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Link to ink
The combined ink know how

Sustainable inks:

Understanding the Environmental aspects

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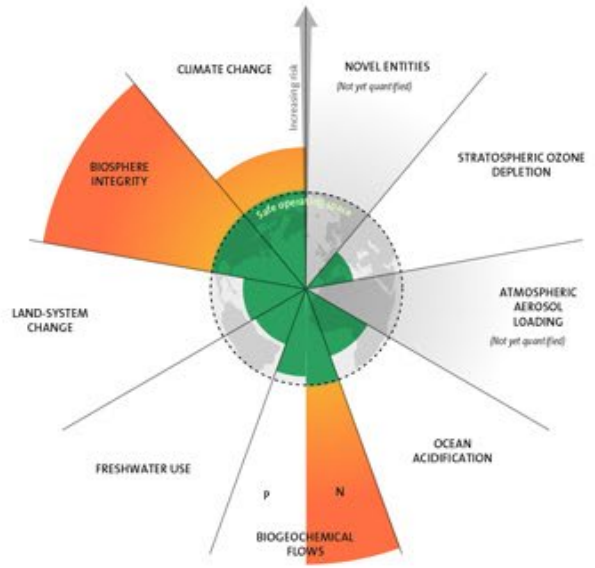
Sustainability is no absolute term but has always to be considered in various impact categories

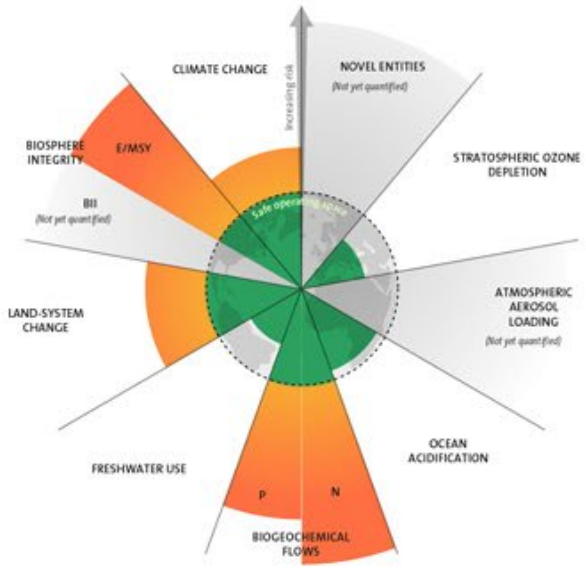
Link to ink
The combined ink know how

2009



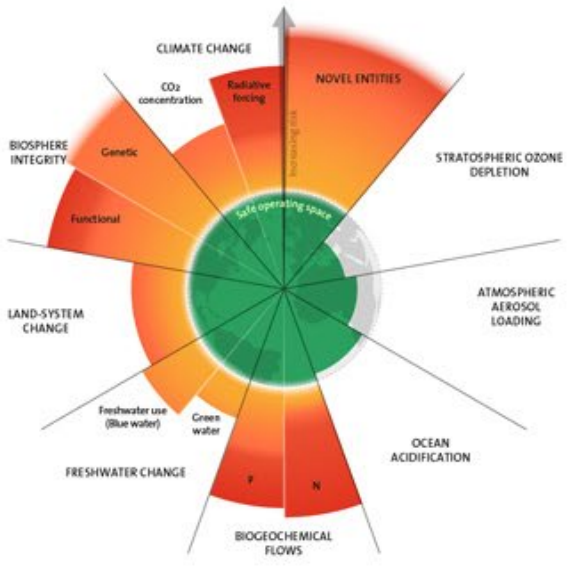
7 boundaries assessed,
3 crossed

2015



7 boundaries assessed,
4 crossed

2023



9 boundaries assessed,
6 crossed

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https://www.bmuv.de/themen/nachhaltigkeit/integriertes-umweltprogramm-2030/planetare-belastbarkeitsgrenzen Based on Richardson et al. 2023, Steffen et al. 2015, and Rockström et al. 2009.

