How to develop a PEFCR/OEFSR?

Training

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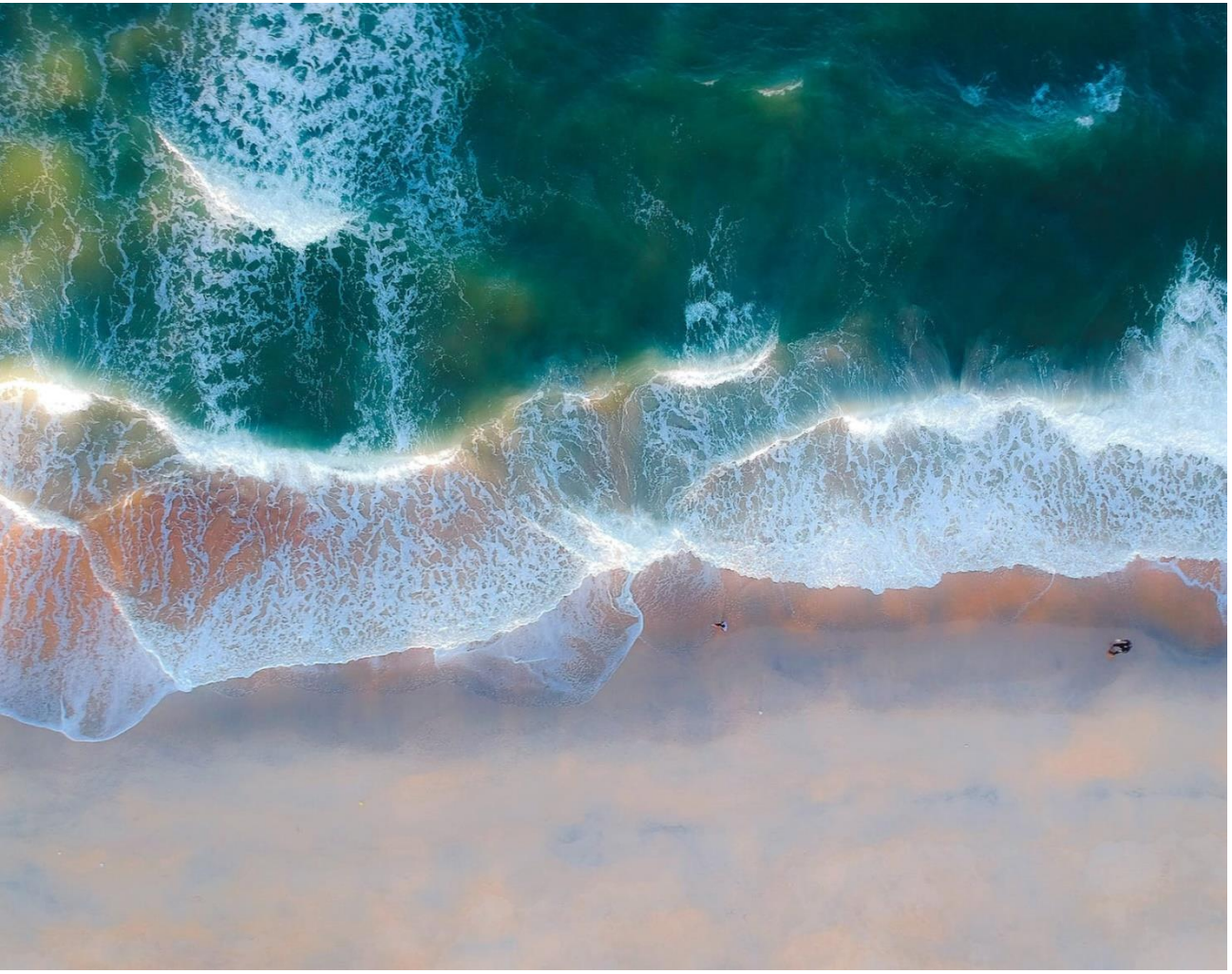
Agenda

- 11:00 – 11:15 Welcome
- 11:15 – 12:15 Introduction and basics
- 12:15 – 13:15 Defining the scope of PEFCRs/OEFSRs
- 13:15 – 14:15 Lunch break
- 14:15 – 15:45 Life cycle inventory
- 15:45 – 16:00 Afternoon break
- 16:00 – 16:40 Data collection and data quality requirements
- 16:40 – 17:15 PEF/OEF results and interpretation
- 17:15 – 17:30 Reporting, verification and validation requirements
- 17:30 – 18:00 Questions and wrap up

Before we start…

- Organisational issues:
  - All slides will be provided after the training via the website of the EC.
  - Open discussions during the presentation are welcome! However, focus of the training is not how to perform PEF/OEF studies, but how to develop PEFCRs/OEFSRs!
  - Please provide feedback to us after the training using the feedback form.
  - Wifi:
    - username: lcm2019
    - password: 5duBU4de9pa

- Level of experience?
  - How many of you have already calculated an LCA study?
  - How many of you have been part of the EF pilot phase, e.g. as a stakeholder?
  - How many of you have taken part in the PEF/OEF training in Helsinki?
  - How many of you have taken part in the webinars given so far during the EF transition phase?



Introduction and basics

Environmental Footprint Initiative: Why?

For consumers

Choosing the right product and understanding labels

For green producers

Fair competition against false green claims

What is a PEFCR?

Product Environmental Footprint Category Rule (PEFCR):

Consistent and specific set of rules to calculate the relevant environmental information of products belonging to the product category in scope.

Objectives:

- Fix consistent and specific set of rules to calculate relevant environmental information of products in a certain product category
- Enable comparisons and comparative assertions

What is an OEFSR?

Organisation Environmental Footprint Sector Rule (OEFSR):

Consistent and specific set of rules to calculate the relevant environmental information of the organisations belonging to the sector in scope.

Objectives:

- Fix consistent and specific set of rules to calculate relevant environmental information of organisations in a certain sector
- Enable comparisons and comparative assertions between organisations or of for one organization over time

Advantages of PEFCRs/OEFSRs

- Enable comparisons and comparative assertions by PEF/OEF studies using the same calculation rules and the same generic data
- Making comparisons possible with a representative product/ organisation
- Focus on what matters to make PEF/OEF studies easier, faster and less costly

Role of PEFCRs and relation with existing PCRs

- PEFCRs should be (not shall) in conformity with existing relevant international Product Category Rules (PCRs):
  - » To the extent possible
  - » Recognising different application contexts
- If other PCRs are available from other schemes, these are to be listed and evaluated. They may be used as a basis for developing a PEFCR.

Role of PEFCRs and relation with existing PCRs

PCR according to ISO 14025:

- Identification of the product category for which a PCR is to be developed, including a description of, for example, the product's function(s), technical performance and use(s);
- Definition of the goal and scope for the Life Cycle Assessment (LCA) of the product, according to the requirement of the ISO 14040 series in terms of, for example, functional unit, system boundary, data quality requirements;
- Description of the Life Cycle Inventory (LCI) analysis, with special focus on the data collection phase, calculation procedures, and allocation rules;

Role of PEFCRs and relation with existing PCRs

PCR according to ISO 14025 (continued):

- Choice of the impact category indicators to be included in the LCA;
- Description of any eventual predetermined parameter for the reporting of LCA data, for example, certain predetermined inventory data categories and/or category indicators;
- If not all life-cycle stages are included in the LCA, information/ justification on which stages are not covered;
- Time validity of the PEFCR being developed.

PEF method is in compliance with ISO 14025, but more specific and more stringent.

Modularity and PEFCRs

The development of “modules” allows for a higher level of consistency among different supply chains that are using the same modules as part of their LCA.

There are different scenarios that require a modular approach:

a) A final product using in its BoM an intermediate product for which there is already an existing PEFCR or a final product that becomes part of the life cycle of another product;

b) A final product using a component or product that is already used as a component by another.

Potential applications for PEF studies

Without an existing PEFCR

With an existing PEFCR

Additional:

- Comparisons and comparative assertions
- Comparisons and comparative assertions against the benchmark
- Identification of significant environmental impacts common to a product group
- Reputational schemes giving visibility to products that calculate their life cycle environmental performance

Potential applications for OEF studies

Without an existing OEFSR

With an existing OEFSR

Additional:

- Identification of significant impacts common to a sector
- Comparisons and comparative assertions against a reference system
- Identification of significant environmental impacts common to a product group
- Participation in 3rd party schemes

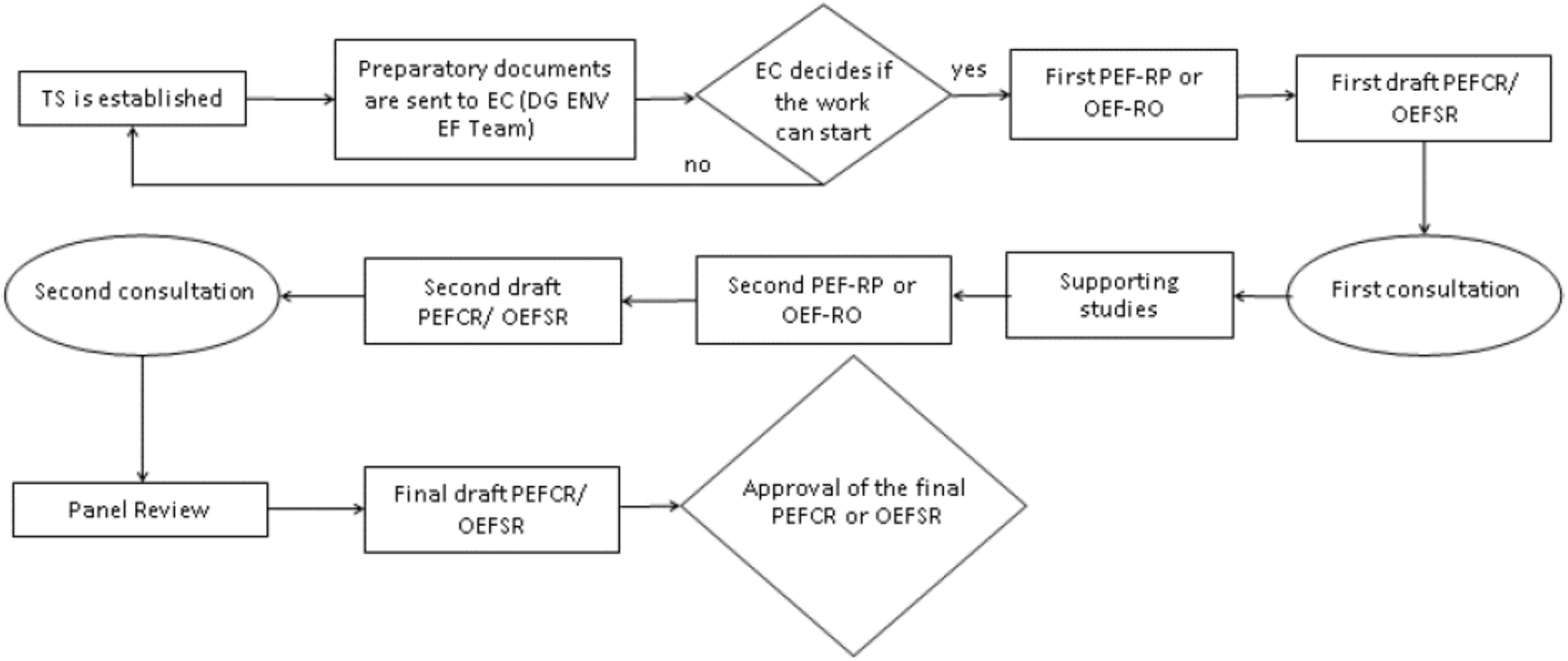
PEFCRs and OEFSRs from the pilot phase

- OEFSRs:
  - Copper production
  - Retail
- PEFCRs:
  - Beer
  - Dairy
  - Decorative paints
  - Household liquid laundry detergents
  - Hot and cold water supply pipe systems
  - Intermediate paper product
  - Thermal insulation
  - Metal sheets
  - Feed for food producing animals
  - IT equipment
  - Leather
  - Packed water
  - Pasta
  - Pet food
  - Photovoltaic electricity production
  - Rechargeable batteries
  - T-shirt
  - Uninterruptible Power Supply
  - Wine

Participation of the pilot phase

- 280 organisations involved (industry associations, large OEMs)
- ~3.000 stakeholders involved

Process of developing new PEFCRs/OEFSRs



Defining the representative product

The representative product (RP) shall be based on actual, current situation, not on future developments

RP:

- a real or a virtual (non-existing) product
- calculated based on average European market sales-weighted characteristics of all existing technologies/ materials covered by the product category or sub-category

Defining the representative organisation

The representative organisation (RO) shall be based on actual, current situation, not on future developments

RO:

- a virtual (non-existing) organisation built, for example, from the average EU sales-weighted characteristics of all existing technologies, production processes and organisation types

First PEF/OEF study of RP/RO

- The first PEF-RP/OEF-RO aims at:
  - » Identifying the most relevant impact categories
  - » Identifying the most relevant life cycle stages, processes and elementary flows
  - » Identifying data needs, data collection activities and data quality requirements
- Cut-offs may only be included in the final PEFCR/OEFSR based on the rules included in the PEF/OEF method.
- The first PEF-RP/OEF-RO and its report shall be reviewed by the review panel and a public review report shall be provided as its annex.

First draft PEFCR/OEFSR

- Based on the results of the first PEF-RP/OEF-RO TS shall produce a first draft PEFCR/OEFSR, used to carry out the PEFCR/OEFSR supporting studies
- The first draft PEFCR/OEFSR shall include all requirements needed for the supporting studies, with particular reference to company-specific data collection tables and procedures

Supporting studies

- For each RP/RO at least three PEF/OEF supporting studies shall be carried out by company not involved in PEFCR/OEFSR or review panel:
  - » No cut-off is allowed
  - » Hot spot analysis must be included
  - » Different company sizes/ technologies/ countries
- Supporting studies shall be reviewed by the review panel

Second PEF/OEF study of RP/RO

- TS shall carry out a second PEF-RP/OEF-RO
  - ⇒ It shall consider the information gathered through the first consultation and the supporting studies.
  - ⇒ In addition: EF 3.0 compliant dataset
- The second PEF-RP and its report shall be reviewed by the review panel and a public review report shall be provided as its annex.

Second draft PEFCR/OEFSR

- TS shall draft the second draft PEFCR/OEFSR taking into consideration all learnings of PEF-RP/OEF-RO
- Identification of data gaps is important

Final draft PEFCR/OEFSR

Following documents need to be sent to the Commission:

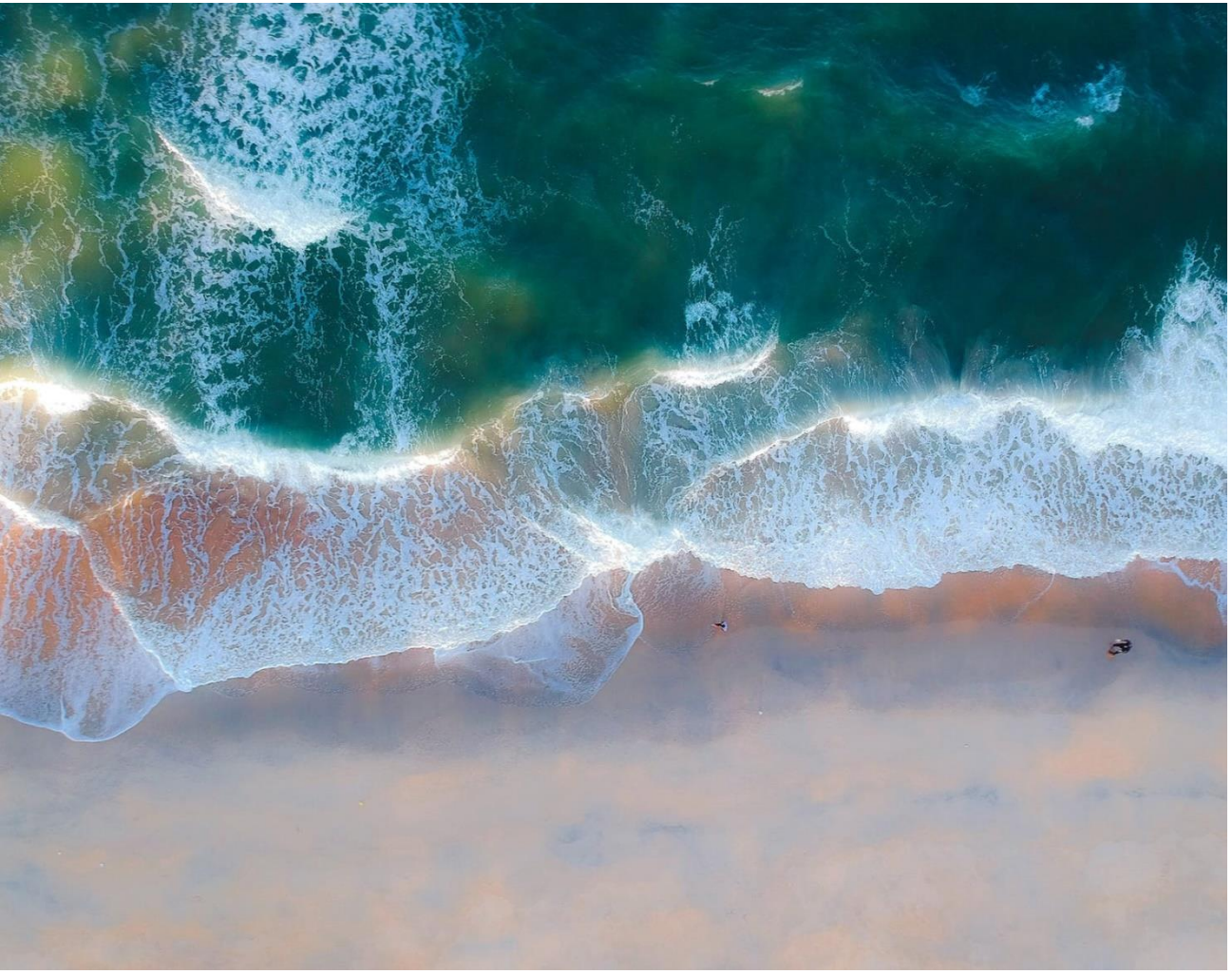
- final draft PEFCR/OEFSR
- confidential review report of the PEFCR/OEFSR
- public review report of the PEFCR/OEFSR
- second PEF-RP/OEF-RO report (including its public review report)
- review statements on the supporting studies
- all EF compliant datasets used for the modelling
- the model(s) of the RP(s)/RO(s) in excel format
- EF compliant dataset of each RP/RO (aggregated and disaggregated, see details in section A.2.10.3)

PEFCR/OEFSR review

- TS shall set up an external independent third-party review panel for the PEFCR/OEFSR review:
  - » Minimum three members (LCA/industry/NGO)
  - » Competence established (review experience/LCA methodology/knowledge of the sector)*
- Review of:
  - » First and second PEF-RP, including the RP model and PEF-RP reports (public review report for each);
  - » Supporting studies (review statement to be provided to the Commission);
  - » Second draft PEFCR (confidential and public review report).

