EcoBeautyScore
CONSORTIUM

Eco-Beauty Score (EBS) Consortium

Guiding principles and methodological basis

Version for Public Consultation

Authors: Quantis

Reviewed by EBS Consortium Members

March 2024

Versioning of EBS methodological guidelines for the purpose of the Public Consultation

Date	Version	Updates
March 2024	*V1*	*EBS Guiding principles and methodological basis*

EcoBeautyScore
CONSORTIUM

Table of Contents

1 Purpose of the document

This document aims to compile all the methodological principles associated with the Consortium's framework, including the environmental footprinting and scoring methodological choices as well as the rationale associated to those choices, in order to enable the cosmetic industry stakeholders to review and comment.

This methodology is in a development stage. To validate the operational aspects of the methodology, a testing phase "at scale" (also called *Real Data Testing Phase (RDTP)*) to assess cosmetics products on the market is currently ongoing based on a pilot version of the calculation tool. The results of this testing phase should inform the decisions on the last remaining methodological questions and validate the first version of the Eco Beauty Score (EBS) footprinting and scoring methodology.

The definitions of technical terms are described in section 12-Glossary.

2 Introduction to EcoBeautyScore

In September 2021, recognizing the growing expectations for transparency and sustainability from consumers and regulators, several cosmetic manufacturers have decided to join forces to **enable consumers to make more informed and sustainable choices**.

The EcoBeauty Score Consortium will deliver **a harmonized industry scoring system**, based on the **environmental impact assessment** of the cosmetics products, thus provide a harmonized communication to consumers and encourage enhanced environmental performance of products. It will provide consumers with **clear, transparent, and comparable** environmental impact information, based on a **common science-driven methodology.**

The initiative has a **global scope**; however, Europe will be the priority market for the first voluntary score publication.

The work of EcoBeautyScore Consortium is articulated around four major deliverables:

1. **A common method for measuring environmental footprints throughout the life cycle of products**, based on the principles of the "Product Environmental Footprint" (PEF) (the European Union's PEF method based on life cycle assessment (LCA) for quantifying the environmental footprint of products).
2. **A common database** of environmental life cycle inventories and characterization factors for cosmetic ingredients, packaging materials and life cycle activities and processes.
3. **A common tool** that enables the assessment of the environmental impact of individual products, usable by experts and non-experts, by small and medium size companies as well as large groups.

4. **A harmonized scoring system** on a voluntary basis **containing a score range enabling the consumer to easily compare products** based on the environmental footprint of their cosmetic products.

To guarantee the quality of these deliverables, the methodological development supported by Quantis (leading environmental sustainability consultancy) as Technical Advisor, has been submitted to a critical review by a panel of independent experts, and finally opened to a public consultation.

The methodology, database, tool and scoring system will be verified by independent parties.

To serve consumer interest and support comparability, the EcoBeautyScore scoring system will work for all Cosmetic Products and enable companies, on **a voluntary basis**, to inform consumers in a clear and effective manner about the footprint assessment of their Cosmetic Products (for example using a graded scale that can be communicated to consumers, either on pack or by other communication means).

The EBS Consortium was born out of a desire from the cosmetics sector to come together and provide a practical tool for the sector to foster sustainability efforts. As such, the development of the methodology and scoring system are very much rooted in the EU's sustainability ambitions.

The methodology and scoring system are backed by the principles of the "Product Environmental Footprint" (version EF 3.1). There were also regular exchanges with the European Commission (Joint Research Centre – JRC, DG ENVironnement) throughout the development process, and the method has been the subject of a critical review by three independent experts.

As of **December 2023, 52** cosmetics and personal care companies and **19** trade associations have joined the EcoBeautyScore Consortium. With small and large companies and trade associations from 4 continents, the EcoBeautyScore Consortium is inclusive and has a global reach. The EcoBeautyScore Consortium still welcomes participation from new companies and associations.

3 Framework of the methodological principles

3.1 Objectives

The objective is to develop a common environmental impact measurement and scoring system for cosmetics products, including:

- A common methodology, database, and tool for environmental impact assessment of cosmetics products.

- A common scoring mechanism & harmonized layout to communicate the environmental impact rating of cosmetics products to consumers, ensuring consistency and comparability.
- Foster a culture of ecodesign within the industry.

The principles of upcoming regulations are including in EBS work to anticipate them, without being the main objectives.

3.2 Fundamental methodological principles

Some fundamental methodological principles have been adopted by the consortium:

- A **science-based** footprinting and scoring system, based on the full **Life Cycle Assessment (LCA) principles**, with multi-impact categories.
- A footprinting method **aligned with the EU PEF method**, including some science-based adaptations to meet the specificities of the cosmetic industry and considering the diversity of products and services that are offered to consumers. In addition, it includes the feasibility to deploy within an industry characterized by the diversity of products and services that are offered to consumers.
- A system that can be **used by non-LCA experts**, that is user-friendly and easily accessible tool interface.
- A **harmonized common industry database**, that should allow in future developments to tailor the assessment with company-specific data when appropriate and available.

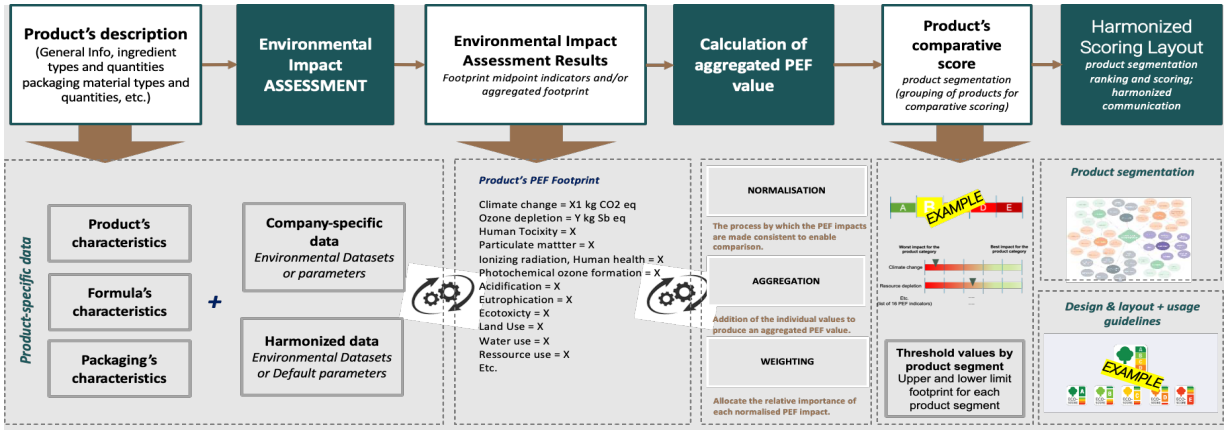


Figure 1. Overview of the footprinting and scoring chain

The methodological development needs to be pragmatic to ensure cost-effectiveness and scalability, by:

- **Leveraging internal knowledge, expertise and developments** from members related to formulations, ingredients, packaging, etc. and considering for example, existing initiatives (e.g., SPICE (Sustainable Packaging In CosmEtics)[1]).
- Making **trade-offs** between specificity of information vs complexity of the tool, while remaining **scientifically robust** in the context of products' comparison.
- Enabling **future methodology, databases, and tool improvement**.
- Selecting Life Cycle Inventories, data specifications and scoring criteria to enable **meaningful and science-based differentiation** between products.

3.3 Phased development.

To reach the objective, a phased methodological development is in progress to deliver the first version of the footprinting and scoring Tool (V1) for the market launch of the scoring system (also called herewith "Go Live") planned for 2024, with further development and improvement of the methodology planned beyond this Go-Live.

Documentation	End Goal	Testing phase (till early 2024)	Development post Go-Live 2024
OBJECTIVES	A common environmental impact scoring system for cosmetics products, enabling consumers to make more informed purchasing decisions.	An intermediary tool, allowing users to test functionalities, understand results, impacts of data sets, product segmentation, scoring methodology, and refine methodological next steps.	Continuous improvement of methodology and database, recalibration of scoring system to fit the market evolution and the expansion of product coverage.
Deliverables	Methodology, database, tool for footprinting and scoring on all product categories.	Methodology, database, and prototype tool for footprinting and scoring.	Improvement of methodology and database, recalibration of scoring system to fit the market evolution
Product scope	All product segments (excluding accessories & devices).	On 4 product segments: • Hair Wash • Hair Treat • Face Moisturise & Treat • Body Wash	More product segments operational for scoring.Expansion to more product segments, depending on a priority order to be defined by the Consortium
Geographical scope	Global	Focus on development and deployment in Europe.	Global

[1] https://open-spice.com/spice-guidelines/

Documentation	End Goal	Testing phase (till early 2024)	Development post Go-Live 2024
		(with potential impact for the development of specific datasets (ex : Use Phase))	
Life Cycle scope	Cradle to Grave	Cradle to Grave	Cradle to Grave
Indicators	Environmental impacts (LCA based & 16 PEF indicators) as a foundation. Additional topics to be part of the assessment if required/relevant.	Environmental impacts (PEF and LCA based)	Improving methodology for the Environmental impacts (LCA based & PEF indicators) as a first priority. Expansion to other topics (e.g. beyond 16 PEF indicators, or including social) is secondary.
Database (Impact factor and other key parameters)	Industry harmonized databases the most complete possible, in continuous refinement and improvement	First version of harmonized databases: • Ingredients impacts for selected product segments • Packaging impacts • Other impacts (e.g. transport) • Harmonized parameters (e.g. for use phase and end of life)	Iterative refinement of databases version based on a priority order / strategy TBD by the Consortium
Company Specific data	Possibility to overwrite default / generic data with company-specific data *	No possibility to overwrite default/generic data	Possibility to overwrite default/generic data with company-specific data on a strictly limited number of stages to test functionality and governance process.