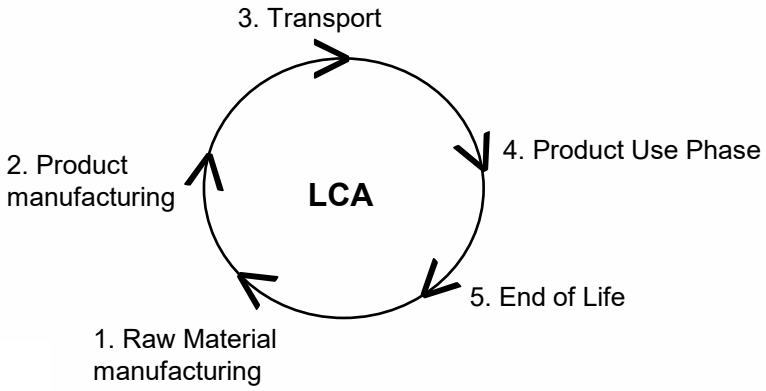
Life Cycle Assessment (LCA) is a systematic approach over all the stages of the product life cycle

- by **addition and evaluation** of different impact factor over the life cycle
- **high-quality data** from all phases are required, **transparent communication** and close cooperation over the supply chain is crucial

→ to make a **general assessment of sustainability** possible
(e. g. “VdL position on the initiative for sustainable products”, 16.11.2020)

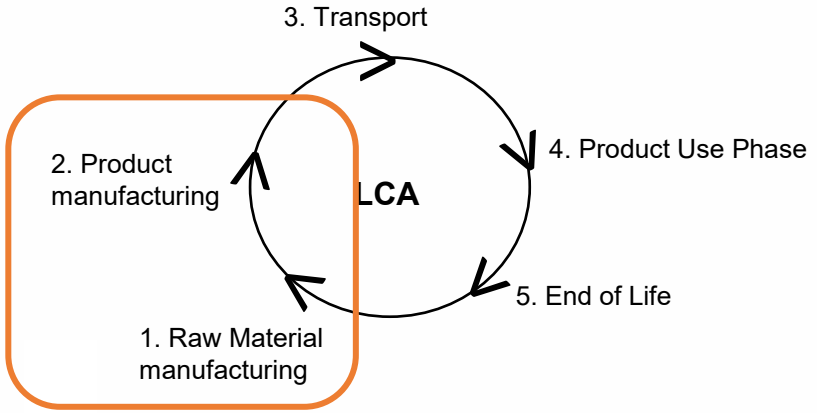
! direct **comparability** between different studies and methods is difficult or **impossible**

Cradle-to-grave



- Must cover the **full life cycle** of a product
- Printing inks are not manufactured for direct use by end customer
- Product use phase & end of life are **mainly unknown** for printing ink manufacturer

Cradle-to-gate



- Focussing only on the **steps in the life cycle related to the ink manufacturing** (direct impact)
- Enable customers to calculate **their own product related environmental impact**

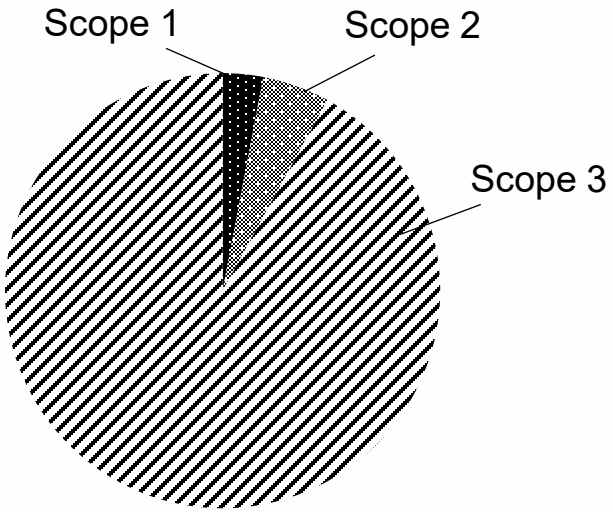
Of all the impact categories, the carbon footprint is the most familiar in the general public

- **Product carbon footprint** (PCF): the balance of greenhouse gas emissions along the entire life cycle of a product (defined application and defined unit of use)
- **Cradle-to-gate** PCF: includes processes from the sourcing of raw materials and production
- **Cradle-to-grave** PCF: covers the entire life cycle of the product, including emissions from the use phase and the end of life.