Consultation Process

- Each TS shall organize at least 2 open consultations, which can be held online or through in-person meetings:
  - 1st consultation shall focus on the first draft PEFCR | OEFSR and related documents
  - 2nd consultation shall focus on the second draft PEFCR | OEFSR and related documents
- The duration of each consultation shall be 3 - 6 weeks (7 over Christmas or Easter)
- The TS shall provide written replies to each comment received. The file will be made available in the wiki.



Defining the scope of PEFCRs/OEFSRs

PEFCR vs. OEFSR

PEFCR	OEFSR
Product categories => products => Represenative Product (RP)	Sectors => organisations => Representative Organisation (RO)
Product Life Cycle => processes	Activities => within the organisation, upstream and downstream
Functional Unit (FU)	Reporting Unit (RU); Product Portfolio (PP)
Product Life	Business year
PEF method	OEF method
	

Product categories and sub-categories

- Primary objective of PEFCR: provide consistent set of rules to calculate environmental impacts of **products** belonging to a **product (sub-)category**
- For heterogenous product categories it might be necessary to split a product category in multiple **sub-categories** to avoid that hotspots are overlooked and to ensure comparability

Requirements for PEFCRs

⇒ Products having similar functions and applications should be grouped within the same PEFCR

⇒ Each sub-category shall be clearly described and will have it´s own representative product (RP) and benchmark together with most relevant processes, life cycle stages, direct elementary flows and impact categories

Example

This PEFCR covers all wine subcategories:

- **Still wine**: the product obtained exclusively from the total or partial alcoholic fermentation of fresh grapes or of grape must. Wine shall have a minimum actual alcoholic strength and specific minimum limits are settled for different wine-growing zones.
- **Sparkling wine**: obtained by first or second alcoholic fermentation from fresh grapes, from grape must or from wine and which, when the container is opened, releases carbon dioxide derived exclusively from fermentation. It includes quality sparkling wine, quality aromatic sparkling wine, aerated sparkling wine, semi-sparkling wine and aerated semi-sparkling wine.

Source: PEFCR for wine

Sectors and sub-sectors

- Primary objective of OEFSR: provide consistent set of rules to calculate environmental impacts of **organisations** belonging to a **(sub-)sector**
- Might be necessary to split a sector in multiple **sub-sectors** to avoid that hotspots are overlooked and to ensure comparability

Requirements for OEFSRs

⇒ Organisations having similar product portfolios (PPs) should be grouped within the same OEFSR

⇒ Each sub-sector shall be clearly described and will have it´s own representative organisation (RO) together with most relevant processes, life cycle stages and impact categories

Example

This OEFSR addresses the activities related to the **retail sector** that covers all activities involving the sale of products[13] to consumers.

This OEFSR may be used by all different types of retailers (e.g., independent stores, chains, franchises, etc.) selling food, fast-moving consumer goods (e.g., shampoo), durable goods (e.g., dishwashers), consumables (e.g., t-shirt) and services (e.g., oil change) to the end user for personal, professional or household use and consumption, **to assess their OEF** over part or full of their product portfolio, including the full life cycle of the product portfolio chosen.

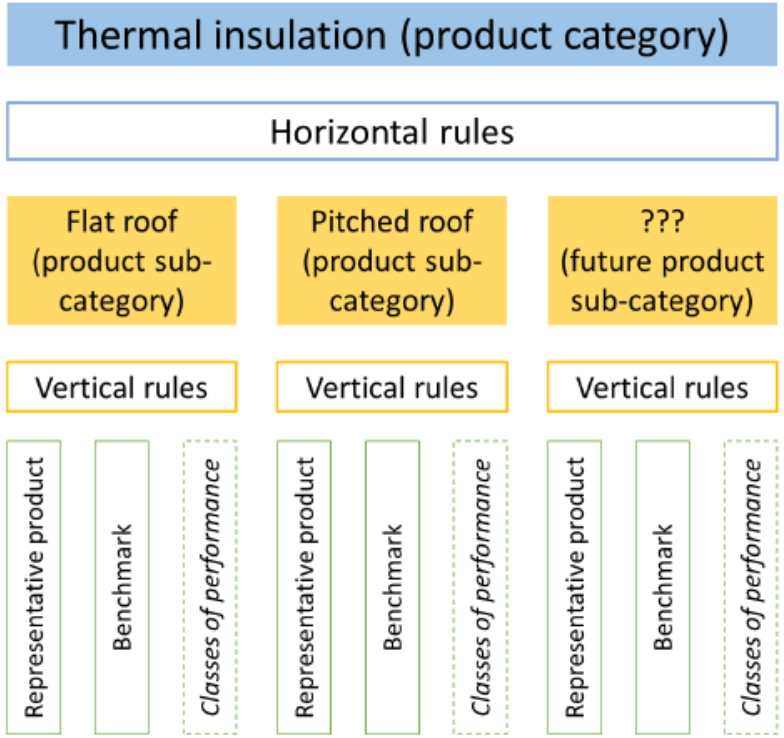
A retailer may engage in the following two major types of activities:

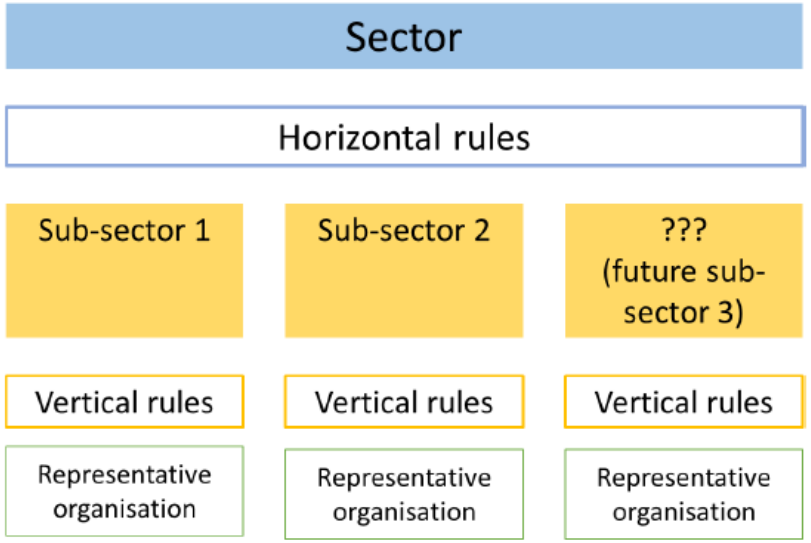
- The **sale of products**: retailing logistics that include all activities necessary for the service of buying and selling products
- The **production and service provision of in-house products**: where the retailer has control (taking into account both financial and operational control)

Source: OEFSR for Retail

Horizontal vs. vertical rules

- There are two kinds of rules:
  - » **“horizontal” rules**: valid for all products/sectors in scope; prevail over vertical rules
  - » **“vertical” rules**: applicable only to a sub-category/sub-sector





Horizontal vs. vertical rules: requirements

Requirements for PEFCRs/OEFSRs

⇒ PEFCRs/OEFSRs shall cover:

- Horizontal rules for all products/sectors in scope
- Vertical rules valid for a sub-category/sub-sector

PEFCR: comparisons (I)

Requirements for PEFCRs

⇒ PEFCR shall enable comparison of products belonging to the same product category and/or sub-category.

⇒ If sub-categories are included: Comparison of products belonging to the same sub-category shall always be allowed.

⇒ However, technical secretariat (TS) may decide (and state), if a comparison among all products belonging to the overarching product category is allowed. If yes:

- A RP shall be defined also at overarching product category level.
- TS shall provide benchmark values of each RP, both at overarching category and sub-category level.
- For the RP of the overarching category the most relevant impact categories shall be calculated for communication purposes, in addition to the calculation of the most relevant impact categories, life cycle stages and direct elementary flows identified for the RP of each sub-category.

⇒ TS may decide (and state), if a cross-comparison of products belonging to two or more different sub-categories is allowed.

PEFCR: comparisons (II)

	Single product category in PEFCR	Category and sub-categories in PEFCR	
		Within the category	*Within the sub-category*
Definition of a RP	Shall	May	Shall
Comparative assertion via benchmark for final products	Shall	May. Shall, if a RP is defined at overarching category level.	Shall
Comparative assertion among final products	Shall	May The TS decides in which cases comparison among products in different sub-categories is allowed.	Shall

OEFSR: comparisons

Requirements for OEFSRs

⇒ Comparisons shall be allowed, within a single sector or within sub-sectors.

⇒ TS shall specify conditions under which comparisons are possible.

⇒ TS shall specify, if cross-comparisons of organisations in different sub-sectors is allowed.

	Single sector in OEFSR	Sector and sub-sectors in OEFSR	
		Within the sector	*Within the sub-sector*
Definition of a RO	Shall	May	Shall
Provision of rules in the OEFSR to enable comparisons and comparative assertions among organisations	Shall	May The TS decides if and in which cases comparison among organisations in different sub-sectors is allowed.	Shall

Scope of a PEFCR/OEFSR

- Scope of a **PEFCR** should be based on the function
  ⇒ Meaningful comparisons only, if products fulfil the same main function
- PEFCR should include as many products as possible available in the market that deliver the same main function
  ⇒ Link to Classification of Products by Activity (CPA) codes

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- Scope of an **OEFSR** shall contain a description of the product portfolio (PP) and applicable NACE code
  ⇒ Meaningful comparisons are only possible if organisations have a similar PP.
- OEFSR shall define:
  - » OEF boundary incl. supply chain stages to be included and all indirect activities (upstream and downstream) and justification, if downstream activities are excluded (e.g. use stage of intermediate products)
  - » Time span to be considered for the assessment (default: 1 year)

Scope of a PEFCR/OEFSR: requirements

Requirements for PEFCRs/OEFSRs

⇒ The scope section of the PEFCR/OEFSR shall contain, as a minimum, the following information:

- General description of the scope of the PEFCR/OEFSR
- Product classification (CPA codes for the products in scope)/NACE codes
- Description of the RP(s)/RO(s) and how it has been derived
- Functional unit + reference flow/reporting unit + definition of PP
- System boundary description and diagram
- List of EF impact categories
- Additional environmental information and additional technical information
- Limitations

General description of the scope: requirements

Requirements for PEFCRs/OEFSRs

⇒ Scope definition shall include a general description of the product category/sector, including:

- Granularity of scope
- Included product sub-categories/sub-sectors (if any)
- Description of the product(s) in scope/belonging to PP and their technical performance
- Omissions

Example

3 PEFCR scope

The product category for this PEFCR includes **packed water not sweetened nor flavoured**. According to EFBW's website (EFBW 2014), water includes **3 varieties**: **i) natural mineral water, ii) spring water and iii) bottled drinking water**, and can be **still or carbonated**[3] (also known as effervescent or sparkling water).[4] All these varieties are in the scope of this document.
The entire life cycle (cradle to grave) of packed water shall be assessed.
For information, there is a limitation on the application of comparison or comparative assertion between different types of packaging materials of packed waters. Since the multi-functionality of packaging is not fully captured, **this PEFCR is not meant to support specific comparison or comparative assertion between packaging materials** (see section 3.6.).

Source: PEFCR for packed water

NACE codes

- Statistical classification of economic activities (NACE): classification system for economic activities on EU level
- Use most current version of NACE codes: Revision 2
- List of NACE codes is available on the website of the EC

n.e.c. : not elsewhere classified			
Division	Group	Class	
			SECTION C — MANUFACTURING
10			Manufacture of food products
	10.1		Processing and preserving of meat and production of meat products
		10.11	Processing and preserving of meat
		10.12	Processing and preserving of poultry meat
		10.13	Production of meat and poultry meat products
	10.2		Processing and preserving of fish, crustaceans and molluscs
		10.20	Processing and preserving of fish, crustaceans and molluscs
	10.3		Processing and preserving of fruit and vegetables
		10.31	Processing and preserving of potatoes
		10.32	Manufacture of fruit and vegetable juice
		10.39	Other processing and preserving of fruit and vegetables
	10.4		Manufacture of vegetable and animal oils and fats
		10.41	Manufacture of oils and fats
		10.42	Manufacture of margarine and similar edible fats
	10.5		Manufacture of dairy products
		10.51	Operation of dairies and cheese making
		10.52	Manufacture of ice cream
	10.6		Manufacture of grain mill products, starches and starch products
		10.61	Manufacture of grain mill products
		10.62	Manufacture of starches and starch products
	10.7		Manufacture of bakery and farinaceous products
		10.71	Manufacture of bread; manufacture of fresh pastrygoods and cakes
		10.72	Manufacture of rusks and biscuits; manufacture of preserved pastry goods and cakes
		10.73	Manufacture of macaroni, noodles, couscous and similar farinaceous products
	10.8		Manufacture of other food products
		10.81	Manufacture of sugar
		10.82	Manufacture of cocoa, chocolate and sugar confectionery
		10.83	Processing of tea and coffee
		10.84	Manufacture of condiments and seasonings
		10.85	Manufacture of prepared meals and dishes
		10.86	Manufacture of homogenised food preparations and dietetic food
		10.89	Manufacture of other food products n.e.c.
	10.9		Manufacture of prepared animal feeds
		10.91	Manufacture of prepared feeds for farm animals
		10.92	Manufacture of prepared pet foods

Requirements for OEFSRs

⇒ NACE code applicable to the sector in scope shall be listed

CPA codes

- Statistical classification of products by activity (CPA): classification system of products at EU level
- Designed to categorize products that have common characteristics as basis statistics on production, trade, consumption, transport, etc.
- It relates to activities defined in NACE codes

  ⇒ Each CPA product is assigned to one single NACE activity

Requirements for PEFCRs

⇒ CPA code of the products in scope shall be listed in PEFCR.

NACE

n.e.c. : not elsewhere classified			
Division	Group	Class	
			SECTION A — AGRICULTURE, FORESTRYAND FISHING
01			Crop and animal production, hunting and related service activities
	01.1		Growing of non-perennial crops
		01.11	Growing of cereals (except rice), leguminous crops and oil seeds
		01.12	Growing of rice
		01.13	Growing of vegetables and melons, roots and tubers
		01.14	Growing of sugar cane
		01.15	Growing of tobacco
		01.16	Growing of fibre crops
		01.19	Growing of other non-perennial crops
	01.2		Growing of perennial crops
		01.21	Growing of grapes
		01.22	Growing of tropical and subtropical fruits

CPA

A	PRODUCTS OF AGRICULTURE, FORESTRY AND FISHING
01	Products of agriculture, hunting and related services
01.1	Non-perennial crops
01.11	Cereals (except rice), leguminous crops and oil seeds
01.11.1	Wheat
01.11.11	Durum wheat
01.11.12	Wheat, except durum wheat
01.11.2	Maize
01.11.20	Maize
01.11.3	Barley, rye and oats
01.11.31	Barley
01.11.32	Rye

Definition of representative product (RP)

- RP may be a real or virtual, final or intermediate product sold on the EU market; it shall reflect the current situation
- RP is the basis for the first and second PEF-RP and is used to identify:
  - » hotspots (most relevant impact categories, life cycle stages, processes, elementary flows)
  - » data needs, data collection activities and data quality requirements (DQR)
  - » the corresponding benchmark

Requirements for PEFCRs

⇒ PEFCR shall include short description of the RP(s)

⇒ TS shall provide an annex with steps taken to define the “model” of the RP

⇒ TS shall take most appropriate measures to preserve confidentiality of data, if applicable

Example

3.2 Representative products

Five different representative products are considered in this PEFCR (Table 6), one for each of the product sub-categories. All representative products are virtual products.