3.3.1 Product coverage

A first methodology testing has been run in 2022, selecting product types based on their ability to stress-test the methodology (e.g. variety in formulation/packaging/delivery, as well as footprinting complexity, etc.) while representing a sufficient diversity of cosmetics products type.

For the ongoing testing phase (RDTP) informing the first version of the EBS tool, it was subsequently proposed to select a group of products encompassing:

- Rinse-off and leave-on products.
- Products sold in large quantities.
- Products representing the technical diversity of each segment selected.
- Products with relevant data availability

Based on these criteria, the testing phase and the first version of the Tool focuses on a limited selection of cosmetic product segments[2] for which specific databases have been developed. These include:

- Hair Wash
- Hair Treat
- Body Wash
- Face Moisturize & Treat

Beyond the 2024 Go-Live, the insights gained from the first launch with the V1 Tool will enable the scope to be progressively deployed across all cosmetics product segments. As part of the Consortium activity, the priority for new product segments will then need to be defined. The granularity of product segments will determine the effort required to cover all cosmetics products.

3.3.2 Geographical scope

Two geographic scopes are being analyzed during the testing phase. The first version of the Tool will focus on Products sold in Europe. Consumer insights work acknowledges the importance of consumers' expectations in Europe (and other parts of the world) where upcoming environmental labelling regulations are being developed.

However, the testing phase will also analyzes:

- The impact of European versus Global downstream footprints
- The impact of product rankings based on products only sold in Europe versus all products.

This internal testing and results analysis phase will help to decide whether the Go Live of the environmental scoring planned in 2024 will be applicable to products sold Worldwide or will be focused only on products sold in Europe.

Beyond 2024: in case Go Live is limited to products sold in Europe, the strategy on how to best cover other regions of the World will be tackled during 2024.

4 Environmental Footprinting: methodological choices and rationale

The fully detailed footprinting methodology and data development method has been captured in a technical document reviewed multiple times by external experts. This document is out of scope of the public consultation.

[2] Group of products (or services) that can fulfil equivalent functions (ISO 14025: 2006).

4.1 Overall methodological principle

4.1.1 Purpose

The overall propositions related to the environmental footprinting methodology reflect the objectives of the Framework of the Consortium above mentioned: it is **a science-based approach** that must allow for meaningful differentiation between products to allow consumers to make more Environmentally informed choices.

4.1.2 Decisions for the first version of the Tool

The referential used is the **Product Environmental Footprint (PEF)**[3], with adaptations to the cosmetics industry's specificities.

Methodological choices have remained flexible in this first version of the Tool development phase, allowing for testing the PEF methodology on cosmetic products and deviate from it when there are significant issues in applying it in the Consortium's context. When deviation from the PEF method is decided, the methodological rationale justifying the Consortium choices is clearly stated.

Rationale:

LCA has been recognized by the European Commission as the most effective method to assess the overall footprint of products and services. The European Commission launched the PEF initiative in order to improve the harmonization of LCA at European level. The PEF guidance is used as the reference measurement system in Europe regarding environmental footprinting using parameters for EU conditions and integrating a global normalization. Members acknowledge both that the PEF is a key method and that it is not fully workable for the cosmetics industry: improvements are needed for cosmetics products regarding methodology and datasets, as reflected in the following sections of the document.

Some key topics subject to improvement from PEF that have already arisen are listed below, (note that this list is not exhaustive and is provided as a preliminary example; it may be revised and potentially expanded based on first version of the Tool learnings):

[3] The Product Environmental Footprint (PEF) is a methodology by the European Commission's Joint Research Center (JRC) which is based on Life Cycle Assessment. PEF is a methodology that quantifies all environmental impacts over the life cycle of a product and would be supplemented with product category-specific rules (PEFCR). Its goal is to provide "a common way of measuring environmental performance" for companies within the EU wishing to market their product.

COMMISSION RECOMMENDATION (EU) 2021/2279 of 15 December 2021 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations.

- Characterization method and data for freshwater ecotoxicity indicator
- Type of secondary data to be used (EF-compliant, Ecoinvent, etc.).

It should also be noted that in some cases of deviation from PEF, the appropriate alternative method needs to be further adjusted for cosmetics (e.g. freshwater ecotoxicity method for ingredient Characterization Factors).

4.1.3 Future Developments

The methodological principles that will be used for future development will consider the learnings from the first version of the Tool as well as the evolution of the context, notably regarding PEF evolutions by the European Commission.

4.2 Functional units and reference flows

4.2.1 Purpose

The environmental footprinting methodology developed for EBS shall reflect the objective of the 'Consortium' abovementioned (section 3): it must **use a science-based approach**, allowing the meaningful **comparability** of products providing same primary benefit.

4.2.2 PEF Key Requirements

Beyond the standard definition of a functional unit (FU), common in LCA science, the PEF method requires the FU to be defined according to the function(s) or service(s) provided ("what"), the extent of the function or service ("how much"), the expected level of quality ("how well") and the duration/lifetime of the product ("how long"). Specifications regarding the FU are given in section 3.2.1 of the PEF method.

4.2.3 Decisions for the first version of the Tool

4.2.3.1 Use dose definition.

To compare the variety of products, The Consortium has decided to **measure and communicate the footprint per use dose** which is the most relevant way to compare the impact of products in a given segment. One functional unit for all product types in the first version of the Tool will be the "use of **one dose** of **product for a specific service / consumer benefit / function / final use** (e.g. shaving, hair washing)".

For each product type within a product segment, a reference flow (use dose) will be determined and agreed by the Consortium based on available literature (SCCS[4] guidelines, Product Environmental Footprint Category Rules (PEFCRs)) or industry averages and expertise, and in considering the specificities of some products (e.g. solid bar shampoo) for greater comparability between products. In addition, standard rinsing volumes and use phase data (e.g.: water consumption) will be proposed to capture the different technologies of products. Afterwards, there may be the possibility for companies to adjust these values to capture specific product designs and innovation (i.e. formula concentration, long lasting products). The required substantiation and verification allowing a modification of the use dose by members is yet to be defined and is under discussion within the Consortium.

Rationale:

The chosen functional unit should allow to compare various products that have the same final use but not necessarily the same physical flows nor products, formula and/or packaging content (e.g. roll-on and spray for deodorants).

4.2.3.1.1 Methodology applied to define the use dose for the Real Data Testing Phase (RDTP[5]).

The definition of use doses for product segments has been split into two steps:

1. Definition of default, non-changeable values that will be applied to all products of within a sub-segment. (e.g. all liquid shampoo has the same use dose, all solid shampoo has the same use dose – Consortium members do not have the option to modify this parameter)

L1 Segment	L2 segment	L3 Sub-segments
Hair	Wash	Liquid/Gel
		Concentrate (ready-to-use)
		Dilutable (not ready to use)
		Foam (foamer mechanism)
		Monodose (liquid/gel/solid/etc)
		Mousse / Foam (formula with propellant)
		Solid (bars, powder, flakes) NO DRY SHAMPOO

Segment and sub-segment illustration for Hair Wash

2. Definition of governance required to improve the default use dose AND for members to modify the use dose and input a product specific one.

The default, non-changeable use doses defined for RDTP, along with the method and sources used to derive these values are summarized in paragraph 6.3 of this document. An important

[4] Scientific Committee on Consumer Safety

[5] The Real Data Testing Phase (RDTP) is a large-scale footprinting exercise that was done within the Consortium to test the full methodology across four product segments to assess the validity of the methodology and finalize choices on specific model parameters to be used in the first version of the Tool. This phase covered approx. 2800 products across four segments using real product data from all Consortium members.

point to mention here is that many of these values have been estimated based on existing sources (SCCS and Ficheux et al., 2016) and using ratios between sub-segments or body zones to extrapolate use dose values to cover all sub-segments tested. Use dose data is calculated by assessing the exposure of consumers to a specific product (e.g. How much is used per day?). This leads to several results based on the diversity of user cases for products that have been analyzed statistically. The Consortium has decided to take into consideration the Median value (50th percentile or P50) instead of P90 (90th percentile) as it is more relevant of a consumer usage (P90 can overestimate the common use dose and is typically used as a high limit for safety reasons).

We are aware of the limitations of this method; therefore, the Consortium uses these values as a starting point for the RDTP, with the objective of improving them and measuring default use dose values collectively in future developments. This proposal is also in line with the second step of the use dose strategy, aiming at defining proper governance to allow for product-specific values.

Review of methodology

In a 1st step, some sub-segments have been defined within each segment of products. These sub-segments can be described by:

- The galenic of the product (solid, liquid foam…) which could be the main reason for applying a different use dose by consumer.
- The application zone of the product (only hands or full body for instance)

The 2nd step was to define the use dose to apply on the more representative sub-segment inside a segment (for example liquid products inside Hair Wash segment, or Body liquid gel inside Body – Wash segment). The choice of representative sub-segment has been defined and agreed upon based on the Consortium members' expertise. SCCS value have been applied when existing, taking P50 value.

Extrapolation method of reliable sub-segments to remaining sub-segments:

- Using a reliable sub-segment within a segment, liquid/gel in Hair Wash for example, we can calculate the ratios between different statistical values from SCCS and Ficheux values. The reliability of the sub-segment is based on availability and quality of the data given for a sub-segment and Consortium members' expertise on specific sub-segments providing higher confidence in the default, non-changeable use dose values agreed upon.
- Extrapolate the agreed upon value for all other sub-segments in the segment.

Extrapolation method for sub-segments for which no data is available:

- For body zones, using surface ratios based on SCCS and other publicly available literature.
- For other sub-segments, "expert" judgment based on other sub-segments in the segment.

- Looking at ratios between galenics (e.g. Ratio of use dose between a liquid and solid galenic for a same product that could be applied across other liquid to solid galenic for another sub-segment)

4.2.3.1.2 Future Developments

Expand the definitions of functional unit and reference flows for all product segments, which may include research needed to identify appropriate reference flows for all cosmetic categories.