- The PCF can be calculated using **various methods**, e.g., according to the greenhouse gas protocol product standard, EN ISO 14044 (LCA), or EN ISO 14067 (PCF). **The absolute numbers of different manufacturers are therefore not generally comparable.**
- Since the absolute values depend heavily on the selected **system boundaries**, reliability of the raw data and assumptions made in the calculation, a transparent communication of the method is essential.

Different emission scopes contribute for Product Carbon Footprint (PCF)

- **Scope 1**
  - Direct GHG emissions generated by a company
    - e.g. emissions from company facilities, boiler house, company cars
- **Scope 2**
  - Indirect GHG emissions generated by a company
    - e.g. purchased steam & electricity (converted into CO_2eq.)
- **Scope 3** (to be divided into up-stream and down-stream emissions
  - Upstream: Indirect emissions (generated externally)
    - e.g. emissions generated by the raw materials used
  - Downstream: Indirect emissions (generated by use of the products)
    - e.g. emissions generated by the printing process, end of life emissions



Typical share of emissions generated by the different scope for the chemical industry (TfS)

For the **cradle-to-gate** boundary only the **Scope 3 upstream emissions** need to be considered

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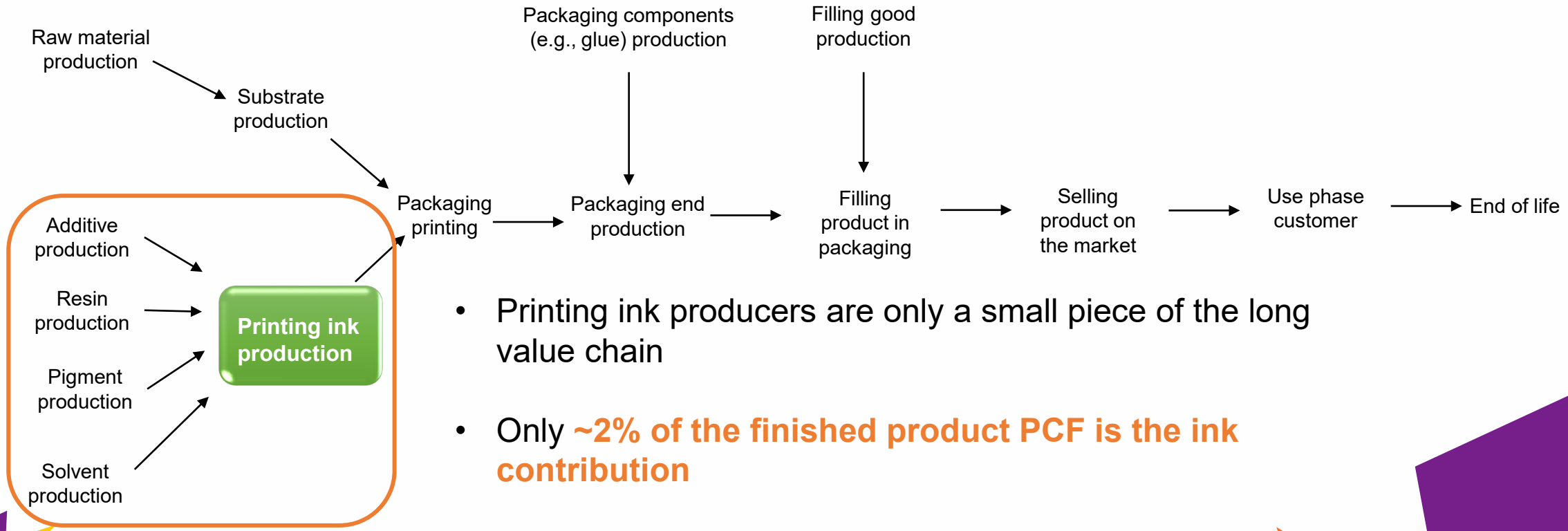
Printing ink manufactures in the value chain

The position of a printing ink manufacturer in the value chain is directly impacting the contribution of an ink to the footprint of the final product.

