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Workshop Report for the OECD Workshop on Improving Alignment of Chemicals and Waste Management Policy

Series on Risk Management
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IOMC

INTER-ORGANIZATION PROGRAMME FOR THE SOUND MANAGEMENT OF CHEMICALS

A cooperative agreement among **FAO, ILO, UNDP, UNEP, UNIDO, UNITAR, WHO, World Bank and OECD**

Environment Directorate
ORGANISATION FOR ECONOMIC COOPERATION AND DEVELOPMENT
Paris 2020

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Note from the Secretariat

This document is a report of the OECD Workshop on Improving Alignment of Chemicals and Waste Management Policy that was held at the OECD on 3 February, 2020. The workshop was organised in co-operation between the Joint Meeting of the Chemicals Committee and the Working Party on Chemicals, Pesticides and Biotechnology and the Working Party on Resource Productivity and Waste, under the Environment Policy Committee.

The annexes to the report contain the presentations from the workshop as well as the case studies at the chemical/waste policy interface that were discussed.

The OECD gratefully acknowledges the case study submitters whose examples enabled the discussion.

Table of Contents

OECD Expert Workshop on Improving Alignment of Chemicals and Waste Management Policy

Background and Objectives

The issue of policy alignment at the chemicals/waste interface is becoming an increasingly prominent issue, especially as many OECD countries are moving towards a circular economy. A lack of alignment of chemicals and waste management policies has been reported to sometimes hamper material recovery. It has also led to the reuse of material containing hazardous substances that have been recognised as being of concern for human health or the environment or the release of hazardous substances from recycling operations.

This workshop aimed to foster a discussion on real-world policy misalignment at the chemicals/waste interface in order to identify and review potential, or already applied, solutions. In order to support this discussion, case studies were submitted via the Joint Meeting of the Chemicals Committee and the Working Party on Chemicals, Pesticides and Biotechnology and the Working Party on Resource Productivity and Waste. The case studies received address different sectors and issues (see summary table in Annex A). They were clustered in three themes to facilitate discussion for the workshop, although the issues overlap to some extent across the themes. The agenda for the workshop is attached in Annex B and the presentations from the workshop are available in Annex C.

Workshop Participants

More than 120 participants from OECD member countries, partner countries, non-governmental organisations and industry participated in the workshop.

Workshop Outcomes

The meeting was co-chaired by Sara Broomhall, Department of the Environment and Energy, Australia (chair of the Joint Meeting of the Chemicals Committee and the Working Party on Chemicals, Pesticides and Biotechnology) and Sofie Bouteligier, Public Waste Agency of Flanders (OVAM), Belgium (chair of the Working Party on Resource Productivity and Waste).

In their opening remarks the chairs emphasised the growing importance of this topic to both groups. The chemicals and waste agendas are more connected than in the past because many countries' efforts to transition towards a circular economy do require that chemical management issues are acknowledged and addressed – from detoxification to addressing the risk of contamination of materials streams. In addition they welcomed the opportunity for the two groups to come together to discuss the case studies and bring the different expertise together to increase cooperation and deepen alignment.

Session 1 – Setting the Scene

The European Commission provided an opening presentation to frame a number of issues that the workshop would be addressing as well as to provide an update on European Commission activities at the chemicals/waste interface.

It was emphasised that there is alignment of high-level policy objectives between chemicals and waste legislation. However, there are opportunities for further alignment within the detailed implementation of these policies. In particular, there is a need to reconcile the fact that waste is a resource but also the need to ensure that waste that contains substances of concern should only be recovered into materials that can be safely and effectively used. It was also questioned whether and under what conditions substances that are no longer allowed in primary materials should be allowed in secondary materials.

In order to ensure the safe recovery of waste materials, the following challenges should be addressed:

- Increase uptake of secondary material and ensure clean and safe secondary materials which consumers trust;
- Ensure information flows and tracking of key data along value chains;
- Have clear rules for the status of waste and products as well as clear classification criteria for waste;
- Properly address legacy substances including when to recycle vs destroy and balancing the related policy objectives;
- Ensure increased information for decision makers to inform consideration of trade-offs.

It was noted that often case-by-case discussions and decisions are required and there is not a one size fits all approach. A balanced approach is needed to make good decisions to move towards circularity.

Session 2 – Facilitating Material Recovery

This session focused on identifying policy misalignments which can hinder material recovery, through the discussion of three case studies from Denmark, Colombia and Germany.

Case Study 1 from Denmark (see Annex D) was presented by the organisations Brenntag Nordic and Dansk Erhvervon and focused on using second-hand chemicals that have primarily been used as process chemicals in the pharmaceutical industry. The work underpinning this case study drew from real experiences that aim to develop a market for second-hand chemicals. Processing aid substances that are not consumed in one application become resources in a second loop (e.g. processing aid from pharmaceutical production used instead of virgin substances in other sectors). A distributor is the connection point between the 'loops' and safe use information is passed along. The analysis found that current legislation actually allows and provides a frame for use of second-hand chemicals but that innovation support and establishment of markets for circular chemical substances would improve the uptake of such models. From the experience, practical guidance has also been developed for companies.

Case Study 2 from Colombia (see Annex E) was presented by the Ministry of Environment of Colombia. The case study focuses on barriers to transferring hazardous waste for reuse across companies. Currently, hazardous waste cannot be transferred to other companies without involving a hazardous waste manager. This has limited the reuse of substances and there is a need to find a balance in order to facilitate reuse and recovery. Often it is in the financial interest of the hazardous waste manager to direct the material to landfilling. Therefore there is a need to either change the current type of intermediary between a waste generator and buyer/user or to consider creating a landfilling tax for some priority streams to promote their recycling and reuse.

Case Study 3 from Germany (see Annex F) was presented by the Ministry of Environment of Germany. The case study involves the management of construction and demolition waste containing asbestos. Most buildings reaching current demolition age were built prior to asbestos bans and therefore larger amounts of demolition waste may contain asbestos. It is not allowed to recycle and reuse construction and demolition waste containing asbestos. There is a challenge with decontamination of the waste prior to demolition and also with the sheer volume that is being directed towards landfills. Although there are opportunities to dismantle prior to demolition to segregate asbestos containing materials, this is not mandatory in Germany. At the same time, naturally occurring presence of asbestos in rocks that are used for construction material do not have the same regulatory status as intentionally added asbestos. There is a need for clear definitions for operators as well as better alignment between regulation relative to intentionally added and naturally occurring materials.

Session 3 - Managing environmental, health and safety risks from the use of recycled materials containing hazardous substances

This session focused on issues related to risks of recycling materials as well as from the use of recycled materials through the discussion of two case studies from Belgium and the United States.

Case Study 4 from Belgium (see Annex G) was presented by the Ministry of Health from Belgium. This case study outlined the issues of the use of recycled rubber infill for sports fields. There are different levels of stringency between primary and secondary materials regarding the levels of hazard substances, including PAHs, which can be present. This leads to concerns for human health and the environment but also imparts a negative image of secondary raw materials and slows down evolution towards non-toxic circular material flows. There are questions also of who should assess the potential risks of certain uses of secondary materials – the primary material manufacturer, the recycler? There is also a potential opportunity to find better reuse scenarios for the recycled rubber tyres than as use for sports fields, a use for which the public tends to have a lower risk appetite than for other uses.

Case Study 5 from the United States (see Annex H) was presented by Inland Empire Paper and NorthWest Green Chemistry. This case study highlighted several challenges associated with recycling of paper products contaminated with PCBs. This contamination occurs in inks and pigments through the inadvertent generation of PCBs during the manufacturing process. It is not associated with legacy PCB contamination issues but a continuing new exposure source of PCBs. The variation in allowable PCB levels between those in inks and pigments and the levels allowable based on state and local water quality guidelines result in a modern paper production facility to be unable to recycle paper as an input. Potential solutions include finding ways to incentivise the development and commercial update of new inks and pigments that contain lower levels of PCBs via changes in regulatory policy and/or procurement practices.

Session 4 - Aligning chemicals and waste legislations for managing hazardous chemicals - the examples of electronics and electrical waste, and healthcare devices waste management

This session focused on different examples that highlighted a need for more alignment between chemicals and waste legislation and the approach to hazardous chemicals management.

Case Study 6 from the United Kingdom (see Annex I) was presented by the UK Department for Environment Food & Rural Affairs. The case study examines the interaction of the EU POPs Regulation requirements with the requirements of waste legislation for managing electronics and electrical waste. The principles of the legislations are well aligned but there is friction at the implementation level. For example, some separation techniques used to identify contaminated waste (e.g. density separation of plastics) also lead to incineration of non-target plastics which makes it difficult to meet recycling targets. In another example, for some sectors such as furniture, re-use is a large component, and economically sound for many reasons. At the same time legacy furniture will often contain banned flame retardants that are not used in new furniture. There are solutions on both the waste and chemicals side that would improve the overall situation. On the waste side could expand targets on chemicals to be removed from waste, maximise produce responsibility and better recognise POPs in waste classification systems. On the chemicals side, it would be prudent to identify potential waste issues earlier (i.e. within risk assessments of the chemicals) and to convey composition information in a useful way. Both groups together can work towards sustainable product design and support more investment in integrated waste management.

Case Study 7 from Colombia (see Annex J) was presented by the Ministry of Environment of Colombia. The case study focused on better defining the management of hazardous substances from electronics and electrical waste. Many countries face challenges in identifying hazardous substances in e-waste, which leads to contaminated material being recycled into new products. Issues include the physical and analytical identification and quantification of certain hazardous substances, but also the lack of cut-off criteria for levels of hazardous substances in e-waste. Better guidance is needed for waste managers on the identification, sorting and recycling of plastics coming from electronics and electrical waste.

Case Study 8 from Italy (see Annex K) was presented by the National Institute of Health of Italy. The case discusses the possibility to replace PVC in the use of medical devices and consumables in hospital practice in view of final waste management (thermal combustion) considerations, as well as consideration about the implications for human health of using PVC in clinical procedures. PVC can cause environmental problems in both the manufacturing and waste stages, however, there are currently no blood bags without PVC or phthalates on the market. This is a concern not only for the waste stage, but also the in-use stage. There is an opportunity to support research into and commercialisation of PVC-free blood bags to find alternative products with comparable performance. This can also be supported through regulatory measures, procurement practices and targeted taxation.

Highlights of Discussions in Sessions 2-5.

The presentation of the case studies was followed by discussions of the workshop delegates. The following points capture some of the issues at a high level.

- A number of delegates noted experiencing similar issues in their jurisdictions, which further emphasises an opportunity to share approaches or best practices for particular issues.
- For recycling it was mentioned that there is a need for better sorting/decontamination. This can be approached through both the promotion and financial support for technological improvements but also the use of regulations that will drive technology improvements.
- The use of the chemical leasing model (link to OECD document on Economic Features of Chemical Leasing), could help with the re-use and recycling of substances and support the creation of closed-loops as it is an incentive for the supplier of the chemical service to reduce the use of input chemicals.
- There is a need to examine cases of recycling which result in down-cycling as these could lead to a fit-for-purpose use in some sectors but may also in other circumstances not align with the concept of circularity.
- It is challenging to incentivise shifts to new practices or use of new chemicals in long-established markets without pressure from regulations or procurement practices. Ecodesign criteria for particular products are a tool that can also be deployed.
- Extended Producer Responsibility schemes may provide a platform to address some misalignment issues (e.g. in e-waste)
- There is a need for integrated policy making to address issues at chemical/waste interface. Although high level policy objectives are generally aligned, many of the case studies identify specificities that speak to a lack of alignment at the technical implementation level. For some substances this includes reflecting on the need for the same (or at least similar) maximum content thresholds for the same substance under different legislations (e.g. primary vs secondary material or natural vs manufactured material).

