PEF and OEF methods
Introduction : Why ? How ? When ?

CBRE
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Lazare Bocabeille

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The Project partners

European Commission Directorate General for the Environment	• The Directorate General has developed methods for measuring and communicating the life cycle environmental performance of products and organisations • It now aims to educate SMEs further on the use of these methods and to build expertise to use them
Green Soluce www.greensoluce.com	• A sustainability consultancy firm based in Paris - France • Green Soluce has experience in project management on sustainability programs, stakeholder engagement as well as content development on energy transition
STUDIO FIESCHI & SOCI www.studiofieschi.it	• Sustainability consultancy firm based in Turin and Venice - Italy • Studio Fieschi has Life Cycle Assessment expertise, as well as OEF/PEF methods expertise
ALDA www.alda-europe.eu	• European Association for Local Democracy • ALDA includes more than 350 members including local authorities, associations of local authorities & civil society organisations, coming from more than 45 countries an work on the Promotion of good governance and citizen participation at the local level

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Why PEF/OEF has been developed

Environmental Footprint Calculation : Why ?

For consumers:
Choosing the right product and understanding labels

For green products:
Fair competition against greenwashing

Challenges for businesses:

Unlock opportunities for the circular and green economy

Provide reliable and relevant environmental claims

More harmonized approach for environmental information

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Environmental Footprint Calculation : Why ?

Same product BUT Different results

We need information that is reproducible, comparable, and verifiable

What is OEF/PEF ?

Product Environmental Footprint (PEF)

PEF is a method for assessing and displaying the environmental impact of a product. This policy has been developed by the European Union, which in 2003 noted the use of **230 labels within its territory**..

3 main objectives :

- Enable consumers to choose eco-responsible products, by providing them with clear, reliable and comparable information between companies

- Combat greenwashing and false environmental claims, using quantified and verified evidence.

- Encourage circular economy and low-carbon initiatives by giving them a commercial advantage and genuine recognition.

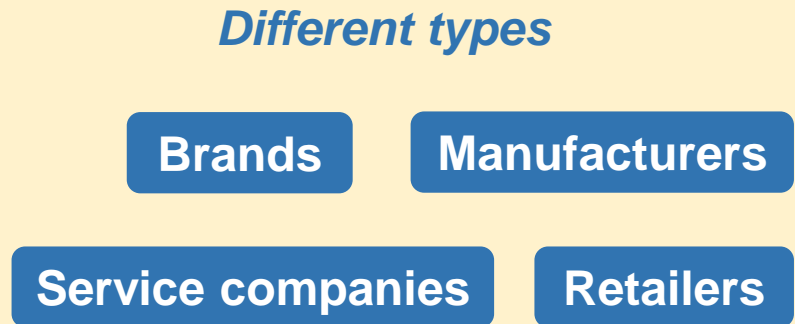| Key methodological issues to define in order to ensure comparability	PEF
Functional unit	**Common** FU fixed in a PEFCR per sector/product category
List of indicators and characterization factors	**One** EF Package with continuous improvement
Scope	Always full life cycle + **common** default scenarios specified in each PEFCR
DB with secondary datasets	**One common** public database validated by the EC
Methodological accounting rules	**Clear common** rules fixed (i.e Circular footprint formula, allocation rules, Electricity mix modelling, DQR,...)

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What is OEF/PEF ?

Product Environmental Footprint (PEF) : Operational and concrete method to measure the overall environmental footprint but above all to identify the right industrial levers to reduce it
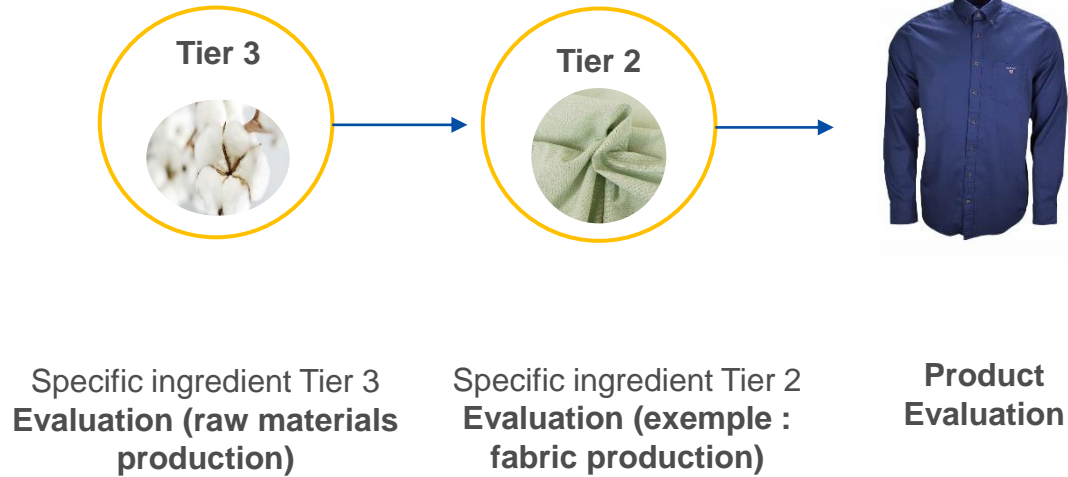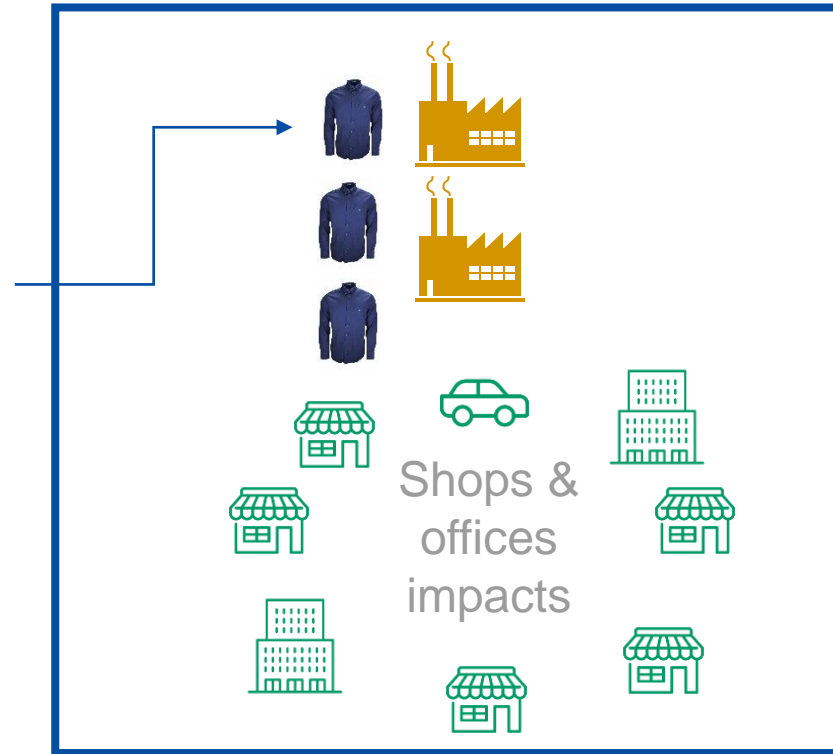
For all sectors

For all business types

Different sizes

Different types

Brands

Manufacturers

Service companies

Retailers

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What is PEF/OEF ?

Tier 3

Tier 2

Specific ingredient Tier 3
Evaluation (raw materials production)

Specific ingredient Tier 2
Evaluation (exemple : fabric production)

Product Evaluation

Shops & offices impacts

Group environmental assessment
Possible decomposition by scope; shop; region; products; scope…

Very specific evaluation at product or intermediary product level (PEF)

Global evaluation (OEF)

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A new paradigm for the European Industry

To help companies in their ecological transition, the European Commission designed two methods to measure and communicate the life cycle environmental performance of products and organisations:
- The Product Environmental Footprint **(PEF)**
- The Organisation Environmental Footprint **(OEF)**

✓ **HARMONIZE** a European methodology to measure and communicate the life cycle environmental performance of products and organisations at a multinational level

✓ **EDUCATE** stakeholders to improve their decision-making process by reducing their confusion on markets and result in better environmentally sustainable consumption, production and investment

✓ **PROMOTE** virtuous well-advanced companies in the ecological transition by giving them more visibility thanks to their good environmental score

✓ **RAISE AWARENESS** among market actors about organisations and products' negative impacts the carbon footprint but also the eutrophication, acidification, eco toxicity, etc

✓ **FACILITATE** the transition of companies by providing rigorous common guidelines to evaluate their environmental impact

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A new paradigm for the European Industry

This methodology is a lever for performance and succès. It enables companies to ::

1. Improve their economical and societal performances

2. Attract more investors caring about low environmental impact projects

3. Provide clear and comparable information for their stakeholders

4. Support the competitiveness of European companies

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Environmental Footprint Initiative and Capacity Building Project

Environmental Footprint Initiative: Why?

Life cycle thinking in European product policies

Integrated Product Policy
Communication COM/2003/302

➡️ **Framework for environmental improvement** of all products throughout based on **Life Cycle Assessment**

International Reference Life Cycle Data System (ILCD)

European Environmental Footprint methods (EF)

Life cycle approach as a major **lever for guiding European policies** and investments towards the environmental sustainability goals (e.g. COM/2019/640 on the European Green Deal)

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Environmental Footprint: Why?

Features of the EF methods:

- **Reproducible**

- **Materiality-driven**

- **Comparable**:

- **Reliable**

- **Agreed**

- **Less cost**

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Capacity Building Project : Why ?

