendation

- The EF recommendation provides prescription to perform EF compliant studies
- **The DNM identifies required data and dataset types** by evaluating the user's level of influence over specific processes also requiring datasets of specific DQR
- The selection of datasets follows a **rigid hierarchy**, mandating official Commission datasets for "core" activities.
- If not available, **ILCD-EL datasets are permitted** as proxies, though their contribution is **strictly capped at 10%** of the final single score of the EF study

Data guide

- The Data Guide provides technical guidance on how to compile EF compliant datasets and develop EF compliant secondary background datasets
- No cap for the use of ILCD-EL datasets

2. Issues and main developments

The existing EF framework faces significant operational complexities

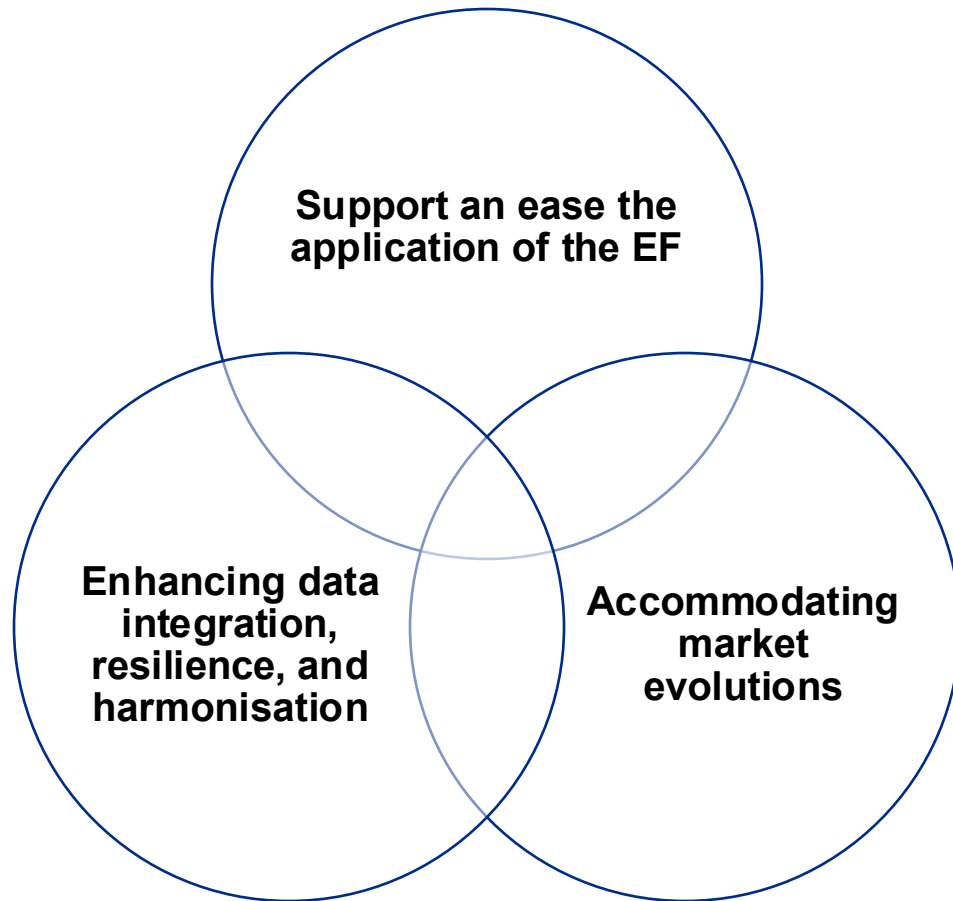
- **Structural rigidities** that hinder its application
- **DNM is fragmented** across annexes 1 and 2, introducing context-specific rules
- Rigidities with the dataset relying on Commission EF core datasets
- **Restricts applicability when core data is missing**
- Lacking integration and harmonisation of data among EF methods and other EU policies.