- Taking into account life-cycle considerations during decision-making may highlight important trade-offs that may need specific considerations and changes in policy approach.
- There might be difficulties in identifying chemicals used in the different components of a product and taking decisions on how to best manage the "unknown" when this product becomes a waste.

Delegates emphasised that this discussion between different experts and the presentation of the varied case studies was informative and highlighted the need to address these issues together and not just from a chemicals or waste standpoint. The workshop also helped to confirm that secondary material use is becoming a more important issue and therefore it is more important to know the composition, hazard and exposure of these materials so that risks can be suitably addressed.

However, it was also noted that while it was good to discuss the common issues, there is also a need to continue discussing the solutions that have been identified. Therefore there are opportunities to continue to share experiences at the chemicals/waste interface and countries' solutions should be brought forward.

Annex A. Summary of Case Studies

Summary of case studies provided for the OECD Workshop on Improving Alignment of Chemicals and Waste Management Policy				
Submitted by:	**Case Study Sector**	**Issue**	**Policies involved and potential solutions**	**Questions/points for discussion**
Workshop Session on Facilitating Material Recovery				
Case Study 1 Denmark *Using second-hand chemicals that have primarily been used as process chemicals in the pharmaceutical industry*	Pharmaceutical production; Chemicals production.	While there are opportunities to generate and use second-hand chemicals that have primarily been used as process chemicals in the pharmaceutical industry, today, most of these used chemicals are treated as waste and incinerated, which results in CO2 emissions.	The analysis shows that legislative obstacles where not present to the extent expected. Potential policy solution: changing the status of used process chemicals from waste to a resource called "a circular substance" may extend the life of chemicals allowing to use them several times, thus reducing the production of new corresponding chemicals. Documentation related to the case study provides examples of chemicals that can be classified as by-products or end of waste and thereby used in other value chains.	The importance of implementing legislation for products that ensure that a circular substance can be used safely and that there is no content of hazardous chemicals; The need to develop international guidance on chemicals classified as by-products and end of waste situations; The development of guidance on how to classify a circular substance and what documentation should be required to follow transboundary movements of circular substances.
Case Study 2 Colombia (1)	Hazardous waste designation, handling and transfer	Hazardous waste generated by a company cannot be used by/transferred to another company, without a third party (hazardous waste manager) being involved in the process. The chemical substances lose all their economic value and their recovery potential and become a hazardous waste. This is	Actual regulation is promoting hazardous waste landfilling, without any other kind of waste management alternatives. An alternative, potential solution could be to hand over the chemical substances if there is an	From a legislative point of view, how can the recycling of chemical substances, surpluses or by-products be promoted to prevent them from becoming hazardous waste?

Transferring hazardous waste for re-use from one company to another		affecting the possibility of establishing industrial parks, where these substances generated by a company can be directly used by another, and it is discouraging recycling, reuse and recovering of hazardous wastes in different production processes.	interested company. The exchange or commercialisation process can be promoted, this time, without an intermediary.	How can more informed and transparent processes be established in order to assure that the recycling/recovery is carried out properly?
Case Study 3 Germany *Management of construction and demolition waste containing asbestos*	Construction	It is not allowed to recycle and reuse construction and demolition waste (CDW) containing asbestos. It is often technically or economically unfeasible to eliminate asbestos from building materials and the systematic investigation of asbestos in buildings is currently not mandatory in Germany. If asbestos remain undetected before demolition, there is a possibility that building materials containing asbestos could end up in recycling plants where they could contaminate asbestos-free materials. Also, while placing on the market of CDW material containing asbestos is not permitted even at contents < 0.1 mass-%, mining and placing on the market of rocks with natural asbestos contents < 0.1 mass-% is permitted in Germany.	Harmonization of legislation in circular economy, legislation for hazardous materials and legislation for chemicals and products. Equal legislation for natural rocks and CDW-materials.	Inspection obligation Definition, analysis and methology to measure asbestos Classification of CDW containing asbestos according to the list of wastes Classification of CDW containing asbestos as hazardous or non-hazardous Handling natural rocks containing asbestos

Workshop Session on Managing Environmental, Health and Safety Risks from the Use of Recycled Materials containing Hazardous Substances				
Submitted by:	**Case Study Sector**	**Issue**	**Policies involved and potential solutions**	**Questions/points for discussion**
Case Study 4 Belgium *Safety and environmental impacts of rubber infill used in sport fields*	Materials recovery and Manufacture of Rubber Products	The use of rubber infill raises concerns regarding their environmental impact and the safety of playing sports on artificial turf pitches. PAH standards for rubber infill (mixture) are less strict than those applying to new tyres or new and recycled consumer products made of rubber, to protect human health. Remarketing products that contain substances of concern endangers humans and environment, negatively impacts the image of secondary raw materials and will slow down the evolution towards non-toxic circular material flows.	The take-back obligation in Belgium for tyres promotes the reuse, recycling, and energy recovery of used tyres; disposal is prohibited. Used tyres are largely material recovered, especially as rubber infill for sports pitches. Only in the Flanders Region end-of-waste (EOW) criteria have been established for rubber infill for sport pitches to protect environment. There are no EU wide EOW criteria. In the EU Regulation REACH, strict PAHs standards apply for (new) tyres and for (new and recycled) consumer products made of rubber, in order to protect health. The PAHs standards for rubber infill (mixture) are much less strict. This situation is being currently addressed in order to harmonise the limit values both for the consumer 'articles' and the 'mixtures' containing PAHs under the correspondent REACH restrictions proposal for 8 PAHs in rubber granules (under examination). However the environmental and health impact of some other organic and inorganic substances should also be investigated.	Life cycle thinking is important in the Circular Economy. Is it the responsibility of the tyre manufacturer or the recycler or the EPR organism to asses the risks of use changes on health and environment ? Could used tyres be retreaded in order to remanufacture tyres instead of downcycling them to rubber granulate ? How can it be avoided that the image of secondary raw materials are negatively affected by the uncertainties about the risks on health and environment ?

Case Study 5 Inland Empire Paper Company & Northwest Green Chemistry (based in the United States) *Recycling of paper products contaminated with PCBs in the inks and pigments*	Manufacturing - Paper and paper products	Current TSCA regulations allow exclusions for the use of pigments and inks to contain polychlorinated biphenyl (PCB) concentrations up to 50 ppm. These PCB-containing pigments and inks are used in printing of newspapers, magazines, and numerous other printed materials. Paper recyclers receive PCB-containing products that ultimately end up in their wastewater discharge. Although PCB concentrations in the recycler's discharge are millions or billions of times lower than the Federal allowance, they are unable to meet stringent water quality standards being set in parts per quadrillion. There are no known commercially available technologies for the removal of PCBs to the levels necessary to meet these water quality criteria, so the only alternative for compliance may be the elimination of paper recycling.	Misalignment between policies promoting paper recycling, and the Federal TSCA allowance and CWA water quality standards that are millions or even billions of times apart. Several U.S. companies have taken it upon themselves to lower their own procurement levels well below the current TSCA allowance. A host of solutions may be required to resolve this misalignment, e.g. • Develop/Use Alternatives to PCB-Containing Products; • Reduce the TSCA/Global Allowance for PCBs; • Incentivize the Research and Development of Non-Chlorinated Alternatives; • Reassess the Current Use Authorizations; • Monochloro-biphenyls and Dichloro-biphenyls should be excluded from total PCB regulation.	Are alternative inks, pigments and dye – without PCB or with with lower than what is current allowed -- available for distribution in commerce? How to support their development? Work with end users of inks, pigments and dyes to determine if non chlorinated products can supplant the current chlorinated products. Encourage enforcement of regulated levels of PCB. The U.S. EPA requires that suppliers self-report.

Workshop Session on Aligning Chemicals and Waste Legislations for Managing Hazardous Chemicals – the examples of electronics and electrical waste, and healthcare devices waste management				
Submitted by:	**Case Study Sector**	**Issue**	**Policies involved and potential solutions**	**Questions/points for discussion**
Case Study 6 United Kingdom *Interaction of the EU POPs Regulation requirements with the requirements of waste legislation for managing electronics and electrical waste (WEEE)*	Waste Management Industry	There is a misalignment between the EU Regulation on POPs (persistent organic pollutants) and waste legislation, with a particular focus on brominated flame retardants in the WEEE waste stream and waste furniture, e.g.; - Recycling: it may not be possible to comply with recovery and/or recycling targets and meet the POPs Regulation requirement to destroy POPs contaminated plastic; - Re-use: WEEE has provision for re-use even if containing POPs, but POPs regulation has no provision for re-use; - Impact on carbon emissions: incineration is the only commercially available option for destroying POPs waste in the UK. But in order to comply with emissions standards, it can be necessary to carefully control inputs to incinerators, avoiding inputs of large amounts of plastic.	The interaction of the EU POPs Regulation requirements with the requirements of waste legislation.	How can waste classification systems be adapted to better enable compliance with all legislation that applies to waste? What can we do to ensure that markets deliver the waste management infrastructure required to meet future waste challenges?
Case Study 7 Colombia (2) *Defining the management of hazardous substances from electronics and electrical waste*	WEEE management	Components of waste electric and electronic equipment (WEEE) are considered hazardous waste and must be managed accordingly, but there is no specific regulation that defines under what conditions WEEE has become a hazardous waste or which are the management options for these components or substances according to their hazardous properties; Since it is impossible to determine if WEEE is considered as hazardous waste and in the absence of corresponding	Establish a legal framework to define when WEEE can be considered hazardous waste, according to maximum thresholds of certain hazardous substances contained in the WEEE. • Establish regulation to define the technical requirements and the analytical methods to be used to determine and quantify brominated flame retardants (BFR) content in materials to be recycled;	What challenges have been identified by OECD countries regarding the setting and control of BFR limits in plastics to be recycled? How has the private sector been involved to overcome these issues? What lessons could be shared in the establishment of limits and enforcement of controls for the WEEE managers?

		thresholds, WEEE managers are not able to manage WEEE in a proper way.	• Develop technical guidelines and demonstrative projects for the identification, sorting and recycling of plastics coming from WEEE.	
Case Study 8 Italy *Replacement of PVC in the use of medical devices and disposable items in hospital practice for the final management of waste*	Rubber and Plastic Products	PVC can cause environmental problems in both the manufacturing and waste stages, which include emissions of heavy metal stabilizers and phthalates and release of dioxins and greenhouse gases during combustion. However, there are currently no blood bags without PVC or phthalates on the market. The case discusses the possibility to replace PVC in the use of medical devices and consumables in hospital practice in view of final waste management (thermal combustion) considerations, as well as consideration about the implications for human health of using PVC in clinical procedures.	Interaction between the Medical Device Regulation and WHO/UNEP policies on safe management of health care waste; Possible solutions to the issue: • Disincentives (e.g. with taxation) to the use of PVC, and corresponding incentives for non-plasticizing materials; • Banning of PVC in such applications and shifting to the greener solution.	How to implement the PVC-Free blood bag market in a definitive and lasting way with the aid of scientific research, considering their current unavailability on the market?

Annex B. Workshop Agenda

OECD Expert Workshop on Improving Alignment of Chemicals and Waste Management Policy

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13.00-13.05

Opening remarks by the Chairs of the Joint Meeting and of the Working Party on Resource Productivity and Waste

– *Sara Broomhall, Department of the Environment and Energy, Australia*

– *Sofie Bouteligier, Public Waste Agency of Flanders, Belgium*

13.05-13.30

1. Setting the scene

This introductory session will highlight the importance and present some of the key aspects (opportunities and challenges) of aligning chemicals and waste management policies.