4 obserations led us to the capacity building project :

Some companies might not be aware about this methodology and might lack expertise : SMEs in particular

The EC want to provide capacity building for these actors
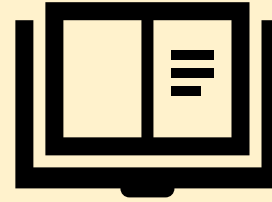
The aim is to share best practices of PEF and OEF and improve the understanding of the methods and its benefits

The more players using the methods, the more transparent the market will be

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Survey results (1/2)

An online survey was distributed amongst SMEs and other entities in order to gain feedback from the methods.

75% of respondents having already used LCA methods used the OEF or PEF methods

This survey unveiled 5 main take aways :

1. Few SMEs use PEF or OEF methods, because of lack of knowledge, technical expertise or cost

2. Compiling the Life Cycle Inventory/collect data and conduct Life Cycle Impact Assessment are especially complex

3. PEF approach is good but still immature (databases for materials and processes, non-LCA indicators, practical use, …)

4. Lack of vision about the future of OEF/PEF methods

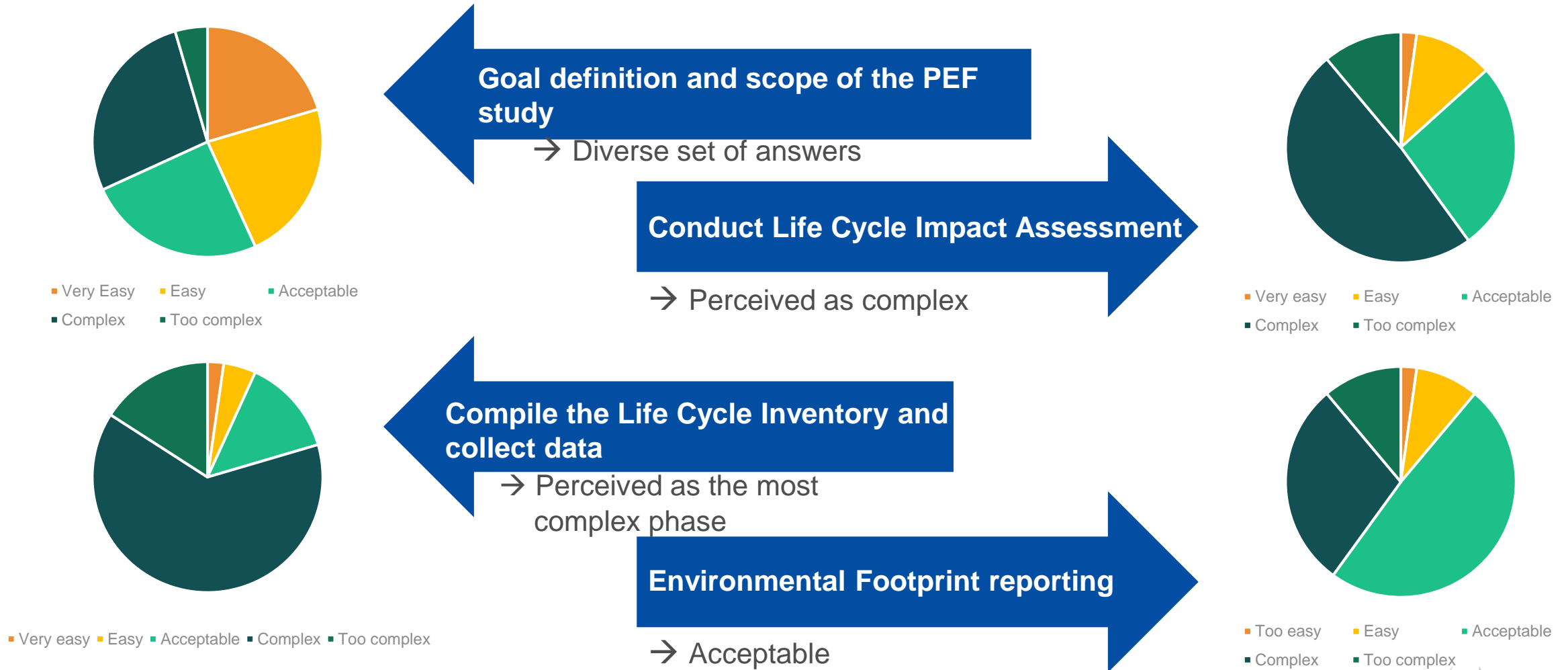5. Strong need for comparable data and methods in Europe, if possible per sector (cf. PEFCR)

"Make all phases more concise and user-friendly."

"Full PEF package would need to be a bit lighter, more pragmatic, and easier to process"

"I found it really hard to find a good database to conduct à PEF study."

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Survey results (2/2) Level of complexity

Respondents were asked to rate the level of complexity of different Footprint assessment phases.

Goal definition and scope of the PEF study

→ Diverse set of answers

Conduct Life Cycle Impact Assessment

→ Perceived as complex

Compile the Life Cycle Inventory and collect data

→ Perceived as the most complex phase

Environmental Footprint reporting

→ Acceptable

- Very Easy
- Easy
- Acceptable
- Complex
- Too complex

- Very easy
- Easy
- Acceptable
- Complex
- Too complex

- Very easy
- Easy
- Acceptable
- Complex
- Too complex

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- Easy
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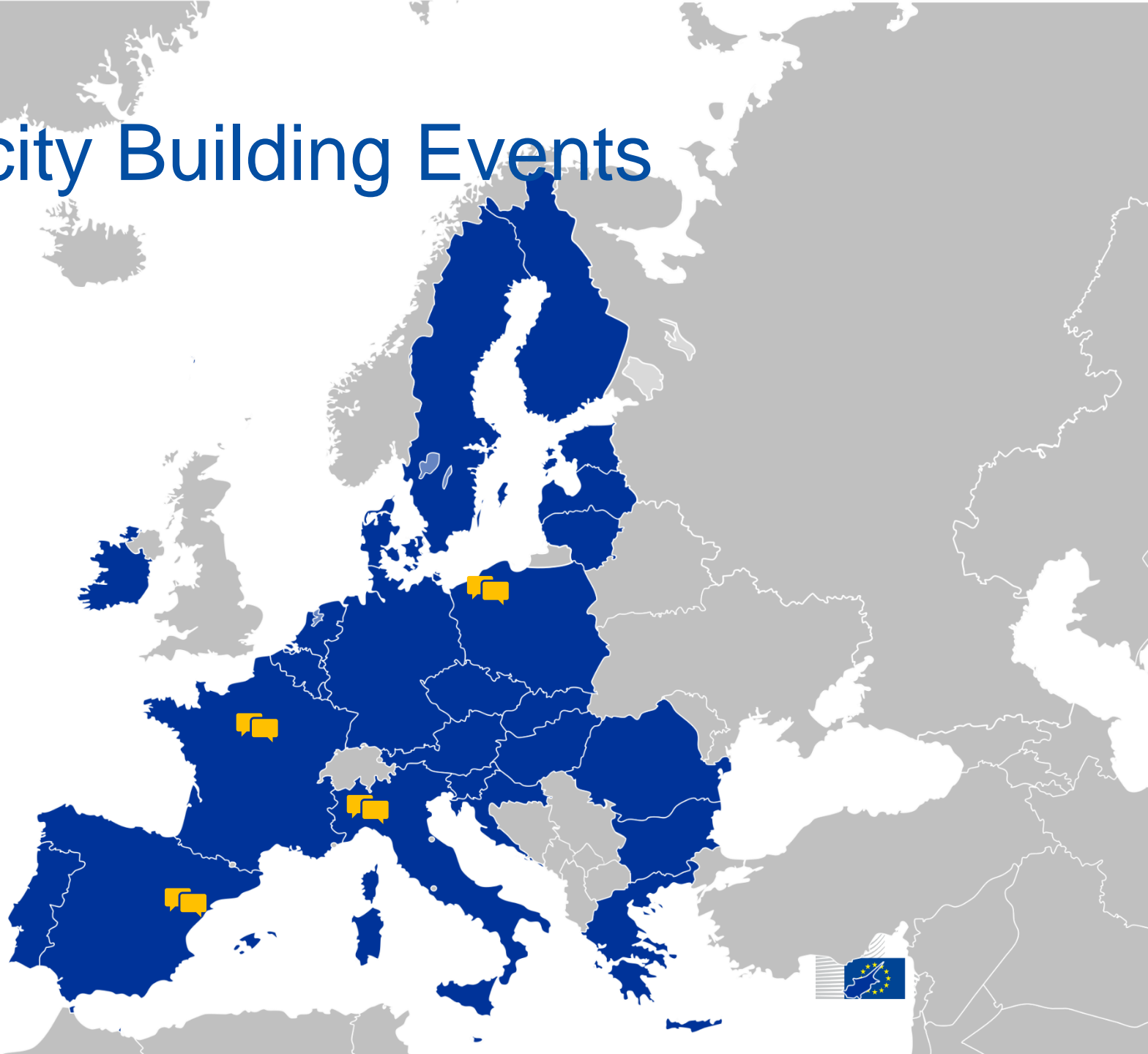# 5 European Capacity Building Events

April 2022: **Digital Event**

June 2022: **Paris**

February 2023:
Barcelona

March 2023: **Bologna**

July 2023: **Digital Event**

Objectives of the events

1. **Raise awareness of the EF methods** among the market actors

2. **Provide capacity building and information**, focussing on the technical aspects of the PEF/OEF

3. **Educate consumers and other market actors on the key features of the methods** so that claims based on the methods are well understood and used for decision-making.

