

Sustainable Products in a Circular Economy

Discussion Paper:
Traceability of substances of concern, recycling materials

26th September 2018, EU Circular Business Conference, B-Brussels

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EPEA: KNOWLEDGE + INNOVATION TRUSTEE

Environmental Protection Encouragement Agency



EPEA Internationale
Umweltforschung GmbH,
D-Hamburg

SCIENCE

PROJECT IMPLEMENTATION



EPEA Switzerland GmbH,
CH-Bäch/SZ

EPEA Core-Competences:

- Material Assessment
- Search for Material Alternatives
- Focus on Industrial Material Streams
- Network Management
- Supply Chain Management
- **Accredited Assessor for Cradle to Cradle Certified™ Certification**

Role: Knowledge + Innovation Trustee

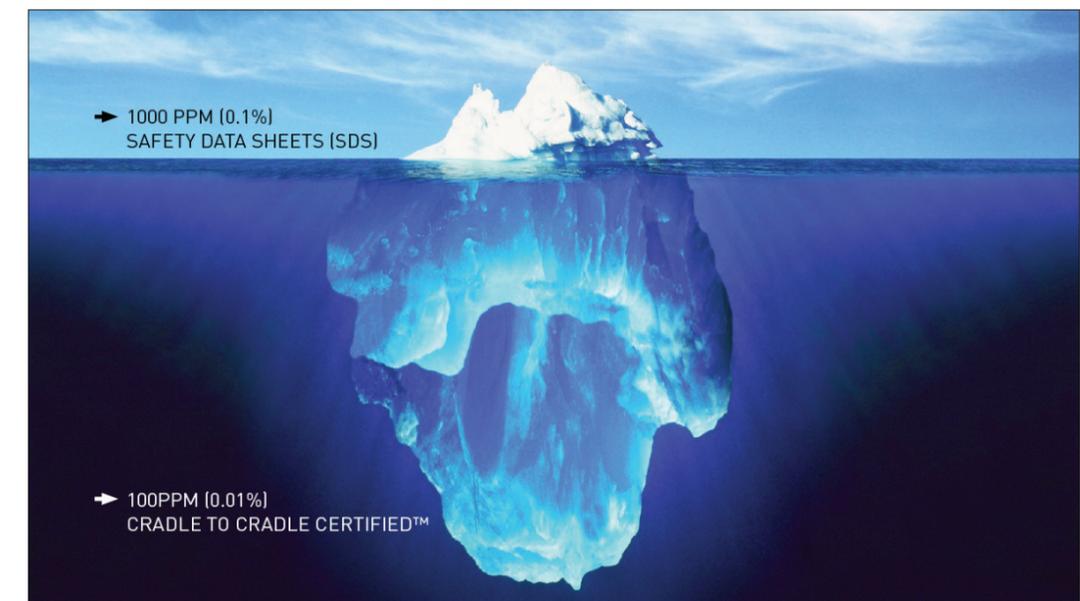
PLASTICS

- Material health quality definition of plastics >100ppm
- Positive list of plastics (Polymer, Additives, Catalyst, Masterbatch, Marker) which are safe in regard to material health >100ppm (0.01%)

Chemicals used in current plastics production are a critical issue.

Currently 5000 to 6000 chemical substances are used for the production of plastic products. Among them are many health related substances. This does not include the metabolites (break-down products) arising from the direct contact of plastics with the environment (for example, water, UV radiation), or upon heating (for example, dyeing in the textile industry, or in the microwave oven).

So far little attention has been given to this issue and legislation appears to support the current status. Industry is under no pressure to make any changes. To achieve the twenty most important characteristics of a plastic product, up to 400-500 chemical substances would be needed whose safety can be guaranteed for use in the biological system.



PRODUCT EXAMPLE: JOGHURT PACKAGING

Cover

- Aluminium
- Printing Inks
- Top Lacquer
- Ground Lacquer
- Sealing Lacquer
- Binder
- Pigments
- Photoinitiators
- Additives