Table 6: Representative products for each sub-category

Sub-category		Representative product
Liquid milk	RP1	Liquid milk, standardised to specific fat content, and thermally treated, homogenised, unsweetened and unflavoured, packaged and conditioned.
Dried whey products	RP2	Whey, whey protein or lactose powder, standardised, with average lactose, protein and dry matter content, average packaging (partly packaged, partly bulk)
Cheeses	RP3	Average of unripened and ripened (soft, semi-hard, hard) cheese, standardised protein and fat, packaged and conditioned
Fermented milk products	RP4	Fermented milk, standardised, cultured, average of skimmed/plain, spoonable/liquid, plain/flavoured/fruited (strawberry), packaged and conditioned
Butterfat products	RP5	Average of butter, half-fat butter and dairy spreads, unsalted/salted, packaged and conditioned

Source: PEFCR for dairy products

Functional unit (FU)

- FU describes qualitatively and quantitatively the function(s) of a product.
- Reference flow is the amount of product needed to fulfil the defined FU.
- A declared unit might be applied for intermediate products, e.g. 1kg, 1m^2 , 1m^3, etc.
- FU of a PEF study shall be defined to four aspects “what”, “how much”, “how well”, “how long”

Let´s define the FU for different floor coverings and the reference flows:

Parquet floor

Laminate

Vinyl flooring

Carpet

Tiles

Functional unit (FU): requirements

Requirements for PEFCRs

⇒ FU shall be described in the PEFCR. In case applicable standards exist, they shall be used and cited in the PEFCR.

⇒ For intermediate products a declared unit may be chosen.

⇒ PEFCR shall explain and document any omissions of the functions of the product in the definition of the FU.

⇒ PEFCR shall describe:

- How each aspect of the FU affects the EF of the product
- How to include this effect in the EF calculations
- How an appropriate reference flow shall be calculated

  ⇒ In case calculation parameters are needed, PEFCR shall provide default values or request parameters as mandatory company-specific data

Example non-food product

3.3 Functional unit and reference flow

The functional unit (FU) is to protect and decorate 1 m^2 of substrate for 50 years at a specified quality level (minimum 98% opacity). The key aspects used to define the functional unit are shown in Table 3.7.

Table 3.7 - Key aspects of the FU

Question	Description
What?	Provide decoration and protection of a substrate
How much?	Coverage of 1 m^2 of substrate
How well?	With a minimum 98% opacity
How long?	For 50 years (life time of the building)

The reference flow is the amount of product needed to fulfil the defined function and shall be measured in kg of paint. All quantitative input and output data collected in the study shall be calculated in relation to this reference flow.

The reference flow shall be calculated with this formula:
kg of paint = 1 (m^2) / Coverage (m^2/L) / applied paint (-) * Paint density (kg/L) * Maintenance multiplier

Source: PEFCR for decorative paints

Definition of the representative organization (RO)

- Representative organisation (RO) shall be present on the EU market reflecting the current situation
- RO may be real or virtual; virtual ROs should be calculated based on sales-weighted characteristics
- RO is the basis for first and second OEF-RO to identify
  - » most relevant impact categories, life cycle stages, processes, elementary flows,
  - » data needs, data collection activities and DQR

Requirements for OEFSRs

⇒ OEFSR include a short description of the RO(s)

⇒ TS shall provide annex to report all steps taken to define and “model” the RO

⇒ TS shall take most appropriate measures to preserve confidentiality of data, if applicable

Reporting unit (RU)

- Reporting unit (RU) is the organisation in scope along with its PP ⇒ parallel to the FU in traditional LCA
- PP is described based on the four aspects “what”, “how much”, “how well” and “how long”
- Reporting interval: should be 1 year; deviations need to be justified

Requirements for OEFSRs

⇒ OEFSR shall require to specify:
  - the name of the organization
  - the kind of goods/services the organization produces
  - locations of operation

- OEFSR shall provide description of PP and reporting interval and require the user of the OEFSR to define its own PP, incl. reference year and reporting interval
- OEFSR shall explain and document any exclusion of products/services from PP
- In case calculation parameters needed, OEFSR shall mandatory ask for company-specific information and provide calculation example

Example

Aspect	**Detail**
[WHAT]	**Blister copper, copper anodes and copper cathodes** – NACE Code: 24.44 Copper production **Sulphuric acid** – NACE Code: 20.13 Manufacture of other inorganic chemicals **Iron silicate (Final slag)** – NACE Code: 23.99 Manufacture of other non-metallic mineral products **Anode slime – NACE Code:** 24.45 Production of other non-ferrous metals **$NiSO_4$, $CuSO_4$, other salts** – NACE Code: 24.45 Production of other non-ferrous metals **Silver /Gold/PGM concentrate** – NACE Code: 24.41 Precious metals production **Lead, Pb-Sn alloys, Tin** – NACE Code: 24.43 Pb, Zn and Sn production **Crude Selenium/Tellurium** – NACE Code: 24.45 Production of other non-ferrous metals **Zinc oxide** - NACE Code: 24.43 Pb, Zn and Sn production **Ammonium perrhenate** - – NACE Code: 24.45 Production of other non-ferrous metals **All metals are associated with copper production and exclude production of these metals from other different sources**

[HOW MUCH]	Quantities produced will be specified over the reporting calendar year. Quantities shall be expressed as mass of each product in the product portfolio.
[HOW WELL]	Excluded from system boundaries as the product portfolio is linked to intermediate products and not to finished products. There are a lot of different possible applications of the products included in the Product Portfolio, so it is not possible to define reliable scenarios for all possible different use phases. The organisation has no influence on the use stage of its products.
[HOW LONG]	Excluded from system boundaries as the product portfolio is linked to intermediate products and not to finished products. There are a lot of different possible applications of the products part of the Product Portfolio, so it is not possible to define all possible different end-of-life scenarios. The organisation has no influence on the end-of-life of its products. Information on recyclability potential at end of life should be provided.[6]
[YEAR]	Specify year of reporting.
[REPORTING INTERVAL]	1 year

Source: OEFSR of copper

System boundary

- System boundary defines which processes belong to the analysed system
  - » PEFCR: life cycle stages of a product and associated processes
  - » OEFSR:
    - Organisational boundary includes all facilities and associated processes that are fully or partially owned and/or operated by the organisation
    - Two types of activities are distinguished
      - **Direct activities**: activities linked to processes within the defined organisational boundary
      - **Indirect activities**: activities that are outside the organisational boundaries necessary to provide PP; they occur upstream or downstream along the supply chains linked to organizational activities
- A flow diagram is a schematic representation of the analysed system; it clearly indicates, which processes are included and excluded

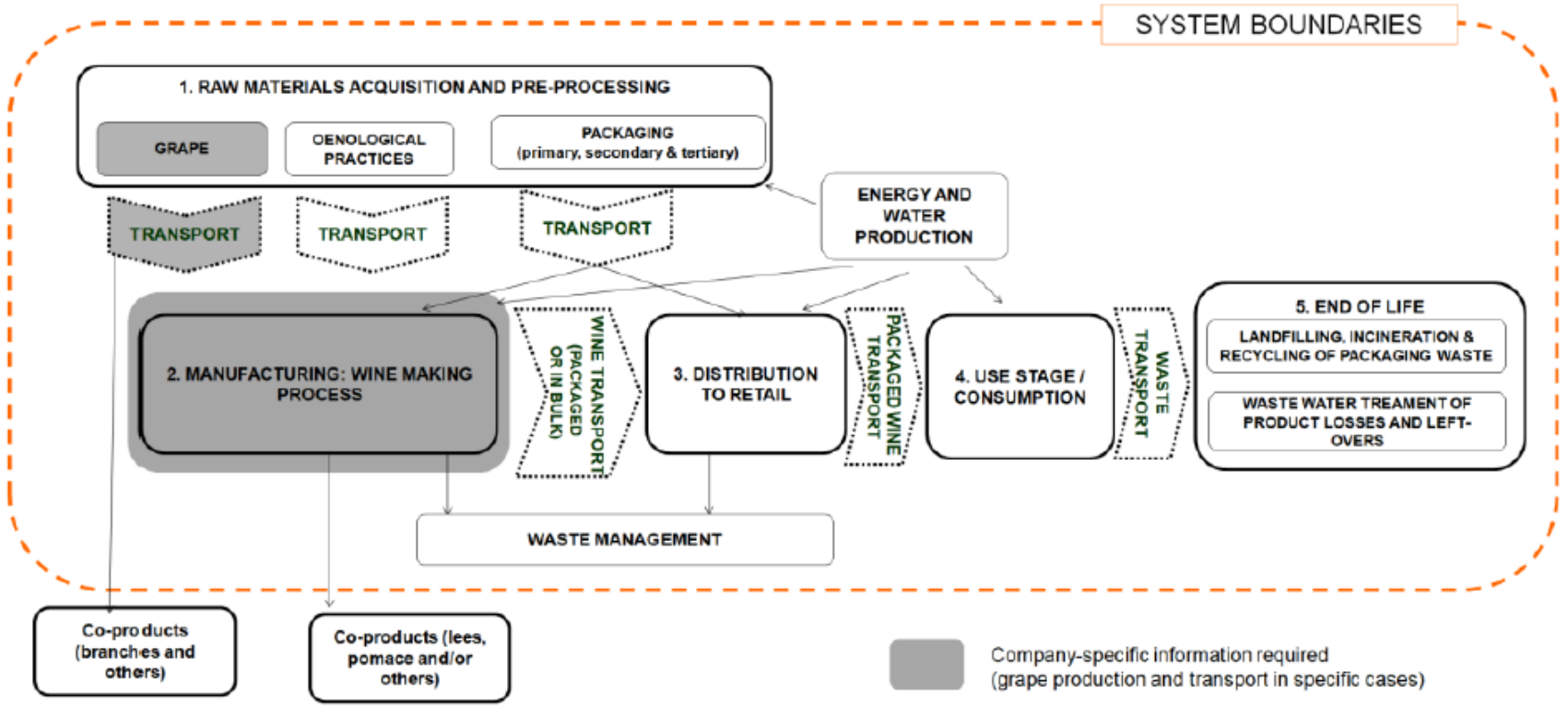
System boundary: requirements

Requirements for PEFCRs/OEFSRs

⇒ PEFCR/OEFSR shall:

- identify and describe processes and life cycle stages (+ direct and indirect activities for OEFSR) that are included in the system boundary
- identify processes that shall be excluded based on the cut-off rule or specify that no cut-off is applicable
- provide a system diagram indicating the processes for which mandatory company-specific data are required, and processes excluded

Example



Source: PEFCR for wine

List of EF impact categories

EF impact category	Impact category indicator	Unit	Characterization model
Climate change	*Radiative forcing as Global Warming Potential (GWP100)*	*kg $CO_{2\ eq}$*	*Baseline model of 100 years of the IPCC (based on IPCC 2013)*
- *Climate change-biogenic* [strikethrough if not to be reported upon]			
- *Climate change – land use and land use change* [strikethrough if not to be reported upon]			
Ozone depletion	*Ozone Depletion Potential (ODP)*	*kg CFC-11 $_{eq}$*	*Steady-state ODPs as in (WMO 2014 + integrations)*
Human toxicity, cancer	*Comparative Toxic Unit for humans (CTU_h)*	*CTUh*	*USEtox model 2.1 (Fankte et al, 2017)*
Human toxicity, non-cancer	*Comparative Toxic Unit for humans (CTU_h)*	*CTUh*	*USEtox model 2.1 (Fankte et al, 2017)*
Particulate matter	*Impact on human health*	*disease incidence*	*PM method recomended by UNEP (UNEP 2016)*

EF impact category	Impact category indicator	Unit	Characterization model
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 implemented 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)*	*kg P $_{eq}$*	*EUTREND model (Struijs et al, 2009) as implemented in ReCiPe*
Eutrophication, marine	*Fraction of nutrients reaching marine end compartment (N)*	*kg N $_{eq}$*	*EUTREND model (Struijs et al, 2009) as implemented in ReCiPe*
Ecotoxicity, freshwater	*Comparative Toxic Unit for ecosystems (CTU_e)*	*CTUe*	*USEtox model 2.1 (Fankte et al, 2017)*
Land use	• *Soil quality index101* • *Biotic production* • *Erosion resistance* • *Mechanical filtration* • *Groundwater replenishment*	• *Dimensionless (pt)* • *kg biotic production* • *kg soil* • *m3 water* • *m3 groundwater*	*Soil quality index based on LANCA (Beck et al. 2010 and Bos et al. 2016)*
Water use	*User deprivation potential (deprivation-weighted water consumption)*	*m^3 world $_{eq}$*	*Available WAter REmaining (AWARE) as recommended by UNEP, 2016*
Resource use[102], minerals and metals	*Abiotic resource depletion (ADP ultimate reserves)*	*kg Sb $_{eq}$*	*CML 2002 (Guinée et al., 2002) and van Oers et al. 2002.*
Resource use, fossils	*Abiotic resource depletion – fossil fuels (ADP-fossil)*	*MJ*	*CML 2002 (Guinée et al., 2002) and van Oers et al. 2002*

List of EF impact categories: requirements

Requirements for PEFCRs/OEFSRs

⇒ PEFCR/OEFSR shall:

- list the 16 impact categories to be used to calculate the PEF/OEF profile
- list most relevant impact categories for the product category/sector and/or sub-categories/sub-sectors
- specify, if the user shall calculate sub-indicators for climate change separately:
  - » Climate Change, fossil
  - » Climate Change, biogenic
  - » Climate Change, land use and land use change
- specify, the version of the EF reference package to be used

EF Reference Packages

- Set of flows, characterisation factors, normalisation factors, weighting factors, etc. is included in the EF reference packages
- EF reference package is available in two versions:
  - » EF Reference Package 2.0: to be used for all EF studies using PEFCRs/OEFSRs developed in the **pilot phase**
  - » EF Reference Package 3.0: to be used for all EF studies using PEFCRs/OEFSRs developed in the **transition phase**

Item	From EF Reference Package 2.0 to 3.0
Impact categories	Updated method for toxicity: • Human toxicity, non cancer • Ecotoxicity, freshwater • Human toxicity, cancer with three sub-categories: ○ metals ○ inorganics ○ organics
Elementary flows	More than 53.000 flows added/~300 deleted
Characterization factors	Update of CFs: land use factors and factors for water use have been recalculated

Additional environmental information

- Not all environmental aspects are fully covered by LCA; therefore, it is possible to ask for additional environmental information in PEFCR/OEFSR
- Examples:
  - Biodiversity: is addressed indirectly by different impact categories (e.g. land use, acidification, eutrophication (terrestrial, freshwater, marine), ecotoxicity (freshwater), climate change)
  - Information on local/site-specific impacts
  - Offsets
  - Environmental indicators (GRI)
  - Noise impacts
- Additional environmental information shall be specific, relevant, accurate and not misleading; it may not double the already covered impact categories

Additional environmental information: requirements

Requirements for PEFCRs/OEFSRs

⇒ PEFCR/OEFSR shall specify, which additional environmental information to report, and whether these are mandatory

⇒ Additional environmental information may be included only if the PEFCR/OEFSR specifies the method that shall be used for its calculation

⇒ Biodiversity shall be addressed by the TS through the following procedure:

1) Assess relevance of biodiversity for products/sectors in scope in first and second PEF-RP/OEF-RO study, e.g. based on expert judgement, LCA-based or through other means already put in place

2) PEFCR/OEFSR shall clearly explain, whether biodiversity is considered relevant or not. If yes: TS shall describe how the user of the PEFCR/OEFSR shall assess and report biodiversity impacts

Additional technical information

- PEFCR/OEFSR is able to ask for reporting of additional technical information
- It may include BOM data, information on the use of hazardous substances, information on energy consumption, use of secondary materials, information about the technical performance of the product, etc.

Requirements for PEFCRs/OEFSRs

⇒ PEFCR/OEFSR shall list additional technical information that shall/ should/ may be reported

⇒ For intermediate products the PEFCR/OEFSR shall request the following information:

- Recycled content (R1-value)
- Biogenic carbon content at factory gate (PEFCR only)
- Results with application-specific A-values of the CFF, if relevant (PEFCR only)

Example

7.3. ADDITIONAL TECHNICAL INFORMATION

The additional technical information listed in Table 7-4 shall be reported in the PEF study.