Example: Value chain for packaging of filled goods



- Printing ink producers are only a small piece of the long value chain
- Only **~2% of the finished product PCF is the ink contribution**
- Position: Middle of first half of the value chain

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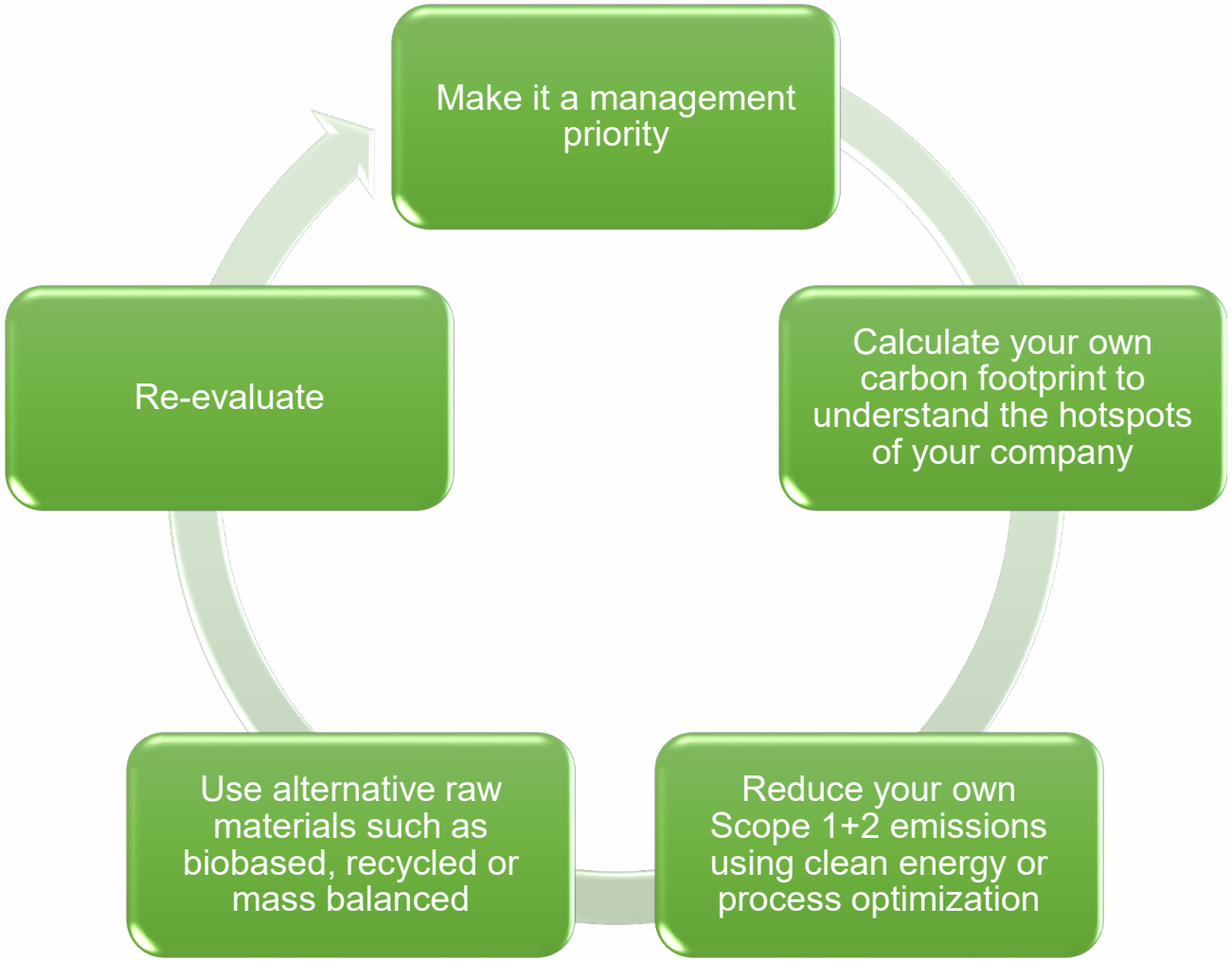
Roadmap to reduce the product carbon footprint



What should you look for?