- *Enrique Garcia John, European Commission*

(Presentation 15 minutes followed by a 10 minutes Q&A)

13.30-14.30

2. Facilitating material recovery

- Case study from Denmark: Using second-hand chemicals that have primarily been used as process chemicals in the pharmaceutical industry
  - *Marianne Lyngsaae, Brenntag Nordic*
  - *Jakob Zeuthen, Dansk Erhverv*
- Case study from Colombia: Transferring hazardous waste for re-use from one company to another
  - *Natalia A. Uscátegui Ruiz on behalf of Diego Escobar Ocampo, Ministry of Environment Colombia*
- Case study from Germany: Management of construction and demolition waste containing asbestos
  - *Michael Siemann, Ministry of Environment Germany*

(30 minutes for presentations followed by a 30 minutes Q&A)

Coffee Break 14.30 – 15.00

15.00-16.00

3. Managing environmental, health and safety risks from the use of recycled materials containing hazardous substances

- Case study from Belgium: safety and environmental impacts of rubber infill used in sport fields
    - *Juan Pineros, Ministry of Health Belgium*
- Case study from Inland Empire Paper Company and North West Green Chemistry: recycling of paper products contaminated with PCBs in the inks and pigments
    - *Doug Krapas, Inland Empire Paper Company*
    - *Lauren Heine, Northwest Green Chemistry*

(20 minutes for presentations followed by a 40 minutes Q&A)

16.00-17.00

4. Aligning chemicals and waste legislations for managing hazardous chemicals - the examples of electronics and electrical waste, and healthcare devices waste management

- Case study from the United Kingdom: interaction of the EU POPs Regulation requirements with the requirements of waste legislation for managing electronics and electrical waste
    - *Max Folkett, Department for Environment, Food and Rural Affairs, United Kingdom*
- Case study from Colombia: defining the management of hazardous substances from electronics and electrical waste
    - *Natalia A. Uscátegui Ruiz on behalf of Diego Escobar Ocampo, Ministry of Environment Colombia*
- Case study from Italy: replacement of PVC in the use of medical devices and disposable items in hospital practice for the final management of waste
    - *Federica Tommasi, Italian National Institute of Health - ISS*

(30 minutes for presentations followed by a 30 minutes Q&A)

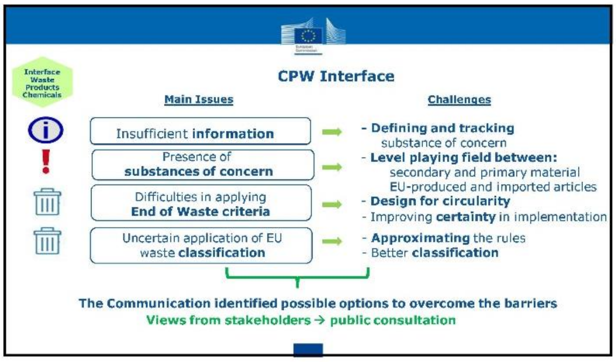
17.00-17.30

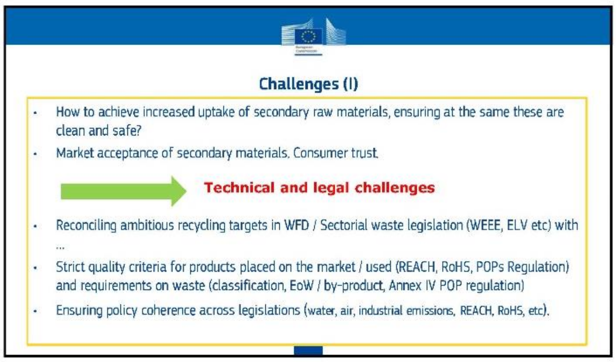
5. Wrap up

This final session will be a discussion amongst delegations to extract key observations from the case studies and discuss potential areas for future OECD work.

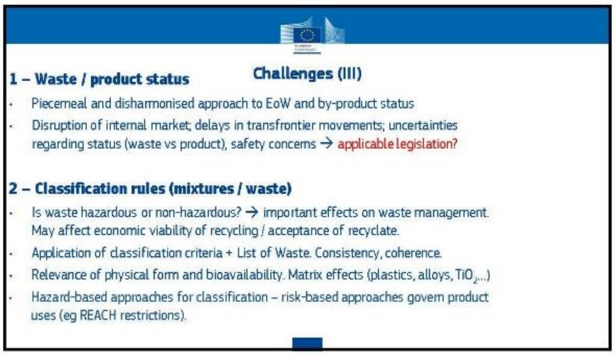
Annex C. Workshop Presentations

Session 1

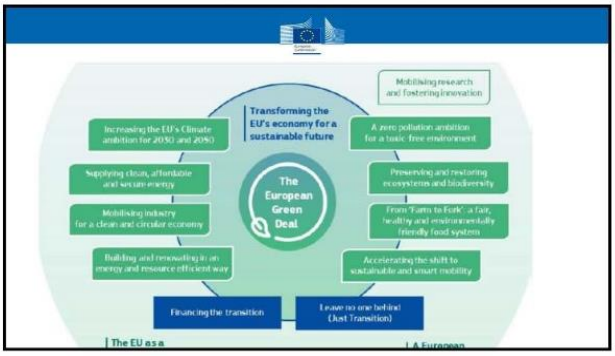




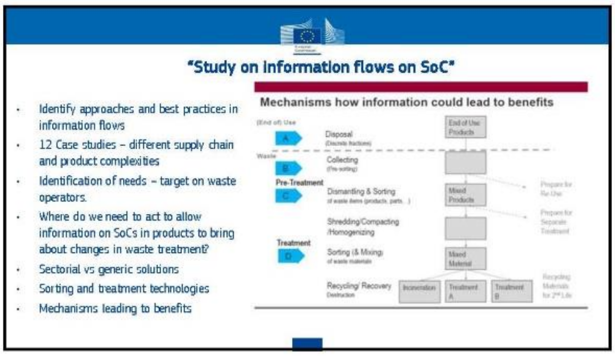

Challenges (II)
1 - Information flows
What substances are of "concern"? How many should we track?
What technologies (tracers, tags, databases ...). Sectorial approaches?
How to best use this information to improve waste management (sorting, decontamination ...)
2 – Legacy substances
Recycle vs destroy – what is the best overall outcome for society?
Substance specific limits, targets, sorting and decontamination options
Competing objectives: resource efficiency, non-toxic cycles, reduction in GHG emissions, hazardous waste mixing ban, waste hierarchy ....
How to balance precautionary principle, proportionality, regulatory effectiveness.

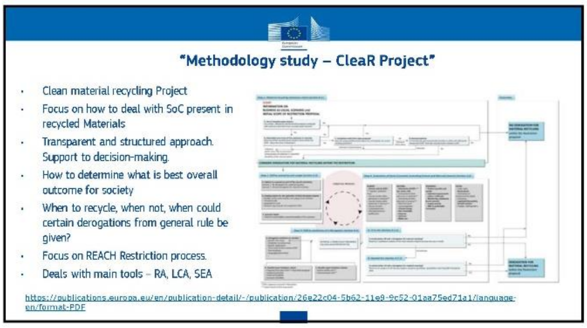

Challenges (III)
1 – Waste / product status
Piecemeal and disharmonised approach to EoW and by-product status
Disruption of internal market; delays in transfrontier movements; uncertainties regarding status (waste vs product), safety concerns → applicable legislation?
2 – Classification rules (mixtures / waste)
Is waste hazardous or non-hazardous? → important effects on waste management. May affect economic viability of recycling / acceptance of recyclate.
Application of classification criteria + List of Waste. Consistency, coherence.
Relevance of physical form and bioavailability. Matrix effects (plastics, alloys, TiO_2,...)
Hazard-based approaches for classification – risk-based approaches govern product uses (eg REACH restrictions).

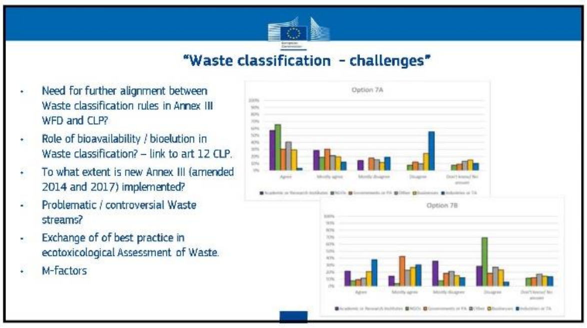

CURRENT AND (FUTURE?) CASES
Stabilisers and plasticisers in PVC (cadmium, lead, DEHP...). Coloured substances.
Flame retardants in ELV and WEEE plastics and textiles (PBDEs, organophosphorous FRs - TCPP, TCEP. etc)
PAHs and other substances in rubber infill – ELV derived infill material. Microplastics.
Asbestos fibres in C&D waste. Impact on recycled aggregates, gypsum plasterboard.
Metals in slags (ferrochrome slags, copper slags, etc) used in construction, cement manufacture, etc - Co, Pb.
Metal impurities in scrap – Co in steel, Pb in Al and Cu, etc. Bismuth in Copper.
Titanium dioxide in plastics, C&D waste, in bauxite residue from alumina production.
Primary amines, metallic pigments, dermal sensitisers in textiles
PCDDs / PCDFs in bottom and fly ashes
Metals and organics in compost, digestate and sludges
Striking the balance


Mobilising research and fostering innovation
Transforming the EU's economy for a sustainable future
Increasing the EU's Climate ambition for 2030 and 2050
A zero pollution ambition for a toxic-free environment
Supplying clean, affordable and secure energy
Preserving and restoring ecosystems and biodiversity
The European Green Deal
Mobilising industry for a clean and circular economy
From 'Farm to Fork': a fair, healthy and environmentally friendly food system
Building and renovating in an energy and resource efficient way
Accelerating the shift to sustainable and smart mobility
Financing the transition
Leave no one behind (Just Transition)
The EU as a
A European


BACK-UP SLIDES

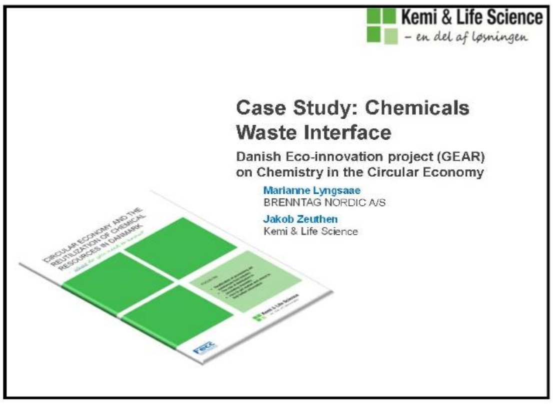

"Study on information flows on SoC"
Identify approaches and best practices in information flows
12 Case studies – different supply chain and product complexities
Identification of needs – target on waste operators.
Where do we need to act to allow information on SoCs in products to bring about changes in waste treatment?
Sectorial vs generic solutions
Sorting and treatment technologies
Mechanisms leading to benefits
Mechanisms how information could lead to benefits
(End of) Use
A
Disposal
End of Use Products
Waste
B
Collecting
Pre-Treatment
C
Dismantling & Sorting
Mixed Products
Shredding/Compacting /Homogenizing
Treatment
D
Sorting (& Mixing)
Mixed Material
Recycling/ Recovery
Destruction
Incineration
Treatment A
Treatment B


"Methodology study – CleaR Project"
Clean material recycling Project
Focus on how to deal with SoC present in recycled Materials
Transparent and structured approach. Support to decision-making.
How to determine what is best overall outcome for society
When to recycle, when not, when could certain derogations from general rule be given?
Focus on REACH Restriction process.
Deals with main tools – RA, LCA, SEA
https://publications.europa.eu/en/publication-detail/-/publication/26e22c04-5b62-11e9-9c52-01aa75ed71a1/language-en/format-PDF