4. **Build expertise on applying PEF/OEF methods by companies**, and especially SMEs: strengthen the skills, competencies, and abilities of stakeholders in applying the PEF/OEF methods, understand the results and use them in the decision-making processes

5. **To raise awareness about tools that make it easier to apply the PEF/OEF methods** (e.g. e-learning, any EU calculation tool, grant opportunities

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Past, present and future

Timeline
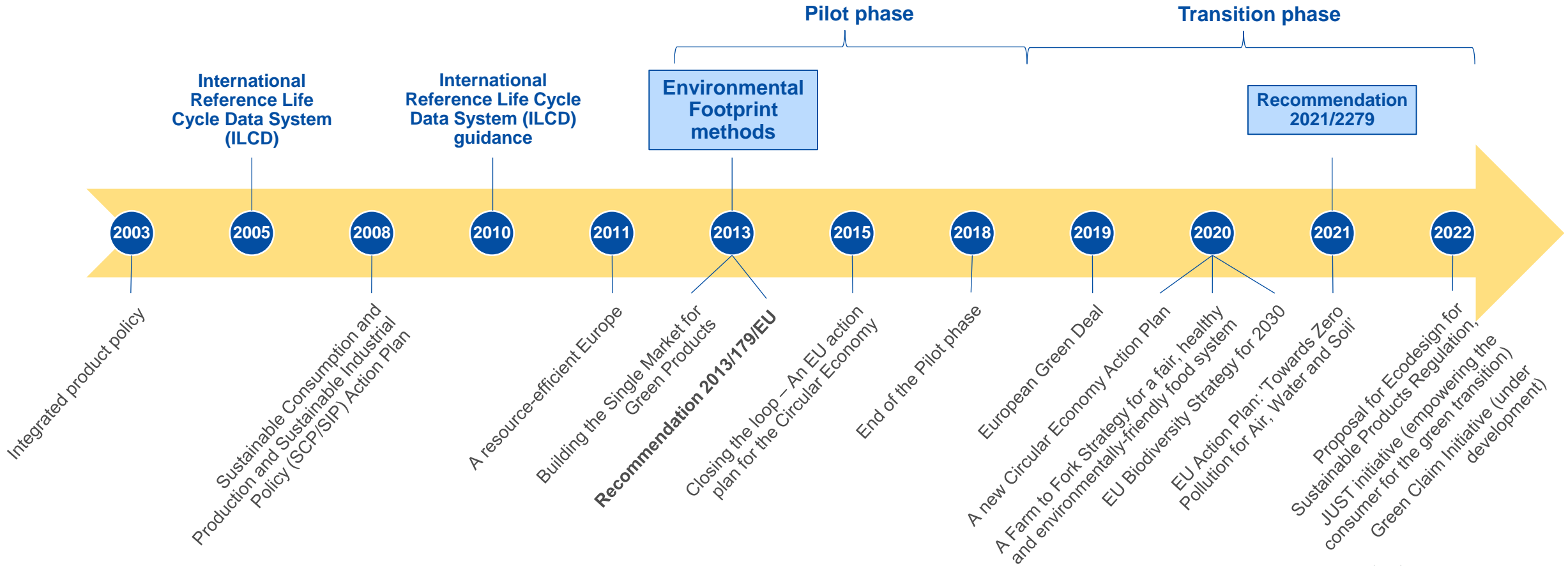
Pilot phase

- Testing and development of **21 PEFCRs[1]/OEFSRs[2]** for specific product categories/sectors

- **~300 organisations** actively involved (mainly industry associations, large OEM's from EU and globally)

- **~3.000 registered stakeholders** involved

[1] Product Environmental Footprint Category Rules

[2] Organisation Environmental Footprint Sector Rules

Finalised PEFCRs:

- Rechargeable batteries
- Decorative paints
- IT equipment (HDD systems)
- Leather
- Thermal insulation (housing)
- Beer
- Dairy products
- Feed for food prod. animals
- Pet food
- Pasta
- Wine
- Packed water
- Hot & cold water pipe systems
- Liquid household detergents
- Photovoltaic electricity generation
- Intermediate paper product
- T-shirt
- Uninterruptable power supply
- Metal sheets

Finalised OEFSRs:

- Retail
- Copper production

Transition phase

The main **aims** of the transition phase are to provide a framework for:

- **monitoring the implementation** of existing PEFCRs and OEFSRs;
- developing **new PEFCRs/OEFSRs**;
- new **methodological developments**.

PEFCR / product category	Coordinated by
Apparel (including accessories, dresses, hosiery, underwear, leggings/ tights, baselayer, jacket, jersey, pants, shirts, skirt, socks, sweater and cardigans, swimwear, t-shirt, boots, cleats, court, dress shoes/ heel, other athletic shoes, sandals and sneakers)	Sustainable Apparel Coalition
Cut flowers and potted plants	Coöperatie Royal FloraHolland U.A.
Flexible packaging (low, medium and high functionality flexible packaging)	Amcor Group GmbH
Synthetic turf	EMEA Synthetic Turf Council (ESTC)
Marine fish (wild caught marine fish and marine fish from marine open net pen aquaculture)	Norwegian Seafood Federation (NSF)

Transition phase

- **Update of the EF database**: The Environmental Footprint (EF) database is designed to support the implementation of Product Environmental Footprint (PEF) and Organisation Environmental Footprint (OEF) studies. It contains the official secondary EF-compliant life cycle inventory datasets and the compatible EF impact assessment methods. **The EF database 3.1 is now available** for the development of new PEFCR and the update of PEFCR/OEFSR developed in pilot phase.

- The **Technical Advisory Board (TAB)** consists of LCA/EF experts and provides technical advice and expertise to the Commission. The issues to be discussed might include, but are not limited to, analysis of the content of newly developed PEFCRs/OEFSRs, consistency of approaches among different PEFCRs/OEFSRs, and new methodological developments seen necessary within the EF context. (https://ec.europa.eu/transparency/expert-groups-register/screen/expert-groups/consult?lang=en&groupID=3710)

  - **Working groups** coordinated by the European Commission and supported by the Joint Research Centre (JRC) have been formed to give **expertise and advice on specific methodological issues**.

- A technical **helpdesk** was contracted to support organizations taking part in the transition phase and to provide technical assistance for the Commission services.

Transition phase

- December 2021 → ***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***

  ➢ It **revises the previous 2013 Recommendation** and incorporates the methodological insights of the 2013 – 2018 pilot phase (Zampori and Pant, 2019)

  ➢ It aims at helping companies to **calculate their environmental performance based on reliable, verifiable and comparable way**, and for other actors (e.g. public administrations, NGOs, business partners) to have access to such information.

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Need more information?

Further information, training materials and documents can be found at the EF webpage of the European commission:

- Environmental Footprint Methods Recommendation: https://ec.europa.eu/environment/eussd/smgp/ef_methods.htm

- Information on EF transition phase: https://ec.europa.eu/environment/eussd/smgp/ef_transition.htm

- Trainings on PEF/OEF: https://ec.europa.eu/environment/eussd/smgp/ef_trainings.htm

- Short guideline on PEF: https://ec.europa.eu/environment/eussd/smgp/pdf/EF%20simple%20guide_v7_clen.pdf

- European Platform on Life Cycle Assessment, Developer EF: https://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml
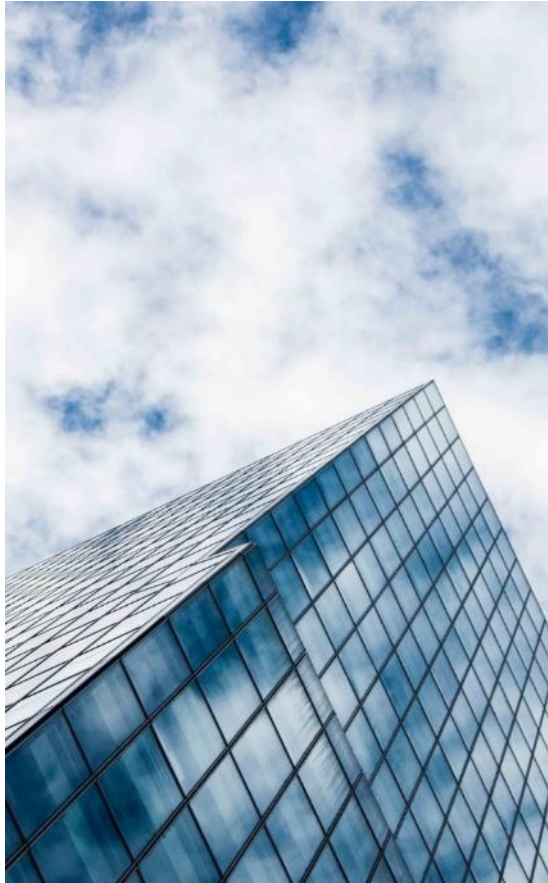
Thank you

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The Future of EU Environment Footprint Initiative

What can SMEs and other stakeholders expect?