Situation 1: process run by the company using the PEFCR	Option 1
	Option 2
Situation 2: process <u>not</u> run by the company using the PEFCR but with access to (company-)specific information	Option 1
	Option 2
Situation 3: process <u>not</u> run by the company using the PEFCR and <u>without</u> access to (company-)specific information	Option 1
	Option 2



		Most relevant process	Other process
Situation 1: process run by the company using the PEFCR	Option 1	Provide company-specific data (as requested in the PEFCR) and create a company-specific dataset, in aggregated form (DQR≤1.5) ¹¹⁷ Calculate the DQR values (for each criterion + total)	
	Option 2		Use default secondary dataset in PEFCR, in aggregated form (DQR≤3.0) Use the default DQR values
Situation 2: process <u>not</u> run by the company using the PEFCR but with access to company-specific information	Option 1	Provide company-specific data (as requested in the PEFCR) and create a company-specific dataset, in aggregated form (DQR≤1.5) Calculate the DQR values (for each criterion + total)	
	Option 2	Use company-specific activity data for transport (distance), and substitute the sub-processes used for electricity mix and transport with supply-chain specific EF compliant datasets (DQR≤3.0). Re-evaluate the DQR criteria within the product specific context	
	Option 3		Use company-specific activity data for transport (distance), and substitute the sub-processes used for electricity mix and transport with supply-chain specific EF compliant datasets (DQR≤4.0) Use the default DQR values.
Situation 3: process <u>not</u> run by the company using the PEFCR and <u>without</u> access to company-specific information	Option 1	Use default secondary data set in aggregated form (DQR≤3.0) Re-evaluate the DQR criteria within the product specific context	
	Option 2		Use default secondary data set in aggregated form (DQR≤4.0) Use the default DQR values

3. Way forward



**Streamlining
and unifying
the DNM**

**Promoting
the use of
primary
data**

**Adopt ILCD
compliant datasets**

- *Modelled applying EF modelling requirements but without using core EF datasets*

3. Way forward

The aim is to
accomplish
harmonization

The process

- Streamline
- Update
- de
- There
- EF
- IL
- IL
- The

Data Needs Matrix		
Situation 1 process controlled directly by the user of the EF methods and with access to company-specific data	A standard choice or for most relevant processes	Collect company-specific data and compile a company-specific dataset as prescribed in "Company-specific dataset" section.
	B for other processes in case of PEFCR/OEFSR	Use default secondary datasets as specified in the PEFCR.
Situation 2 process <u>not</u> controlled by the user of the EF methods but with access to company-specific data	A standard choice or for most relevant processes	Collect company-specific data and compile a company-specific dataset as prescribed in "Company-specific dataset" section, or uses company-specific datasets compiled by the supply chain
	B for other processes in case of PEFCR/OEFSR	Use secondary default datasets.
Situation 3 process <u>not</u> controlled by the user of the EF methods and no access to company-specific data		Use secondary datasets (they can be default secondary datasets).

data.



16 - Quality and uncertainty aspects



1. Current approach in EF methods

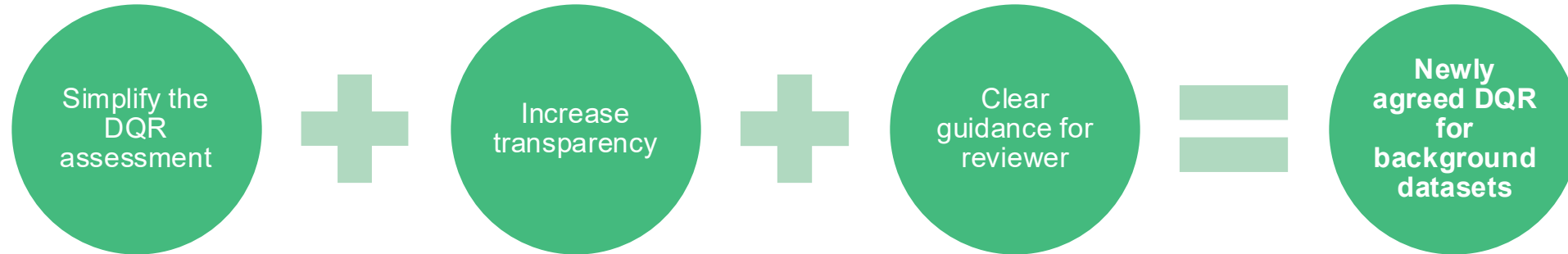
Data Quality Rating

- **The current method is based on four data quality criteria:**
 - Technological Representativeness
 - Geographical Representativeness
 - Time Representativeness
 - Precision
- **Each criterion is assigned a numerical score** from 1 (excellent) to 5 (poor), which are then **averaged to determine the final DQR** score for the dataset

Uncertainty

- **The current recommendation does not explicitly address how to deal with uncertainty.**
- Qualitatively considered in the DQR.