"Waste classification - challenges"
Need for further alignment between Waste classification rules in Annex III WFD and CLP?
Role of bioavailability / bioelution in Waste classification? – link to art 12 CLP.
To what extent is new Annex III (amended 2014 and 2017) implemented?
Problematic / controversial Waste streams?
Exchange of of best practice in ecotoxicological Assessment of Waste.
M-factors
Option 7A
Option 7B


European Commission
CIRCULAR ECONOMY
Closing the loop
Thank you!
http://ec.europa.eu/environment/circular-economy/index_en.htm
ec.europa.eu/environment/waste

Session 2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Case Study: Chemicals Waste Interface
Danish Eco-innovation project (GEAR) on Chemistry in the Circular Economy
Marianne Lyngsaae
BRENNTAG NORDIC A/S
Jakob Zeuthen
Kemi & Life Science


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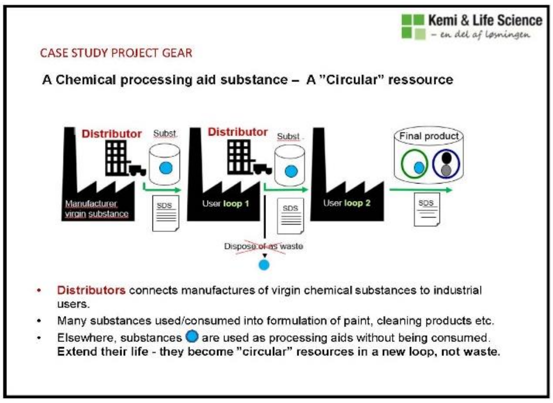
CASE STUDY PROJECT GEAR
Policies at stake - Legislations and Solutions
Explore opportunities in "second-hand" chemicals initially used as industrial processing aid substances:
Starting point
– Legislation on waste (EU Waste Framework Directive) and Chemicals (REACH)
– A general perception that waste legislation could prevent new usage of already used substances, in other value chains
Key Findings
✓ Supportive frame conditions do exist
✓ Danish guidance document and project material clarify and exemplify how to do it safely
✓ Estimate - 36000 T used processing aids to be saved from waste in Danish Pharma industry?
✓ CO2 gains
✓ New business models
Improved sustainability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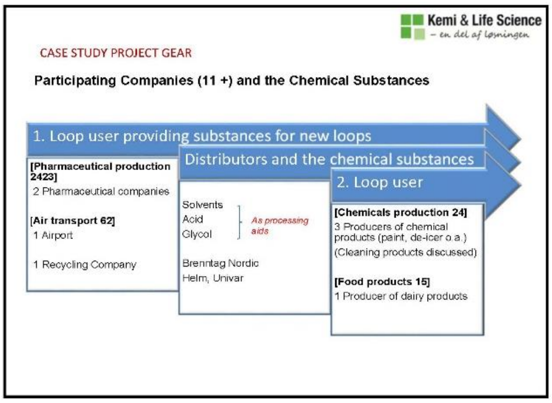
CASE STUDY PROJECT GEAR
A Chemical processing aid substance – A "Circular" ressource
Distributor
Subst.
Distributor
Subst.
Final product
Manufacturer virgin substance
SDS
User loop 1
SDS
User loop 2
SDS
Dispose of as waste
• Distributors connects manufactures of virgin chemical substances to industrial users.
• Many substances used/consumed into formulation of paint, cleaning products etc.
• Elsewhere, substances are used as processing aids without being consumed. Extend their life - they become "circular" resources in a new loop, not waste.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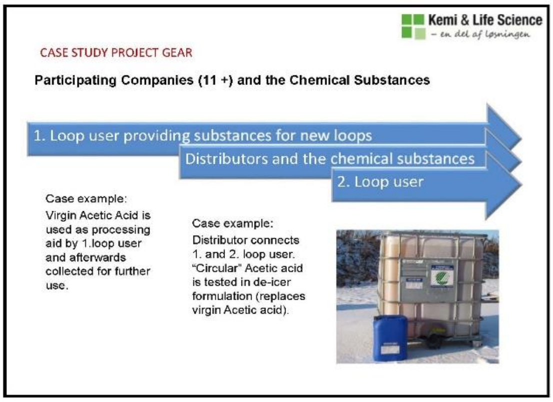
CASE STUDY PROJECT GEAR
Participating Companies (11 +) and the Chemical Substances
1. Loop user providing substances for new loops
Distributors and the chemical substances
2. Loop user
[Pharmaceutical production 2423]
2 Pharmaceutical companies
[Air transport 62]
1 Airport
1 Recycling Company
Solvents
Acid
Glycol
As processing aids
Brenntag Nordic
Helm, Univar
[Chemicals production 24]
3 Producers of chemical products (paint, de-icer o.a.)
(Cleaning products discussed)
[Food products 15]
1 Producer of dairy products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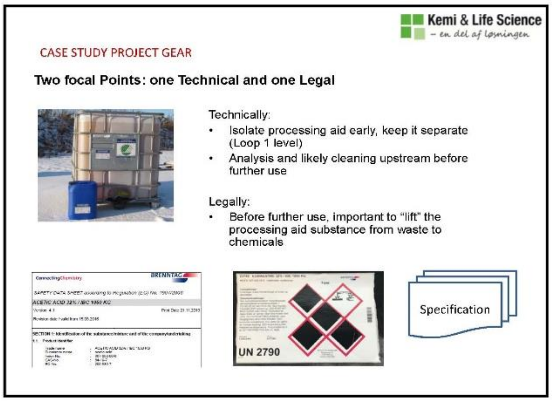
CASE STUDY PROJECT GEAR
Participating Companies (11 +) and the Chemical Substances
1. Loop user providing substances for new loops
Distributors and the chemical substances
2. Loop user
Case example:
Virgin Acetic Acid is used as processing aid by 1.loop user and afterwards collected for further use.
Case example:
Distributor connects 1. and 2. loop user.
"Circular" Acetic acid is tested in de-icer formulation (replaces virgin Acetic acid).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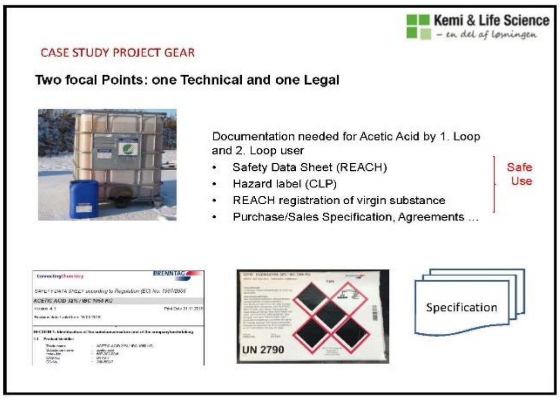
CASE STUDY PROJECT GEAR
Two focal Points: one Technical and one Legal
Technically:
• Isolate processing aid early, keep it separate (Loop 1 level)
• Analysis and likely cleaning upstream before further use
Legally:
• Before further use, important to "lift" the processing aid substance from waste to chemicals
UN 2790
Specification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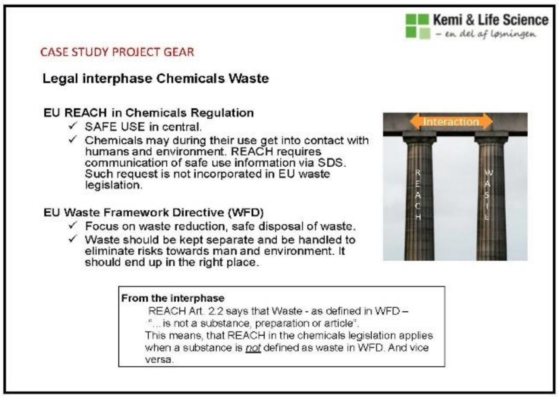
CASE STUDY PROJECT GEAR
Two focal Points: one Technical and one Legal
Documentation needed for Acetic Acid by 1. Loop and 2. Loop user
• Safety Data Sheet (REACH)
• Hazard label (CLP)
• REACH registration of virgin substance
• Purchase/Sales Specification, Agreements …
Safe Use
UN 2790
Specification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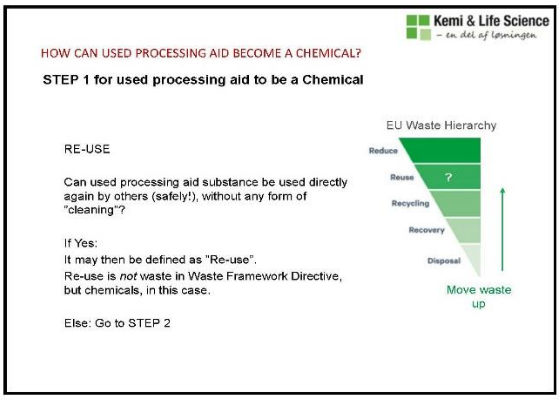
CASE STUDY PROJECT GEAR
Legal interphase Chemicals Waste
EU REACH in Chemicals Regulation
✓ SAFE USE in central.
✓ Chemicals may during their use get into contact with humans and environment. REACH requires communication of safe use information via SDS. Such request is not incorporated in EU waste legislation.
EU Waste Framework Directive (WFD)
✓ Focus on waste reduction, safe disposal of waste.
✓ Waste should be kept separate and be handled to eliminate risks towards man and environment. It should end up in the right place.
Interaction
REACH
WASTE
From the interphase
REACH Art. 2.2 says that Waste - as defined in WFD – "… is not a substance, preparation or article".
This means, that REACH in the chemicals legislation applies when a substance is not defined as waste in WFD. And vice versa.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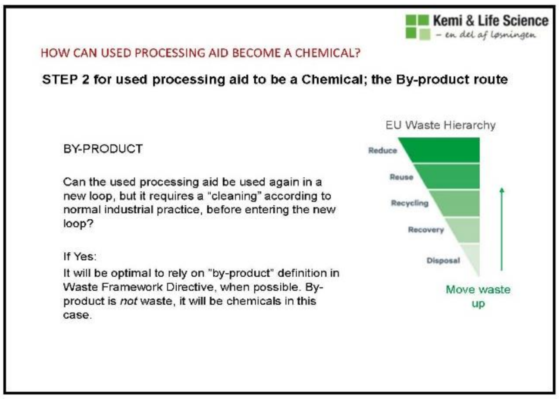
HOW CAN USED PROCESSING AID BECOME A CHEMICAL?
STEP 1 for used processing aid to be a Chemical
RE-USE
Can used processing aid substance be used directly again by others (safely!), without any form of "cleaning"?
If Yes:
It may then be defined as "Re-use".
Re-use is not waste in Waste Framework Directive, but chemicals, in this case.
Else: Go to STEP 2
EU Waste Hierarchy
Reduce
Reuse
?
Recycling
Recovery
Disposal
Move waste up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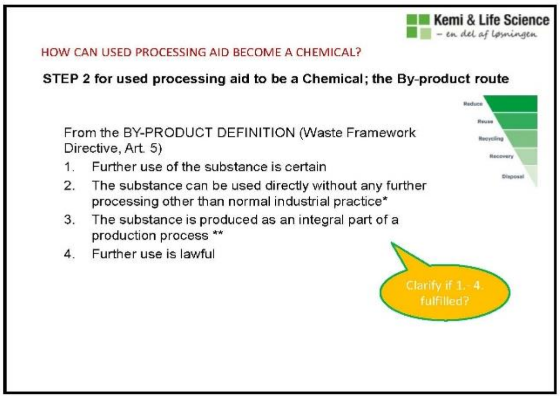
HOW CAN USED PROCESSING AID BECOME A CHEMICAL?
STEP 2 for used processing aid to be a Chemical; the By-product route
BY-PRODUCT
Can the used processing aid be used again in a new loop, but it requires a "cleaning" according to normal industrial practice, before entering the new loop?
If Yes:
It will be optimal to rely on "by-product" definition in Waste Framework Directive, when possible. By-product is not waste, it will be chemicals in this case.
EU Waste Hierarchy
Reduce
Reuse
Recycling
Recovery
Disposal
Move waste up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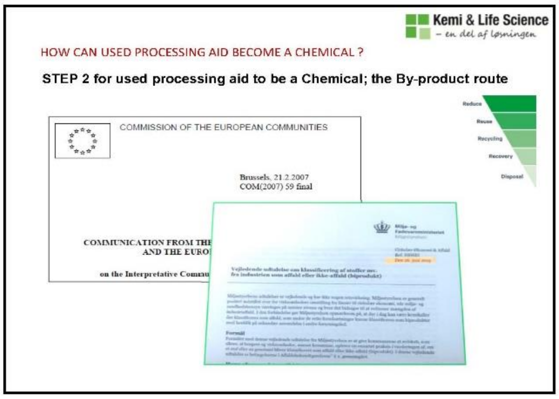
HOW CAN USED PROCESSING AID BECOME A CHEMICAL?
STEP 2 for used processing aid to be a Chemical; the By-product route
From the BY-PRODUCT DEFINITION (Waste Framework Directive, Art. 5)
1. Further use of the substance is certain
2. The substance can be used directly without any further processing other than normal industrial practice*
3. The substance is produced as an integral part of a production process **
4. Further use is lawful
Clarify if 1.- 4. fulfilled?
Reduce
Reuse
Recycling
Recovery
Disposal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HOW CAN USED PROCESSING AID BECOME A CHEMICAL ?
STEP 2 for used processing aid to be a Chemical; the By-product route
COMMISSION OF THE EUROPEAN COMMUNITIES
Brussels, 21.2.2007
COM(2007) 59 final
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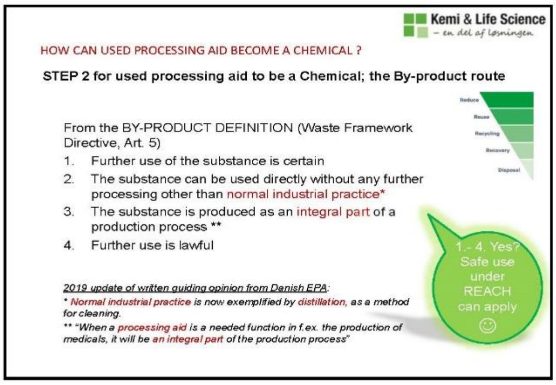
Reduce
Reuse
Recycling
Recovery
Disposal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HOW CAN USED PROCESSING AID BECOME A CHEMICAL ?
STEP 2 for used processing aid to be a Chemical; the By-product route
Reduce
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Disposal
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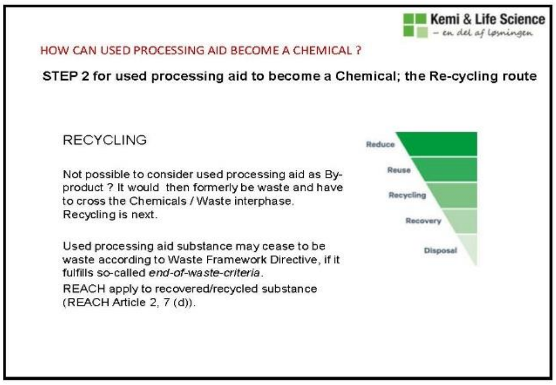
1. Further use of the substance is certain
2. The substance can be used directly without any further processing other than normal industrial practice*
3. The substance is produced as an integral part of a production process **
4. Further use is lawful
2019 update of written guiding opinion from Danish EPA:
* Normal industrial practice is now exemplified by distillation, as a method for cleaning.
** "When a processing aid is a needed function in f.ex. the production of medicals, it will be an integral part of the production process"
1.- 4. Yes? Safe use under REACH can apply ☺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HOW CAN USED PROCESSING AID BECOME A CHEMICAL ?
STEP 2 for used processing aid to become a Chemical; the Re-cycling route
RECYCLING
Not possible to consider used processing aid as By-product ? It would then formerly be waste and have to cross the Chemicals / Waste interphase. Recycling is next.
Used processing aid substance may cease to be waste according to Waste Framework Directive, if it fulfills so-called end-of-waste-criteria.
REACH apply to recovered/recycled substance (REACH Article 2, 7 (d)).
Reduce
Reuse
Recycling
Recovery
Disposal