Małgorzata Gołębiewska

DG Environment, European Commission

The EU policy dimension

❑ **European Green Deal – 12/2019**

Reliable, comparable and verifiable information also plays an important part in enabling buyers to make more sustainable decisions and reduces the risk of 'green washing'
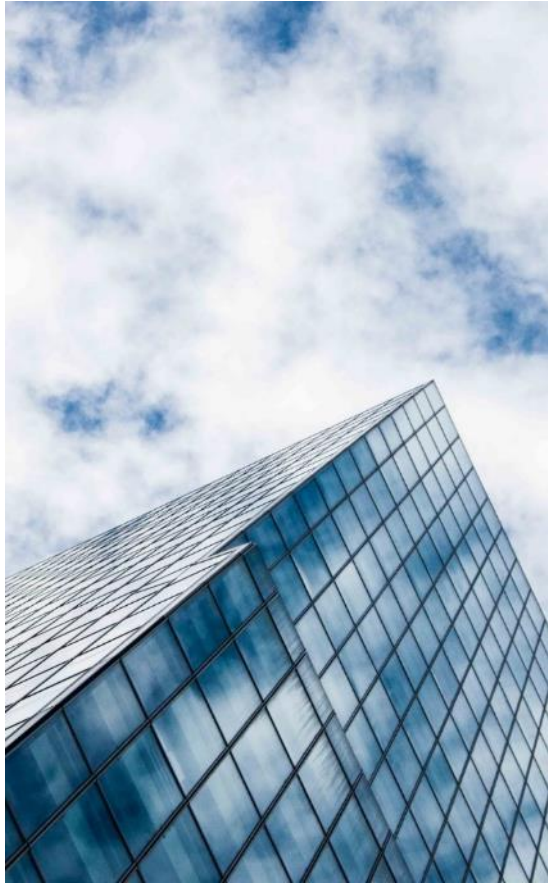
❑ **Circular Economy Action Plan – 3/2020**

The Commission will propose that companies substantiate their environmental claims using Product and Organisation Environmental Footprint methods

❑ **Commission Recommendation – 12/2021**

Updated recommendation to the EU Member States and updated EF Methods

The EU policy dimension

- ❑ **Taxonomy Regulation**

  ➢ the definition and carbon footprint thresholds for sustainable companies

- ❑ **Proposal for a regulation on Eco-design for Sustainable Product**

  ➢ Introduction of mandatory ecodesign requirements (circularity) beyond energy-efficiency

  ➢ PEF amongst the reference methods when setting the ecodesign requirements for products

  ➢ Information rules – creation of a digital product passport; control of environmental claims on products
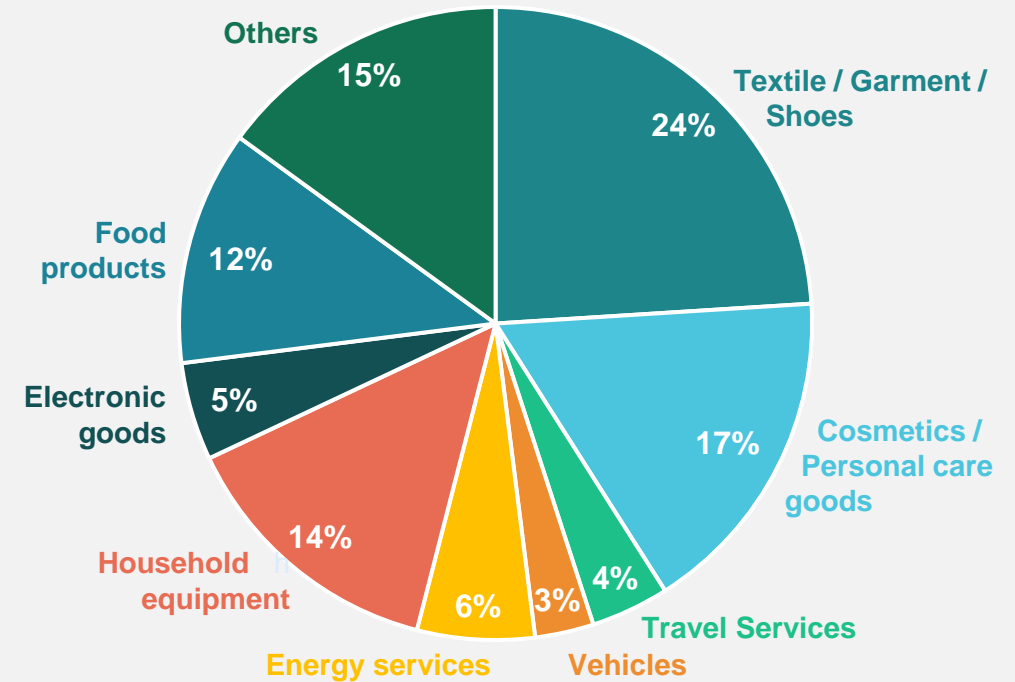
  ➢ Priority product groups beyond energy using products

- ❑ **Batteries Regulation**

  ➢ new rules aim to promote a circular economy by regulating batteries throughout their life cycle;

  ➢ carbon footprint calculation based on PEF

Green Claims Directive – legislative proposal

- **Protect** consumers and companies from **greenwashing** (+/-75% of products bear claims)

- **Enable** consumers to make informed purchasing decisions based on credible environmental claims and labels (+/-230 in EU)

- Reliable claims need credible & proportionate substantiation

- *PEF is an appropriate method to comply with the requirements of the GCD*

  - claims on environmental impacts

 - claims on environmental footprint of products or organisations

  - comparative claims

2020 sweep on misleading sustainability claims

- Others 15%
- Textile / Garment / Shoes 24%
- Cosmetics / Personal care goods 17%
- Travel Services 4%
- Vehicles 3%
- Energy services 6%
- Household equipment 14%
- Electronic goods 5%
- Food products 12%

2020 inventory on environmental claims

53% of claims provide **vague, misleading or unfounded** environmental information on the product

PEF – added value for companies
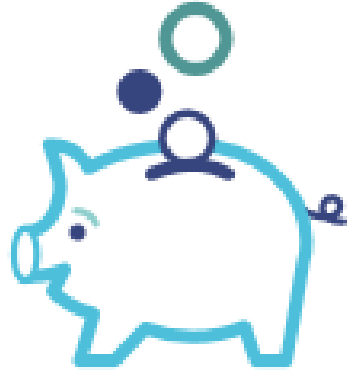
- Reduction of costs related to similar existing methods
- Reduction of costs due to better management of resources and supply-chain
- Access to new markets and finance opportunities
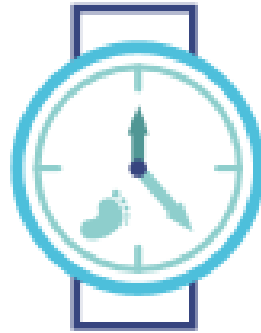
- Clear, simple and comparable information
- One single method applicable everywhere

- Information more traceable
- No communication without independent third party verification
- Information that consumers, authorities, and investors can trust

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PEF – what happens next?

Pilot phase: 21 PEFCRs/OEFSRs – some are currently being updated

Finalised PEFCRs

- Rechargeable batteries
- Decorative paints
- IT equipment (HDD systems)
- Leather
- Thermal insulation (housing)
- Beer
- Dairy products
- Feed for food prod. animals
- Pet food
- Pasta
- Wine
- Packed water

Finalised PEFCRs

- Hot & cold water pipe systems
- Liquid household detergents
- Uninterruptable power supply
- Photovoltaic electricity generation
- Intermediate paper product
- T-shirt

Finalised OEFSRs

- Retail
- Copper production

PEF – what happens next?

➤ *Sectors developing new PEFCRs*

	Apparel (including accessories, dresses, hosiery, underwear, leggings/ tights, baselayer, jacket, jersey, pants, shirts, skirt, socks, sweater and cardigans, swimwear, t-shirt, boots, cleats, court, dress shoes/ heel, other athletic shoes, sandals and sneakers)	Sustainable Apparel Coalition pef@apparelcoalition.org
	Cut flowers and potted plants	Coöperatie Royal FloraHolland U.A. pietbriet@royalfloraholland.com
	Flexible packaging (low, medium and high functionality flexible packaging)	Amcor Group GmbH isabelle.jenny@amcor.com
	Synthetic turf	EMEA Synthetic Turf Council (ESTC) stefan@estc.info
	Marine fish (wild caught marine fish and marine fish from marine open net pen aquaculture)	Norwegian Seafood Federation (NSF) henrik.stenwig@sjomatnorge.no

PEF – what happens next?

➢ Upcoming **eco-design rules for specific product groups** expected to be based to some extent on PEF

 ▪ *Rules for **textiles** expected to take into account the work performed under the PEFCR Apparel & Footwear*

➢ **Green Claims Directive** to allow EC to adopt product category rules developed in line with PEF method

PEF – what happens next?

➢ **Future EF database** – EC developing a large database of secondary data for value chains with more open **intellectual property regime**

➢ **EF method** to be regularly updated to respond to new challenges- *microplastics release, biodiversity impacts, sustainability of fish stocks, animal welfare, etc.*

➢ Potential new PEFCRs in the future

Need more info?

➢ ***Circular economy:*** [Circular economy (europa.eu)](#)

➢ ***Environment Footprint methods:*** [Environmental Footprint methods (europa.eu)](#)

➢ ***JRC website:*** [European Platform on LCA | EPLCA (europa.eu)](#)

➢ ***Green claims:*** [Green claims (europa.eu)](#)

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PEF and OEF methods
Basic concepts and Main opportunities and challenges

STUDIO FIESCHI
& SOCI

Irene Cropanise

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What's new on the latest EC recommendation on the use of Environmental Footprint methods

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The revised EC recommendation on EF methods

- December 2021 → ***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***

  ➢ It **revises the previous 2013 Recommendation** and incorporates the methodological insights of the 2013 – 2018 pilot phase (Zampori and Pant, 2019)

  ➢ It aims at helping companies to **calculate their environmental performance based on reliable, verifiable and comparable way**, and for other actors (e.g. public administrations, NGOs, business partners) to have access to such information.

The revised EC recommendation on EF methods

- The fundamental principles of the methods adopted in today's Recommendation remain **unchanged**.

- Most of the changes introduced are of a **methodological nature in the following** three main areas:

  1. **modelling requirements**

  2. **data and data quality requirements**

  3. **life cycle impact assessment**

Main revisions of the EF methods

1. **Modelling requirements:**

   - agreements on the **modelling of key aspects** concerning climate change, electricity, transport, infrastructure & equipment, packaging, end of life and agriculture;

   - guidelines on how to include **biodiversity** as additional environmental information;

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Main revisions of the EF methods

2. **Data and data quality requirements**

   - detailed **rules for data collection** and data quality requirements (Data Needs Matrix);

   - provision of a guide on Environmental Footprint **compliant datasets**.