- Look for **science based** and general accepted guidelines.
- Look for standards and approaches that are broadly considered to be **industry best practices**.
- Look for **industry standards** and **guidelines harmonized** by associations.

Together for Sustainability Guidelines (TfS)	ISO14040, ISO14044 and ISO14067
Science Based Target Initiative (SBTI)	Ecovadis Score
Carbon Disclosure Project (CDP)	Greenhouse Gas Protocol (GHG)

European Printing Ink Association (EuPIA) internal guidance and strudy on generic reference

- The **Environmental Footprint Printing Inks** (EFPI) guidance document has been formulated in order to enable the whole **EuPIA membership** to make use of the available data coming from the suppliers or elsewhere (recognized databases, secondary sources, and expert opinion), in order to make an internal evaluation of the Environmental Footprint of their products
- This guidance covers all printing inks types and related products, as defined by EuPIA, and focuses on the **Cradle-to-Gate Product Carbon Footprint** (PCF)
- **Eco Footprint screening study** was performed on a generic ink formulation for high-level assessment

EuPIA

Eco Footprint of a generic reference – version 2020

The European Printing Inks Association (EuPIA) is dedicated to sustainability. Product stewardship is the major pillar of its action delivering safe and efficient product to use on various substrates and with different print processes.

Due to the application process of printing, a very thin layer of ink is laid down on a relatively thicker substrate and as such previous third parties' studies are showing that the relative impact of printing inks is negligible versus the overall printed material footprint.

Nevertheless, EuPIA has decided to perform a Life Cycle Assessment with CEPE (European Confederation of Paint, Printing Inks and Artists' Colours) to gather its own viewpoint on the LCA of printing inks.

Aim of the study

EuPIA has taken the approach of studying the footprint of a generic printing ink formulation that would represent correctly all print processes. As such the idea was to focus on the highest possible quality of a limited number of raw materials. Indeed, printing inks are made of thousands of raw materials and trying to evaluate all possible combinations would not be a reachable target.

The scope of the study covers the impact from raw material extraction to printing ink production (cradle-to-gate). In addition, a downstream simplified analysis has been also performed to put the results of the study into a meaningful context for printed products.

Product Description – Generic reference

The generic reference is a virtual product representative of the market for printing inks in Europe, as defined and selected by EuPIA, the European Printing Ink Association.

The formulation of the generic reference is the weighted average of the actual production mix of printing inks in Europe. Therefore, it does not represent a real product, but a virtual combination of the raw materials currently used in the production of different types of printing inks.

Production Process

The cradle-to-gate production process of ink starts with the extraction of feedstock and the production of raw materials. The raw materials are then transported from the supplier to the ink producer, where they undergo various grinding and mixing processes. Finally, the ink is filled into packaging units.

Models and data used in the study

The models for the production of the virtual reference are based on the life cycle inventories (LCI) of raw materials and solvent-borne coatings, as developed by CEPE, the European coatings trade association, as part of its raw materials and coating manufacturing databases.

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Wider considerations – Working downstream to reduce emissions

- It is important to understand the **various impacts** of the different steps in your supply chain and manufacturing process.
- By understanding the hotspots of your own process, you can **create specific actions** or implement changes that results in greater reductions.
- For a typical ink (~ 2% of total emissions in final printed product), **raw materials** (approx. 85%) and **manufacturing** (approx. 15%) are the two highest contributing factors to focus on, if you want to reduce your emissions.
- Ink manufacturers are working to reduce the carbon footprint of their products. We take a holistic approach to reducing environmental impact.
- Ink manufacturers are working with raw material suppliers to reduce these emissions. As we work with supplier, we are trying to understand the wider environmental impacts of alternative products such as impacts on biodiversity and land use change.
- We also want to work with customers to take an LCA approach – to understand the downstream impact
  - How much energy is used in printing and drying inks?
  - How can ink facilitate and contribute to the recover of packaging substrates?

We must work collaboratively to address these shared objectives.