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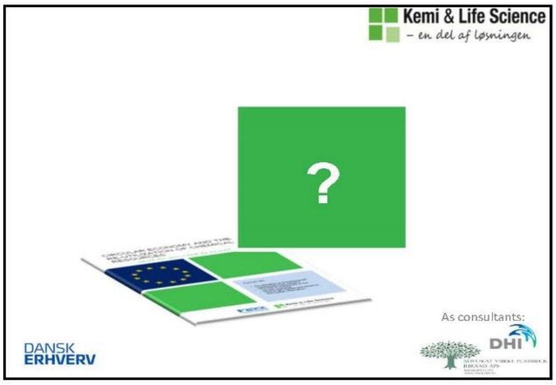
CASE STUDY PROJECT GEAR
What else may be needed ?
1. Share and Communicate this experience - clear potential for improved sustainability; frame conditions already in place
2. Communication to member states on how to establish markets for these "circular" chemical substances
3. Consider financial support (EU Green Deal)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?
As consultants:
DHI
DANSK
ERHVERV

CASE STUDY ON MIS-ALIGNMENT AT THE CHEMICALS WASTE INTERFACE

TRANSFERRING HAZARDOUS WASTE FOR RE-USE FROM ONE COMPANY TO ANOTHER

El medio ambiente es de todos

Minambiente

Ministry of Environment and Sustainable Development

Chemical Substances, Hazardous Waste and Technical Ozone Unit Group

February 2020

OECD

DESCRIPCTION OF THE MISSALIGMENT

- The hazardous waste generated by a company can not be transferred to other company, without involving a hazardous waste manager in the process.
- This situation is discouraging prevention, recycling, reuse and recovering of the hazardous wastes.
- It is also affecting the possibility of establishing industrial parks, where these kinds of substances, generated by a company, can be directly used by another in its production process.

Industrial park "Parquiamérica"- Cartagena

01. POLICIES

DECREE 1076 OF 2015 (Minambiente)

It is established that only the hazardous waste managers can handle surpluses, by-products or chemical substances generated in the production, if they become hazardous waste.

Chapter 3 on Environmental Licensing regulations

- Article 2.2.2.3.2.3. **Activities subject to an Environmental License**. Competence of the Territorial Environmental Authorities.
- The activities of "*Construction and operation of facilities whose purpose is the storage, treatment,* ***recovery, recycling and final disposal of hazardous waste*** *and the construction and operation hazardous waste landfills for hospital waste*" require the application and approval of an Environmental License before their development.

Chapter 6 Hazardous Waste, Chapter on hazardous waste management regulations

This decree aims to regulate the prevention and management of hazardous waste, in the framework of integrated waste management, to protect humans health and the environment.

It establishes responsibilities and obligations for the different actors involved in the hazardous waste management.

GENERATOR

- Any person, whose activity produces hazardous waste. **If it** is an unknown person, the generator would be the person who is in possession of the waste. The producer or importer of a **product or chemical substance with hazardous characteristic**, for the purposes of the decree is equated to a generator.

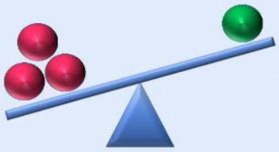
OBLIGATIONS AND RESPONSIBILITIES OF GENERATOR/PRODUCER:

- Guarantee that the hazardous wastes are managed properly and to **contract** the storage, recovery, recycling, treatment and final disposal services, with installations who **have a license, permits, authorizations** and other management and control environmental instruments.
- The generator is responsible for the hazardous waste it generates. The responsibility comprises the **effluents, emissions, products and by-products,** for all the impacts caused to human health and the environment.
- The extended generator responsibility goes until the hazardous waste is either recovered or reused, as raw material, or finally disposed.

02. IMPACT ON THE ENVIRONMENT AND HUMAN HEALTH AND ON THE INDUSTRY

KEY ISSUE: FIND A MIDDLE POINT BETWEEN: STRICTER CONTROL OR FACILITATE THE REUSE AND RECOVERY OF CHEMICAL SUBSTANCES

- Give added value to the Substance.
- Mayor synergy between companies.
- Ease for the use of substances and waste.
- Prevent waste from reaching landfills



To manage the chemical substances by hazardous waste managers permits:

- **Have stricter control over the hazardous waste managed.**
- Having consolidated and depurated data.

The hazardous waste management hierarchy in Colombia is in the wrong position:

- Discouraging prevention, recycling, reuse and recovery.
- More hazardous substances are landfilled.

03. POSSIBLE SOLUTIONS

ALTERNATIVES

- To establish an intermediate process, where the chemical substances are offered under the conditions that are generated in the production process, and if there exists a company interested in buying or using this substance, the exchange or commercialization process can be promoted, without an intermediary.
- To create a public access information system, where the stakeholders can be informed about the substances, quantities and the processes involved in the management of hazardous substances. This system would provide transparent and clear information, and would guarantee the follow-up of the process to assure environmental and sound management of the substances.
- To create a tax to landfilling for some priority streams, to promote their recycling, reuse or recovery, where it is feasible, thus preventing them from becoming hazardous waste, that has to be landfilled.

04. ISSUES FOR FURTHER DISCUSSION

DISCUSSION

- How can, from a normative point of view, the recycling of chemical substances, surpluses or by-products be promoted to prevent them from becoming hazardous waste?
- How could be clearer, more informed and transparent process to be established in order to assure that the recycling/recovery is carried out properly?

El medio ambiente es de todos

Minambiente

Contact Point Information:
Diego Escobar Ocampo,
diescobar@minambiente.gov.co

Thank you!

Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit

Construction and Demolition Waste (CDW) containing Asbestos

Dr. Michael Siemann

Head of Division

Division for Pollutants, Mineral Wastes, Landfilling

Department for Circular Economy

Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit

Content

1. Introduction into the problem
2. Questions:
   1. **Can recycled CDW containing asbestos be placed on the market?**
   2. **Can CDW containing asbestos cease to be waste?**
   3. **Can CDW containing asbestos be recovered or recycled?**

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CDW containing Asbestos

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Waste quantity structure - estimation

- 58 million t CDW. > 90% recycled to RC materials, 2016 in Germany
- 80 % of the buildings and structures in Germany are built before 1993 – a growing number of them will be dismantled in the coming years
- By experience, in approx. 25% of samples from buildings and structures in Germany, asbestos is detected.
- => ~ 20 % of all buildings and structures in Germany may contain asbestos in components or construction chemicals.
- Up to a max. of 12 million t / y building rubble to be disposed of additionally in landfills
- It is often technically impossible to remove asbestos from building rubble heaps
- preliminary exploration followed by selective dismantling will reduce the amount of asbestos rubble – but is not mandatory in Germany

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EU-REACH-Regulation Chemicals legislation

1. Can recycled CDW containing asbestos be placed on the market?

- REACH is a regulation of the European Union, adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals, while enhancing the competitiveness of the EU chemicals industry
- REACH includes an absolute ban on the use and marketing of products containing asbestos
- ANNEX XVII: Asbestos fibres: **The placing on the market and use of these fibres and of articles containing these fibres <u>added intentionally</u> shall be prohibited.**
- "added intentionally" means the addition of asbestos to improve technical properties and serves to distinguish it from asbestos naturally present in rocks

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EU-REACH-Regulation Chemicals legislation

- **Meaning**:
  - The recycling of CDW with asbestos fibres added for technical or other reasons is not permitted
  - CDW containing, for example, gravel with natural asbestos content is not covered by the marketing and use ban
- **But**:
  - Waste [...] is not a substance, preparation or article within the meaning [..] of [the REACH] Regulation
  - REACH does not define the meaning of "contains asbestos" – one fibre policy?
  - REACH would only apply if CDW reaches the end of its waste status (cease to be waste)

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End-of-Waste
Waste legislation

2. Can CDW containing asbestos cease to be waste?

Regulation 2008/98/EC Article 6 or § 3 German Circular Economy Act

Certain specified waste shall cease to be waste […] when it has undergone a recovery, including recycling, operation and complies with specific criteria to be developed in accordance with the following conditions:

a) the substance or object is commonly used for specific purposes;

b) a **market** or demand exists for such a substance or object;

c) the substance or object **fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products**; and

d) the use of the substance or object **will not lead to overall adverse environmental or human health impacts**.