+

EF database 3.1
available for PEFCR in
transition phase

Main revisions of the EF methods

3. Life cycle impact assessment

- application of the materiality principle ("act where it matters");

- inclusion of mandatory **normalisation** and **weighting factors**;

- **improvement of some impact assessment methods**, with particular attention to the toxicity-related methods (human toxicity – cancer effects; human toxicity – non-cancer effects; eco-toxicity freshwater, water use, land use, resources and particulate matter);

- defining characterisation factors based on **REACH** data;

- definition of a **benchmark** corresponding to the Environmental Footprint profile of the average production in the European market, also called representative product.

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A living method

Discussions in the Commission expert group on the Technical Advisory Board

- Advising on an approach for integrating **biodiversity** as a separate indicator into the EF methods

- Modelling **agriculture**: pesticides, fertilizers, feed digestion and manure management, water use, primary data collection/quality for farm related activities

- **Data**: update of the EF reference package, advanced documentation requirements for dataset reviewers, proposal for a new and more specific set of requirements for reviewer qualification and guideline on review process and method

- Discussing **carbon** modelling: biogenic carbon uptake and storage, emissions and removals from land use due to agricultural and forestry practices, emissions from land use change

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Basic concepts on LCA and relationship with PEF/OEF

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Why a life cycle perspective?

- **Systemic perspective** considering the three pillars of sustainability: **environmental, social and economic** → fundamental approach to support decisions related to sustainability of policies, production systems and services.

- **Measures focused on one specific goal** (e.g. reducing greenhouse gases) might hide **negative consequences that were not considered**, such as different impact types, different geographical areas or different stages of the value chain.

Life Cycle Assessment (LCA) represents the practical realisation of **life cycle thinking**.

LCA forms the scientific and methodological foundation of the PEF and OEF methods.

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What is Life Cycle Assessment (LCA)?

LCA is a methodology for assessing environmental impacts associated with **all the stages of the life cycle** of a product, **process, or service**, by:

- **Compiling an inventory** of relevant energy and material inputs and environmental releases;

- **Evaluating the potential impacts** associated with identified resource inputs and emissions;

- **Interpreting the results** to help making a more informed decision.
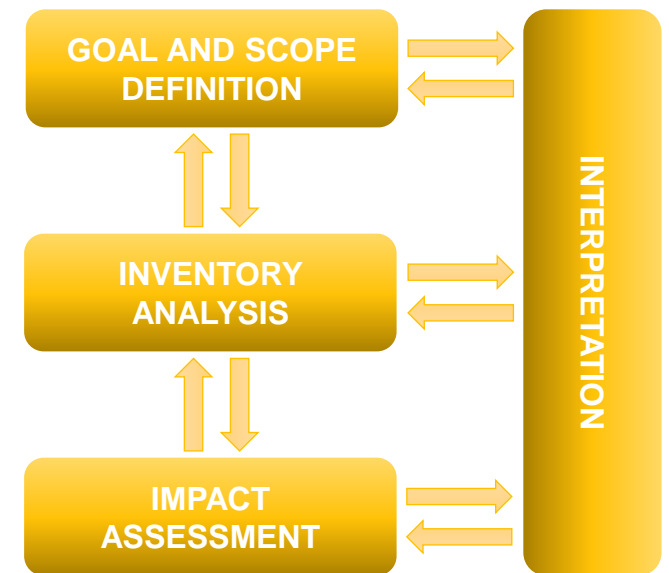
Illustration of the general phases of a life cycle assessment, as described by ISO 14040

Standards

Other related Standards:

- ISO 14046:2014 Environmental management — **Water footprint** — Principles, requirements and guidelines.
- ISO 14006:2020 Environmental management systems — Guidelines for incorporating **ecodesign**.
- ISO 14025:2006 Environmental labels and declarations — **Type III environmental declarations** — Principles and procedures.
- ISO 14064-1:2018 Greenhouse gases — Part 1: Specification with **guidance at the organization level for quantification and reporting of greenhouse gas emissions** and removals.
- ISO 14067:2018 Greenhouse gases — **Carbon footprint of products** — Requirements and guidelines for quantification.
- ISO 14072:2014 Environmental management — Life cycle assessment — Requirements and guidelines for **organizational life cycle assessment**.

LCA and PEF/OEF

- PEF and OEF are designed to measure and communicate the life cycle environmental performance of products and organisations.

- Together, PEF and OEF, constitute the **EF methods, grounded on the LCA standard methodology**.

- **Following the framework standardised by ISO 14040-44, the EF is structured in similar steps, yet providing further specifications necessary to achieve a <u>higher degree of robustness, consistency, reproducibility, and comparability</u>.**

LCA and PEF/OEF

Phases of a life cycle assessment	Standardised steps of LCA according to ISO 14040-44	Steps of the EF method
Goal and scope	Reasons and intended applications **Functional unit** **System boundary** **Impact categories** Allocations Data requirements Assumptions and limitations	**Functional unit** shall be defined according to "what", "how much", "how long", "how well". In the **system boundary** cut-off shall be avoided unless following specific rules. A default set of 16 **impact categories** shall be considered.
Inventory analysis	Collection of primary and secondary data on elementary and non-elementary flows exchanged through the ecosphere and the technosphere: • input of energy, raw materials, and other physical inputs • output of products, co-products, waste, emissions. Data calculation relating to unit processes, functional unit, and allocations.	Detailed **modelling requirements** and data (e.g. electricity, transport, agricultural production). **Data quality requirements** (semiquantitative) are provided and shall be met by specific (primary) and generic (secondary) data. **Allocation for recycling** shall be applied using the circular footprint formula.
Impact Assessment	Calculation of potential impact associated to the defined impact categories from inventory data. Optional grouping, normalisation, and weighting.	The mandatory steps are: **classification, characterisation, normalisation, and weighting**. Results shall be calculated as characterised, normalised and weighted for each impact category and as a single score based on the weighting factors provided.
Interpretation and reporting	Interpretation of LCIA results, hotspot analysis to find relevant processes and flows, sensitivity analysis of modelling choices, recommendations. The interpretation may involve iteratively reviewing the choices made in the previous stages of the LCA.	Interpretation shall include **robustness assessment** (completeness, sensitivity, consistency), **hotspot analysis** (most relevant impact categories, life cycle stages, processes, flows), and **uncertainty** (qualitative or quantitative using e.g. Monte Carlo simulation). Results shall be reported for the total life cycle, and the total life cycle excluding the use stage.
Verification and validation	Critical review foreseen in case of comparative assertions.	**Minimum requirements on reviewers** and review panels are defined depending on the intended application.

How to develop an EF study: main steps

Phases of an EF study

The company decides to carry out a PEF or an OEF → Check for internal resources, external experts, training → Check for existing PEFCR/OEFSR

YES → Carry out a PEF/OEF based on PEFCR/OEFSR

NO ↓

Carry out a PEF/OEF based on the general PEF/OEF method

Goal definition
Intended application(s)
Reasons
Target audience
Commissioner
Identity of the verifier

Scope definition
Functional unit and reference flow
System boundary
EF impact categories
Additional information
Assumptions/limitations

Life cycle inventory
Definition of data needs and quality requirements
Primary and secondary data collection

Life cycle impact assessment
Classification
Characterisation
Normalisation
Weighting

Interpretation
Completeness check
Sensitivity check
Consistency check
Hotspot analysis

Reporting

Verification and validation
PEF/OEF study
PEF/OEF report
Communication vehicles

■ Additional elements covered by the PEFCR/OEFSR

Source: «EC, Understanding Product Environmental Footprint and Organisation Environmental Footprint methods, 2021»

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PEFCR and OEFSR

- **If a PEFCR/OEFSR is available, it shall be used**, otherwise the general PEF/OEF method shall be used.

- PEFCRs and OEFSRs are specific rules that complement the general PEF and OEF methods by **providing further specification** at the level of a specific product category or sector.

- They help to **place the focus on those aspects and parameters that matter the most**, and hence contribute to **increased relevance, reproducibility and consistency** of the results.

- **PEFCRs** also provide **characterised benchmark values** for the specific product category

PEFCR = Product Environmental Footprint Category Rules
OEFSR = Organisation Environmental Footprint Sector Rules

Product Environmental Footprint
Category Rules (PEFCR)

T-shirts

Sandrine Pesnel*, Jérôme Payet* on behalf of the
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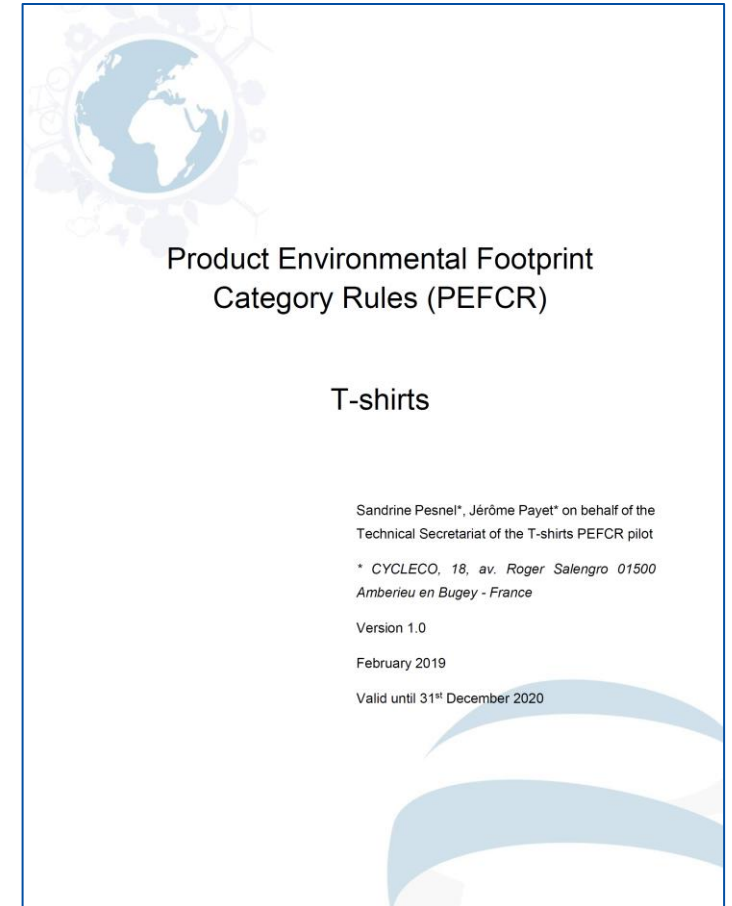
Extract from PEFCR T-shirts

PEFCR and OEFSR

- An EF study following the general method shall follow the principles of **relevance, completeness, consistency, accuracy, and transparency**.