Cup

- Plastics
- Additives
- Pigments
- Fillers
- Labels
- Printing Inks

ASSESSMENT EXAMPLE OF ONE COLOR INGREDIENT BRONZE LEVEL

Lfd.-Nr.	CAS-Nummer	Bezeichnung	Funktion	abcx	abcx Kommentar	Gehalt %/ppm
1	7732-18-5	Wasser		b		65-75
2	0815-55-7	Harz		b	No major concern expected with this polymer.	20-40
3	777-44-2	Lalasaureester		c	Moderate to high aquatic toxicity but biodegradable under aerobic and anaerobic conditions. The degradation product might exhibit reproductive toxicity, the issue is currently under regulatory discussion. Causes serious eye damage/eye irritation (H318), moderate skin irritation (H315), moderate oral toxicity - Not expected to reach the environment in this use scenario, minor exposure to end users, and adequate protection of workers.	5-10
4			Pigment	grey	unbekannt	0-3
5			Lösemittel	grey	unbekannt	0,5-5
6	4711-23-6	Pigment	Pigment	x	Halogenated organic compound, contains copper. Loss of the scarce resource Cu.	1
7	4712-34-1	Colora 5	Pigment	b	Chinacridon-Derivat	2
8	22-33-45454	"1,2-Konservodol"	Konservierungsmittel	c	Generally sensitization potential. Considered EXPOSURE very limited (very small amounts). Severely toxic for aquatic organisms, slowly aerobically biodegradable and not bioaccumulative.	ca. 100 ppm
9	11-22-232	"1-halo-3-phantas-to-diol"	Konservierungsmittel	x	Halogenated preservative. Sensitizer (BRCat B; Mak Sh), high oral and dermal toxicity. Highly toxic to aquatic organisms, but expected to degrade at low concentrations. High amounts of this preservative are not expected to enter water streams systematically in this use scenario.	200 ppm
10	7777-2-33	Eisen (23)-dingstat	Trocknungsbeschleuniger	x	CMR. According to REACH considered reprotoxic(H316).	200 ppm

- Banned List conformity
- < 75% bewertet
- 3 X-assessments, of which 1 CMR

- 150 ingredients at 100 ppm level (0.01%).
- substances detected which are banned in the textile industry for more than 20 years.

MARKER

- DNA Marker Fingerprint
- Global code identification
- Defined for multiple cycles (Polymer or Watermarks - marker remain in cycles)
- Safe for biological systems



PACKAGING (LABEL+PRINTING)

- Material health positive list of plastics >100 ppm (0.01%)
- Material health positive list of label + printing >100 ppm (0.01%)
- Flexible packaging defined for recycling in a circular economy



100% rPET



100% rHDPE

Printing inks

DRUCKFARBEN

SIEGWERK

Flexible Packaging

WERNER & MERTZ GmbH

Product development

Sustainable pouch packaging

Targets

- Development of a verifiable **sustainable and recyclable film materials** suitable for **stand-up pouches**
- Realization of recyclability and **separability of pouch material and decoration**
- Substitution of existing **laminate**

Status

- Development of a stand-up pouch concept in cooperation with **Mondi Consumer Packaging Technologies GmbH**
- Cradle-to-Cradle®-approach** supported by **EPEA Switzerland**
- Submission of different **patents**

INNOVATIVE POLYMER SOLUTIONS FOR MICRO FIBERS + OCEAN PLASTICS

- Developing opportunities for innovative polymer plastics, fibers that are safe for biological or technical cycles >100ppm (0.01%) (polymer, additives, catalyst, masterbatch, marker)
- Marker safe for biological systems
- Integrate collecting systems, recycling + traceability technologies in product design for a circular economy
- Industrial composting:
 - Economical industrial composting is under way
 - Integrate permission from authorities and legislation for industrial products for ind. comp.



Deutsche Bahn:

Shirts solution for micro fiber biodegradable polymer

Lauffenmühle

textile innovation



Wolford:

Luxury fashion biodegradable Elastomer



Bayonix:

Solution for Ocean Plastic biodegradable polymer



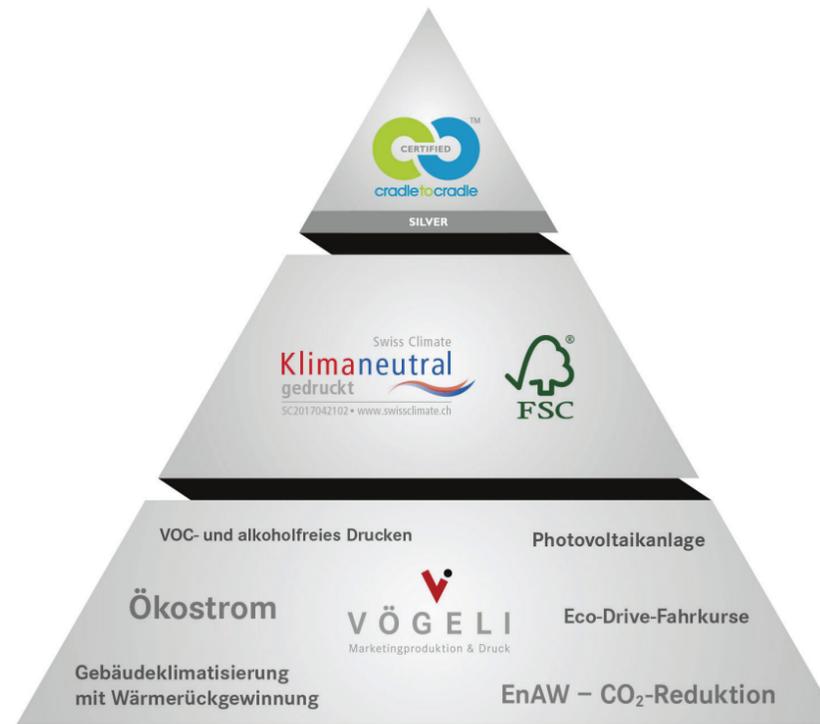
BIOMASS

33% of soil is degraded or used unsustainable due to various reasons

PAPER



Van Houtum NL:
Satino Black



Vögel Printing CH:
Healthy prints



Healthy Printing Initiative:
EPEA Int.