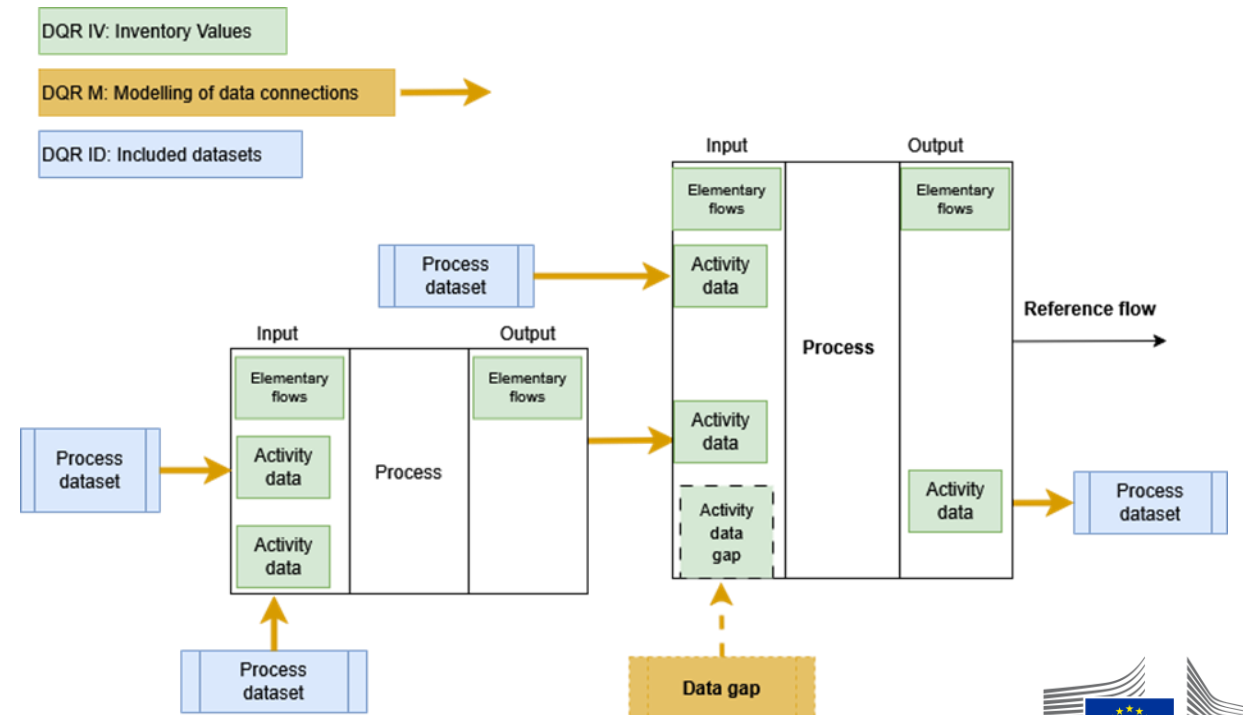
2. Issues and main developments



Based on expert judgment*

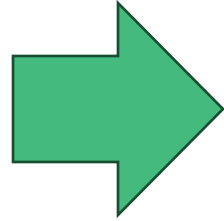
- **3 components:**
 - Quality of inventory values (DQR IV)
 - Quality of included datasets (DQR ID)
 - Quality of the modelling of data connections (DQR M)
- **2 criteria**
 - Precision
 - Representativeness

* **The reviewer has specific guidance (named 'descriptors', Eynard et al., 2025) to evaluate each criterion (P and R) for each component (IV, ID, M). The assessment compares the information available, i.e. the model and its characteristics, with the descriptors which act as standardised guidance on assigning the DQR score**



2. Issues and main developments

Discussions on uncertainty



... and focus of the review

To focus the efforts to address
Stochastic uncertainty

- Multiple sources of uncertainty can be identified in LCA studies
- Currently only qualitatively addressed by DQR
- **TAB feedback clarified a preference towards the needs of uncertainty quantification**
- TAB feedback clarified a **preference against the qualitative derivation of the uncertainty**

- *It refers to the inherent degree of doubt or error associated with the data and models used in the LCA*
- *It can arise from measurement errors, data gaps, model-related inaccuracies or natural variations.*
- *It reflects the random variation of inventory data and is quantified by probability distributions*

3. Way forward

The newly agreed DQR for EF studies

- **Further simplification** focusing only on more important elements of the models.
- Simplification should be **based on hotspot analysis and expert judgement** (referring to relevant KPIs).
- The scores for the components and criteria shall be reported separately.