Define a specific governance rules and process to improve the current set of default use doses and open the possibility for Consortium members to modify the default use dose towards specific values calculated by the member.

4.2.3.2 Supplementary reference flows for rinsed products

For rinsed-off products, it is important to define the amount of water consumed per use. To define this value, data were collected from all Consortium members and the average value for each segment/sub-segment were applied based on European habits.

Use dose applied for each sub-segment.

As defined in paragraph 4.2.4, we first defined the sub-segments and then defined the use-dose based on the method approved by all members. Those assumptions could be challenged after analysis of the results of the current pilot (RDTP) and the values will be challenged and reviewed.

Methodology applied for Monodose: for RDTP, we assume 0% leftover rate[6] and use entire volume of primary pack. Post-RDTP, we will refine based on left-over rates of monodose packaging types.

Methodology applied for Concentrates: for RDTP, we assume default use dose for same galenic. Post-RDTP, we will perform case studies with willing members based on concentration factor guidelines to be developed by sub-group.

Methodology applied for dilutable:

1. Ask in the data collection file if product is a dilutable.
2. A dilution rate must be provided.
3. Same use dose will be used based on the galenic the ready-to-use form of the dilutable product (i.e. if liquid when diluted, liquid dose will be applied.

[6] Leftover rate: Share of the product which cannot be easily used by consumers. It is usually related to the primary packaging type not enabling to recover 100% of the product.

Beyond the testing phase, improvements could happen as part of a consumer study, done collectively through EBS, to determine dosage of the various sub-segments.

4.3 Life cycle stages & System boundaries

4.3.1 Purpose

The life cycle stages and system boundary of products environmental footprinting shall be defined.

4.3.2 PEF Key Requirements

Information regarding life cycle stages is given in Section 4.2 of the PEF Method. The essential life cycle stages that must be included are as follows:

- Raw material acquisition and pre-processing (including production of parts and components)
- Manufacturing (production of the main product)
- Distribution (product distribution and storage)
- Use phase,
- End of life (including product recovery or recycling)

The PEF method also allows for the exclusion of life cycle stages beyond this list (e.g. transportation or use stage for intermediate products). To do so, a justification must be given. It is also possible to divide life cycle stages into smaller steps (i.e. separation of raw materials acquisition and pre-processing).

4.3.3 Decisions for the first version of the Tool

The system boundary selected for the first version of the Tool includes all the life cycle stages used by the PEF known as cradle to grave, it includes all major drivers of impact (formula, packaging, consumer use phase, end of life).

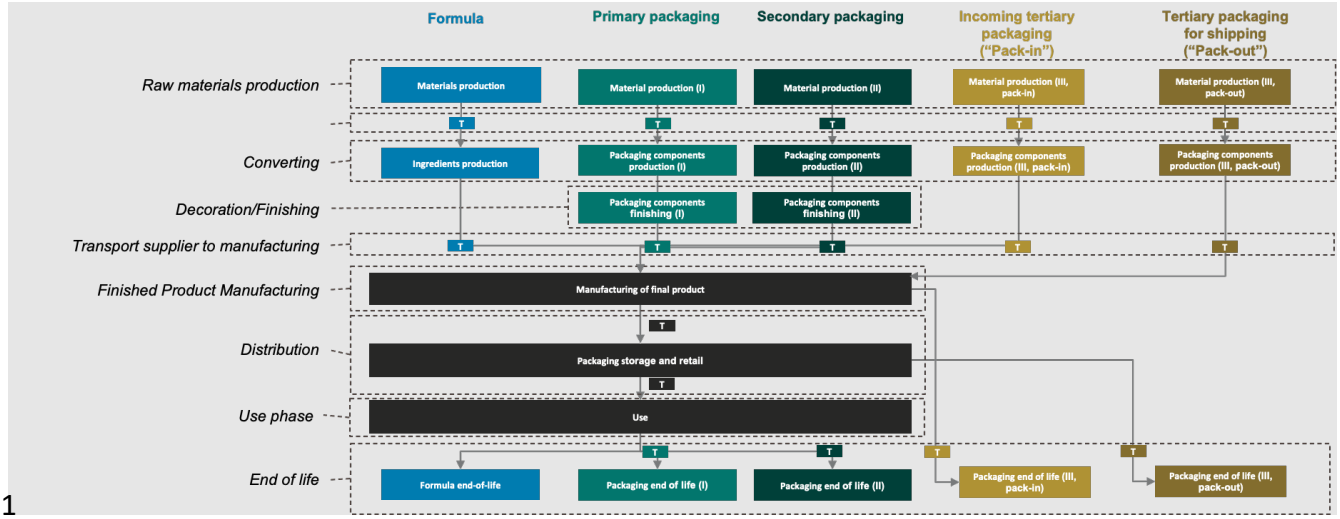


Figure 2. Generic life cycle of cosmetics products

- Included life cycle stages: Raw Materials production and converting processes in formula ingredients and packaging components, manufacturing, transport supplier to manufacturing, finished product manufacturing, distribution, use-phase (e.g. rinsing phase), End of life of formula (including specific removal rate of ingredients in wastewater treatment plant), End of life of packaging (including recycling)[7]. Recharge/refill could be included depending on the progress of the technical work on this topic and based on the results of the pilot phase.

- Excluded life cycle stages: Use of additional products (e.g. cotton pads), additional packaging (e.g. gift boxes), e-commerce, other purchased goods and services, transversal and research activities (corporate, R&D, etc.) and any other stage not listed above.

Following this mindset, the first version of the Tool is focused on single use products, therefore situations where there is a combination of several products is excluded (e.g. cosmetic routines).

Rationale:

The scope should maintain the right balance between comprehensiveness and efficiency. The life cycle steps covered in the scope should cover the full life cycle ("cradle to grave") of cosmetics products, in order to capture the most comprehensive way possible all key

[7] The Organisation Environmental Footprint Sector Rules (OEFSR) retail uses a different life cycle stage nomenclature than the PEF and this document. For better alignment, it is important to note that "downstream transportation, retail" is equivalent to OEFSRs "logistics retail place, support, and distribution of sold products to the client" (Quantis, 2018). European Commission.
https://ec.europa.eu/environment/eussd/smgp/pdf/OEFSR-Retail_15052018.pdf OEFSR Retail

environmental impacts of these products. However, transverse activities that are not directly linked to a product are excluded at this time[8].

4.3.4 Future Developments

The learnings of the first version of the Tool might help to identify categories/products for which expanding the perimeter is relevant to cover additional product components or life cycle phases (for instance: application accessories, reuse/refill scenarios if not included before, etc.)

4.4 Impact assessment categories

4.4.1 Purpose

The environmental impacts related to each product and their assessment methods must be determined.

4.4.2 PEF Key Requirements

The 16 environmental footprint impact categories and related assessment methods given in Table 2 of Section 3.2.3 of the PEF method are required to be included in PEF calculations. The proposition for the first version of the Tool is thus aligned with the PEF.

4.4.3 Decisions for the first version of the Tool

A **full life cycle Assessment will be conducted on all 16 midpoint PEF (EF 3.1) indicators with adaptations by EBS Consortium for freshwater ecotoxicity midpoint (***Table 1***). Learnings will be used to understand the most relevant and reliable indicators for Cosmetics products. This can also be used to understand if any impact categories/assessment methods require further development to improve the quality of the results generated by the footprinting methodology.** Discussions with EU authorities will be organized thereafter to consolidate the most appropriate set of 16 midpoint indicators to be used in the methodology.

[8] Note: this may not be the case for marketing activities, which can be strongly linked to a given product and differ greatly from one product to another. However, since data on these activities are difficult to consolidate and in order to limit the complexity of the method, marketing activities are excluded for now.

Impact category	Indicator	Unit	LCIA method
Climate change, total	Global warming potential (GWP100)	kg $CO_{2\text{-}eq}$	Bern model - Global warming potentials (GWP) over a 100-year time horizon (based on IPCC 2021)
Ozone depletion	Ozone depletion potential (ODP)	kg CFC-11_{eq}	EDIP model based on the ODPs of the World Meteorological Organisation (WMO) over an infinite time horizon (WMO 2014 + integrations)
Human toxicity, cancer	Comparative toxic unit for humans (CTU_h)	CTUh	Based on USEtox2.1 model (Fantke et al. 2017), adapted as in Saouter et al., 2018 and Andreasi Bassi et al., 2023
Human toxicity, non-cancer	Comparative toxic unit for humans (CTU_h)	CTUh	Based on USEtox2.1 model (Fantke et al. 2017), adapted as in Saouter et al., 2018 and Andreasi Bassi et al., 2023
Particulate matter	Impact on human health	Disease incidence	PM model (Fantke et al., 2016 in UNEP 2016)
Ionising radiation, human health	Human exposure efficiency relative to U^{235}	kBq U^{235}_{eq}	Human health effect model as developed by Dreicer et al. 1995 (Frischknecht et al, 2000)
Photochemical ozone formation, human health	Tropospheric ozone concentration increase	kg $NMVOC_{eq}$	LOTOS-EUROS model (Van Zelm et al, 2008) as applied in ReCiPe 2008
Acidification	Accumulated exceedance (AE)	mol $H+_{eq}$	Accumulated exceedance (Seppälä et al. 2006, Posch et al, 2008)
Eutrophication, terrestrial	Accumulated exceedance (AE)	mol N_{eq}	Accumulated exceedance (Seppälä et al. 2006, Posch et al, 2008)
Eutrophication, freshwater	Fraction of nutrients reaching freshwater end compartment (P)	mol P_{eq}	EUTREND model (Struijs et al, 2009) as applied in ReCiPe
Eutrophication, marine	Fraction of nutrients reaching marine end compartment (N)	mol N_{eq}	EUTREND model (Struijs et al, 2009) as applied in ReCiPe
Ecotoxicity, freshwater	Comparative toxic unit for ecosystems (CTU_e)	CTUe	Based on USEtox2.1 model (Fantke et al. 2017), adapted as in Saouter et al., 2018, and Andreasi Bassi et al., 2023, with further adaptions by EBS Consortium for assessment of ingredients at the end-of-life stage
Land use	Soil quality index	Dimensionless (pt)	Soil quality index based on LANCA model (De Laurentiis et al. 2019) and on the LANCA CF version 2.5 (Horn and Maier, 2018)
Water use	User deprivation potential (deprivation-weighted water consumption)	m^3 water eq of deprived water	Available WAter REmaining (AWARE) model (Boulay et al., 2018; UNEP 2016)
Resource use, minerals and metals	Abiotic resource depletion (ADP ultimate reserves)	Kg Sb_{eq}	van Oers et al., 2002 as in CML 2002 method, v.4.8
Resource use, fossils	Abiotic resource depletion – fossil fuels (ADP-fossil)	MJ	van Oers et al., 2002 as in CML 2002 method, v.4.8

Table 1

Rationale:

The impact categories and assessment methods shall consider a wide range of environmental issues to be able to capture potential "burden shifting" from one environmental topic to another. The assessment methods should reflect as much as possible the state-of-the-art of most recognized Life Cycle Impact Assessment (LCIA) methods. Additionally, the first version of the Tool will be used to understand PEF EF 3.1 impact assessment results.