Table 7-4 Additional technical information that shall be reported

Information	How to report the information
Geographical origin of the ingredients (i.e. agricultural raw materials)	Indication of country of origin of primary ingredient and other ingredients shall be given. In such event, provisions of art. 26, Regulation (EU) n. 1169/2011 apply.
Biogenic carbon content	Physical content and allocated content of biogenic carbon stored at the factory gate

7.4. ADDITIONAL ENVIRONMENTAL INFORMATION

The additional environmental information listed in Table 7-5 shall be reported in the PEF study.

Table 7-5 Additional environmental information that shall be reported

Information	How to report the information
Environmental certifications of the plants (e.g. ISO 14001, EMAS)	Percentage of plants producing the product subject to PEFCR having a certified EMS

The company should also report the results of verified studies carried out to assess the benefit due to practices adopted to reduce the environmental impact of cooking (e.g. use of less water).

Biodiversity is a relevant issue for pasta production and it is measured through 6 impact categories assessed by the EF method (climate change, eutrophication aquatic freshwater, eutrophication aquatic marine, acidification, water use, land use). Biodiversity should also be measured through the percentage of ingredients coming from organic production.

Source: PEFCR for dry pasta

Limitations

- Certain limitations, even if PEF/OEF studies carried out in accordance with PEFCRs/OEFSRs, e.g. use of secondary data, data gaps, use of proxies, default values, use scenarios, normalization factors, etc.

Requirements for PEFCRs/OEFSRs

⇒ PEFCR/OEFSR shall include:

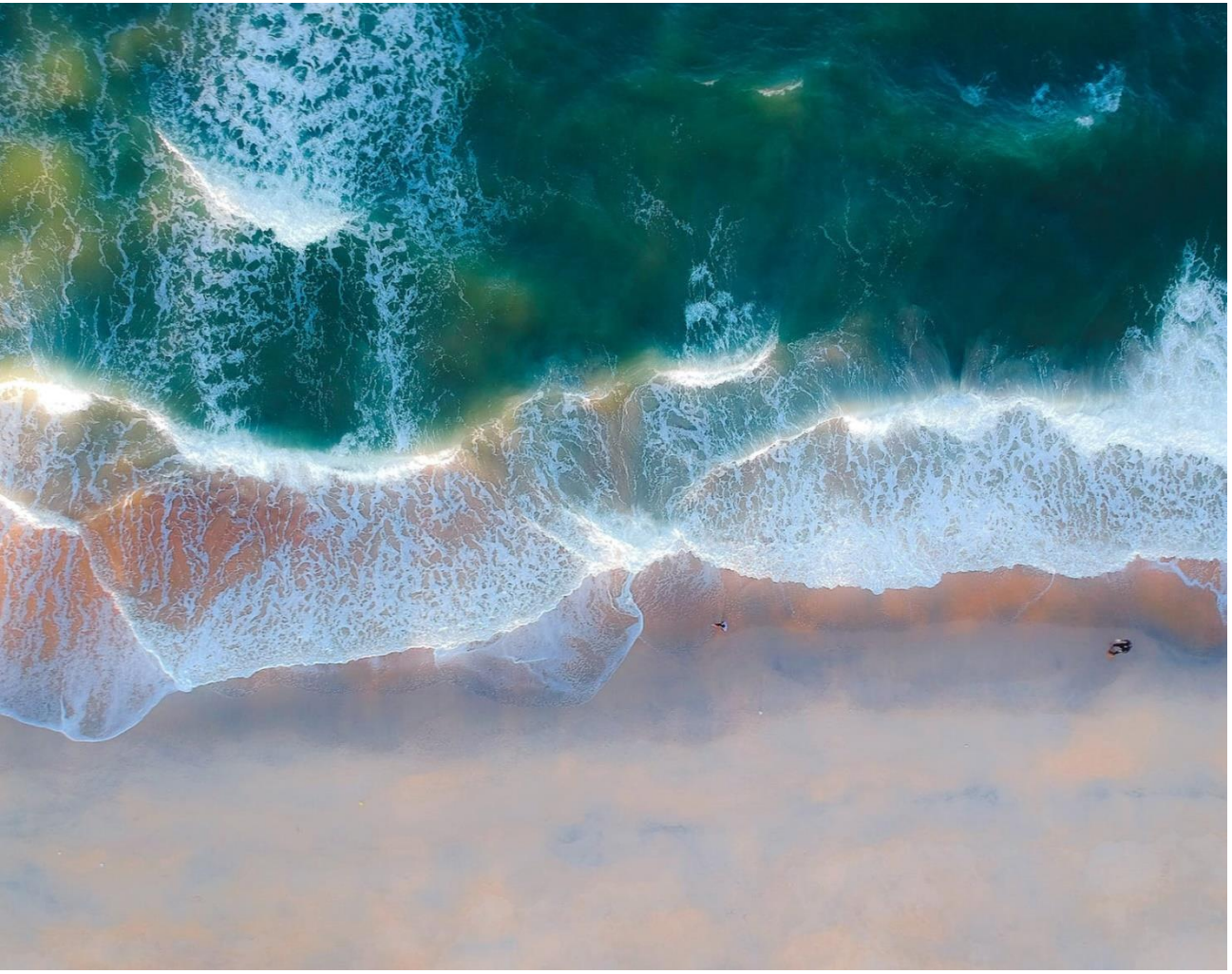
- the list of limitations a PEF/OEF study is subject to
- conditions under which a comparison or comparative assertion may be made
- list of
  - » ILCD-EL compliant proxy datasets used when modelling the RPs/ROs
  - » data gaps

Example

3.6 Limitations

- Resource use, fossil and Resource use, minerals and metals are the dominating impact category when applying the method "ADP crustal content/ultimate reserves" and current normalisation factors for assessing minerals and metals. This outcome shall be interpreted with caution. The ADP crustal content/ultimate reserves is considered as an intermediate recommendation. The European Commission, in cooperation with industry, should develop a new method moving from a depletion to a dissipation model to better quantify the potential for conservation of resources.
- The TS for IT equipment believes that PEF studies are usable for disclosing environmental information. It remains to be seen to what extent the comparison of results based on different PEF studies carried out in compliance with this PEFCR will lead to meaningful results.
- The default parameters of the circular footprint formula are average values for Europe.

Source: PEFCR for IT equipment



Life Cycle Inventory

Life cycle inventory

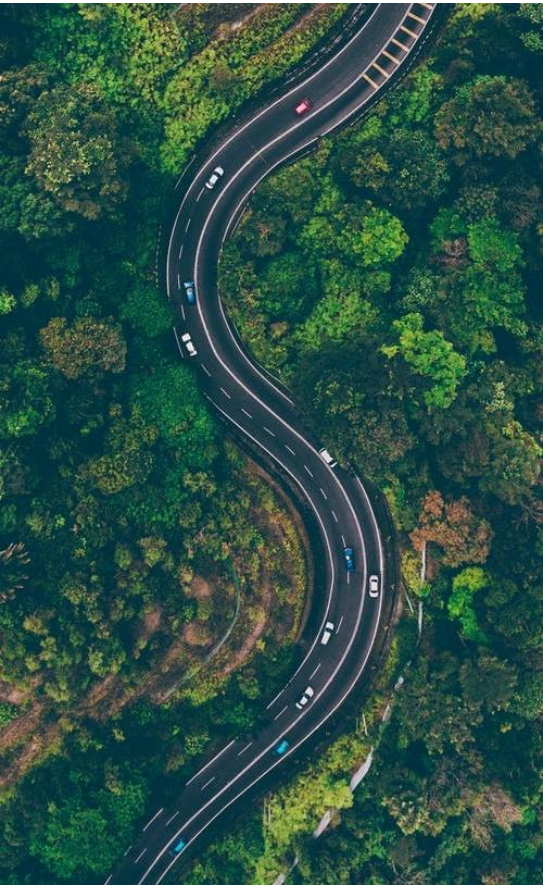
What is a Life Cycle Inventory (LCI)?

Inventory of all material, energy and waste inputs and outputs and emissions into air, water and soil for the product supply chain

The PEFCR/OEFSR shall list all processes taking place in each life cycle stage: For each process it shall include the default secondary data sets to be used by the user, unless the process is covered by mandatory company-specific data.

If the product portfolio for the OEFSR includes mainly services it is up to the TS to evaluate the applicability of life cycle stages to the sector in scope. If the product portfolio inclued mainly products, life cycle stage shall be used

Modelling requirements topics

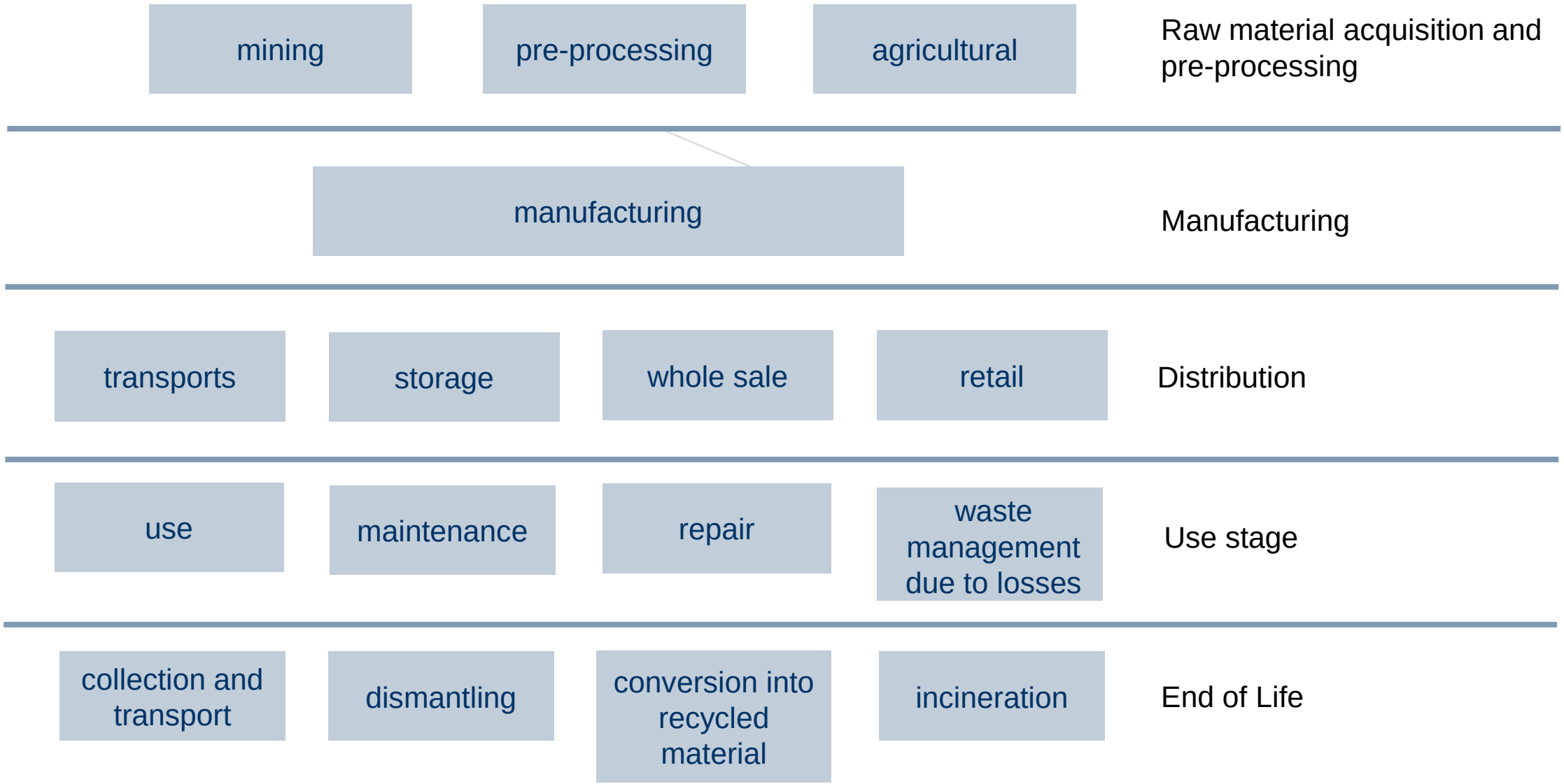


- Agricultural production
- Electricity use
- Transport and logistics
- Capital goods
- Storage at distribution center or retail
- Sampling procedure
- Use stage
- End of life modelling
- Extended product lifetime
- Packaging
- Greenhouse gas emissions and removals
- Offsets
- Handling multi-functional processes
- Data requirements
- Cut-off: 3% for all impact categories based on environmental significance (with justification)

Life cycle stages

- The default life cycle stages are fixed:
  - Raw material acquisition and pre-processing
  - Manufacturing
  - Distribution
  - Use stage
  - End-of life
- TS may decide to split or add life cycle stages; the default life cycle stages it corresponds to shall be stated
- For intermediate products, the following life cycle stages shall be excluded:
  - Use stage
  - End of life

Life cycle stages



Raw material acquisition and pre-processing

- Mining and extraction of resources
- Pre-processing of all materials, including recyclable materials
- Agricultural and forestry activities
- Transportation to the production facility
- Packaging production

Agricultural production

Modelling requirements for agricultural production must be included in the PEFCR/OEFSR, if relevant:

- LEAP guidelines: http://www.fao.org/partnerships/leap/publications/en
- Crop-specific and country-, region- or climate-specific data
- Averaging data as described in the LEAP guidelines
- Pesticides emissions shall be modelled as specific active ingredients, as 90% to soil, 9% to air and 1% to water. More specific data may be used.

Agricultural production: fertilisers

- Fertiliser emissions shall be differentiated per fertiliser type, as a minimum:
  - » NH_3, to air (from N-fertiliser application)
  - » N_2O, to air (direct and indirect) (from N-fertiliser application)
  - » CO_2, to air (from lime, urea and urea-compounds application)
  - » NO_3, to water unspecified (leaching from N-fertiliser application)
  - » PO_4, to water unspecified or freshwater (leaching and run-off of soluble phosphate from P-fertiliser application)
  - » P, to water unspecified or freshwater (soil particles containing phosphorous, from P-fertiliser application)
- TS shall select between two different models for nitrogen modelling provided in the PEF/OEF method

Manufacturing

- All processes within the production site
- Examples:
  - » Chemical processing
  - » Manufacturing
  - » Transport in case of semi-finished products between processes
  - » Assembly of components
  - » Production waste included in the manufacturing stage

Manufacturing: capital goods

- In PEF-RP/OEF-RO studies all processes shall be included
- PEFCR/OEFSR shall identify if, based on the results of the PEF-RP/OEF-RO study, capital goods are subject to cut-off or not

Sampling

- Sampling procedure is sometimes needed to limit the data collection only to a representative samples of plants/distribution centres/users/etc.
- TS shall decide, if sampling is allowed or not in its PEFCR/OEFSR
- In case the PEFCR/OEFSR allows the use of sampling, the PEFCR/OEFSR shall define the requirements for reporting:
  - » % of the total population, or
  - » % of number of sites

Sampling: stratified sample

- Stratification:
  - process of dividing members of a population into homogeneous sub-populations.
  - Sub-populations should be mutually exclusive: every element in the population shall be assigned to only one sub-population

- Aspects at least to be considered:
  - Geographical distribution of sites
  - Technologies/farming practices involved
  - Production capacity of companies/sites

⇒ PEFCR/OEFSR may list additional aspects to be taken into consideration

Sampling: stratified sample

The number of sub-populations shall be idenfitied as:

$$Nsp = g * t * c$$

Nsp: number of sub-populations

g: number of countries in which the sites/plants/farms are located

t: number of technologies/farming practices

c: number of classes of capacity of companies

Sampling: sample size

1) Based on **total production:** Each sub-population ≥ 50% of their production
2) Based on the **number of sites/farms/plants**

$$n_{SS} = \sqrt{n_{SP}}$$

nSS: required sub-sample size

nSP: sub-population size

The PEFCR/OEFSR shall specify the approach chosen.

The same approach shall be used for all the sub-populations selected.