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End-of-Waste
Waste legislation

- **Meaning**: CDW containing asbestos can never cease to be waste as it does not meet the legal requirements for products (REACH) and its use would lead to an adverse human health impact (Risk of exposure of fibres)
- **But**: Up to now, there is no legally binding definition of the terms "containing asbestos" or "free of asbestos" in Germany

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Recycling and Recovery
Waste legislation

3. Can CDW containing asbestos be recycled or recovered?

§ 7 German Circular Economy Act

(3) [1]The recovery of waste, especially binding of waste within products, must take place **properly and safely**.

[2]Recovery shall be deemed to take place **properly** if it is effected **in compliance with** the provisions of this Act and with other **provisions of public law**. [3]It shall be deemed to take place **safely** when, given the nature of the waste, the level of contaminants that the waste contains and the type of recovery in question, no impairment of the public interest is expected, and in particular when **no accumulation of harmful substances occurs within the substance cycle**.

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Recovery and Recycling
Waste legislation

Some other legislation and guidance:

- CDW containing asbestos may not be fed into sorting and treatment plants, even if the calculated proportion of fibers is less than 0.1mass-%. *(LAGA Communication 23 – legally not binding)*
- The use of this waste as a substitute building material in technical structures is generally inadmissible, as the safety of this recovery cannot be assumed for future handling. *(German Circular Economy Act)*
- Recovery of CDW containing asbestos in landfill construction or placing it on the market as a substitute for landfill construction material is inadmissible. *(German Landfill Ordinance)*

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Recovery and Recycling
Waste legislation

- **Meaning**:
  - Recovery and recycling of CDW containing asbestos is only permitted, if the asbestos has been properly and safely separated from the CDW prior to recycling.
  - Any recovery or recycling of CDW still containing asbestos is inadmissible
- **But**: Up to now, there is no legally binding definition of the terms "containing asbestos" or "free of asbestos" in Germany.

  Question: how many fibres can be tolerated to declare a material asbestos-free? None – one – LOD of analytical method?

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The Dilemma – Part I

- CDW containing asbestos cannot be recovered or recycled legally because
  - The recovery would neither be proper nor safe
  - The recovery would lead to a product that cannot be placed on the market
- CDW containing asbestos has to be disposed of in appropriate landfills

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CDW vs. Rocks

Annex 2 of the German Ordinance on protection against hazardous substances - Restrictions on production and use

(1) work on parts of buildings, equipment, machinery, plant, vehicles and other objects containing asbestos products is prohibited. The first sentence shall not apply to
1. demolition work,
2. rehabilitation and maintenance work, ...

(2) The extraction, treatment, processing and reuse of naturally occurring mineral resources and mixtures and products made from them, which contain more than 0.1 mass-% asbestos is prohibited. (*What means that all natural materials with less than 0.1 mass-% asbestos are allowed…)*

Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit

Thanks a lot for your attention!

michael.siemann@bmu.bund.de

Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit

RESERVE

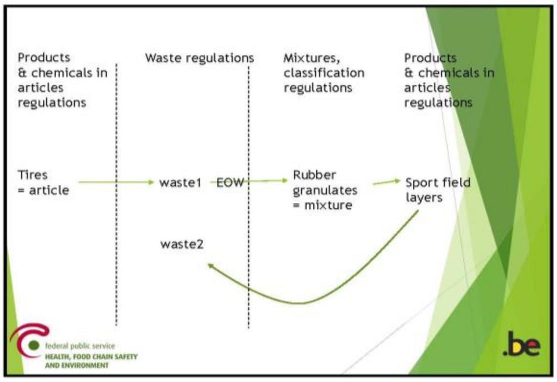
Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit

The Dilemma – Part II

	Primary Material	Recycling	Secondary Material
Natural rock < 1 mass-% asbestos		✓	
Concrete with grevel of natural rocks < 1 mass-% asbestos		✓	
Building component X mass-% asbestos		X	• No recovery • No recycling • To be disposed of in appropriate landfills
Concrete with asbestos component < 1 mass-% asbestos		X	
Concrete with asbestos component and natural rocks < 1 mass-% asbestos		X	

Session 3


federal public service
HEALTH, FOOD CHAIN SAFETY AND ENVIRONMENT
Health and Environmental Impacts of Rubber Infill Used in Sport Fields
Dr. Juan D. Piñeros Garcet
OECD Expert Workshop on the Misalignment of Chemicals and Waste Management Policy,
3d February 2020
DISCLAIMER: this presentation does not represent official positions of the FPS Health or the Belgian government, it is provided only as an expert opinion.
.be


Products & chemicals in articles regulations
Waste regulations
Mixtures, classification regulations
Products & chemicals in articles regulations
Tires = article
waste1
EOW
Rubber granulates = mixture
Sport field layers
waste2
federal public service
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Waste legislation
The take-back obligation in Belgium for tyres promotes the reuse, recycling, and energy recovery of used tyres; disposal is prohibited.
End-of-waste (EOW) criteria: waste obtains a status of a product or a secondary raw material (object, substance, mixture).
Used tyres are largely material recovered, especially as rubber infill for sports pitches. Flanders (one of the 3 Belgian regions) has EOW criteria for rubber infill for sport pitches to protect environment (decree from 17/2/2012, with criteria for lixiviation, limit spreading around the sport pitches, replacement of the lower layer, end of life).
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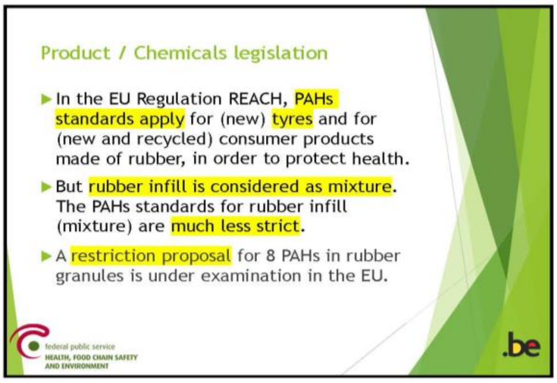
Product / Chemicals legislation
In the EU Regulation REACH, PAHs standards apply for (new) tyres and for (new and recycled) consumer products made of rubber, in order to protect health.
But rubber infill is considered as mixture. The PAHs standards for rubber infill (mixture) are much less strict.
A restriction proposal for 8 PAHs in rubber granules is under examination in the EU.
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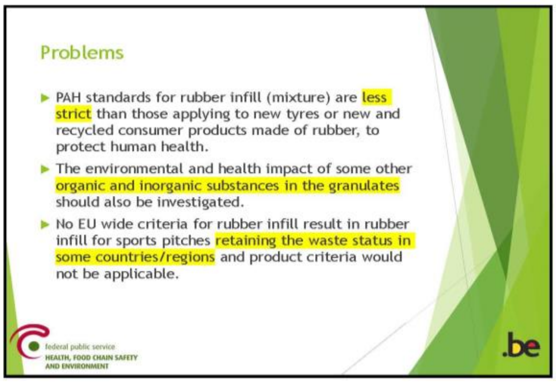
Problems
PAH standards for rubber infill (mixture) are less strict than those applying to new tyres or new and recycled consumer products made of rubber, to protect human health.
The environmental and health impact of some other organic and inorganic substances in the granulates should also be investigated.
No EU wide criteria for rubber infill result in rubber infill for sports pitches retaining the waste status in some countries/regions and product criteria would not be applicable.
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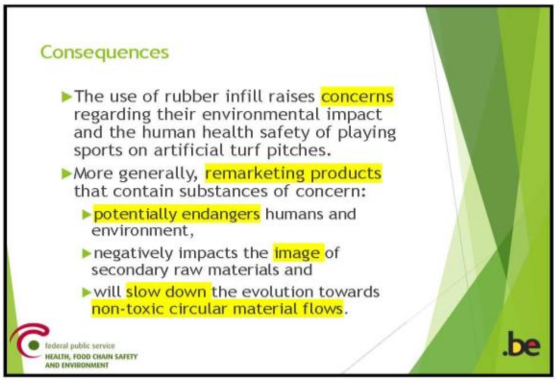
Consequences
The use of rubber infill raises concerns regarding their environmental impact and the human health safety of playing sports on artificial turf pitches.
More generally, remarketing products that contain substances of concern:
potentially endangers humans and environment,
negatively impacts the image of secondary raw materials and
will slow down the evolution towards non-toxic circular material flows.
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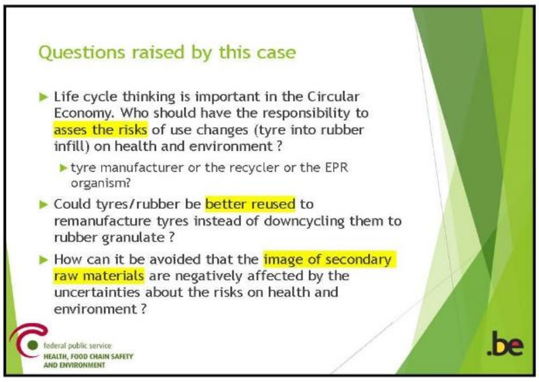
Questions raised by this case
Life cycle thinking is important in the Circular Economy. Who should have the responsibility to asses the risks of use changes (tyre into rubber infill) on health and environment ?
tyre manufacturer or the recycler or the EPR organism?
Could tyres/rubber be better reused to remanufacture tyres instead of downcycling them to rubber granulate ?
How can it be avoided that the image of secondary raw materials are negatively affected by the uncertainties about the risks on health and environment ?
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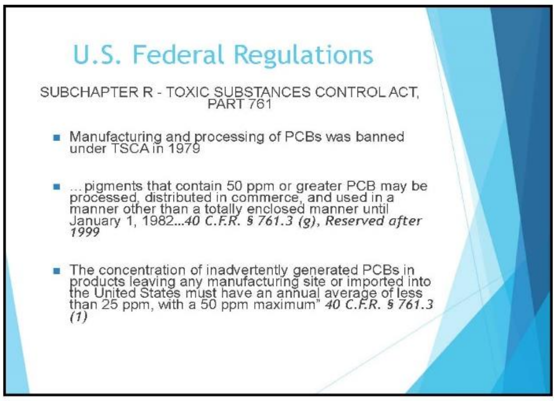
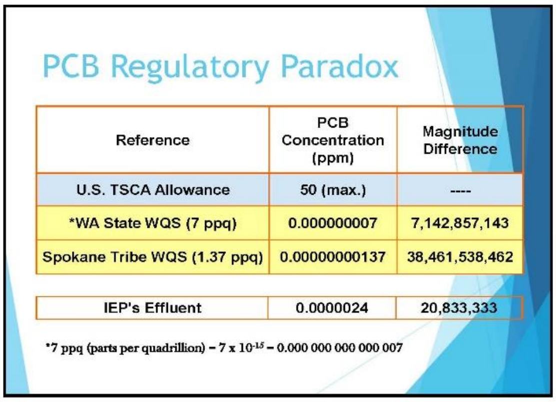
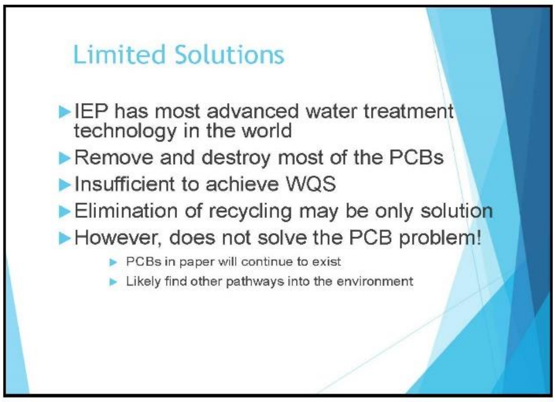