Next steps:

Along with the development of the first version of the Tool, all environmental footprint impact categories will be assessed and adapted if necessary to be still using the best of scientific knowledge.

4.4.4 Future Development

Following the evolution of PEF guidance to maintain state of the art, industry-relevant impact assessment methods for the footprinting methodology. Additionally, integrating insights from the first version of the Tool phase regarding impact categories that provide meaningful results for cosmetic products.

4.5 Specific calculation rules: Propositions for the first version of the Tool

4.5.1 Solid waste end-of-life

PEF rules with the Circular Footprint Formula (CFF) is applied, while making sure that its application is aligned with current cosmetic industry context and practices regarding e.g. allocation factors, quality ratio, etc.[9]

Rationale:

PEF guidance indicates that CFF should be used for solid waste end-of-life and thus CFF proposed to be implemented in the first version of the Tool.

4.5.2 Type of allocation

The following guiding principle is used for the allocation rules: allocation based on underlying physical relationship is prioritized. Economic allocation can be used when the underlying physical relationship between co-products does not capture their functionalities. Clear justification shall be given in that event. The allocation rules for each type of process will be defined and agreed upon with the Consortium.

Rationale:

The objective of the allocation is to ensure a fair sharing of the impacts between co-products, using a recognized approach. Where an allocation based on relevant physical relationship is the target, there are many cases where it is difficult to establish. For example, a mass allocation (without comparable functionalities between co-products) can potentially lead to situations where the co-product of interest gets a small share of the overall damages, just because a heavier, less useful co-product is generated simultaneously. Economic allocation allows to share impacts between co-products according to their economic value, used as a way to capture their “usefulness”.

4.5.3 Carbon release at end-of-life

Biogenic carbon capture will be accounted for only when there is actual long-term storage (at least 100 years) in the life cycle (e.g. in landfills), provided there is no degradation of the materials. In case of degradation, the emissions of biogenic carbon such as methane will be accounted for. Otherwise, there will be no accounting of biogenic carbon, including for natural ingredients, i.e. biogenic carbon emissions and removal will be modelled separately and

[9] CFF specifications can be found in section 4.4.8.1. under ‘End of life modelling’ following the link to the recent PEF guidelines: https://eplca.jrc.ec.europa.eu/permalink/PEF_method.pdf

corresponding characterization factors for e.g. CO_2 uptakes and emissions will be set to 0. The first version of the Tool can be used to understand results of this accounting method.

In case there are both fossil-derived carbons and bio-derived carbons in an ingredient, CO_2 emissions from the bio-based fraction will not be counted (as previously explained) while the fossil-based ones will. This will be done by determining the number of carbon in the molecule that originate from fossil- derived sources and then obtaining the molecule's the mass fraction accordingly. This will be multiplied by the ratio of CO_2 to carbon to obtain a CO_2 equivalent. This will finally be multiplied by the total amount of ingredients there is in the product.

Rationale:

On a general perspective, Biogenic carbon for Fast Moving Consumer Goods can be left out of the assessment: when the carbon dioxide initially captured by the plant is remitted later, one can consider that its effect on climate change is neutral. That is why the biogenic carbon flows for ingredients can be left out. However, when the carbon is either stored for a long (100+ years) period (e.g. a non-degradable packaging in a landfill) or is converted into methane (e.g. a degradable packaging in a landfill), then the corresponding flow should be taken into account.

4.5.4 Land use occupancy

Only direct land use change (dLUC) is accounted for.

Rationale:

This is aligned with the PEF guidelines. As the methods and data for assessing indirect Land Use change (iLUC) are not fully developed, only dLUC is taken into account.

4.5.5 Ecotoxicity, freshwater

The PEF method prescribes a characterization model based on USEtox2.1 model (Fantke et al. 2017), adapted as in Saouter et al., 2018 and Andreasi Bassi et al., 2023 the assessment of Ecotoxicity, freshwater.

There is a concern within the EBS Consortium on some limitations of the USEtox model and data to generate robust environmental scores of cosmetics products suitable for the main objective of the Consortium, i.e. meaningful differentiation. Several options are being investigated and evaluated within the Consortium on the characterization model to be used for this impact category. These options include:

- Improving data coverage: Developing new characterization factors and characterization factor proxies to fill-in data gaps and avoid no data = no impact
- Improving data quality - Working on systematic identification of inconsistent CF and replacement with improved CF based on experts' ingredients knowledge.
- Improving the suitability of USEtox model for cosmetics, including (but not restricted to) seeking alignment between LCA best practice and ecologically relevant principles and leveraging data used in risk assessment to improve data quality.

This concern on USEtox and the different options assessed have been shared with the Joint Research Center (JRC) (European Commission) through ongoing discussions and feedback from the JRC. Further exchanges are planned with the JRC with the objective to achieve alignment.

4.6 Aggregation method

4.6.1 Purpose

The final score should be easily and accurately understood by the consumer and allow meaningful product comparability. This will rely on how individual impact category footprints are aggregated through the process of normalization and weighting to generate a single score for each product.

The following Figure presents the principle of aggregating the environmental footprint:

Figure 3. Aggregation steps to generate Single Score

4.6.2 PEF Key Requirements

The PEF method relies on normalization and weighting of impact categories. It provides normalization and weighting factors that shall be used to convert impact category results into a single score output. The normalization factors are expressed per capita based on global values. The weighing factors are determined through panel-based approach to gather the perceived relative importance of environmental footprint impact categories from general public, LCA experts and impact assessment experts (Sala, Cerutti, & Pant, 2017). Normalization and weighing information can be found in section 5.2 of the PEF Method. The latest Normalization and Weighting factors appear to be embedded in the EF3.1 package at the time of the writing of this document.

4.6.3 Decision for the first version of the Tool

Work on-going.

Normalization and (PEF recommended) panel-based weighing factors are used within the first versions of the tool.

Similarly to the work done to improve the characterization of freshwater ecotoxicity results, the consortium has sought to improve key limitations associated with the freshwater ecotoxicity normalization factor of PEF. Major limitations include:

1. Largely incomplete inventory coverage (lowest PEF robustness score: III – Crenna et al. (2019)), with no sectorial coverage of cosmetics substances
2. Limited inventory robustness (lowest PEF robustness score: III – Crenna et al. (2019)[10]), as gaps in chemical emissions are reported, and extrapolations are conducted at different levels.
3. Largely incomplete set of characterization factors relevant for cosmetics

The EBS-improved freshwater ecotoxicity normalization factor is used as a basis, while the influence is investigated in a sensitivity analysis when compared to the initial PEF normalization factor value.

Further tests could be considered in future developments to identify whether the Planetary boundaries weighting methods (listed below) could be used to derive science based representative and robust results for the cosmetics industry. The detail of these different weighting methods is presented in the tables below:

[10] Global environmental impacts: data sources and methodological choices for calculating normalization factors for LCA - E. Crenna, M. Secchi, L. Benini, Serenella Sala (2019)

606 **Normalization:**

Type	Authors	Year	Description	Key sources
Global	**PEF/JRC**	**2022**	**Global normalization values for EF3.1**	**EF REFERENCE PACKAGE 3.1**

607

608 **Weighting:**

Type	Authors	Description	Key sources
Panel-based	Sala et al (JRC)	Survey of experts to rank environmental impact categories	Methodological document https://ec.europa.eu/environment/eussd/smgp/documents/2018_JRC_Weighting_EF.pdf
Planetary Boundaries	Vargas et al.	Uses the approach of planetary boundaries to define weighting factors for each PEF indicators (PEF 2.0). Starting from Björn 2015, updates and addition of boundaries calculation to cover the whole set of impact categories.	Scientific publication https://doi.org/10.1016/j.ecolind.2019.105498 Björn 2015: https://backend.orbit.dtu.dk/ws/portalfiles/portal/118946760/Better_but_good_enough.pdf
Planetary Boundaries	Sala et al. (JRC)	Assessment of planetary boundaries for each EF3.1 impact category. Aggregation of several sources, including Björn 2015 and Vargas et al 2019.	Scientific publication https://doi.org/10.1016/j.jenvman.2020.110686

609

5 Data and databases

5.1 Harmonized database development strategy

5.1.1 Purpose

The harmonized database is a key pillar of the measurement system, as it will provide environmental impacts on a wide range of activities and materials. This database should cover two main types of data – Life Cycle Inventory (LCI) data (in the background system) and activity data (in the foreground system) (e.g. use phase parameters).