Electricity use

In hierarchical order:

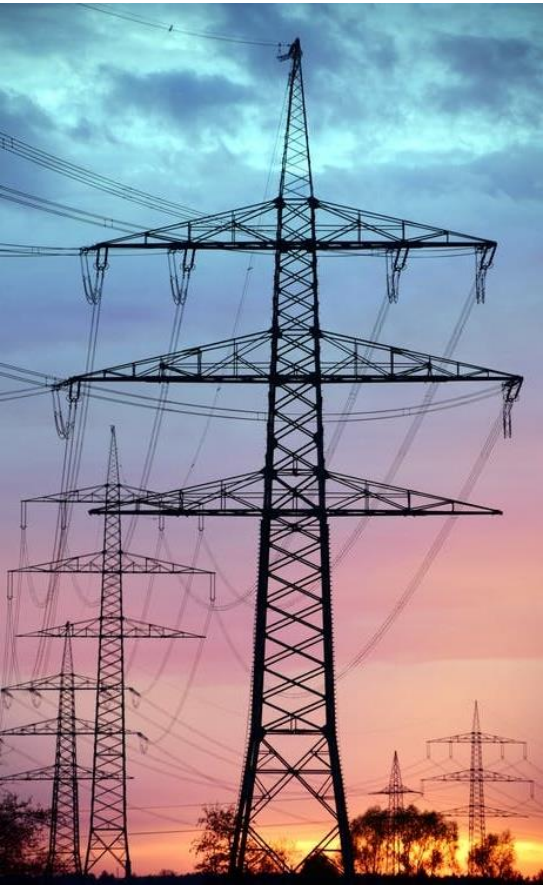
1. Supplier-specific electricity product if there is a 100% tracking system or if:
   a) available, and
   b) the set of minimum criteria to ensure the contractual instruments are reliable is met.

2. The supplier-specific total electricity mix if:
   a) available, and
   b) the set of minimum criteria to ensure the contractual instruments are reliable is met.

3. The country-specific residual mix, consumption mix. The residual mix prevents double-counting with 1) and 2).

4. The average EU residual grid mix, consumption mix, region representative residual grid mix, consumption mix.

Minimum criteria for the use of supplier-specific electricity mix



Minimum criteria to ensure contractual instruments from suppliers:

1. Convey environmental attributes and give explanation about the calculation method
2. Unique claims
3. Be issued and redeemed as close as possible to the period of electricity consumption to which the contractual instrument is applied

Electricity modelling for benchmark/RO

- In benchmark calculations/modelling the RO, the following electricity mix shall be used in hierarchical order:

  1) Sector-specific information on the use of green energy if:

     a) Available, and

     b) The set of minimum criteria to ensure the contractual instruments are reliable is met.

  2) Consumption grid mix in case no sector-specific information is available

- The electricity mix shall reflect the ratios of production or ratios of sales

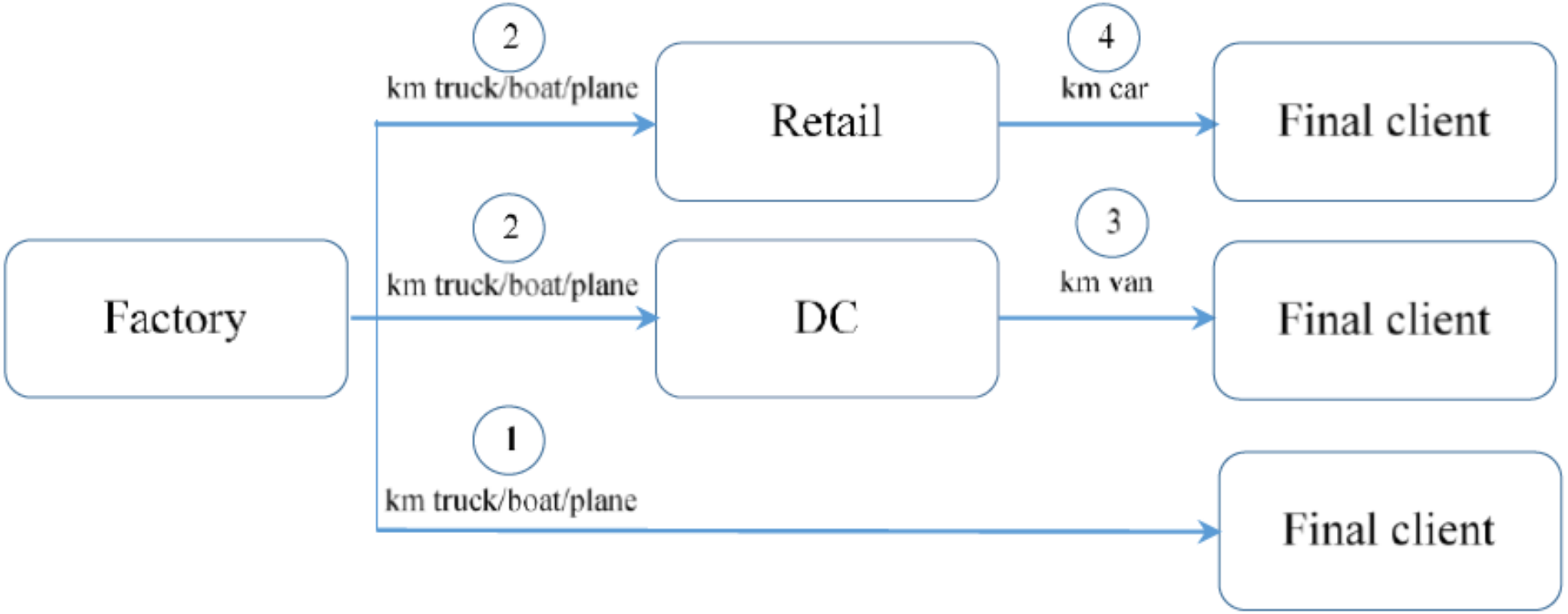
Distribution

- Important parameters for the TS:
  - » Transport type
  - » Type of vehicle and fuel consumption
  - » Loading rate
  - » Number of empty returns
  - » Transport distances
  - » The % to different distribution streams
- PEFCR/OEFSR shall provide default transport scenarios in case these data are not listed as mandatory company-specific information

Default scenarios

- From supplier to factory:
  - » PEFCR/OEFSR shall specify default transport distances, transport modes and truck load factors to be used for the transport of products from supplier to factory
  - » If no specific data is available, default data of the PEF/OEF method shall be prescribed in the PEFCR/OEFSR
- From factory to final client:
  - » Shall be described in distribution stage
  - » In case no specific transport scenario is available the default scenario in PEF/OEF method shall be used as basis, togehter with some specific values:
    - ○ Ratio between products sold through retail, distribution centre and directly to final client
    - ○ For factory to final client: Ratio between local, intracontinental and international supply chains
    - ○ For factory to retail: distribution between intracontinental and international supply chains.

Default scenario: from factory to client



Use stage

- All materials and energy applied in the use stage.
- Examples:
  - spare parts
  - coolant production
  - waste management due to losses

Use stage

- **Main function approach**: use stage processes related to the main function of the product
- **Delta approach**: use of the product influences the impact of another product

The PEFCR/OEFSR shall describe which approach shall be applied. If the delta approach is used, the PEFCR shall specify a reference consumption to be defined for each associated product (e.g. of energy and materials).

Use stage

Is the use stage process ...		Actions to be taken by the TS	
Product dependent?	**Most relevant?**	**Modelling guidelines**	**Where to report**
Yes	Yes	To be included in the PEFCR system boundary. Provide default data	Mandatory: PEF/OEF report, reported separately*
	No	Optional: may be included in the PEFCR/OEFSR system boundary when the uncertainty can be quantified (provide default data)	Optional: PEF/OEF report, reported separately*
No	Yes/No	Excluded from the PEFCR/OEFSR system boundary	Optional: qualitative information

* Use stage results for final products shall be reported separately

End of life (including product recovery and recycling)

Examples:

- collection and transport of product and its packaging to end of life treatment facilities
- dismantling of components
- shredding and sorting
- wastewater of products used to dissolve in or with water
- conversion into recycled material
- composting
- incineration and disposal of bottom ash
- lanfilling and landfill operations and maintenance

End of life modelling

PEFCR/OEFSR shall prescribe the use of the Circular Footprint Formula (CFF) and provide all the values for the parameters to be used.

Online webinar: The CFF in detail on 08/10/19 16h00-17h00

End of life modelling: CFF

LCI from virgin/ primary material

LCI associated to recycled content input

LCI from the recycling (or reuse) process from which the credit from avoided virgin material are substracted

Material

$$(1-R_1)E_V + R_1 \times \left(AE_{recycled} + (1-A)E_V \times \frac{Q_{Sin}}{Q_p}\right) + (1-A)R_2 \times \left(E_{recyclingEoL} - E_V^* \times \frac{Q_{Sout}}{Q_P}\right)$$

Energy

$$(1-B)R_3 \times (E_{ER} - LHV \times X_{ER,heat} \times E_{SE,heat} - LHV \times X_{ER,elec} \times E_{SE,elec})$$

Disposal

$$(1-R_2-R_3) \times E_D$$

LCI from the disposal

LCI from the energy recovery process from which avoided emissions arising from the substituted energy source have been substracted

CFF: A factor

- The A factor allocates burdens and credits from recycling and virgin material production between two life cycles
  - A=1 would reflect a 100:0 approach (i.e. credits are given to the recycled content)
  - A=0 would reflect a 0:100 approach (i.e. credits are given to the recycled materials at the end of life).
- The A-factors shall be clearly listed in the PEFCR/OEFSR.
  - If an application-specific A value is not available, the material-specific A value shall be used.
  - If a material-specific A value is not available, the A-value shall be set equal to 0.5.

CFF: B factor

- The B factor is used as an allocation factor of energy recovery processes
- Applies both to burdens and credits
- In benchmark calculations/modelling the RO, the B value shall be **equal to 0 as default**.

CFF: point of substitution

- Necessary to be determined for the material part of the formula
- Point of substitution = point in the value chain where secondary materials substitute primary materials

Material

$$(1 - R_1)E_V + R_1 \times \left(AE_{recycled} + (1 - A)E_V \times \frac{Q_{Sin}}{Q_p}\right) + (1 - A)R_2 \times \left(E_{recyclingEoL} - E_V^* \times \frac{Q_{Sout}}{Q_P}\right)$$

Energy

$$(1 - B)R_3 \times (E_{ER} - LHV \times X_{ER,heat} \times E_{SE,heat} - LHV \times X_{ER,elec} \times E_{SE,elec})$$

Disposal

$$(1 - R_2 - R_3) \times E_D$$

CFF: quality ratios

- Quality ratios Qs_{in}/Qp and Qs_{out}/Qp shall be determined at the point of substitution per application or material
- They are PEFCR-/OEFSR-specific.
  - Accounts for quality of both ingoing and outgoing recycled materials
  - If **Ev=E*v**, the two quality ratios are needed: Qsin/Qp associated to the recycled content, and Qsout/Qp associated to recyclability at EoL -> to capture downcycling
  - If **Ev≠E*v**, one quality ratio is needed: Qsin/Qp associated to the recycled content.
- For packaging each PEFCR/OEFSR should use default values provided in Annex C

CFF: recycled content (R_1 value)

Situation	Option	Most relevant process	Other process
Situation 1: Process run by the company using the PEFCR	Option 1	Supply-chain specific R_1 value	
	Option 2		Default (application-specific) R_1 value
Situation 2: process not run by the company but with access to (company)-specific information	Option 1	Supply-chain specific R1 value	
	Option 2	Default (application-specific) R_1 value	
	Option 3		Default (application-specific) R1 value
Situation 3: Process not run by the company and without access to specific information	Option 1	Default (application-specific) R_1 value	
	Option 2		Default (application-specific) R_1 value

CFF: recycling output rate (R_2 value)

- PEFCR/OEFSR shall list the default R_2 values to be used when no company-specific values are available
- In case no R_2 values are available, the TS chooses:
  - » R_2 shall be equal to 0
  - » TS generates new statistics to assign an R_2 value

CFF: E_{rec} and E_{recEoL}

- PEFCR/OEFSR shall list the default datasets that the user of the PEFCR/OEFSR shall apply to model E_{rec} and E_{recEoL}
  - » **E_{rec}**: specific emissions and resources consumed arising from the recycling process of the recycled (reused) material, including, collection, sorting and transportation
  - » **E_{recEoL}**: specific emissions and resources consumed arising from the recycling process at EoL including, collection, sorting and transportation

Example

Aluminium frames:

R1: content of recycled aluminium

R2: recycled material at output of recycling plant (R2=100%)

Qsin/Qp: quality factor (quality of recycled material is lower than virgin material)

Qsout/Qp: quality factor (=Qsin/Qp)

A: allocation fo burdens and credits (A=0,5)

R3=0 No energy recovery

How to apply the CFF to intermediate prodcuts

- Intermediate products => cradle-to-gate PEF studies
- PEFCR/OEFSR shall prescribe:
  - The use of the CFF
  - To exclude the end-of-life by setting R2, R3 and Ed to 0
  - Application- or material-specific A-values for the product
  - To use and report results with two types of A values for the product in scope:
    - Setting A = 1 in the PEF/OEF profile calculation
    - Setting A = default value as listed in PEFCR/OEFSR to be used when creating EF compliant datasets

Multi-functional processes

Decision hierarchy:

1. Subdivision or system expansion
2. Allocation based on physical relationship
3. Allocation based on another relationship

Ad 1. the PEFCR/OEFSR shall specify which processes are to be sub-divided and the principles that such subdivision should adhere to.

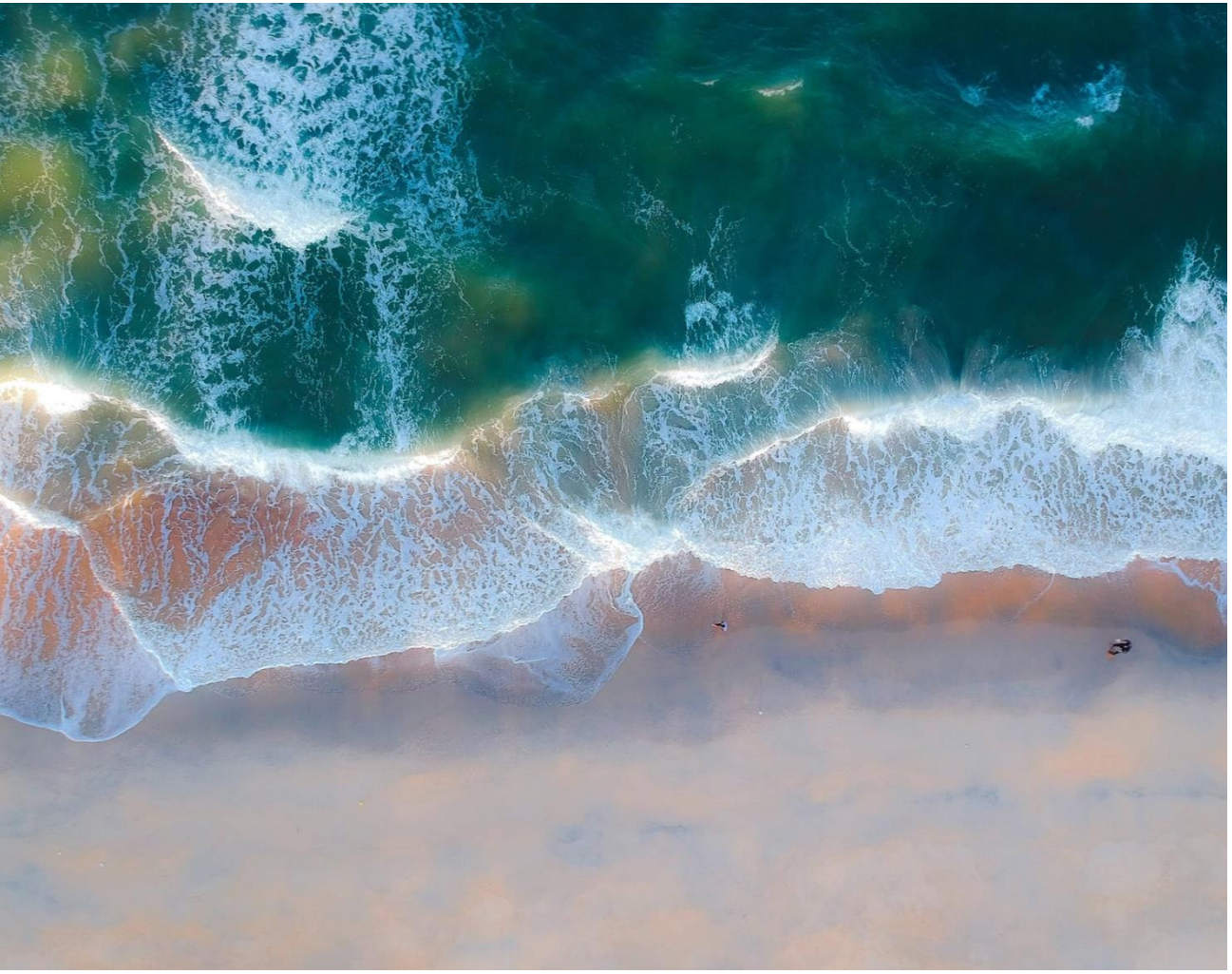
Ad 2. the PEFCR/OEFSR shall specify the relevant underlying physical relationships that shall be considered and list the specific allocation values that shall be fixed for all studies using the PEFCR/OEFSR.

Ad 3. the PEFCR/OEFSR shall specify this relationship and list the specific allocation values that shall be fixed for all studies using the PEFCR/OEFSR.