Reference	PCB Concentration (ppm)	Magnitude Difference
U.S. TSCA Allowance	50 (max.)	----
*WA State WQS (7 ppq)	0.000000007	7,142,857,143
Spokane Tribe WQS (1.37 ppq)	0.00000000137	38,461,538,462
IEP's Effluent	0.0000024	20,833,333

*7 ppq (parts per quadrillion) = 7×10^{-15} = 0.000 000 000 000 007



Potential Solutions?

- Regulatory/Policy:
  - Perform risk assessment of iPCB congeners
  - Do not regulate lower congener PCBs
  - Regulate only the 12 Dioxin like PCBs
  - Establish lower TSCA thresholds
  - Rulemaking to bring CWA & TSCA regulations on PCBs into conformity, if environmental or health risk is demonstrated
  - Provide NPDES permit Offsets/Exclusions for iPCBs
  - Encourage End-Users to use lower or non-chlorinated containing products (Publishers, Printers, Packaging, State's, etc.)
  - Incentivize competitive marketing advantage with use of non-PCB containing products
  - Other Regulatory/Policy Solutions?

To Better Understand the Issue

- Create cradle to grave, regulatory, environmental, regional, and economic systems map to understand movement of iPCBs, gaps in regulation and compliance, and where to intervene for greatest impact
  - Create a systems map that identifies roles and responsibilities of industry and government agencies in relation to iPCBs
  - Allows comparison across agencies and categories for a product, product class, or chemical of concern
  - Could be modeled after life cycle analysis so we see how iPCBs are handled throughout the life cycle, regulatory requirements, and where intervention occurs to mitigate issues
  - Provide big picture of issue to consumers
  - The visualization could also address total cost of ownership of products since producers do not pay the price of negative externalities, often this is paid by the taxpayer in remediation, mitigation, source control, and other pollution prevention and clean up strategies
    - It should be possible to target specific chemicals
    - Demonstrate the health and environmental impacts

Change Brands' Policies

- Raise awareness among brands of iPCBs in pigments, inks, and packaging
- Increase adoption of voluntary corporate policies and implement lower limits
- Create workbook for Brands presented at the Sustainable Packaging Coalition's Conferences to gain traction

Session 4

Department for Environment Food & Rural Affairs

Managing POPs in waste, including e-waste

Challenges at the interface of chemicals and waste legislation

Max Folkett
'POPs, and Chemicals in Waste'
Department for Environment, Food and Rural Affairs, UK

Policies

Waste

Chemicals

EU Circular Economy Package (2018)
- Prevent waste and prioritise re-use
- Control and trace hazardous waste

EU WEEE Directive (2012)
- Promote re-use to minimise e-waste
- Remove POPs (BFRs) at end-of-life
- Achieve targets for recycling and recovery

EU RoHS Directive (2011)
- Restrict the use of hazardous substances in electricals

EU POPs Regulations (2019)
- Ensure destruction of POP content of waste where present above thresholds
  - 0.1% for PBDEs
- Prevent re-use of articles that are POPs waste
- Control and trace POPs waste

EU List of Waste decision (2000)
- Designates hazardous and non-hazardous waste

UK Climate Change Act
- Limit greenhouse gas emissions through carbon budgets

2

POPs in UK e-waste

- 500,000 tonnes of e-waste collected p.a.
- BFRs added to plastic, up to 15-20 wt%
- Four PBDEs banned in EU in 2004.
- decaBDE use reduced from 2009 (RoHS) and banned in 2017
- A UK study (2019) scanned 2,395 articles with XRF and analysed 202 samples:
- 0.1% POPs waste threshold exceeded in the following categories:
  - CRT displays, Flat Panel displays, Small Mixed WEEE, Cables (and wires)
  - And Fridges (components)

3

Misalignment: The devil is in the detail

The principles are well aligned

- The legislative framework has reduced use of POPs and requires POPs waste to be destroyed.
- This protects the **environment** and **human health** and improves the **quality of secondary materials**

But there is friction

- Can't visually identify POPs waste/components, so manual pre-treatment limited. Density separation leads to **incineration of non-target plastics**
- Meeting **recycling targets** difficult for some types of e-waste
- Restricting **re-use** of some POPs waste would have a big impact
- Some POPs wastes are non-hazardous waste, which makes it **very difficult to control and trace** them

4

Furniture re-use has huge benefits

- Re-use economy worth £350m in UK
- In 2017/18, 3.5m items re-used
- Supports 52,700 people through volunteering, training and work placements
- Save 1.55m low-income households over £448m
- Over 120,000 tonnes diverted from landfill

(re-use network: Social impact report 2008)

5

Range of chemicals used means ongoing challenges

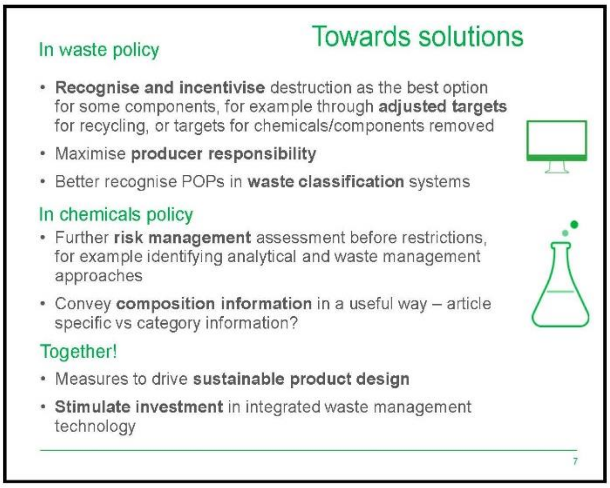
- Study found 'missing bromine' not attributed to PBDEs
  - indicates use of non-POP BFRs
- Sometimes no/low bromine
  - chlorinated flame retardants?
  - may require different management

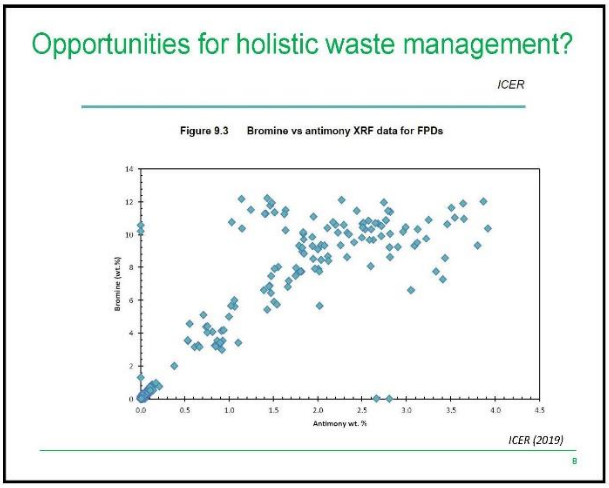
Table 9.1 The bromine concentration of the FPD samples determined by XRF, the PBDE concentration and the bromine extraction efficiency during GCMS analysis

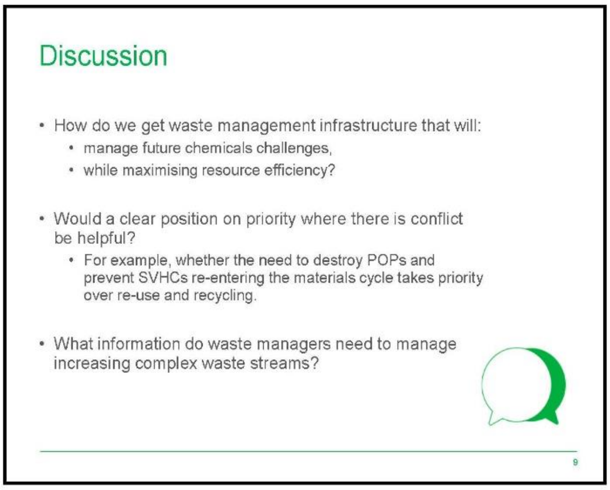
Sample ID	Bromine concentration (wt%)	Total PBDE (mg/kg)	Total POPs PBDE (mg/kg)	Deca BDE (mg/kg)	Extraction efficiency (%)	TDDPA (mg/kg)
W4538	9.82	48	39	26	14	
W4539	0.07	138	134	27	17	
W4540	0.17	503	487	477	50	
W4541	5.10	2	2	0	50	140
W4542	[illegible]	60	54	48	30	
W4543	0.39	1928	1847	1795	57	
W4544	0.15	99	95	91	86	
W4545	7.97	69	63	61	92	
W4546	10.33	6	3	0	3	14
W4547	0.54	3752	3628	3604	51	
W4548	2.00	333	320	308	28	
W4549	[illegible]	15	13	9	90	
W4550	0.00	26	24	23	68	
W4551	10.64	3	3	0	71	125250
W4552	7.75	4	1	0	22	
W4869	11.33	5	5	0	37	
W4870	10.89	211	177	129	94	
W4871	10.44	12	12	7	18	

ICER (2019)

6


Towards solutions
In waste policy
• Recognise and incentivise destruction as the best option for some components, for example through adjusted targets for recycling, or targets for chemicals/components removed
• Maximise producer responsibility
• Better recognise POPs in waste classification systems
In chemicals policy
• Further risk management assessment before restrictions, for example identifying analytical and waste management approaches
• Convey composition information in a useful way – article specific vs category information?
Together!
• Measures to drive sustainable product design
• Stimulate investment in integrated waste management technology
7


Opportunities for holistic waste management?
ICER
Figure 9.3 Bromine vs antimony XRF data for FPDs
Bromine (wt.%)
Antimony wt. %
ICER (2019)
8

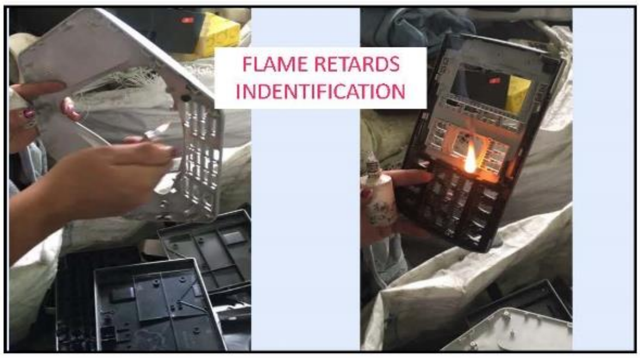

Discussion
• How do we get waste management infrastructure that will:
• manage future chemicals challenges,
• while maximising resource efficiency?
• Would a clear position on priority where there is conflict be helpful?
• For example, whether the need to destroy POPs and prevent SVHCs re-entering the materials cycle takes priority over re-use and recycling.
• What information do waste managers need to manage increasing complex waste streams?
9