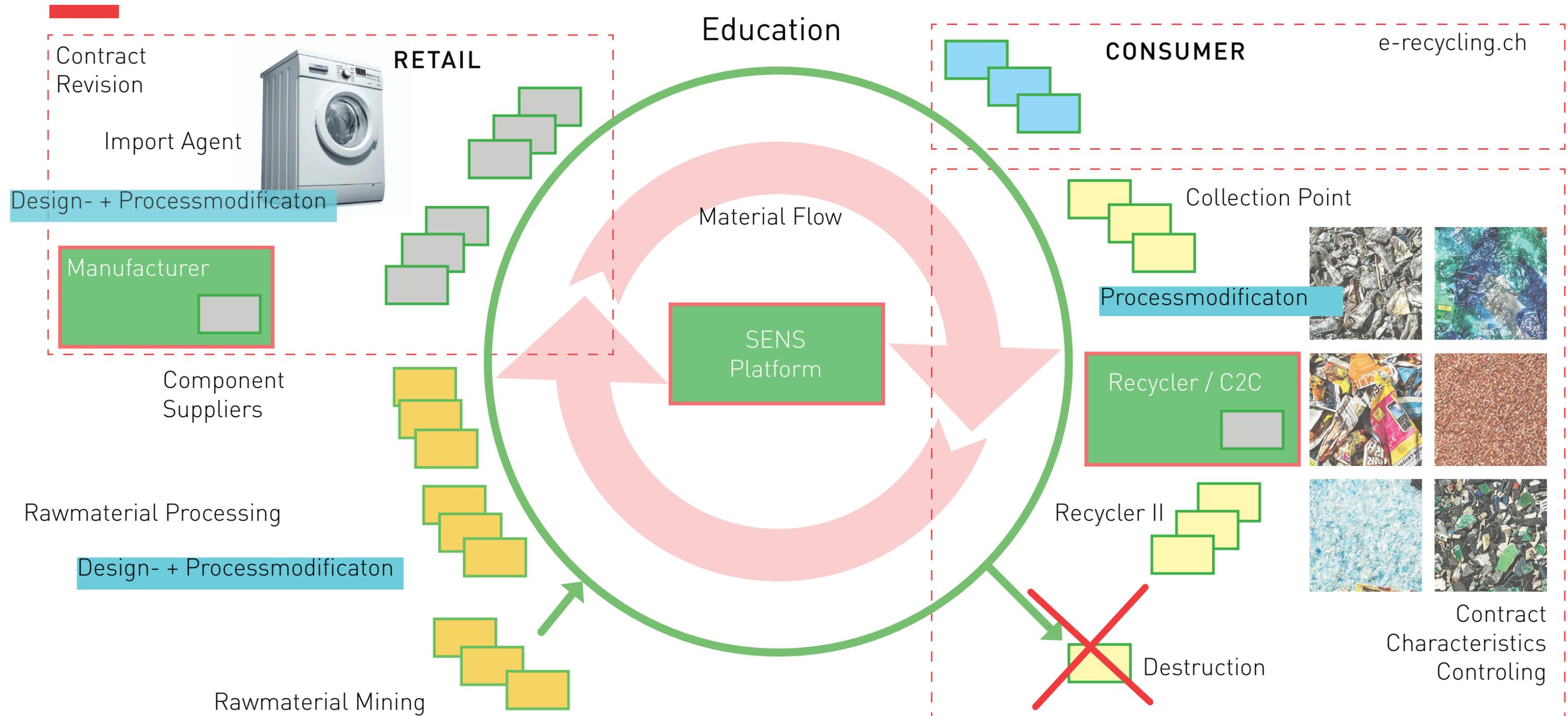
WEEE

- Effective use of RFID for instructions disassembly, reuse, recycling, upcycling, reintegration into the supply chain
- Materials pooling for mass material streams
 - Develop resources exchange + resources accounting
 - Separate electric products in biological / technical cycles
- Paradigma change (transformation of electronic industry)
 - incentive premium for transformation electronic goods for a circular economy
 - financial streams
 - information streams
 - material streams

ELECTRONIC GOODS: SEARCH FIELD CRADLE TO CRADLE® MATERIAL CYCLE



SENS **eRecycling**



CONCEPTS FOR PRODUCT IDENTIFICATION

- Product passport
- Environmental Product Declaration (EDP)
- Certifications for circular products (Material Health Certificate, Cradle to Cradle Certified™)

**PRODUCT
PASSPORT**

EDP:
ENVIRONMENTAL
PRODUCT
DECLARATION



NEW REQUIREMENTS WASTE LEGISLATION

- Wording: Resources + waste legislation for a circular environment
- Include resources in content and support circular concepts
- Include recycling, upcycling + industrial composting for a closed loop concept



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