Excercise

Case: plastic beverage bottle

- Define the functional unit (FU).
- Which, if any, subgroups would you define?
- Describe the life cycle stages for the plastic bottle.



Data collection and data quality requirements

Data collection requirements

- OEF/PEF method follows “materiality” approach

  ⇒ Focusing where it really matters:

  - **Impact categories, life cycle stages, processes and direct elementary flows**: PEFCR/OEFSR shall identify most relevant ones
  - **Data requirements**: most relevant processes shall be modeled by data of higher quality, independently where they occur in the system boundaries

    ⇒ Company-specific data: list of mandatory company-specific data is defined in PEFCR/OEFSR based on relevance of process, level of effort needed to collect it and overall effort to collect all mandatory company-specific data

    ⇒ Secondary data: EF-compliant datasets

- For the development of PEFCRs/OEFSRs all datasets shall be available for free and available in disaggregated form

Company-specific data

Requirements for PEFCRs/OEFSRs

⇒ For each process for which company-specific data is mandatory, the PEFCRs/OEFSRs shall provide:

1. List of company-specific activity data to be declared by the user together with the default secondary datasets to be used (units of measure, any other characteristics that could help the user)

2. List of direct (i.e. foreground) elementary flows to be declared by the user (frequency of measurements, measurement methods, any other technical information necessary to ensure comparability)

Requirements for secondary datasets when developing final PEFCR/OEFSR

- When **developing** the final PEFCR/OEFSR EF-compliant datasets shall be used, when available for free.

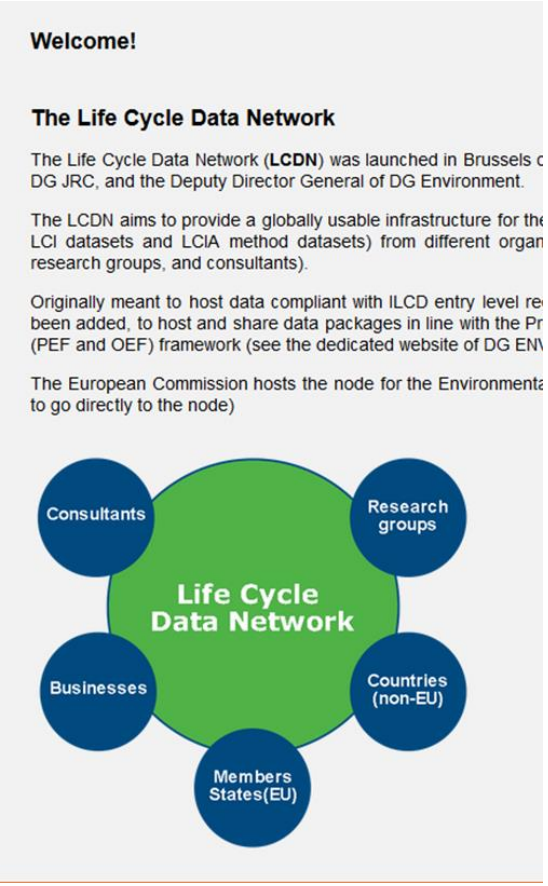
- In case EF-compliant datasets are not available, the following rules shall be followed in hierarchical order:

  1) Use an EF-compliant proxy, which is available for free:
     It shall be included in the list of default processes and stated within the limitations section of the PEFCR/OEFSR.

  2) Use an ILCD DN entry level (EL) compliant proxy, which is available for free:
     These may be used up to a maximum of 10% of the total environmental impact of the final PEF-RP/OEF-RO (calculated cumulatively from lowest to largest contribution to the total EF profile).

  3) If none of the above is available for free, process shall be excluded from the model: This shall be clearly stated as a data gap and validated by the verifier.

Requirements for secondary datasets for users of a PEFCR/OEFSR



- When **using** a PEFCR/OEFSR, the secondary datasets listed in the PEFCR/OEFSR shall be used.
- If a dataset needed to calculate the PEF/OEF profile is not among those listed, the following rules shall be followed in hierarchical order:
  1) Use EF-compliant dataset available on one of the nodes of the LCDN
  2) Use EF-compliant dataset available in a free or commercial source
  3) Use another EF-compliant dataset considered to be a good proxy
  4) Use an ILCD DN EL compliant dataset:
     a maximum of 10% of the total environmental impact may be derived from such datasets (calculated cumulatively from lowest to largest contribution to the total EF profile).
  5) If none of the above is available, process shall be excluded:
     This shall be clearly stated as a data gap and validated by the verifier.

⇒ Data gaps shall stay data gaps. They cannot be filled by the user of the PEFCR/OEFSR!

⇒ The presentation form the webinar on EF compliant datasets can be found on:

https://ec.europa.eu/environment/eussd/smgp/pdf/webinar_what_%20is_an_EF_compliant_da
pdf

EF-compliant datasets

1) Modelling compliance (capital goods, CFF, etc.)

2) Meta data compliance (e.g. DQR, extent of documentation, etc.)

3) Nomenclature, characterisation factors, and other relevant information

⇒ Dictionary to develop EF compliant dataset (=flow list, flow properties, characterization and normalization factors …)

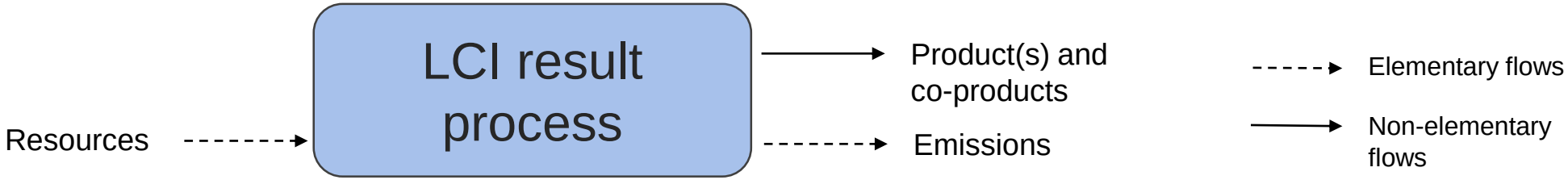
PEF and OEF methods:
http://ec.europa.eu/environment/eussd/smgp/ef_transition.htm

Guide on EF compliant data sets:
https://eplca.jrc.ec.europa.eu/permalink/Guide_EF_DATA.pdf

EF reference package (EF 2.0 or 3.0)
http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml

Dataset types

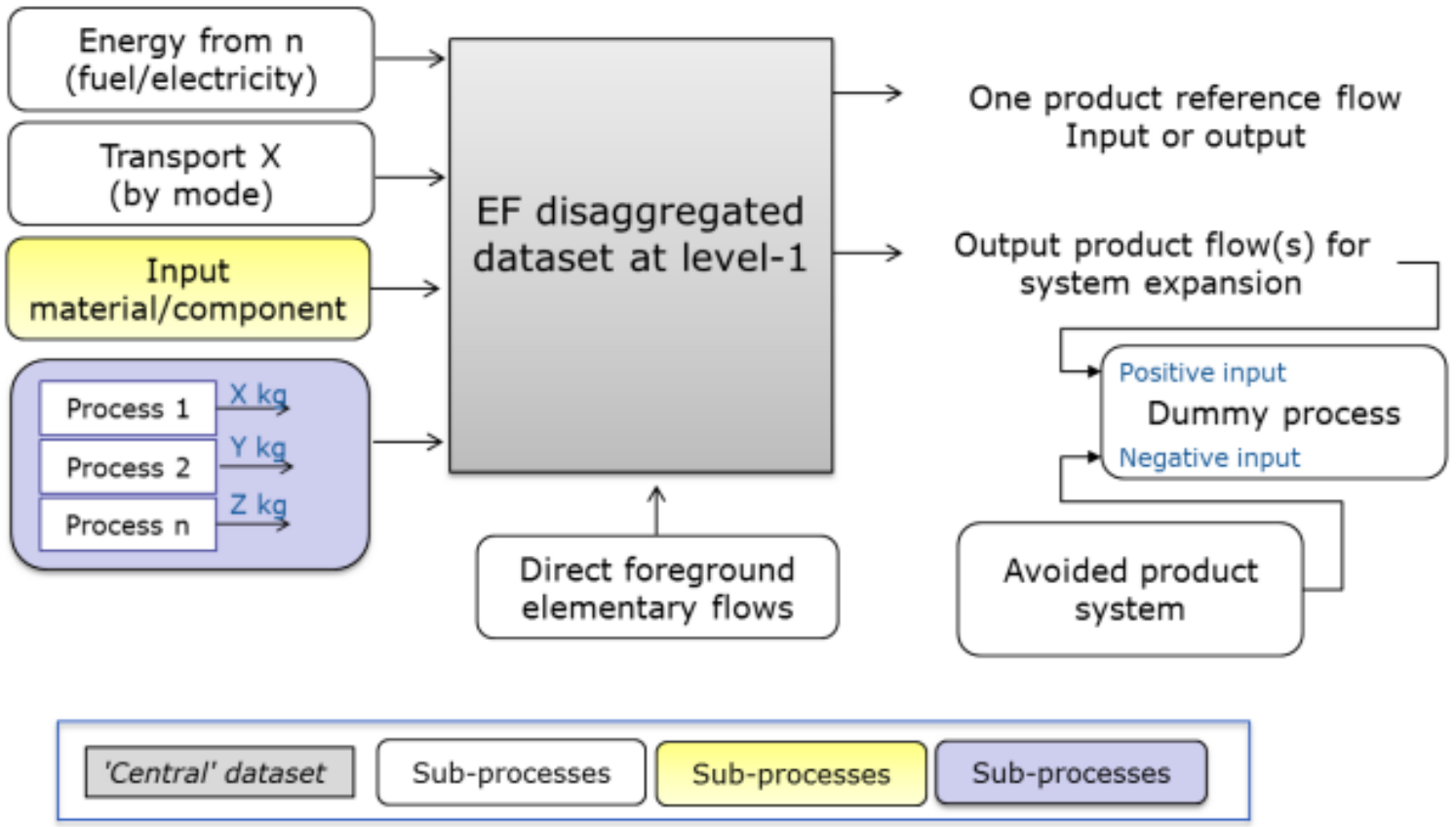
- **Aggregated dataset** (LCI result): Complete or partial life cycle of a product system that next to the elementary flows lists in the input/output list exclusively the product(s) of the process as reference flow(s), but no other goods or services.



- **Partially aggregated dataset**: A dataset with a LCI that contains elementary flows and activity data, and that only in combination with its complementing supporting datasets yield a complete aggregated LCI data set.

- **Partially aggregated dataset at level-1**: A partially aggregated dataset at level-1 contains elementary flows and activity data of one level down in the supply chain, while all complementing supporting datasets are in their aggregated form (*see next slide*).

Partially aggregated dataset at level-1



Where to find EF-compliant datasets

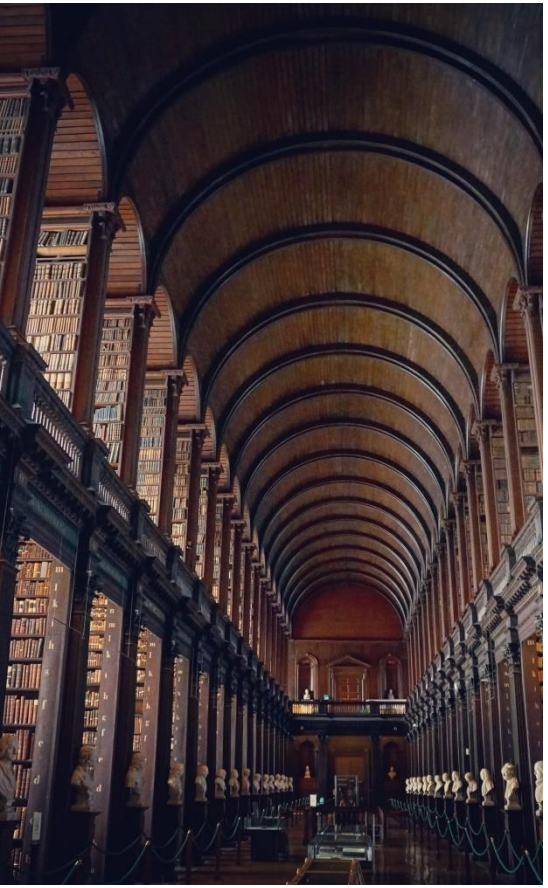
» The EF tendered datasets are available via the registered nodes of the data developers:

Provider	Link to Node	Name
Quantis	https://lcdn.quantis-software.com/PEF/	Data on agricultural products, other processes
CEPE, ecoinvent	http://lcdn-cepe.org	Data on chemicals for paint
thinkstep	http://lcdn.thinkstep.com/Node/	Data on energy, transport, End-of-Life and recycling, incineration, metals, packaging, plastics (non packaging), official pilot proxy data
FEFAC	http://lcdn.blonkconsultants.nl/Node/	Data on feed
Cycleco	https://node.cycleco.eu/node/	Data on textiles
ecoinvent	http://ecoinvent.lca-data.com/	Data on chemicals
RDC	http://soda.rdc.yp5.be/	Data on container glass, provided by FEVE
JRC	https://eplca.jrc.ec.europa.eu/EF-node/	Data on RP and RO incl. background data and data developed outside the specific data calls

Harmonisation of EF datasets

- The EF transition datasets, that are currently being prepared by external contractors, will be harmonised in foreground model methodology and will use the same background data for all energy, transport, packaging and end-of-life (recycling, incineration, landfill) processes
- The EF transition datasets will be available in aggregated and 1-st level partially aggregated type.

User rights



- Datasets are owned by data providers
- Usage in the PEF/OEF framework is funded by the European Commission
  - PEFCRs/OEFSRs from the **pilot phase**: EF 2.0 package datasets to be used
  - PEFCRs/OEFSRs within the **transition phase**: EF 3.0 package datasets to be used
- For any other purposes, the dataset use rights need to be consulted

Data quality requirements

- Semi-quantitative assessment of data quality based on 4 criteria with a rating from 1 (best) to 5 (worst): Technological representativeness (TeR), Geographical representativeness (GeR), Time-related representativeness (TiR) and precision (P).

Data Quality Rating of Data Quality Criteria (TeR, GeR, TiR, P)	Data Quality Level
1	Excellent
2	Very Good
3	Good
4	Fair
5	Poor

- Data Quality Rating (DQR) is the average of the 4 data quality criteria
- Separate DQR tables for company-specific and secondary datasets

DQR: 3 different applications

1) **Company-specific datasets**:
   1. Calculate separately TeR_{AD}, TeR_{EF}, TiR_{AD}, TiR_{EF}, GeR_{AD}, GeR_{EF} , P_{AD}, P_{EF} for most relevant AD and EF
   2. Determine environmental contribution of most relevant AD and EF
   3. Calculate weighted average

$$DQR = \frac{\overline{Te_R} + \overline{Ge_R} + \overline{Ti_R} + \overline{P}}{4}$$

2) **Most relevant secondary datasets**:
   - » Re-calculate TeR, TiR and GeR of most relevant processes (for others take default DQR values)
   - » PEFCR/OEFSR lists default secondary datasets along with their default DQR values for each criterion

$$DQR = \frac{TeR + GeR + TiR + P}{4}$$

3) **PEF/OEF study**:
   1. Calculate separately TeR, TiR, GeR, P based on the DQR of most relevant processes
   2. Determine environmental contribution of each most relevant process to overall score
   3. Calculate weighted average

$$DQR = \frac{\overline{Te_R} + \overline{Ge_R} + \overline{Ti_R} + \overline{P}}{4}$$

DQR of company-specific datasets

Rating	P_{EF} and P_{AD}	TiR_{EF} and TiR_{AD}	TeR_{EF} and TeR_{AD}	GR_{EF} and GR_{AD}
1	Measured/calculated and externally verified	The data refers to the most recent annual administration period with respect to the EF report publication date	The elementary flows and the activity data exactly the technology of the newly developed dataset	The activity data and elementary flows reflects the exact geography where the process modelled in the newly created dataset takes place
2	Measured/calculated and internally verified, plausibility checked by reviewer	The data refers to maximum 2 annual administration periods with respect to the EF report publication date	The elementary flows and the activity data is a proxy of the technology of the newly developed dataset	The activity data and elementary flows) partly reflects the geography where the process modelled in the newly created dataset takes place
3	Measured/calculated/literature and plausibility not checked by reviewer OR Qualified estimate based on calculations plausibility checked by reviewer	The data refers to maximum three annual administration periods with respect to the EF report publication date	Not applicable	Not applicable
4-5	Not applicable	Not applicable	Not applicable	Not applicable

- DQR table shall be based on the one provided in the PEF/OEF method: only reference years criteria may be adapted by TS (TiR_{-EF}, TiR_{-AD})
- Score of P and TiR cannot be higher than 3, while the score for TeR and GeR cannot be higher than 2
- For newly developed company-specific datasets: separate assessment of most relevant activity data and most relevant direct elementary flows, i.e. contributing cumulatively at least 80% to the total impact of the dataset

DQR of secondary datasets

Rating	Ti_R	Te_R	Ge_R
1	The EF report publication date happens within the time validity of the dataset	The technology used in the EF study is exactly the same as the one in scope of the dataset	The process modelled in the EF study takes place in the country the dataset is valid for
2	The EF report publication date happens not later than 2 years beyond the time validity of the dataset	The technologies used in the EF study is included in the mix of technologies in scope of the dataset	The process modelled in the EF study takes place in the geographical region (e.g. Europe) the dataset is valid for
3	The EF report publication date happens not later than 4 years beyond the time validity of the dataset	The technologies used in the EF study are only partly included in the scope of the dataset	The process modelled in the EF study takes place in one of the geographical regions the dataset is valid for
4	The EF report publication date happens not later than 6 years beyond the time validity of the dataset	The technologies used in the EF study are similar to those included in the scope of the dataset	The process modelled in the EF study takes place in a country that is not included in the geographical region(s) the dataset is valid for, but sufficient similarities are estimated based on expert judgement.
5	The EF report publication date happens later than 6 years after the time validity of the dataset, or the time validity is not specified	The technologies used in the EF study are different from those included in the scope of the dataset	The process modelled in the EF study takes place in a different country than the one the dataset is valid for

- DQR table shall be based on the one provided in the PEF/OEF method: only reference years criteria may be adapted by TS
- To assess DQR of secondary datasets the DNM shall be applied.