- However, EF results as obtained from the general EF method are not directly comparable to results of other products/organisations, because **specific products and sectors can be characterised by peculiarities and uniqueness, and some methodological and data choices can be left to the user's discretion**.

Development of
✓ **Product Environmental Footprint Category Rules** (PEFCRs) and
✓ **Organisation Environmental Footprint Sector Rules** (OEFSRs)
establishing category and sector requirements of EF studies.

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Goal and Scope

Goal

Sets the overall context for the study.

It shall include:

- Intended application(s)
- Reasons for carrying out the study and decision context
- Target audience
- Commissioner of the study
- Identity of the verifier

Scope

Describes the system to be evaluated and the technical specifications.

It shall be in line with the defined goals of the study and shall include:

- Functional unit and reference flow
- System boundary
- EF impact categories
- Additional information to be included
- Assumptions/Limitations

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Functional Unit

Quantified performance of a product system for use as a reference unit

The EF method requires to define the functional unit as:

- **what**: the function or service provided;
- **how much**: the extent of the function or service;
- **how long**: the duration or the lifetime;
- **how well**: the expected level of quality.

3.3 Functional unit and reference flow

The FU is "To wear a clean T-shirt until it becomes dirty 52 times". Table 4 defines the key aspects used to define the FU.

Table 4. Key aspects of the FU

What?	T-shirt The T-shirt description is available in the part "3 PEFCR scope".
How much?	1 T-shirt
How well?	Wearing a clean T-shirt until it becomes dirty
How long?	52 times

The criterion "how long" has an influence on the environmental impact of the use stage. The impact of the use stage is proportional to the number of use of an article, that is, the more the article is worn, the more the use stage is impacting.

This functional unit enables to compare the different T-shirts based on the function brought by the product. It covers the entire category of the products investigated.
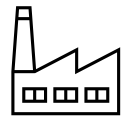
Extract from PEFCR T-shirts

System boundary

The **mandatory life cycle stages** included in an EF

Raw material acquisition and pre-processing

e.g., extraction of resources, pre-p
agriculture, forestry, packaging pro

Manufacturing

all processes taking place from the
processing, manufacturing, assem
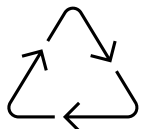
Distribution

transport and storage of the finishe
consumptions (e.g., energy).

Use stage

product(s) use for the defined func
maintenance materials, coolant).

End of life

all activities occurring from the mor
or recycled. This includes e.g., coll
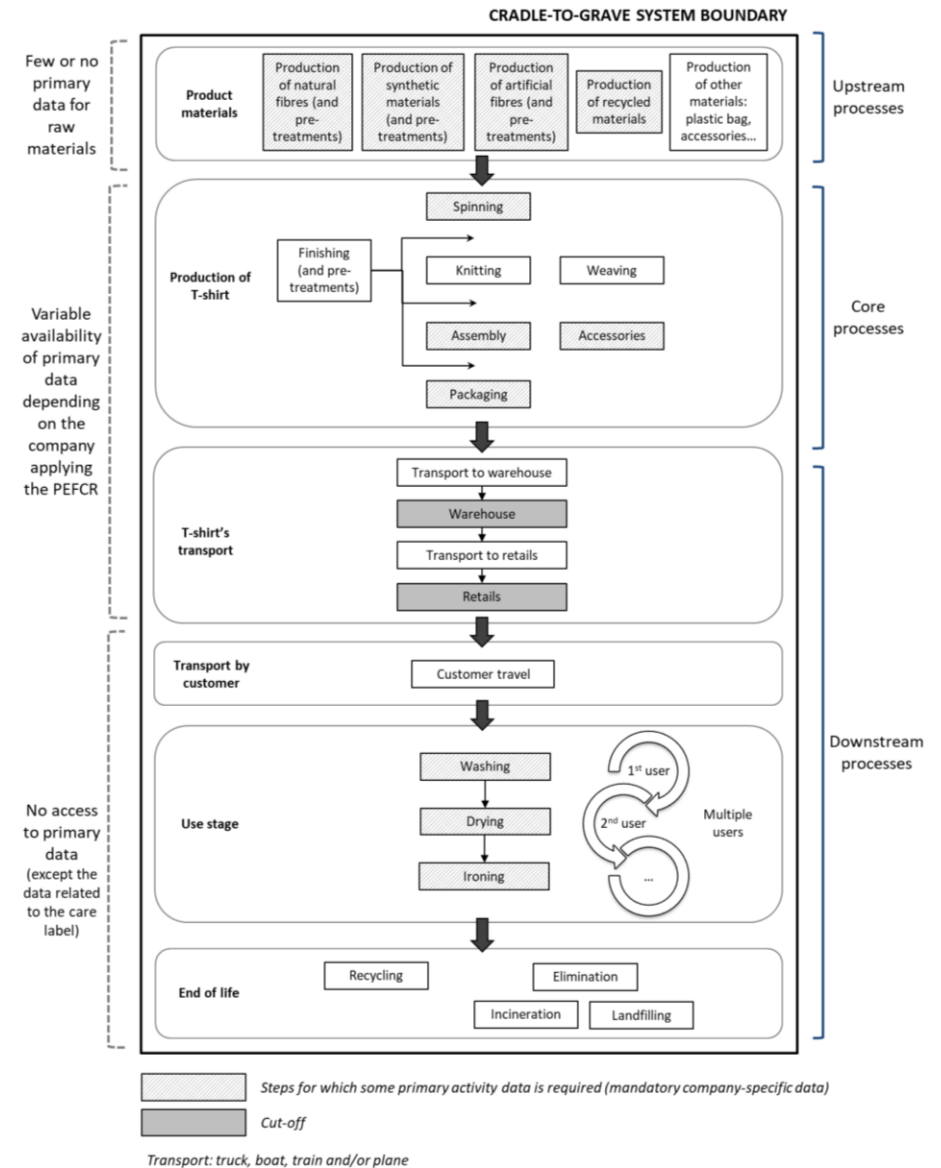recycled material, landfill, incineration

Figure 4. Product system with system boundary

Extract from PEFCR T-shirts

Life Cycle Inventory

- The Life Cycle Inventory is the collection of data related to all known inputs and outputs of the processes involved.

- The PEF/OEF methods provide **guidance** for the collection and modelling of inventory data.

- All activities run by a company carrying out EF require collecting **primary data** (company and site-specific) for all known inputs and outputs of the processes involved.

- **Secondary data** (e.g. from sector-specific databases or literature) may be used to model processes that are included in the system boundary for which primary data are not available (e.g. not run by the company).

- **Data shall be EF-compliant**. Data quality requirements for both primary and secondary data are also defined by the EF method.

5.1 List of mandatory company-specific data

The Table 15 identifies the processes for which company-specific information is mandatory and, for each process, the list of the activity data to be used in the calculations.

Table 15. List of mandatory processes and activity data to be used in the calculations

Mandatory processes	Activity data to be used in the calculations
-	- Weight of T-shirt (primary data or calculated data based on primary data) - Textile material input and output for each process (calculated data based on the weight of the T-shirt's textile portion (for the reference size) and residual textile losses for each process[10])
Textile raw materials production	- % of each raw material in the final product - % of recycled material (R1) - raw material type (select the appropriate raw material)
Spinning	- Technology (depending on raw materials AND spinning technology: carded, combed, open-end, filament, staple fibres) - Production location (choice of the continent)
Printing	- Printed surface
Finishing	- Type of finishing (if relevant)
Accessories	- Quantity of material - Type of material (composition label, brand tag, button, zip, strass, snaps)
Packaging	- Quantity of material - Type of packaging (primary, secondary or tertiary, choose accordingly) - Type of material (composition in case of material mixing)
Assembly	- Assembly time - Use of ironing: yes or no

Extract from PEFCR T-shirts

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Where to find EF compliant data sets

The official EF data sets are available via the registered nodes of the data developers:

https://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml

The updated database v. 3.1 is now available.

Owner	Description of the lot(s) present in the node and compliance system
ESIG	•Solvents (EF 3.1)
CEPE/Ecoinvent	•Chemicals for paint (EF 3.1)
Ecoinvent	•Chemicals (EF 2.0 and 3.1) •Apparel (EF 3.1) •Plastics (EF 3.1) •Other (EF 3.1)
FEFAC	•Feed (EF 3.1) •Agrofood (EF 3.1) •Renewable (EF 3.1)
Quantis	•Agrofood, "others" (EF 2.0)
RDC	•Glass recycling (EF 2.0)
Sphera	•Core datasets official Energy, Transport, Packaging End of life (includes non-packaging plastics, electric and electronics, metals and minerals) (EF 3.1)

Life Cycle Impact Assessment

The key steps in the impact assessment are:

I.   **classification,**

II. **characterization,**

III. **normalization,**

IV. **weighting.**

➡ **Mandatory for PEF/OEF**, optional for ISO 14040 series.