Sector specific descriptors may be suggested by sectorial users (e.g. by the PEFCR) it contributes to further reduce complexity of DQR assessment by providing sectorial harmonized guidance.

Uncertainty collection

- Improve transparency and fair reporting of EF LCIA values (e.g. in comparative assertion)
- Introduce quantification of uncertainty in LCI
- Focus on stochastic uncertainty prioritizing primary and process specific sources of uncertainty values
- High quality data is when uncertainty is also collected: **DQR IV(P) can be assessed 1 only if uncertainty is reported in the inventory.**

... and reporting

Reporting **results in EF studies** should be accompanied **with a transparent indication of the associated uncertainty range.**

*A comparative assertion **should** be considered robust only if the respective uncertainty can also be compared*

17 – Interpretation and communication



1. Current approach in EF methods

Interpretation is reported in Chapter 6 of Recommendation (EU) 2021/2279.

It is divided in two main parts:

- **Assessment of the robustness** of EF studies (i.e., interpretation): Evaluates the extent to which methodological choices influence the results:
 - Completeness checks
 - Sensitivity checks
 - Consistency checks
- **Identification of hotspots**
 - The user of the EF methods shall identify and list in the EF report the **most relevant impact categories, life-cycle stages, processes, elementary flows**

Communication

- No description about how EF studies may be used for external communication.
- The text defines “**EF communication vehicles**” as all the possible ways that may be used to communicate the results of an EF study to stakeholders.

2. Issues and main developments

- **Hotspot analysis:** The hotspot analysis was deemed a highly laborious activity >> Clarifications needed
- **'Adapted' Single score:** The **definition of the single score** has been criticised, especially for some applications and sectorial rules
 - This calls for the definition of a more flexible approach, depending on specific needs
- **Communication:** A recurring issue is linked to the communication of results. Clarity is required to define:
 - (a) What information shall (mandatory), should (recommended), and may (possible) be included in EF reports
 - **(b) What may be directly used in external communication**

3. Way forward

Hotspot analysis and interpretation

Hotspot analysis

- Where specified in the EF methods or when prescribed in PEFCRs and OEFSRs, **the most relevant life-cycle stages and processes** shall also be identified **in the sensitivity analyses**.
 - The list of most relevant life-cycle stages and processes shall include those identified **both with and without the sensitivity analysis**.
- **Deviation** in the identification of **most relevant impact categories and processes** may be allowed (only in case of PEFCRs/OEFSRs development).

Interpretation

- **The method** followed to implement the sensitivity analysis is reported within the 'Scope' section of the EF report.
- **Mandatory sensitivity analyses** that:
 - **affect a single impact category** will be shown next to the original impact category.
 - **affect all impact categories** are reported separately in LCIA results chapter.
- **Non-mandatory sensitivity analyses** may address additional modelling choices.
 - Results of the non-mandatory sensitivity analyses shall be reported in the 'Interpretation' chapter of the EF report.

3. Way forward

Communication

- **Adapted single score.** During the PEFCRs/OEFCRs development, the TS may suggest an ‘**adapted single score**’ that shall include the adapted list of most relevant impact categories and additional impact categories:
 - It shall be agreed with the EC and it shall be used only for communication purposes
 - Adapted weighting factors shall be provided
- **Communication.** LCIA results, additional information, as well as key results of the hotspots, uncertainty and sensitivity analyses may be used for **communication purposes**.
- **Category rules. PEFCRs/OEFSRs** may provide additional instructions about which EF results and interpretation results are to be communicated and how.

Context	Results to include in the EF report	How results may be used for communication
Without PEFCR/OEFSR	<ul style="list-style-type: none"> • EF LCIA results (characterized, normalized, weighted) for 18 impact categories; 3 AoP; single score • Results of the interpretation phase. • Additional information (mandatory and voluntary elements) 	<ul style="list-style-type: none"> • Single score • 3 AoP • Most relevant impact categories (characterized) • Relevant additional information
With PEFCR/OEFSR	Differently from the section without PEFCR/OEFSR: <ul style="list-style-type: none"> • Most relevant impact categories calculated based on the single score or other value choices. • ‘Adapted single score’, based on most relevant impact categories. 	<ul style="list-style-type: none"> • Single score, or ‘Adapted single score’ • Up to 3 AoP, if relevant • Most relevant impact categories (characterized) • Relevant additional information • Relevant results of sensitivity analysis

Thank you



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