- **Regarding LCI data**: As packaging materials already have good coverage in existing LCA databases, most of the effort has been put on covering the formula ingredients.
- **Regarding Activity data**: a common set of generic parameters is developed within the Consortium.

5.1.2 PEF Key Requirements

For the creation of datasets and databases, the PEF method refers to its "Guide for EF compliant data sets".

5.1.3 Decision for the first version of the Tool

LCIs and characterization factors:

The availability for both the production and end-of life-datasets for ingredients varies depending on the databases utilized (e.g., Ecoinvent, USEtox, EF 3.1). Currently, there is a lack of availability of EF compliant data. For instance, it is possible to have access to sourcing & production data of an ingredient but not have end-of-life formula data for this same ingredient. This has implied selecting alternates for primary data sources for inventories of materials. Thus, the following strategy has been used for ingredients (sourcing & production and formula end-of-life) datasets:

- Map the strategic cosmetic ingredients[11] for priority product types defined in Section 3.3.1, through specific data granted by members or literature-based models as agreed by Consortium members.

[11] Strategic ingredients are determined via four specific criteria: 1. Ingredients that represent approximately 80% volume of specific product type of members, 2. Ingredients representing highest volumes in a "sub-segment" (i.e. for hair wash segment - Sulfate free, antidandruff, solid shampoos etc.) 3. Ingredients present in highest concentration in formulas - cut-off at 5% on

- Find proxies by ingredients and/or approach by clusters of ingredients categories.
- Define default, conservative non-specific datasets to fill-in remaining data gaps when no dataset is available in the database for some ingredients, as agreed by Consortium members.

All this activity is conducted by consortium members sharing data internally developed or through specific data development, and collective agreement on data selected.

As a guiding principle, the overall target is to have 99,99% of the total formula composition covered. The proxy datasets have been defined and agreed by all members.

The list of priority ingredients is covered, for both production and end-of-life data:

- With existing databases.
- With datasets from Member Companies or developed within EBS.
- With proxy or clusters of ingredients (by function or chemical structure) adapted to the target ingredient.
- With default (median of all ingredients) values to avoid “no data no impact”.

Other parameters:

Common specific values have been defined with possibility of replacement by industry averages/generic data developed by the Consortium, under specific rules to be established.

All data choices have been agreed upon by Consortium companies.

If company -pecific values are proposed as common specific values, those data are to be shared among members transparently for collective evaluation.

It is agreed upon by the members of the Consortium that generic activity data are used for non-ingredient-specific parameters such as transportation, tertiary packaging, etc.

To ensure datasets harmonization, data development guidelines have been developed by the Consortium. Specific processes have been agreed on for:

- Ingredient from plant extraction: steam distillation, solvent extraction processes have been developed to model essential oil and plant extracts production,
- Ingredient from chemical synthesis: default modeling guidelines have been developed (to be applied if no industrial data is available). These modeling guidelines particularly tackle default yield, energy consumption, other utilities (water, infrastructure), waste.

dry extract 4. Most impacting ingredients based on internal or public studies and known from members as key contributors in the overall impact.

5.2 Granularity of data: geographical representativeness

Rules on the geographical granularity of data will be defined at the end of the internal testing phase (H1 2024), to determine the scope of the downstream parameters of the model and scoring scales for the Go Live of environmental labelling in 2024: Europe or Worldwide.

5.2.1 PEF Key Requirements

The PEF method indicates that the geographical validity must be identified within a PEF study. A table listing the countries where products included in the study is consumed/sold along with the relative market share shall be included in the study. If the data is not available for certain products, the value of Europe and the European Free Trade Association (EFTA) shall be considered by default as for the market share, it shall be split evenly between all countries.

Additionally, geographical representativeness is also taken into consideration to calculate the data quality requirements (DQR) for datasets. This information is given in Tables B.9 and B.11 for company-specific and secondary datasets respectively. General information on this topic can also be found in the PEF method in sections 4.6.5, A4.4 and B5.3.

5.2.2 Proposition for the first version of the Tool

LCIs and characterization factors:

The proposal aims to have:

- Global datasets for ingredients production, global datasets for end-of-life, packaging production and end-of-life, transport modes and other transverse activities.
- European or Worldwide datasets for energy mix of the use phase for example, depending on the final geographical scope retained for the Go Live phase.

Other parameters:

The proposition is to aim for life cycle parameters (e.g. use phase, end-of-life scenarios) that correspond to reference data, or average European or Worldwide data depending on the final geographical scope retained for the Go Live phase.

Rationale:

This approach allows not only to limit the complexity but also the time of development for the first version of the Tool. By focusing on the priority, which is to be representative of European Union or All World according to the geographical scope finally retained. Additionally, this proposition anticipates the possible expansion of the final tool to other international geographies to best represent all Consortium members.

5.3 Inclusion of company-specific datasets

5.3.1 Decision for the first version of the tool

The environmental footprinting tool will ultimately allow companies to include company-specific data, however clear methodological rules and substantification process for allowing these datasets to be included needs to be defined. This will be done in a later stage, therefore company-specific data integration won't be available in the first version of the tool.

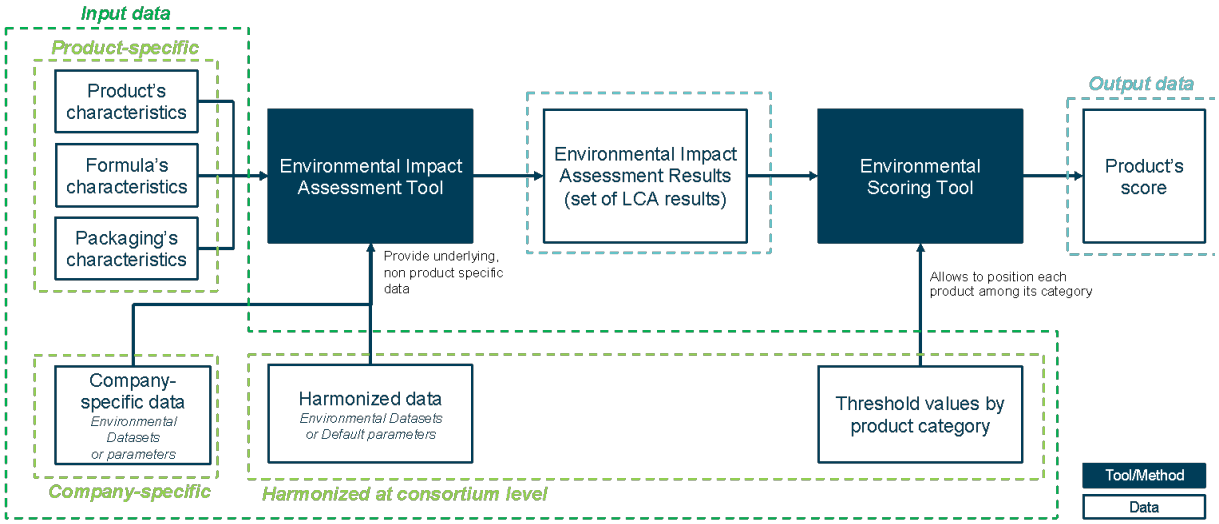


Figure 4. Types of datasets within the footprinting tool

Rationale:

The objective is to define a model for the first version of the Tool that best describes the environmental impacts of cosmetic products, allowing meaningful differentiation between products, while keeping a reasonable number of specific data entry to: 1) ensure the development in the required timeframe and resources and 2) help democratize the tool and methodology for smaller players with no internal LCA expertise.

Additional developments and more specific approach can be taken after the first version of the Tool, to move towards a more specific and accurate model (the tool should be developed in a way to ensure a relevant versatility to integrate future developments).

6 Consumer facing scoring: methodology and rationale.

6.1 Context

The ambition of the scoring working group is to create a harmonized product scoring or rating system that allows consumers to make sustainable purchasing decisions within a functional product segment, and that is displayable on pack and/or web-based (e.g. QR code, website).

This means that we need to conduct:

- A scoring methodology to transform a footprinting assessment result (e.g. the normalized and weighted aggregated footprint single value) into a product score that is meaningful to consumers.
- A segment definition based on common segmentation principles applied consistently across segments.
- A harmonized scoring layout by product segment

6.2 Product Segmentation

This involves categorizing the full diversity of the products on offer within the industry in a simple, yet comprehensive framework. It should enable consumers to make an informed choice with complete confidence, by allowing an easy and sincere discrimination of products through their footprint value (aggregated footprinting assessment result).

Our approach to segmentation is therefore intended to enable consumers to:

- Compare products grouped by the same principal benefit or service.
- Compare products based on their usage dose (which can differ within a segment, for example, depending on the format of product delivery).

In doing this, it is important to strike the right balance between identifying enough segments (to reflect consumers' range of choices) but not too many (to avoid complexity and the challenge of maintaining potentially hundreds of product category rules/schemes over time). Additionally, the ability to distinguish different product scores within a segment is necessary.

Specific criteria were evaluated to define segments, this can be summarized in the following guiding principles:

- Products should be grouped based on the service provided to the consumer, reflecting the final use (e.g. washing hair, protection from the sun, avoiding unpleasant odors, etc.) and not the technical content, nor the format/packaging type (e.g. liquids, aerosols).

- The segmentation shall cover all cosmetics products, though this may need to be achieved through a phased approach.
- The segmentation shall be sufficiently simple so that it is not too onerous for the industry to implement.
- Segmentation must allow flexibility in case of future development: further sub-segments could be added, and product segments could be broken down to an additional level of granularity.
- The definition of the product segments must be easy to understand by consumers and not misleading.
- The level of segmentation will be validated through available footprint data to ensure that it is statistically relevant (i.e. there is the ability to determine a difference between products' impacts and/or have enough products to measure).