Data needs matrix (DNM)

		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)[102] 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 not 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 not run by the company using the PEFCR and without 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

Rules for DQR

Developing a PEFCR/OEFSR

The PEFCR/OEFSR shall include the following information for all processes that are not on the list of mandatory company-specific data:

1. Provide list of default secondary datasets to be used within the scope of the PEFCR/OEFSR
2. Report default DQR values for each criterion as provided in their meta data, for all default datasets listed
3. Indicate the most relevant processes
4. Provide one or more DQR table(s) for most relevant processes
5. Indicate the processes expected to be in situation 1
6. For those, provide a list of activity data and elementary flows to be declared by the user. This list shall be as specific as possible in terms of unit of measurement, averaging data, etc.

Using a PEFCR/OEFSR

The user of the PEFCR/OEFSR shall apply the DNM to evaluate which data is needed. It shall be used within the modelling of its PEF/OEF study, depending on the level of influence. The user of the PEFCR/OEFSR shall:

1. Determine the level of influence the company has over each process in the supply chain
2. Follow the rules of the DNM for most relevant processes and for other processes.
3. Calculate or re-evaluate the DQR for all datasets used for the most relevant processes and the new ones created. For all other provided DQR values shall be used.
4. If one or more processes are not included in the list of default processes in the PEFCR/OEFSR, the user shall identify a suitable dataset acc. to the requirements defined

DQR of a PEF/OEF study

- PEFCR shall require delivery of EF-compliant dataset (aggregated)
- DQR of dataset shall be included in PEF report
- PEFCR/OEFSR shall specify that the user of the PEFCR/OEFSR shall follow the DQR calculation rules of the PEF/OEF method:

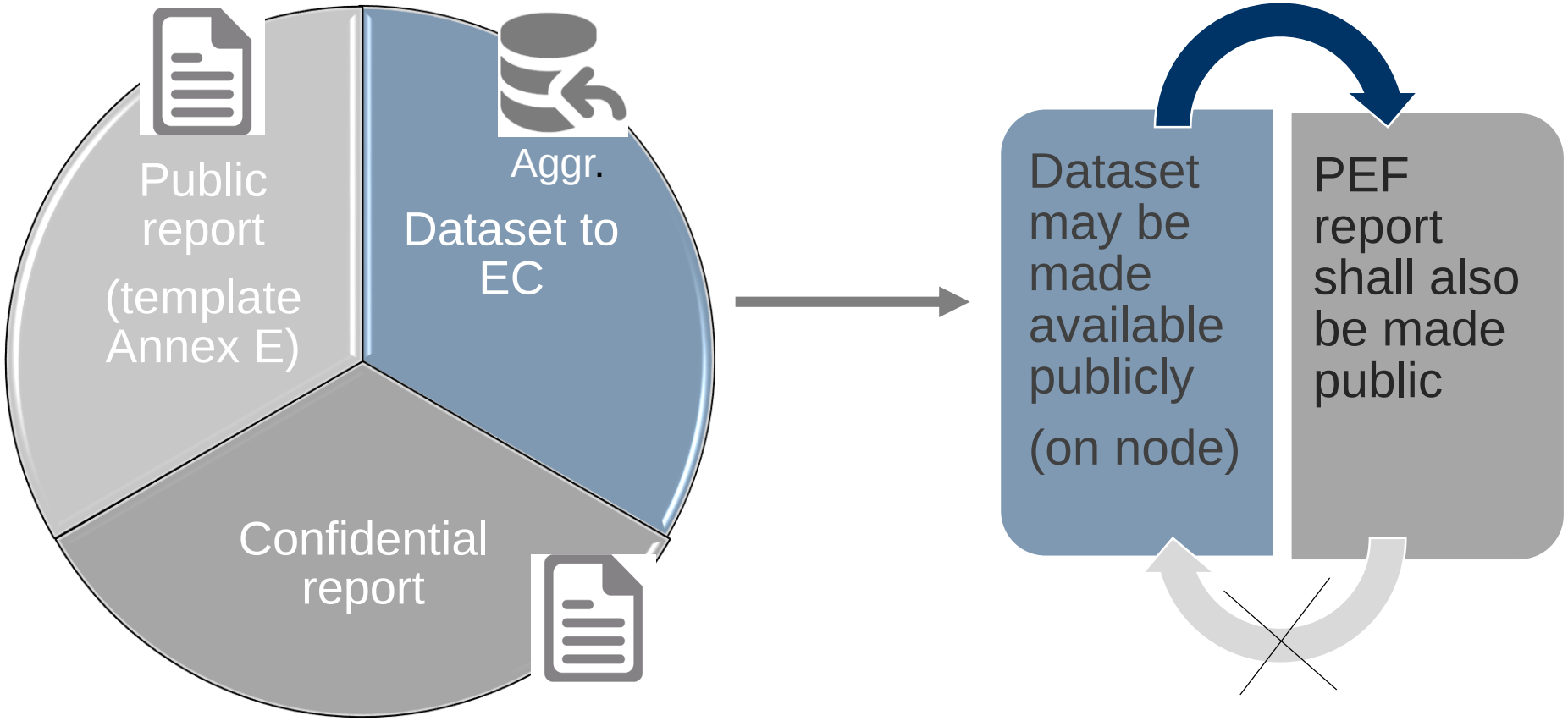
  ⇒ Calculate separately TeR, TiR, GeR and P as weighted average of the DQR scores of all most relevant processes based o their contribution to the single overall score

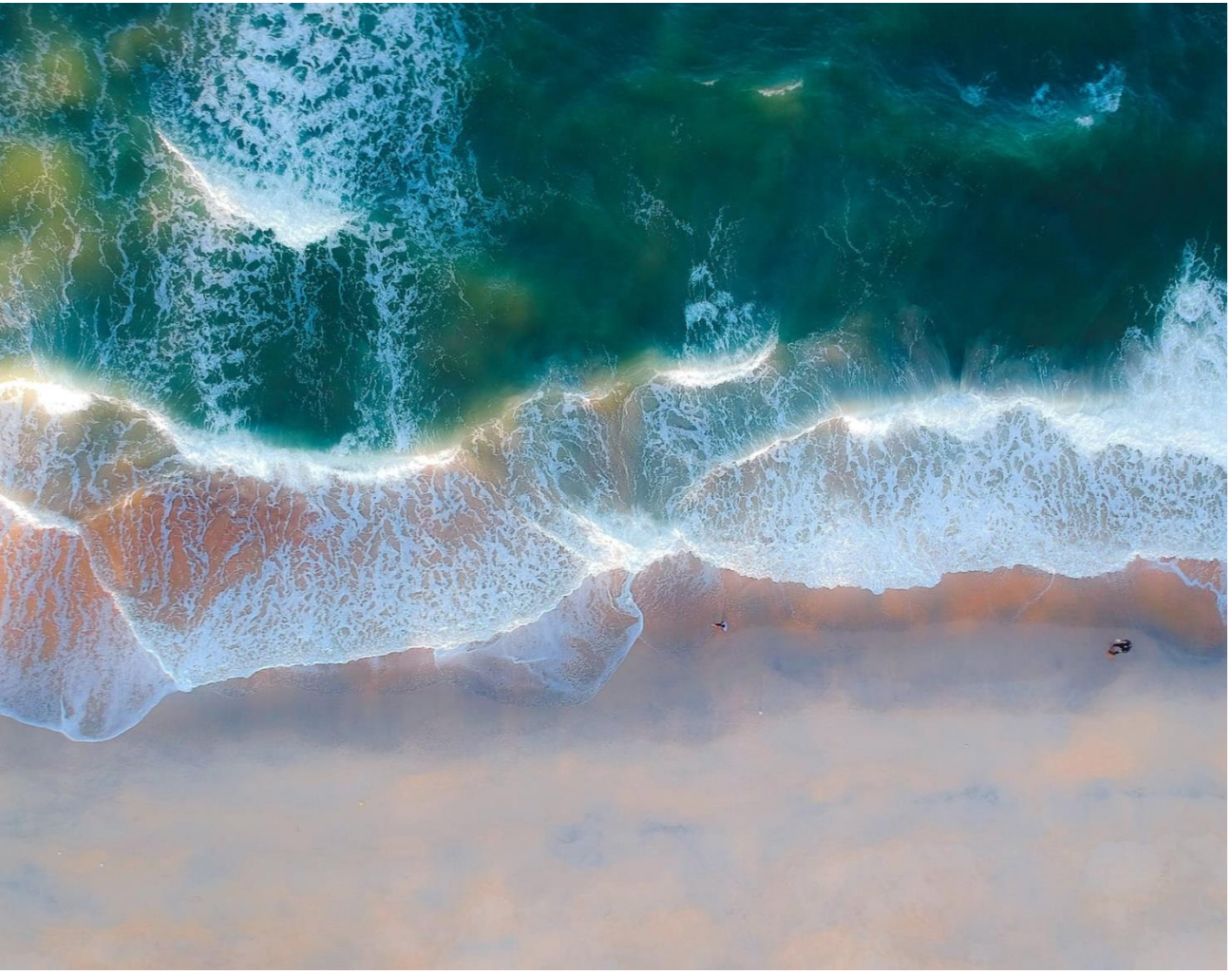
Data quality requirements: requirements

Requirements for PEFCRs/OEFSRs

- PEFCR/OEFSR shall provide tables with criteria to be used for the semi-quantitative assessment (at least one table for company-specific and at least one for secondary datasets)
- PEFCR/OEFSR may specify more stringent or specify additional data quality requirements, if appropriate

When publishing PEF/OEF results





PEF/OEF Results and Interpretation

PEF/OEF results

- PEFCR/OEFSR shall require the user to calculate results of the PEF/OEF study as
  - » characterised
  - » normalised and
  - » weighted results for each impact category and
  - » as single overall score based on the weighting factors provided
- In addition, PEFCRs shall include benchmarks and optionally classes of performance

Benchmark

- Benchmark is a standard or point of reference against which any comparisons may be made
- In context of PEF the term “benchmark” refers to the average environmental performance of the RP sold in EU market

Requirements for PEFCRs

- Benchmark shall be provided for each RP and shall correspond to the PEF profile of the second PEF-RP
- PEFCR shall provide results of the benchmark for each RP as characterised, normalised and weighted results and as an overall score
- Result shall be provided for:
  - total life cycle
  - total life cycle without use stage
- No benchmark for intermediate products allowed

PEFCR: comparisons

	Single product category in PEFCR	Category and sub-categories in PEFCR	
		Within the category	*Within the sub-category*
Definition of a RP	Shall	May	Shall
Comparative assertion via benchmark for final products	Shall	May. Shall, if a RP is defined at overarching category level.	Shall
Comparative assertion among final products	Shall	May The TS decides in which cases comparison among products in different sub-categories is allowed.	Shall

Normalisation & weighting factors

- Normalisation is the step during impact assessment after characterization, where characterised results are divided by normalisation factors, which represent the overall inventory of a reference unit

  ⇒ Normalisation factors are derived from emission statistics; normalisation factors of the EF impact categories are expressed per capita based on a global value

- Weighting is the last step during impact assessment, where normalised results are multiplied with weighting factors, which express the perceived relative importance of each impact category

  ⇒ Weighting factors for the EF impact categories are given in %

- Normalisation and weighting factors are included in the EF reference packages and are fixed for every PEFCR/OEFSR/PEF study/OEF study

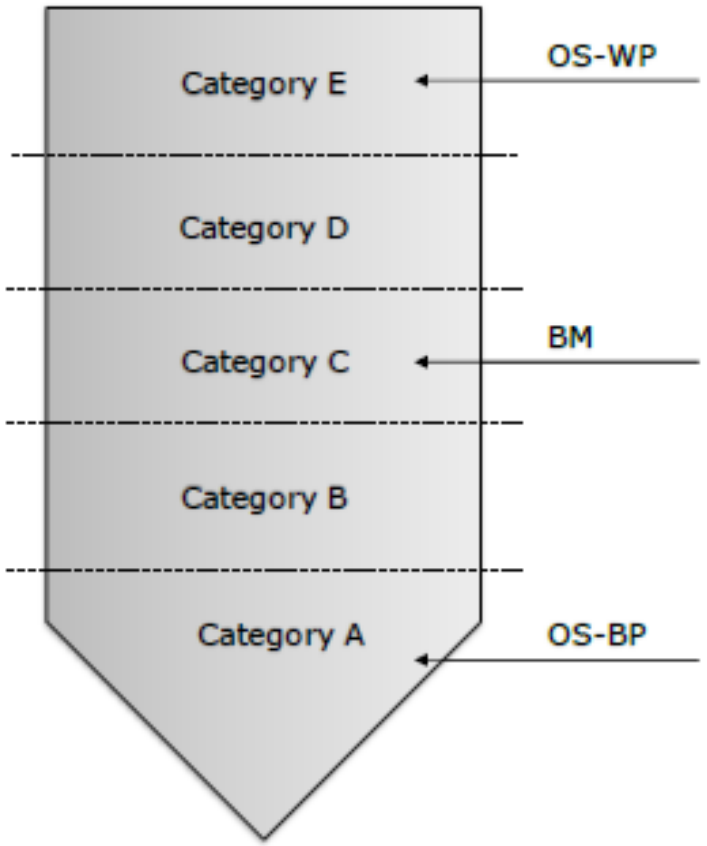
Example

Table 15: Weighted benchmark values for the hot and cold water supply plastic piping systems in buildings representative product

Impact category	Life cycle excl. use stage
Climate change	7,59E-03
Ozone depletion	3,93E-05
Particulate matter	2,09E-03
Ionising radiation, human health	4,99E-04
Photochemical ozone formation, human health	6,60E-04
Acidification	1,01E-03
Eutrophication, terrestrial	3,89E-04
Eutrophication, freshwater	2,41E-05
Eutrophication, marine	1,86E-04
Land use	4,01E-05
Water use	2,81E-04
Resource use, minerals and metals	2,05E-03
Resource use, fossils	6,38E-03

Source: PEFCR for hot and cold water supply plastic piping systems in the building

Classes of performance



- TS is free to define classes of performance.
- PEF method provides an example with 5 classes of performance ranging from A (best) to E (worst) :
  - » applied for the single overall score
  - » Result of the RP represents the midpoint of class C
  - » Upper and lower limit are identified through a sensitivity analysis (identification of theoretical best and worst product)

Interpretation

- Interpretation includes the following aspects based on the first and second PEF-RP/OEF-RO:
  - » most relevant impact categories
  - » most relevant life cycle stages

  Relevant for communication

  - » most relevant processes
  - » most relevant direct elementary flows

  Relevant for engineers and designers

  - » Benchmark and classes of performance for PEFCRs

  Relevant for comparisons

- Identification of most relevant processes and direct elementary flows has a key role in the process to identify data-related requirements (⇒ DNM)

