Link to ink
The combined ink know how

Recycling – Sustainable Inks and Coatings for sophisticated Print Products

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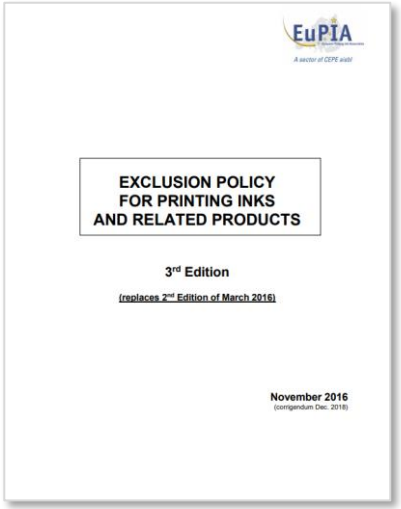
Raw Material Commitments: EuPIA Exclusion Policy

- Extensive procedure for selection of raw materials with low hazard profile
- Aspects of work, consumer and environmental protection are considered.
- Own analytical spot checks and supplier audits are performed.



What is prevented from entering the supply chain cannot cause problems end of life

Raw Materials: Renewable sources as “part of the game”

- Traditionally, ink makers use raw materials from renewable resources.
- There is a huge variety of naturally occurring substances available.
- Trees: important raw material source for ink and paper.
- Cellulose, gum and tall oil rosin are precursors for binders used in printing inks.

Image source: Siegwerk

Trees as raw material source

- Trees are separated in resin and pulp which both are merged again in the printing process as ingredients of ink and paper and board.

Image sources: Adobe Stock

Examples for renewable raw materials

Ink technology	Raw material	Ratio of renewable raw material*
Sheetfed- & Weboffset inks	Modified gum rosin resins, soybean-based alkyd resins, tall oil esters, vegetable oils, linseed oil	25-70%
Publication gravure inks	Modified gum rosin resins	up to 55%
Solvent-based inks (gravure & flexo printing)	Cellulose-esters, bioethanol, soybean & castor oil derivatives, oleic acid amides, shellac-based binders	15-40%
Water-based inks	Starch, wood resins	>50%
UV/EB-curing inks	Glycerin-based monomers, soybean-based oligomers	0%

*in printed layer

Carbon footprint of printing inks

- CO2 footprint of printing inks on average is approx. 2.2 kg CO2 / kg ink
- This equals the CO2 emission of a compact car with diesel engine driving a distance of 15.7 km.[1]
- Usually the share of ink on the carbon footprint of a final printed product is < 1%

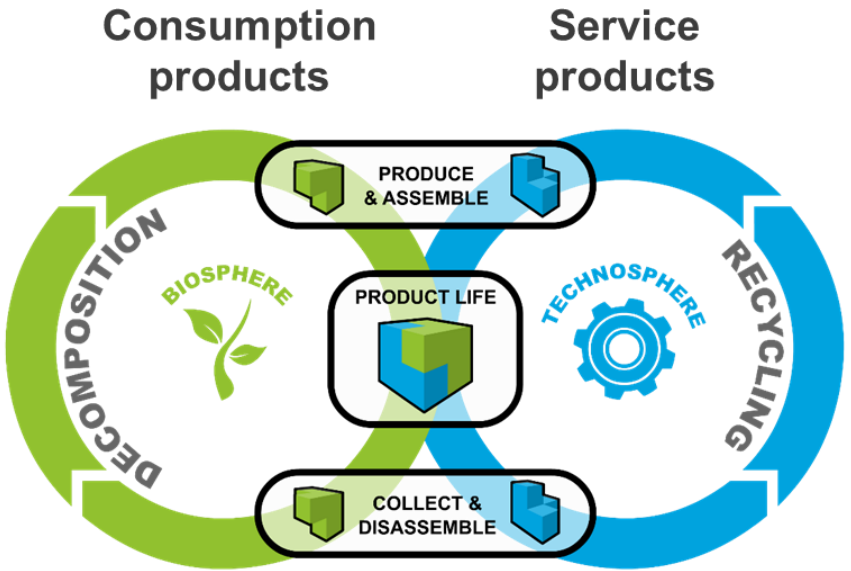
[1] http://www.co2online.de/klima-schuetzen/mobilitaet/auto-co2-ausstoss/media/durchschnittliche-emissionen-von-pkws/
Image source: Creative Commons

Circular Economy = Hot topic globally – example EU

EU Green Deal: Circularity, zero pollution, value chains of concern (packaging, plastics), reducing environmental footprints … work programme for the future

Circular Economy is based on three principles

1. Design out **waste** and **pollution**
2. Keep products and materials **in use**
3. **Regenerate** natural systems



Stakeholder claims: Examples Paper and Plastic

EPRC:
- Entire paper value chain
- 74% recycling rate by 2020

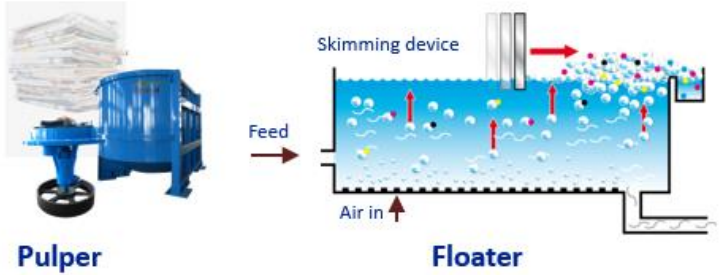
4evergreen:
- Fibre-based packaging chain
- 90% recycling rate by 2030