By following these principles, this has resulted in the definition of a taxonomy of approx. 30 segments (divided into seven product families - see diagram below) among which 4 we will focus on for the first testing phase (RDTP) Hair Wash, Hair Treat, Body wash and Face Care. We believe this is a pragmatic and practical approach that is consumer-relevant and will facilitate the implementation and subsequent maintenance of the EBS system.

Figure 6. *Product segmentation L1 families*

For the first testing phase (RDTP), we focused on 4 segments: Hair Wash, Hair Treat, Face Moisturize & Treat and Body Wash. This decision has been taken based on technical considerations and relevancy for a majority of members of the consortium to enable participation.

<u>Product Segmentation areas of note:</u>

Out of scope

- Hand sanitizer

- Wipes/masks (out of scope for now, until methodology agreed on how to assess impact)
- Household fragrances
- Ingestible (e.g. food supplements)
- Devices and accessories

Regional variation

- Where a product does not fall within cosmetics regulations (e.g. anti dandruff or acne in the US) in a specific market, no score will be applied to these products within that market. NB while no score will be communicated in these markets, their footprints will be taken into account for the purposes of building the scales.

Multipurpose products

- There are several products that fall into more than one segment (e.g. 2-in-1 shampoo & conditioner or 2-in-1 face and eye cleanser)
- It has been agreed that a rule will be defined which can be applied consistently, e.g. based on highest use dose (hypothetically 2-in-1 shampoo & conditioner would sit in Hair Wash due to assumed higher dose, similarly, Face and Eye face cleanser would sit in Face Cleanser category). The specifics of this rule are still to be defined.

6.3 Scoring Methodology Principles

6.3.1 Scope of the scoring principles

The scope is to investigate and develop practical proposals for a scoring methodology which is:

- Fit for purpose, i.e. provides clear environmental product information that enables responsible consumption choices
- Science-based
- Scalable (to brands, product segments and geographies)
- Easy to implement
- Credible
- Sustainable/onwardly viable

These underlying principles are separated from future choices that needs be made around implementation, for example:

- Visual representation: final design and layout of the score
- Regionalization strategy

6.3.2 Why do we need a scoring methodology?

- The Aggregated Footprint Value - per usage dose - of products range across a very extended range, that makes it difficult to compare products without performance classes.
- In some segments, all products have very close footprint values (like rinsed off), which would make it very difficult for consumers to compare products without performance classes.
- Value ranges will be segment specific, hence the need to define one scale and performance classes per segment.
- There is no universal benchmark from which to define an EcoBeautyScore.
- In order to easily compare the environmental performance of products within a segment, a set of segment-specific thresholds (limits) needs to be defined to divide that range into performance classes.

6.3.3 Key assumptions

- The Consortium has defined a methodology which can produce Aggregated Footprint Values. The Scoring methodology will take Aggregated Footprint Values as an input.
- The Final EcoBeauty Scoring methodology will be universal, but the thresholds and ranges it generates will have a defined scope.
    - The same underlying approach will be taken for all product segments.
    - The application of this approach will give EcoBeautyScore thresholds for a tightly defined segment of products.

6.3.4 Key components of the scoring methodology principles

In devising the scoring methodology for EBS, several options were considered, and inspiration was drawn from the PEF methodology as well as existing scoring schemes on the market. The below outlines the approach that EBS intends to take with regards to setting a scale and distributing aggregated footprint values along that scale.

The main components of the scoring methodology include:

Overall approach

Two options were considered for anchoring the scale: a portfolio assessment approach (i.e. using a group of products to set the upper and lower limits of the range) vs a pseudo industry average (i.e. identifying a typical 'average' product as the mean within a segment).

Sampling principles

1. Measuring the whole market vs a representative sample
2. Defining representative

Range setting principles

1. One product, one value vs weight the sample
2. Tackling the extremes
3. Defining the boundaries

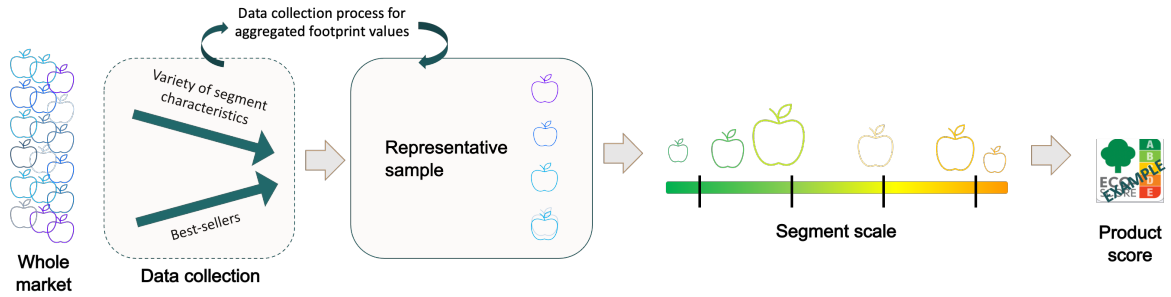


Figure 7. Overview *of high-level scoring methodological principles process*

6.3.4.1 Overall approach

EBS Approach

The EBS favors the 'portfolio assessment' approach, rather than the generation of a 'pseudo-industry average product'.

Portfolio Assessment:

- Approach commonly taken in academic literature and other ecolabelling schemes (e.g. Decathlon).
- Defines an actual benchmarking scale based on current market.
- More applicable to broad and varied product segments (as is the case with cosmetics and personal care).

- For each segment, a representative sample of products is evaluated, and this range of Footprint Values is used to define thresholds for classes of environmental performance .

Rationale

In order to provide consumers with a meaningful rating, the full range of possible scores within an EBS segment needs to be considered when devising a rating system – the portfolio assessment method allows this.

Devising a method to generate a statistically representative sample of the segment streamlines the process and allows for new products and members to be given scores in an ongoing manner.

Alternatively, given the proposed segmentation approach, covering a large range of formats, product types and packaging / delivery approaches, the concept of how to determine an "average" product (i.e. the pseudo industry average) is not practical or intuitive. Furthermore, it would be complex to execute and require regular updates to remain relevant, considering the rhythm of launches and product updates in the cosmetics and personal care industry.

Considerations

The PEF example for the definition of performance classes is based on the pseudo-industry average segment product approach, but this is not a mandatory requirement.

6.3.4.2 Sampling

EBS approach

The EBS favors a representative sampling approach, as part of the overall portfolio assessment, whereby a subset of products currently available on the market within a segment are selected and assessed to provide a representative distribution of Aggregated Footprint Values.

Representative sample:

- Aggregated Footprint Values are calculated for a manageably sized, but statistically representative, subset of a product segment.
- Thresholds for classes of performance are defined according to this representative subset.
- Size of subset can be set according to resource and tooling capacity of EBS and can evolve over time.

- Additional products (including new product developments) are assessed during the scale calibration phase and are given an EcoBeautyScore based on the thresholds determined by the representative subset.

Rationale

It would not be practical to assess every product eligible for an EcoBeautyScore prior to setting a rating scale, both in terms of time and resources. Devising a method to generate a statistically representative sample of the segment streamlines the process and allows for new products and members to be given EcoBeautyScores in an ongoing manner.

Considerations

There is a risk that the sample may turn out to be a poor representation of the market situation during the scale calibration phase. This risk is mitigated through a proper design of the sampling process, and making sure that EBS members represent well the overall market and if necessary, will be corrected when the scale requires recalculation (scale validity period to be determined at a later stage).

6.3.4.2.1 Defining representative sample

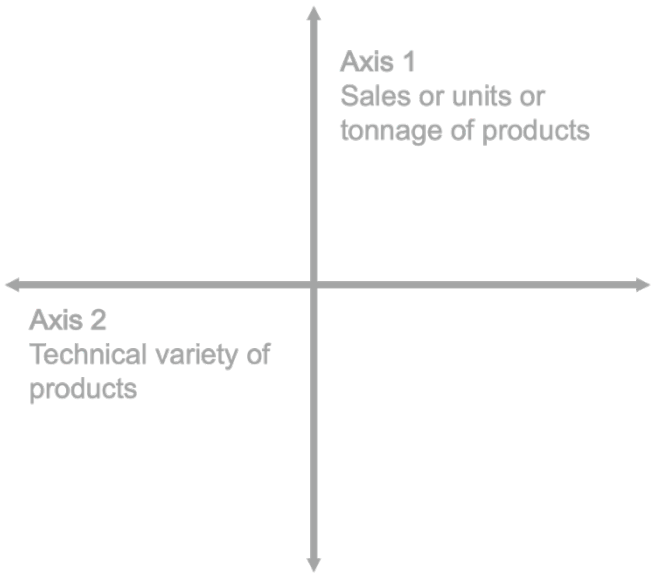
Every EBS Consortium company would be asked to contribute to the sampling process wherever relevant for their portfolio, by providing – on a confidential basis – product specifications for selected products. This information would then be aggregated and anonymized.

EBS approach

EBS has defined the selection of products for sampling along two axes of representativeness:

1. Representativeness of EBS members market share, by mandating the inclusion of 'bestselling' products within the sample selection (30% of the sample).
2. Representativeness of the variety of the segment, by mandating the inclusion of as broad a variety of formats and technical specifications within the sample as is practical (70% of the sample).

Figure 5. Illustration of two axes of representativeness



Rationale

The sample must contain the biggest sellers that consumers would consider to be representative of a segment, while simultaneously including the full variety of products (and product impacts) from EBS members that are available to the consumer. As EBS members represent a significant share of the global cosmetic market, this ensures sample representativity.

Stratifying the sampling in this way fulfils both requirements.

6.3.4.3 Range setting

EBS approach

EBS favors an unweighted system, as it is consistent with a simple product-by-product comparison, i.e. 'one product, one aggregated footprint value'.

The data used to determine the range and distribution of the representative sample will therefore not be weighted by sales or volume.

Rationale

The purpose of defining the range and distribution is to represent the choices that the consumer will have available 'on shelf'.

This method fits with the way a consumer would make their choice when purchasing a product, allowing us to rank products based on their environmental impact.