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Life Cycle Impact Assessment

Classification implies assigning all input and output flows collected in the inventory to the relevant impact categories.

Life cycle stages

Raw material acquisition and pre-processing

Manufacturing

Distribution

Use stage

End of life

Life cycle inventory

Resources → Input / Output → Emissions

Resources → Input / Output → Emissions

Resources → Input / Output → Emissions

Resources → Input / Output → Emissions

Resources → Input / Output → Emissions
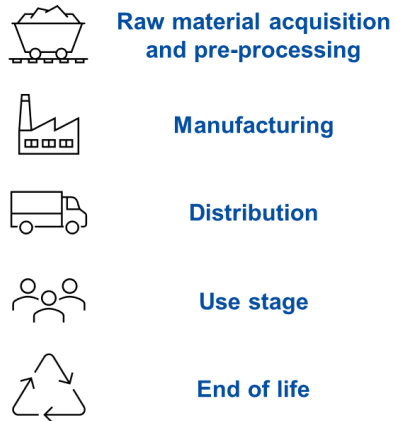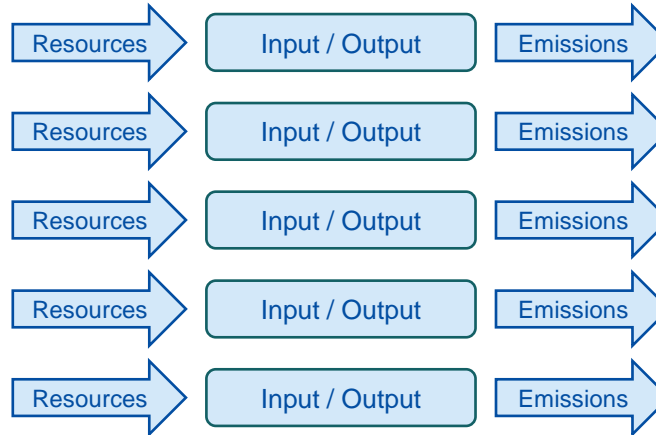
Life Cycle Impact Assessment

Environmental profile and environmental impact indicators

Impact category	Impact category Indicator (unit of measure)	Description
Climate change, total	Radiative forcing as global warming potential – GWP100 (kg CO_2 eq)	Increase in the average global temperature resulting from greenhouse gas emissions (GHG)
Ozone depletion	Ozone Depletion Potential – ODP (kg CFC-11 eq)	Depletion of the stratospheric ozone layer protecting from hazardous ultraviolet radiation
Human toxicity, cancer	Comparative Toxic Unit for humans (CTUh)	Impact on human health caused by absorbing substances through the air, water, and soil. Direct effects of products on humans are not measured
Human toxicity, non-cancer	Comparative Toxic Unit for humans (CTUh)	
Particulate matter	Impact on human health (disease incidence)	Impact on human health caused by particulate matter emissions and its precursors (e.g. sulfur and nitrogen oxides)
Ionising radiation, human health	Human exposure efficiency relative to U-235 (kBq U-235 eq)	Impact of exposure to ionising radiations on human health
Photochemical ozone formation, human health	Tropospheric ozone concentration increase (kg NMVOC eq)	Potential of harmful tropospheric ozone formation ("summer smog") from air emissions
Acidification	Accumulated Exceedance – AE (mol H^+ eq)	Acidification from air, water, and soil emissions (primarily sulfur compounds) mainly due to combustion processes in electricity generation, heating, and transport

Impact categories included in PEF/OEF and details of the methods and indicators used to assess them

Source: «EC, Understanding Product Environmental Footprint and Organisation Environmental Footprint methods, 2021»

European Commission

Environmental profile and environmental impact indicators

	Eutrophication, terrestrial	Accumulated Exceedance – AE (mol N eq)	
	Eutrophication, freshwater	Fraction of nutrients reaching freshwater end compartment (kg P eq)	Eutrophication and potential impact on ecosystems caused by nitrogen and phosphorous emissions mainly due to fertilizers, combustion, sewage systems
	Eutrophication, marine	Fraction of nutrients reaching marine end compartment (kg N eq)	
	Ecotoxicity, freshwater	Comparative Toxic Unit for ecosystems (CTUe)	Impact of toxic substances on freshwater ecosystems
	Land use	Soil quality index, representing the aggregated impact of land use on: Biotic production; Erosion resistance; Mechanical filtration; Groundwater replenishment (Dimensionless – pt)	Transformation and use of land for agriculture, roads, housing, mining or other purposes. The impact can include loss of species, organic matter, soil, filtration capacity, permeability
	Water use	Weighted user deprivation potential (m³ world eq)	Depletion of available water depending on local water scarcity and water needs for human activities and ecosystem integrity
	Resource use, minerals and metals	Abiotic resource depletion – ADP ultimate reserves (kg Sb eq)	
	Resource use, fossils	Abiotic resource depletion, fossil fuels – ADP-fossil (MJ)	Depletion of non-renewable resources and deprivation for future generations

Impact categories included in PEF/OEF and details of the methods and indicators used to assess them

Source: «EC, Understanding Product Environmental Footprint and Organisation Environmental Footprint methods, 2021»

European Commission

Life Cycle Impact Assessment

Characterisation = Process to model environmental mechanisms **linking the environmental pressures represented by inventory data to each EF impact category**, and to quantify the impact magnitude.

Each impact category refers to a **stand-alone characterisation model** attributing characterisation factors to the relevant flows in the inventory.

European Commission

Life Cycle Impact Assessment

Normalisation = Calculation of the magnitude of the category indicator results relatively to a reference system.

The **aim** of normalisation is to **understand better the relative contribution** of the studied system to the reference system for each indicator result, and **which impact categories are more critical for the product system under study**.

European Commission

Life Cycle Impact Assessment

Weighting = Process of converting normalised results of the different impact categories by using numerical factors based on the expressed relative importance of the impact categories considered.

It may include **aggregation** of the weighted indicator results.

A study for defining the weighting factors for the 16 EF impact categories was conducted by JRC in 2018 based on input from environmental experts and stakeholders.

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Interpretation

- **Interpretation** of EF results follows the life cycle impact assessment stage.

- Results can be used for **hotspot analysis** to identify the most relevant impact categories, life cycle stages, processes, and elementary flows. **The EF methods provide specific instructions to carry out a hotspot analysis.**

- EF results allow optimising environmental performances of products (e.g. better environmental design or eco-design) and organisations. The single score can serve for marketing purposes and, in case of a PEF study developed in accordance with PEFCRs, can be used for **comparison and comparative assertions**.

EF Study report

- Summary
- Main report
  - General information
  - Goal of the study
  - Scope of the study
  - Life cycle inventory analysis
  - Life cycle impact assessment results
  - Hotspot results and Interpretation
  - Additional (environmental and/or technical) information
- Validation statement
- Annexes
- *Possibly: Confidential report (for verification/validation only)*
- EF-compliant aggregated data set

EF report templates are available in Part E of Annexes II and IV of the **Recommendation 2021/2279**. The templates shall be used.

European Commission

Verification

Verification and validation of the EF studies by a verifier is **mandatory** whenever the EF study, or part of the information therein, is used **for any type of external communication**.

The assessment of the competences of verifier or verification team is based on a **scoring system** that takes into account:

- **verification and validation** experience;
- **EF/LCA** methodology and practice;
- knowledge of **relevant technologies**, processes or other activities included in the product(s)/organisation(s) in scope of the study.

	Topic	Criteria	Score (points)				
			0	**1**	**2**	**3**	**4**
Mandatory criteria	Verification and validation practice	Years of experience (1)	<2	$2 \leq x < 4$	$4 \leq x < 8$	$8 \leq x < 14$	≥ 14
		Number of verifications (2)	≤5	$5 < x \leq 10$	$11 \leq x \leq 20$	$21 \leq x \leq 30$	>30
	LCA methodlogy and practice	Years of experience (3)	<2	$2 \leq x < 4$	$4 \leq x < 8$	$8 \leq x < 14$	≥ 14
		Number of LCA studies or reviews (4)	≤5	$5 < x \leq 10$	$11 \leq x \leq 20$	$21 \leq x \leq 30$	>30
	Knowledge of the specific sector	Years of experience (5)	<1	$1 \leq x < 3$	$3 \leq x < 6$	$6 \leq x < 10$	≥ 10
Additional criteria	Review, verification/ 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, EN ISO 14001:2015, or other EMS				

Scoring system for each relevant competence and experience topic for the assessment of the competences of verifier(s)

Source: Recommendation on the use of Environmental Footprint methods, 2021

European Commission

What opportunities and challenges for SMEs in applying this method?

European Commission

SMEs and green markets

- **32% of SMEs in the EU offer green products or services**, with a further **11% planning to do so** in the next two years.

- Compared to 2017, there is a **seven-point increase** in the proportion of SMEs currently offering green products or services and a three-point increase in the proportion planning to do so in the next two years.

Upsurge in green products and services

32% of SMEs offer green products or services, with a further 11% planning to do so in the next two years

This is an increase compared to previous years

2013	2015	2017	2021
26%	26%	25%	32%

Flash Eurobarometer 498
SMEs, green markets and resource efficiency

Source: European Union, 2022, Flash Eurobarometer 498 SMEs, green markets and resource efficiency – November-December 2021

SMEs and green markets

BUT SMEs **are not aware of ongoing updates of EU competition rules to facilitate the green and digital transitions and to make markets work better:**

- 33% are aware of the update but are not entirely clear what they are

- 9% are aware of them and follow them closely

- **58% have never heard about this**

Q8 Over the last 12 months, have you seen or heard about the ongoing updates to EU competition rules to facilitate the green and digital transitions and to make markets work better? (% EU27)

9% Yes, and I follow these updates closely

33% Yes, but I am not entirely clear what the updates are

58% No, I have never heard about this

1% Don't know/No answer

Base: All SMEs (n=12 809)

European Commission

SMEs and green markets

The main needs SMEs declare to expand their green offer and become more resource-efficient are:

- Need for **financial incentives**

- **Cooperation** between companies across sectors

- Need for **consultancy and technical support**

What would help SMEs most to go green?