Identification of hotspots

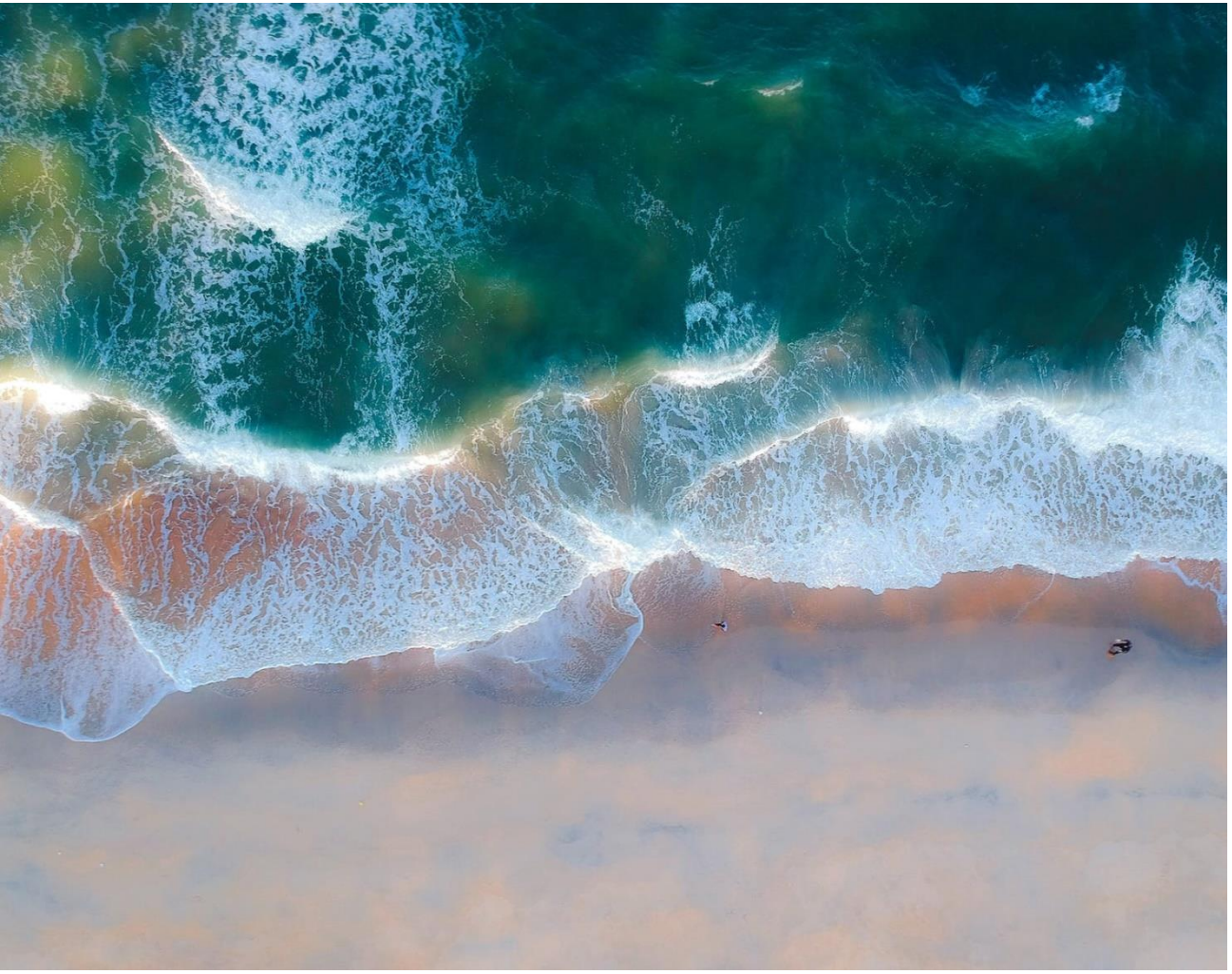
Item	At what level does relevance need to be identified?	Threshold
Most relevant **impact categories**	Normalised and weighted results	Impact categories contributing cumulatively at least 80% to the total environmental impact
Most relevant **life cycle stages**	For each most relevant impact category	All life cycle stages contributing cumulatively more than 80% to that impact category
Most relevant **processes**	For each most relevant impact category	All processes contributing cumulatively (along the entire life cycle) more than 80% to that impact category, considering absolute values.
Most relevant **elementary flows**	For each most relevant process and most relevant impact categories	All elementary flows contributing cumulatively at least to 80% to the total impact for each most relevant process. If disaggregated data are available: for each most relevant process, all direct elementary flows contributing cumulatively at least to 80% to that impact category (caused by the direct elementary flows only)

Interpretation: requirements

Requirements for PEFCRs/OEFSRs

- Identification of most relevant…
  - … impact categories
  - … life cycle stages
  - … processes
  - … direct elementary flows

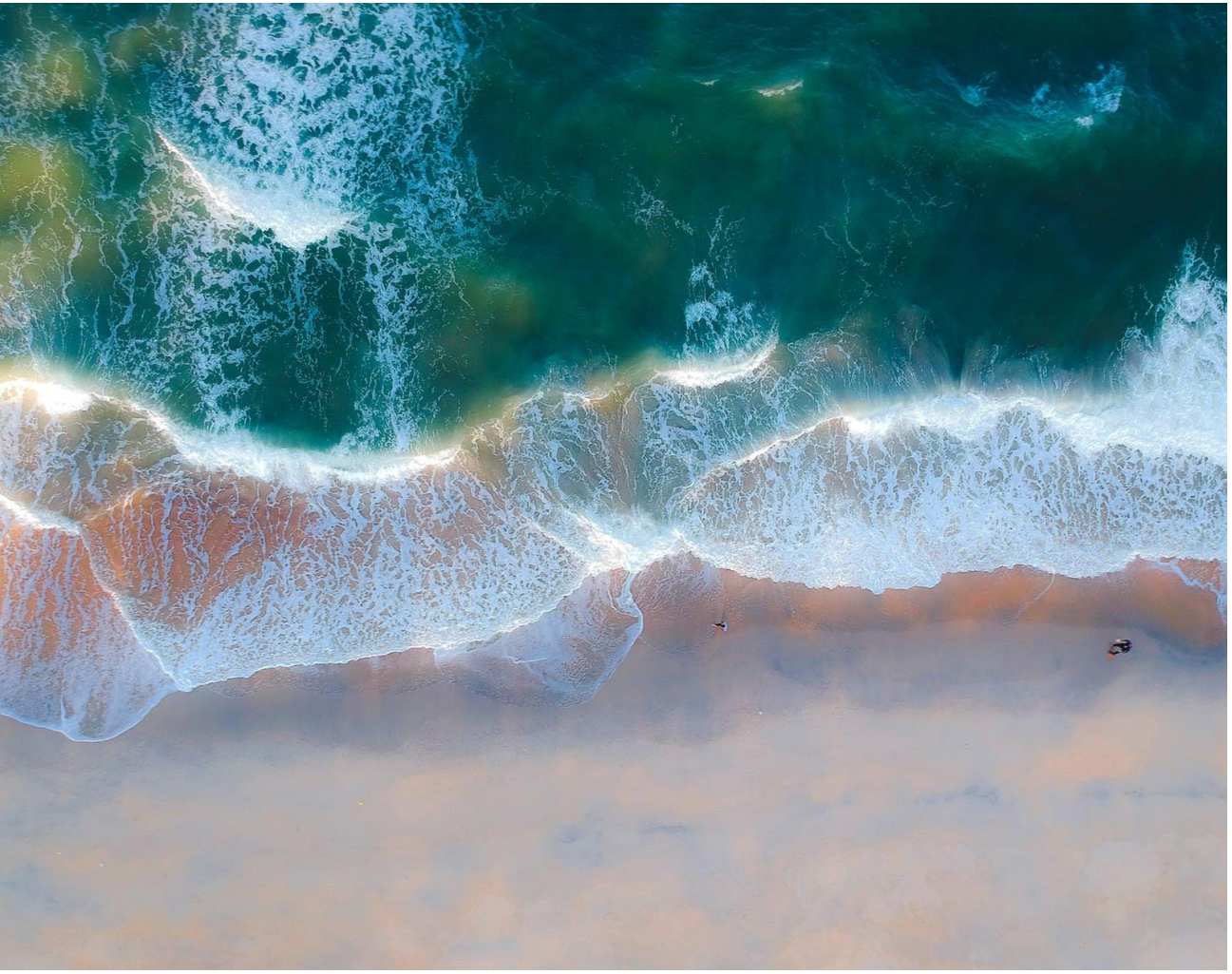
  … shall follow the requirements of the PEF/OEF method
- additional items may be added



Reporting, verification and validation requirements

Minimum requirements for the verification and validation of PEF/OEF studies

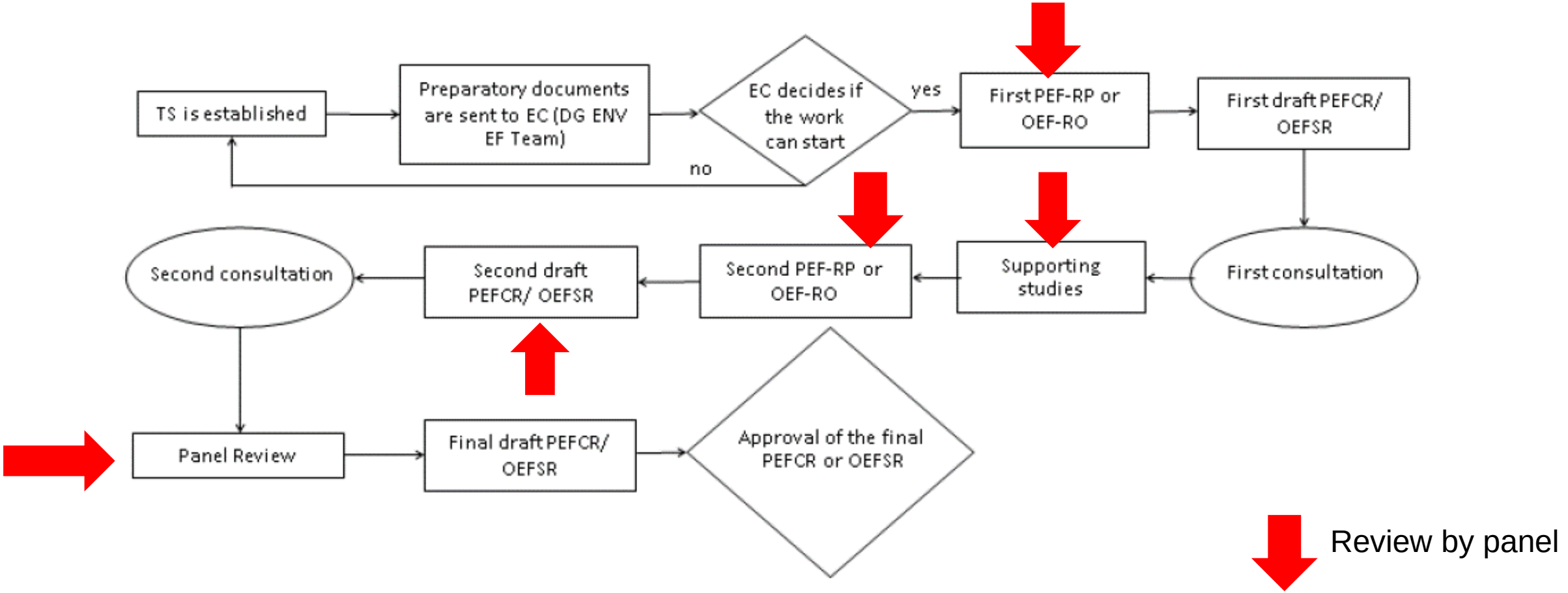
- Minimum requirements for verification and validation of PEF/OEF studies include:
  - » Impact assessment method (including normalization and weighting)
  - » Cut off applied
  - » Dataset EF compliance
  - » EF compliant dataset is made available to European commission
  - » Minimum % of processes underlying data validated
  - » DQR satisfies the minimum DQR as specified in PEFCR/OEFSR
- PEFCR/OEFSR may add additional requirements for the validation
- Also: sampling procedure in accordance with the sampling procedure in the PEFCR/OEFSR



Review requirements of PEFCR/OEFSR

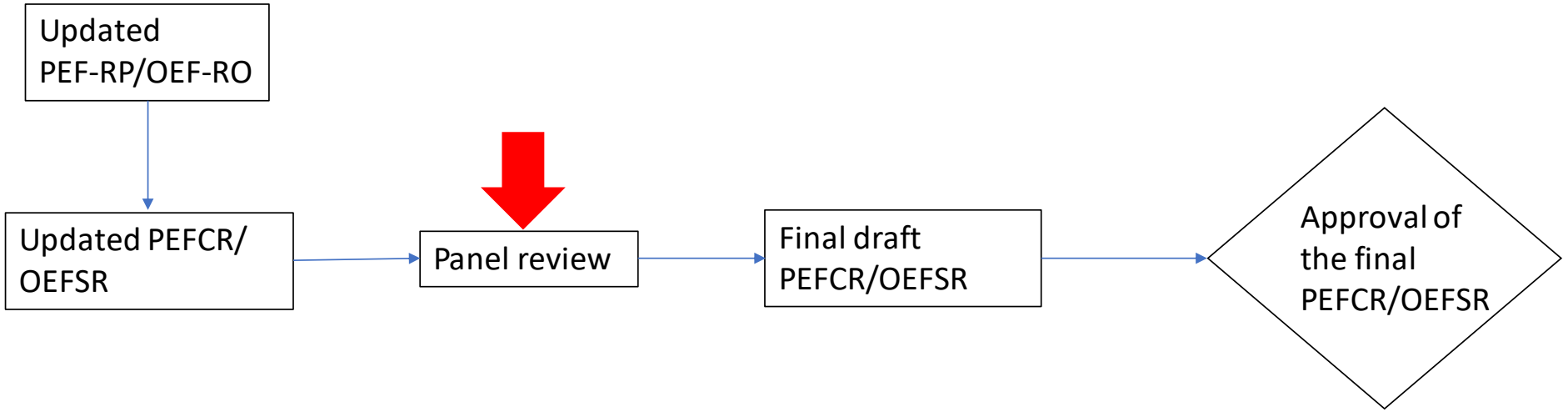
Review of PEFCR/OEFSR

New and full revision



Review of PEFCR/OEFSR

Partial revision (when minimum changes on LCIA of RP)



Review by panel

PEFCR/OEFSR review

- TS shall set up an external independent third-party review panel for the PEFCR review
  - Minimum three members (LCA/industry/NGO)
  - Competence established (review experience/LCA methodology/knowledge of the sector)

- Review of:
  - First and second PEF-RP, including the RP model and PEF-RP reports (public review report for each)
  - Supporting studies (review statement to be provided to the Commission)
  - Second draft PEFCR (confidential and public review report)

Who may perform the verification/validation?

Panel of three members

The independence of the verifiers shall be guaranteed (i.e. they shall fulfil the intentions in the requirements of ISO/IEC 17020:2012 regarding a 3rd party verifier, they shall not have conflicts of interests on concerned products and cannot include members of the Technical Secretariat or of the consultants involved in previous part of the work - PEF-RP studies, supporting studies, PEFCR drafting).

Absence of conflict of interest to be stated in the validation statement

Scoring system for self-declaration of reviewers

			Score (points)				
	Topic	**Criteria**	**0**	**1**	**2**	**3**	**4**
Mandatory criteria	Verification and validation practice	Years of experience (1)	<2	2 ≤ x < 4	4 ≤ x < 8	8≤ x < 14	≥14
		Number of verifications (2)	≤5	5 < x ≤ 10	11 ≤ x ≤ 20	21 ≤ x ≤ 30	>30
	LCA method-logy and practice	Years of experience (3)	<2	2 ≤ x < 4	4 ≤ x < 8	8≤ x < 14	≥14
		Number of LCA studies or reviews (4)	≤5	5 < x ≤ 10	11 ≤ x ≤ 20	21 ≤ x ≤ 30	>30
	Know-ledge of the specific sector	Years of experience (5)	<1	1 ≤ x < 3	3 ≤ x < 6	6≤ x < 10	≥10
Additional criteria	Review, verifica-tion/ validation practice	Optional scores relating to verification/ validation	— 2 points: Accreditation as third party verifier for EMAS — 1 point: Accreditation as third party reviewer for at least one EPD Scheme, ISO 14001, or other EMS				

Validity of PEFCRs/OEFSRs

- PEFCR/OEFSR has been developed in accordance with the requirements provided in the PEF/OEF method and Annex A of the PEF/OEF method
- PEFCR/OEFSR supports the creation of credible, relevant and consistent PEF/OEF profiles
- PEFCR/OEFSR scope and RPs/ROs are adequately defined
- Functional unit, allocation and calculation rules are adequate for the product category
- Datasets used in the PEF-RPs/OEF-ROs and the supporting studies are relevant, representative, reliable, and in compliance with data quality requirements

Validity of PEFCRs/OEFSRs

- Selected additional environmental and technical information are appropriate for the product category/sector and the selection is done in accordance with the requirements stated in the PEF/OEF method
- Model of RP/RO and corresponding benchmark (if applicable) represent correctly the product category or sub-category/sector or sub-sector
- RP/RO model is in line with the PEFCR/OEFSR and dataset is available in disaggregated and aggregated in ILCD format, are EF compliance http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml
- RP/RO model and its corresponding excel version is compliant with the rules outlined in section A.2.3 of PEF/OEF method
- Data Needs Matrix is correctly implemented
- Classes of performance, if identified, are appropriate for the product category

Questions

Thank you for your attention!

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