It also avoids the risks attached to the disclosure of commercially sensitive information which would require complex handling and aggregation processes.

6.3.4.3.1 Setting the extremes

EBS approach

EBS proposes to absorb Aggregated Footprint Values that fall at the extremes of the sample range (e.g. top/bottom 10%) into an open-ended category, i.e. zero ◊ lower threshold, or higher threshold ◊ infinity.

By absorbing the top and bottom 10% (in terms of Aggregated Footprint Values rather than number) into each end of the sample allows a focus on the variety of Values within the core of the range.

We thus recommend a representation with a scale split in N ranks (for example 5 for a A to E or 1 to 5) allowing this open-ended approach.

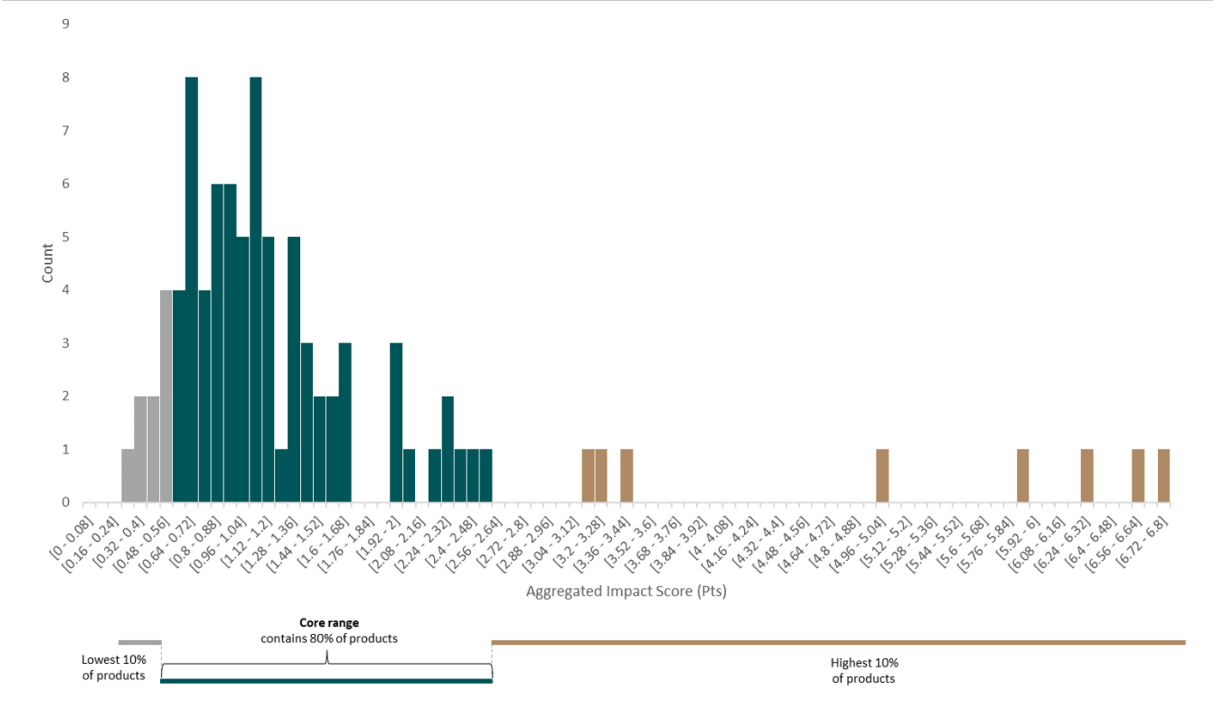


Figure 6 Aggregated Footprint Values – core vs extremes

Rationale

The observed and anticipated distribution of Aggregated Footprint Values within a segment is such that the extreme ends are likely to skew the distribution of EcoBeauty Scores towards the lower end. This shift could present a greenwashing risk, reducing the consumer's ability to make a choice at the shelf. By absorbing the extreme ends of the distribution, the scoring methodology can focus on the core of the range, where the majority of products lie.

If/when after setting the scale, Aggregated Footprint Values are calculated for products that sit beyond the extremes of the original range, they will also be placed in these open-ended categories (e.g. A and E).

6.3.4.3.2 Defining the boundaries

EBS approach

EBS proposes to adopt regular intervals of the core thresholds between performance classes (i.e. between the top and bottom thresholds which define the extremes). There will be hard boundaries, but no matter how close a product's Aggregated Footprint Value is to a boundary, it will be given its rating based on which side it falls.

Rationale

After absorbing the outliers into the upper and lower limits of the range (as opposed to letting them dictate the limits), the simplest approach to dividing up the core range of Aggregated Footprint Values is into equal sections on the basis of the Aggregated Footprint Value.

For this core range, there is a direct link between the environmental impact and the EcoBeauty Score.

6.4 Consumer testing approach and insights

6.4.1 Objectives and methodology

In order to understand consumer reactions to and preferences for an environmental impact label on cosmetics products, the Consortium has conducted a series of consumer tests.

This began with a qualitative test in summer 2022 to understand the interest of consumers, relevancy of our approach and specifically the clarity of three proposed score design concepts. This test was conducted with consumers across three markets: France, the US and China.

Methodology

- Three groups per country, so as to rotate the stimuli.
- Multi-channel consumers (mass and luxury)
- Aged 30-50 (FR-US) 20-35 (China)
- Total of 50+ consumers with mixed levels of sustainability engagement/knowledge. No militants

A fictional brand CARE was created for the purpose of the test and three product types – shampoo, face cream and lipstick – were mocked up with this branding. Consumers were shown a product score on both a fake product web page and fake product packshot displaying one of the three score designs, with exposure to a design one at a time.

This initial 'cold' exposure to the score without any further context was designed to gain clear insights regarding points of clarity/understanding of each design route. Following this, more information was then progressively revealed in the form of a product page simulation, to identify which part of the content is most useful to bring understanding/relevance/ credibility/ likeability.

6.4.2 Key insights

The outcomes from the qualitative testing are very encouraging with some questions to be addressed:

- There is interest in the EcoBeautyScore regardless of consumer cultural maturity or sustainability awareness and a **general expectation that this new environmental scoring information is made available** either on digital product information or on pack.
- There is **no tangible reason not to use the same score layout globally**: even though there are diverse "cultures of scoring", **green to red color codes are considered clear, univocal and universal**.
- As consumers have high expectations of "Clean Beauty" (especially in France and US) **it is key that the notion of environmental impact is communicated via the score design,** otherwise there is a risk that EBS is confused with a "Clean Beauty" score.
- **Transparency is viewed as a brand asset**.
- Impact on product desirability: when hesitating between two products, **consumers will generally prefer the one with a greener score.** However, if their favorite product displays a low score, most will still buy it and expect the brand to work on reducing the product's environmental impact.
- The **narrative** explaining the science-based Life Cycle Assessment principles, industry voluntary participation and third part verification **is judged clear, educational and credible**.
- Regarding the **product segments**: consumers are keen to see a score for face care because they consider an environmentally friendly product will also be better for their skin, rather than shampoo as this is washed down the drain. There was a lower interest in seeing a score for lipstick products.

- The products consumers most expected to display environmental impact scores include natural/green brands, followed by dermo-cosmetics, then luxury, then mass market products.

6.4.3 Next steps

The Consortium has leveraged these insights to put a refined two score designs into quantitative consumer testing. This is being conducted across four markets: France, US, China and Brazil. Early indications align with the insights from qualitative testing that the initiative is welcomed by consumers who believe it is relevant to the category. Most consumers understand well that products are scored according to their environmental impact and intend to take environmental performance into consideration when making purchasing decision.

7 Critical review of EBS methodology

7.1 Objective of the panel

The review covered all methodological aspects developed by the Consortium:

- Footprinting methodology – incl. strategy for filling data gaps
- Scoring methodology – incl. key principles/rules for product segmentation

The review did NOT cover the communication aspect of the scoring.

7.2 Experts' mission

The mission proposed was a two main steps approach:

- Methodological orientations (early stage) conducted end of 2022.
- Methodological review (full review) conducted in 2023.

7.2.1 Methodological orientations (early stage)

The objective was to provide first recommendations on the main methodological orientations taken, but not limited to, and ensure that these are consistent with the objectives and methodological framework of the project.

More precisely, it was expected from the panel expert to provide advice on:

- If the overall direction adopted for the methodology is the right one and if it is aligned with EBS principles and goals.
- If there are already red flags into the methodological approach proposed.
- If there are major methodological elements missing from the EBS methodology.
- What are the key items of focus anticipated for the in-depth review.

7.2.2 Methodological review (full review)

The objective is to conduct a full review of the footprinting methodology with a perspective of PEF-alignment whenever it is possible and advise on the scoring methodology.

More precisely, it is expected from the panel expert to:

- Conduct a critical review of the footprinting methodology and data strategy developed for EBS.
- Advise on the overall consistency of the footprinting and scoring methodological choices made, including on deviations from PEF, their justifications, and the alternative approach.

The comments from the expert panel have been analyzed by EBS members, and the most relevant have been integrated in the first version of the EBS methodology. Other comments have been parked for future iterations of the methodology.

8 "Real Data" Testing Phase (RDTP) process

The current ongoing testing phase (end 2023 to Q1 2024) has been called "real data testing phase" as it is the first time the EBS methodology is tested at scale, on the 4 product segments selected.

Members from the EBS consortium have been encouraged to provide product specifications data, on a voluntary basis, with the intent to obtain sufficient representativity in the number of products assessed per segments.

The results of the RDTP are meant to:

- Test the methodology at scale (> 3000 products) and ensure overall consistency of the system developed.
- Inform the decisions required on the last remaining methodological questions to stabilize the first version of the EBS methodology for the 2024 Go-Live

9 Tool Development

The objective of EBS Consortium is to develop a tool based on the footprinting and scoring methodology defined above, relying on the harmonized database developed by the EBS consortium.