Helping SMEs to...

...be more resource efficient

Grants or subsidies
36%

Better cooperation between companies across sectors so that new processes to reuse waste and by-products can be developed
26%

Consultancy of how to improve resource efficiency in your company
25%

...expand their green offer

Financial incentives for developing products, services or new processes
43%

Assistance with identifying markets and customers
27%

Technical support and consultancy for developing products, services or new processes
28%

Flash Eurobarometer 498
SMEs, green markets and resource efficiency

European Commission

SMEs and green markets

The European Commission is providing European Companies and SMEs with this help with different tools and initiatives, among which:

- **The development of PEF and OEF methods**, which provide a common methodology for measuring environmental performance and communicating reliable results on the impacts of products and services.

- **Funding programmes** (e.g. LIFE) to support the implementation of PEF and OEF methods. Among these:

- LIFE GreenShoes4All
- LIFE AQUAPEF
- LIFE EFFIGE
- LIFE RENDER

- LIFE BIOPOL
- LIFE PREFER
- LIFE CiP

European Commission

E-learning tools

- The European Commission is developing two **e-learning tools**, one on PEF and one on OEF. They will focus on **applying the PEF and OEF without a PEFCR or OEFSR**.

- The tools are going to be tested before being finalized. They are expected to be finalized and made **available in Autumn 2023**.

- They will be made available on the EUAcademy platform (https://academy.europa.eu/)

European Commission

Opportunities and challenges for SMEs

Opportunities:

- Availability of **reliable and standardised method**
- Availability of **predefined rules** (PEFCR/OEFSR) and **data sets**
- PEFCRs also provide **benchmark values** based on a representative product/organisation, thus allowing companies to **compare the environmental profile of their product with the average European values**.
- Being prepared for future developments in European policies

Challenges:

- PEFCR/OEFSR are **not available for all product categories/sectors**
- SMEs may face a **lack of knowledge and expertise** on life cycle thinking and/or resources to allocate in such projects.

European Commission

Supporting tools

For further information

- The European Commission is developing two **e-learning tools**, one on PEF and one on OEF, focused on **applying the PEF and OEF without a PEFCR or OEFSR**. They are expected to be finalized and made **available in October 2023** on the EU Academy platform (https://academy.europa.eu/)

- JRC publication *Understanding Product Environmental Footprint and Organisation Environmental Footprint methods* (2022) (https://publications.jrc.ec.europa.eu/repository/handle/JRC129907)

- **Help Desk:** EF_Helpdesk@sphera.com for technical questions on the PEF/OEF methods

- **E-mail:** env-environmental-footprint@ec.europa.eu and ec-eplca@ec.europa.eu for generic questions on the EF methods.

Q&A

PEF/OEF in practice
Best Practices and examples of implementations

Cantina Vignaioli del Morellino di Scansano
(Scansano – Tuscany – Italy)
Sergio Bucci

Our Winery

Our winery was established in 1972 by a small group of wine producers who decided to join forces to give value to the production of wine in the area of Maremma, in Southern Tuscany.

Scansano

Our Numbers Today

170 vintners – members
700 hectares
29 employees
17.5 million euros in investments
15 million turnover

Our Values

Sustainability and Teamwork are our core values

As a cooperative, our values have always been focused on **social and economic sustainability**.
Thanks to our work, 170 families can earn a living by producing grapes.

Over the past 15 years, **economic sustainability** has acquired significant importance to safeguard our territory but also to increase competitiveness

Life Cycle Assessment

Life Cycle Assessment

2007	POR-FSE 2007-2013: First studies to measure the Carbon Footprint «Green Marketing Made in Maremma» - PAS 2050
2013	Environment Ministry: LCA and Evaluation of the Carbon footprint according to ISO 14067
2014	Measurement and validation of the Carbon Footprint ISO 14067 of «Morellino di Scansano DOCG» and «Roggiano DOCG»
2015	VIVA Sustainable Wine certificate assigned to «Morellino di Scansano DOCG » and «Roggiano DOCG»
2015	PSR 2014-2020 Tuscany Region– PIF – Project «SOSWINE» for Wine Sustainablity
2018	LCA and assessment of the Carbon Footprint according to the PEF for «Morellino di Scansano DOCG»
2018	Measurement and validation ofteh Carbon Footprint according to the PEF
2018	Optimisation of the results and technological adjustments to imrpove the impact and renewthe certificates
2022	First Sustainability Report

Actions

In the vineyard:

- Adoption of a decision support information system (DSS) and phytosanitary forecast maps
- Introductions of sensors for remote and continuous vineyard mapping of the physiological state of the vines and the ripening grapes

Actions

In the winery

- Adoption of a new system to recover the water
- Interventions to reduce energy consumption during the wine-making process
- Adoption of solar panels to produce renewable electricity
- Adoption of new, less-heavy packaging for most of the production

Our focus for PEF was on two wines

While only these two wines have the PEF certificate, the actions adopted for these wines have a positive impact on the entire production

Water Consumption

Please note: results may vary from year to year because they depend on the weather throughout the year and during the harvest.
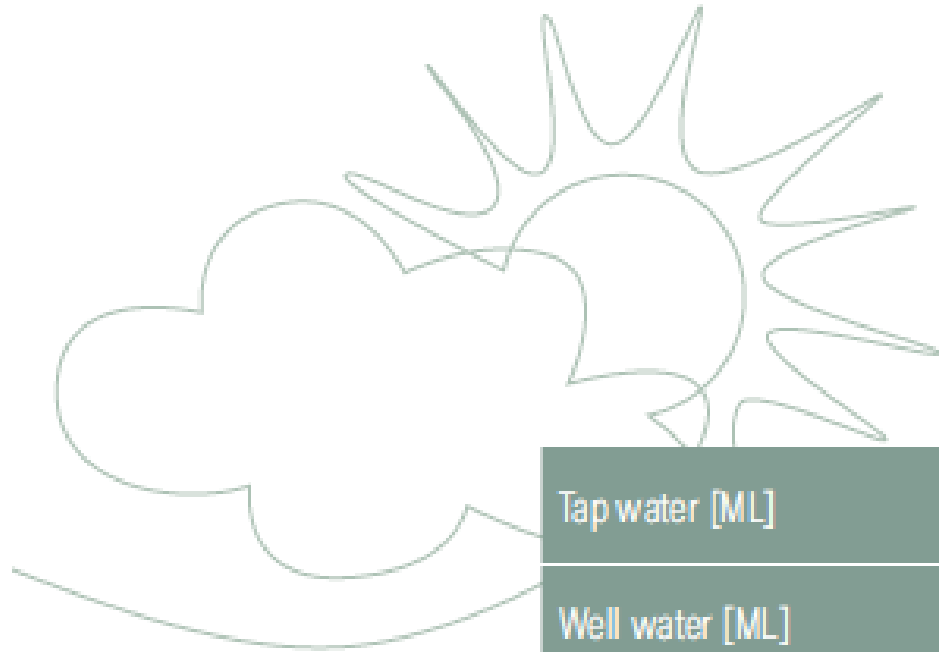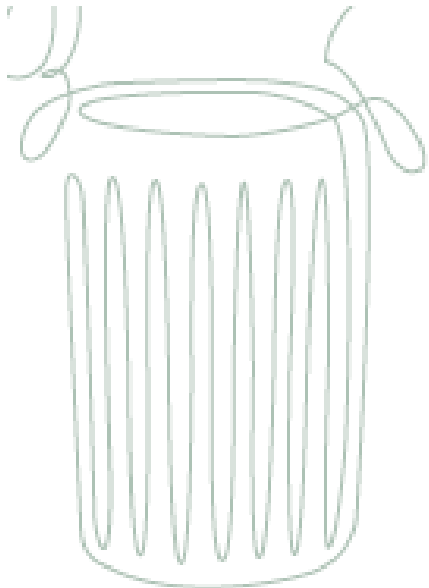
	2021	2020	2019
Tap water [ML]	4.73	2.40	8.09
Well water [ML]	7.96	4.72	3.88
Waste water [ML]	12.70	7.13	11.97

Electricity Consumption

	2021	2020	2019
Electricity consumption [GJ]	4,254	4,117	4,085
From renewable sources [GJ]	647	601	560
From non-renewable sources [GJ]	3,607	3,515	3,524
Electricity sold [GJ]	11.5	9.8	6.4
Energy consumption for heating [GJ]	412	383	414
Total energy consumption [GJ]	4,667	4,500	4,498

European Commission

Waste Management

	2021	2020	2019
Hazardous generated waste [t]	0	0.43	2.06
Non-hazardous generated waste [t]	322.24	167.17	243.54
Total generated waste [t]	322.24	167.60	246.60

European Commission

Emissions

	2021	2020	2019
Direct emissions [t Co2eq]	12,772	11,852	60,369
Indirect emissions (location based) [t Co2eq]	246,197	249,021	263,489
Indirect emissions (market based) [t Co2eq]	457,924	447,281	456,284
Total direct and indirect emissions (location based) [t Co2eq]	258,969	260,873	323,858
Total direct and indirect emissions (market based) [t Co2eq]	470,696	459,133	516,653

Q&A