CEFLEX:
- Entire flexible packaging chain
- >80% recycling rate by 2025

Inks as enabler – Paper Chain

- **Re-cycling**
  Conservation of resources through a high proportion of recycled paper in paper and cardboard applications

- **Deinking**
  High quality recycling requires very good deinkability of all components of the print product, means a.o. optimized inks and varnishes for deinking



- Paper recycling saves money:

50%	66%	100%
Energy	Wasser	Wood

Inks as enabler – Plastic Chain

Sortability

- Inks must not hamper NIR sorting
- Restrictions might exist for NIR absorbing or reflecting printed surfaces

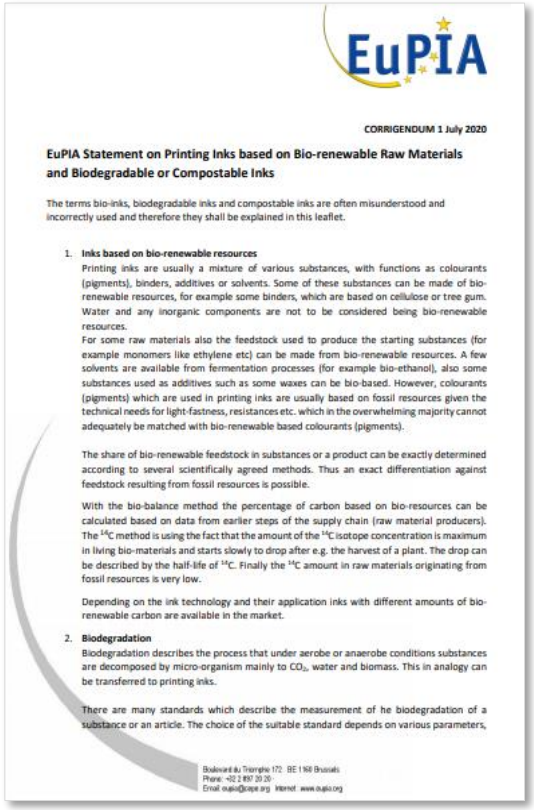
Redesign

- Inks/varnishes shall support paperisation trend
- Inks/varnishes shall support monoplastics trend and thus better recyclability

Technology compatibility

- Inks shall ideally not impair recyclate quality when extruded at high temperature
- Wash-off inks/delamination primers facilitate separation + improve recyclate qualities
- De-inking solutions shall improve mechanical recycling yielding high quality PCRs

Inks as enabler – Composting



EuPIA

CORRIGENDUM 1 July 2020

EuPIA Statement on Printing Inks based on Bio-renewable Raw Materials and Biodegradable or Compostable Inks

The terms bio-inks, biodegradable inks and compostable inks are often misunderstood and incorrectly used and therefore they shall be explained in this leaflet.

1. **Inks based on bio-renewable resources**
   Printing inks are usually a mixture of various substances, with functions as colourants (pigments), binders, additives or solvents. Some of these substances can be made of bio-renewable resources, for example some binders, which are based on cellulose or tree gum. Water and any inorganic components are not to be considered being bio-renewable resources.
   For some raw materials also the feedstock used to produce the starting substances (for example monomers like ethylene etc) can be made from bio-renewable resources. A few solvents are available from fermentation processes (for example bio-ethanol), also some substances used as additives such as some waxes can be bio-based. However, colourants (pigments) which are used in printing inks are usually based on fossil resources given the technical needs for light-fastness, resistances etc. which in the overwhelming majority cannot adequately be matched with bio-renewable based colourants (pigments).

   The share of bio-renewable feedstock in substances or a product can be exactly determined according to several scientifically agreed methods. Thus an exact differentiation against feedstock resulting from fossil resources is possible.

   With the bio-balance method the percentage of carbon based on bio-resources can be calculated based on data from earlier steps of the supply chain (raw material producers). The ^{14}C method is using the fact that the amount of the ^{14}C isotope concentration is maximum in living bio-materials and starts slowly to drop after e.g. the harvest of a plant. The drop can be described by the half-life of ^{14}C. Finally the ^{14}C amount in raw materials originating from fossil resources is very low.

   Depending on the ink technology and their application inks with different amounts of bio-renewable carbon are available in the market.

2. **Biodegradation**
   Biodegradation describes the process that under aerobe or anaerobe conditions substances are decomposed by micro-organism mainly to CO_2, water and biomass. This in analogy can be transferred to printing inks.

   There are many standards which describe the measurement of he biodegradation of a substance or an article. The choice of the suitable standard depends on various parameters,

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- Compostable inks do complete the circularity option for the biosphere
- They have to fulfil the requirements of pertinent standards like EN 13432
- Composting can be seen as additional component for solving waste problems when in compliance with local/regional/national waste regulations

Eco-Label landscape of the printing industry in Europe & worldwide

Today we are facing a large number of eco-labels

- exclusively for finished print products
- Industry and product independent
- Printing-ink specific
- Country and region-specific

Their number is constantly growing and the printing ink and varnish manufacturers meet this challenge every day with growing success.

Summary

- ✓ The printing ink industry is an important contributor to the sustainability of print products.
- ✓ Sustainability aspects are at the forefront along the entire value chain - from the selection of raw materials and production to the use of printing inks.
- ✓ However, the Circular Economy confronts our industry with new challenges.
- ✓ The target is to enable and promote circularity.

Thank you for your attention!

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