The system will be made available to the whole cosmetic industry sector; therefore it should be understandable and usable internally by any company without internal LCA expertise, whatever its size and its level of expertise.

This V1 tool will be in development in 2024, based on the version of the methodology stabilized post RDTP.

10 Footprinting and scoring system updates.

The impact calculations and scale thresholds will be updated to take into account updates in source data, in accordance with the recommendations of all scientific organizations developing impact models.

The frequency of updates and the process to manage the updates is still to be defined.

Nevertheless, EBS methodology does not foresee a recalibration of the thresholds on the basis of an updated catalog. The aim is to keep track of the improvement of our products thanks to company eco-design efforts; as their catalogs improve, the number of low rated products should decrease, as their rating classes improve. So, it will also be a next step for EBS members to define the frequency of recalibration of the scoring scale thresholds and the associated process.

11 References

European Commission, Joint Research Centre, Cerutti, A., Pant, R., Sala, S. (2018)*Development of a weighting approach for the environmental footprint*, Publications Office. **https://data.europa.eu/doi/10.2760/945290**

Zampori, L., & Pant, R. (2019). Suggestions for updating the Product Environmental Footprint (PEF) method.*Publications Office of the European Union: Luxembourg*.

Latest version of the EF recommendation and Annex I for PEF:
Corrigendum to Commission Recommendation (EU) 2021/2279 of 15 December 2021 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations - ANNEX I
Product Environmental Footprint Method
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32021H2279R(01)

Global environmental impacts: data sources and methodological choices for calculating normalization factors for LCA - E. Crenna, M. Secchi, L. Benini, Serenella Sala (2019)

12 Glossary

Environmental Footprint (EF)	• A quantitative measure of the environmental impacts a product or service has throughout its life cycle. It takes into account the resources used to produce the product and its subsequent generation of gases, liquid and solid wastes.
Environmental Footprint (EF) Impact Assessment Methodology	• Set of **rules and procedures** to be used to assess the environmental footprint of a product using a **Life Cycle Assessment (LCA) approach**. • It covers notably the **scope** to be considered, the **functional unit**, **system boundaries**, **reference flows, calculation formulas**, **data requirements**, **default assumptions, limitations, impact categories, additional information** etc. • **Synonyms**: Environmental Footprint Method, Environmental Assessment Method, Environmental Impact Assessment Methodology
Life Cycle Inventories (LCI)	• ” Building **blocks**” of the environmental impact assessment, they describe a list of all **inputs and outputs required** for the production of a given activity (e.g., production of 1 kg of Material X, consumption of Y kWh of electricity in each country, etc.), which are presented in the form of a dataset. • These datasets are composed of activity data (see “Activity data”), and can be derived from several sources, either company-provided or generic. • The environmental impacts of each of these building blocks are combined with the **product’s characteristics** to obtain the environmental impact of a given product. • **Synonym**: Environmental datasets
Environmental Footprint (EF) Impact Assessment Tool	• Assessment tool that generates the environmental footprint of a product within its life cycle phases, based on characteristics (material type and quantity, type of processes etc.) and environmental **datasets**, according to the **Environmental Footprint Impact Assessment Methodology**. • The typical output of an impact assessment tool is a set of **environmental footprint indicators** (and possibly an **aggregated**

<table>
<tr><td></td><td>footprint that combines those different indicators through normalization and weighting) by functional unit.
• Synonyms: Environmental Footprint Tool, Environmental Assessment Tool, Life Cycle Assessment Tool</td></tr>
<tr><td>Environmental Footprint (EF) Impact category</td><td>• Specific categories that link the type of resource used and the subsequent environmental impact to which the life cycle inventory data are related.
• This PEF-aligned methodology uses 16 specific categories: climate change, ozone depletion, human toxicity (cancer), human toxicity (non-cancer), particulate matter, ionizing radiation (human health), photochemical ozone formation (human health), acidification, eutrophication (terrestrial), eutrophication (freshwater), eutrophication (marine), ecotoxicity (freshwater), land use, water use, resource use (minerals and metals), resource use (fossils)</td></tr>
<tr><td>Environmental Footprint (EF) Impact Category Indicator</td><td>• The quantifiable representation of the EF impact category with a corresponding unit.
• Synonym: Environmental Footprint Indicator
• Example:
<table>
<tr><th>EF Impact category</th><th>EF Impact category indicator</th><th>Unit</th></tr>
<tr><td>Climate change, total</td><td>Global warming potential (GWP100)</td><td>kg CO_2 eq</td></tr>
</table></td></tr>
<tr><td>Environmental Scoring Methodology</td><td>• Set of rules and procedures to be used to assess the <u>relative</u> environmental score of products.
• The environmental score is typically relative to a pre-defined scale (e.g., A to E or 0 to 100), with upper and lower limits defined for each product segment, potentially applicable to several impact categories separately.
• The scoring shall be based on LCA impact assessment only according to the environmental footprinting methodology developed within the EBS Consortium.
• Synonym: Method for defining Performance Classes and Benchmark</td></tr>
<tr><td>Environmental Scoring Tool</td><td>• Assessment tool that generates the relative environmental score of a product according to the Scoring Methodology
• Synonym: Environmental Benchmark Tool</td></tr>
</table>

Environmental Labelling	• On a general point of view, the term may refer to **self-declared environmental claims** (ISO14021), **ecolabels** (ISO14024) or **Environmental Product Declarations** (ISO14025).) • Within the context of the Consortium, the term does not apply to the Development, but is only meant as a **consumer-friendly way of communicating a relative environmental score generated based on the set of environmental footprint indicators (or aggregated footprint of a product), calculated using an LCA-based approach**, typically displayed on the packaging itself or digitally (e.g. on the website of the brand).
Functional Unit (FU)	• Provides quantitative and qualitative characteristics to the function of the product or service. According to the PEF guidelines, it does so by defining the following questions: "What?" "How much?" "How long?" "How well?" • **Example**: Provide full coverage and decoration to 1 pair of lips for 6h. • The FU allows for fair comparisons between products that have the same function.
Reference Flow	• The amount of output within a product system required to satisfy the function described in the functional unit. • **Example**: 2.25 grams of lipstick products
System Boundary	• The description of what is included or excluded from the analysis. • **Example**: The system boundary of a 'cradle-to-grave' analysis includes all life cycle activities of a product - from raw material extraction to the use and disposal methods
Ingredient	• A component within the formula of cosmetic products. It can be described as a chemical substance or/and a component of a raw material used to produce the formula. Each ingredient shall be identified, as a minimum, by its INCI name as a reference
Activity Data	• This term refers to information which is associated with processes while modelling Life Cycle Inventories (LCI). It particularly corresponds to the input parameters that are attributable to a product and are required for generating a footprint and ultimately a score. • **Examples**: quantity of kilowatt-hours of electricity used, quantity of fuel used, output of a process (e.g. waste), number of hours equipment is operated, distance travelled, floor area of a building, etc. • Activity data can be provided or collected by a specific company or be generic (generated from industry averages and literature reviews, sourced from third-party databases).

	• The aggregated LCI inputs and outputs of the process chains that represent the activities of a process are each multiplied by the corresponding activity data and then combined to derive the environmental footprint associated with that process.
	• In the case of the first version of the Tool, this data type can either be:
	  ○ Default, not changeable: the data for a given parameter is used in the calculations, but cannot be changed by users
	  ○ Default, changeable: Generic data is proposed, but can be changed by users
	  ○ Mandatory values: Specific data that must be entered or selected from a pre-defined list by users.
	• **Synonym**: Product-specific data, product specification

Company-specific Data	• This term refers to directly measured or collected data from one or more facilities (site-specific data) that are representative for the activities of the company (company is used as synonym of organization). • Company specific data covers site-specific, supplier-specific, or value-chain-specific data. It may be obtained through meter readings, purchase records, utility bills, engineering models, direct monitoring, material/product balances, stoichiometry, or other methods for obtaining data from specific processes in the value chain of the company. • In this project, company-specific data is synonym of "primary data" or "supply-chain specific data" and is essentially primary datasets of what is termed 'Life Cycle Inventories'. • **Example**: Dataset for producing 1 kg of ingredient X, etc.
Generic Data	• Generic data covers Environmental datasets that are not directly collected, measured, or estimated by the company carrying out the assessment, but sourced from a third-party life-cycle-inventory database or other sources e.g., from published production data, government statistics, or industry associations), literature studies, engineering studies and patents, and can also be based on financial data, and contain proxy data, and other generic data. • In the case of the first version of the Tool, generic data can be used to replace certain company-specific data if, for the given case, it is more accurate and complete than the available data (i.e. supplier-operated processes). • **Synonym**: harmonized data, secondary data

Default data	• Default data refer to industry-average parameters (e.g. product manufacturing scenarios, end-of-life scenarios, default transport distances…)
Primary Data	• Data from specific processes within the supply chain of the product, which can be site-specific, company-specific, or supply-chain specific.
Secondary Data	• This refers to data that is not directly collected, measured, or estimated by the company, but sourced from a third party LCI database or other sources. Secondary data includes industry average data (e.g., from published production data, government statistics, and industry associations), literature studies, engineering studies and patents, and may also be based on financial data, and contain proxy data, and other generic data.
Product Segments	• Group of products (or services) that can fulfil equivalent functions (ISO 14025: 2006).) • Hair Wash, Facecare, Bodycare, Decorative cosmetics, Oral care, Fragrance, Grooming. • **Synonym**: Product group, product category
Product Type	• Any goods or services (ISO 14025:2006) • Product types do not automatically translate to a product segment. • **Examples**: The proxy product segments selected purely for the purpose of the development first version of the Tool, ○ i.e.: lipsticks & gloss, shampoo, or face cream. • **Synonym**: Product
Co-product	• When the same system or unit process generates more than one product.

1142