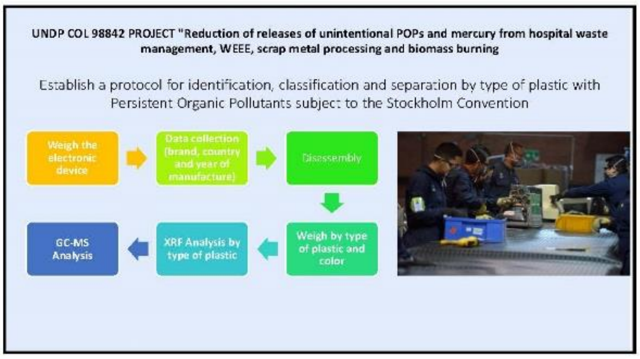

CASE STUDY ON MIS-ALIGNMENT AT THE CHEMICALS WASTE INTERFACE
WEEE plastics management in Colombia
El ambiente es de todos
Minambiente
Ministry of Environment and Sustainable Development
Chemical Substances, Hazardous Waste and Technical Ozone Unit Group
February 2020
OECD


Policies at stake
Colombia has recently established a regulatory and policy framework concerning the Waste Electrical and Electronic Equipment (WEEE) management:
Regulatory framework
Law 1196 of 2008 (SC approval)
Law 1672 of 2013 (WEEE)
Decree 284 of 2018,
Resolution 076 of 2019
WEEE Management Policy, 2017
Principles & tools
• Extended Producer Responsibility (EPR)
• Best Available Techniques / Best Environmental Practices (BAT/BEP)
• GEF-UNDP National Project addressing POPs management.
• National Strategy for Circular Economy

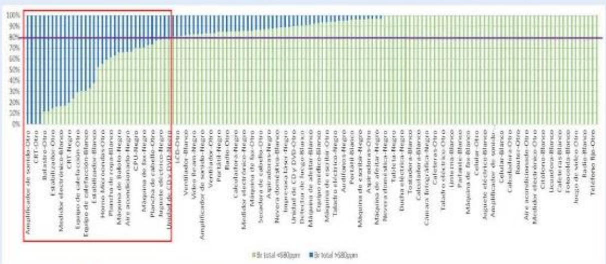

Mis-alignment leading to major consequences
Brominated Flame Retardants (PBB, PBDE, HBCD) are covered by the Stockholm Convention as Persistent Organic Pollutants (POPs) and these are considered as hazardous substances.
Plastics containing Brominated Flame Retardants have to be removed from collected WEEE, in order to be treated separately.
Colombia has not defined thresholds for specific substances, such as PBB, PBDE, HBCD, which are covered by the Stockholm Convention as Persistent Organic Pollutants (POPs).
Management options for WEEE plastics depends on their hazardous characteristics.
WEEE managers are not able to accomplish an environmental sound management of these wastes, because they cannot sort the plastic that might contain BFR and treat it separately.


Mis-alignment leading to major consequences
WEEE managers
Plastic managers
Plastic manufacturer
Consumers
Plastics are collected from WEEE management activities
Unsorted plastics are sent to recycling facilities
Pellets are sent to plastic appliances producers
New products are sold to consumers
Brominated flame retardants in WEEE plastics
Brominated flame retardants in products


FLAME RETARDS INDENTIFICATION


UNDP COL 98842 PROJECT "Reduction of releases of unintentional POPs and mercury from hospital waste management, WEEE, scrap metal processing and biomass burning
Establish a protocol for identification, classification and separation by type of plastic with Persistent Organic Pollutants subject to the Stockholm Convention
Weigh the electronic device
Data collection (brand, country and year of manufacture)
Disassembly
Weigh by type of plastic and color
XRF Analysis by type of plastic
GC-MS Analysis

Bromide concentration according to the kind of device and colour (n=8.385)



25,4% n=8.385 74,6%

Possible solutions to overcome misalignment

- To establish a legal framework to define when waste electric and electronic equipment (WEEE) can be considered hazardous waste, according to thresholds of certain hazardous substances contained in the WEEE.
- To establish a regulation to define the technical requirements and the analytical methods to be used to determine and quantify BFR content in materials to be recycled.
- To develop technical guidelines and demonstrative projects for the identification, sorting and recycling of plastics coming from WEEE.
- To establish a harmonized procedure to identify BFR from WEEE, for Countries, that allows to have a unified database and to classify an e-waste between suspect and not suspect in a more truthful way. This requires, among other aspects, a unified classification of E-waste.

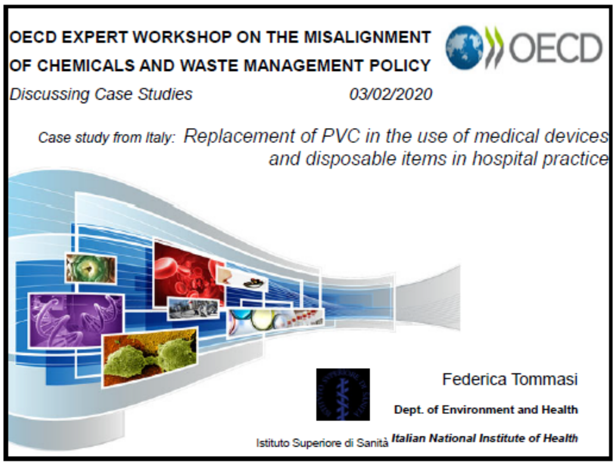
Issues for further discussion

- What problems, needs and challenges have been identified by the OECD member countries regarding the setting and control of the BFR limits in plastics to be recycled?
- How has the private recycling sector been strengthened to overcome and accomplish these identified issues?
- What lessons learned could be shared in the establishment of limits and enforcement of controls for the WEEE managers?

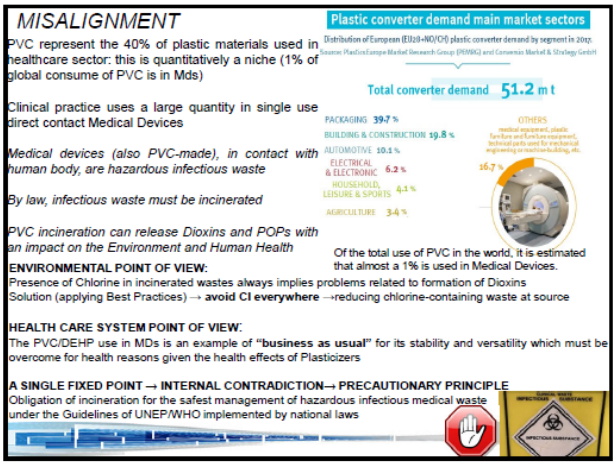
El ambiente es de todos | Minambiente

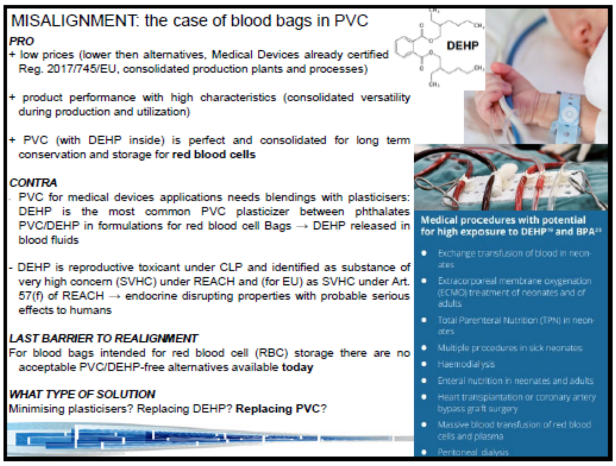
Contact Point Information:
Diego Escobar Ocampo,
diescobar@minambiente.gov.co

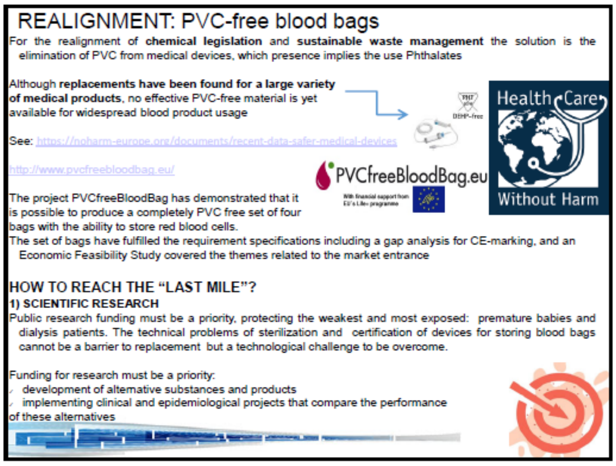
Thank you!

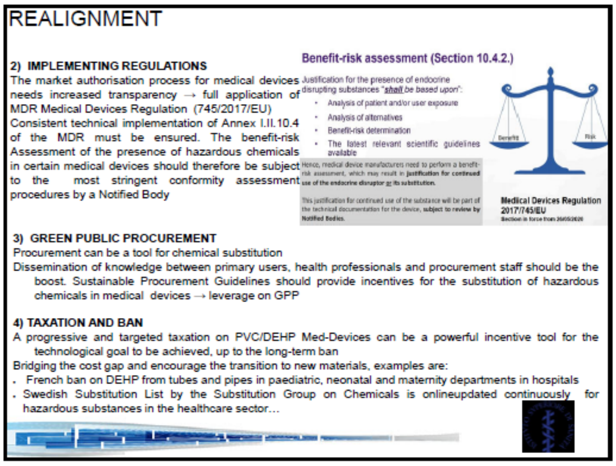

OECD EXPERT WORKSHOP ON THE MISALIGNMENT
OF CHEMICALS AND WASTE MANAGEMENT POLICY
OECD
Discussing Case Studies
03/02/2020
Case study from Italy: Replacement of PVC in the use of medical devices and disposable items in hospital practice
Federica Tommasi
Dept. of Environment and Health
Istituto Superiore di Sanità
Italian National Institute of Health


MISALIGNMENT
Misalignment?
Not exactly, this is a story about a missed goal: the phasing out of PVC from healthcare medical devices, closing with the case of the blood bags…
Premise: the framework of this case is related to European Union Countries
Reference legislation
Practice: waste management and healthcare management
Scientific Research: Life+Project http://www.pvcfreebloodbag.eu/ experience


MISALIGNMENT
PVC represent the 40% of plastic materials used in healthcare sector: this is quantitatively a niche (1% of global consume of PVC is in Mds)
Clinical practice uses a large quantity in single use direct contact Medical Devices
Medical devices (also PVC-made), in contact with human body, are hazardous infectious waste
By law, infectious waste must be incinerated
PVC incineration can release Dioxins and POPs with an impact on the Environment and Human Health
Plastic converter demand main market sectors
Distribution of European (EU28+NO/CH) plastic converter demand by segment in 2017.
Source: PlasticsEurope Market Research Group (PEMRG) and Conversio Market & Strategy GmbH
Total converter demand 51.2 m t
PACKAGING 39.7 %
BUILDING & CONSTRUCTION 19.8 %
AUTOMOTIVE 10.1 %
ELECTRICAL & ELECTRONIC 6.2 %
HOUSEHOLD, LEISURE & SPORTS 4.1 %
AGRICULTURE 3.4 %
OTHERS
medical equipment, plastic furniture and furniture equipment, technical parts used for mechanical engineering or machine-building, etc.
16.7 %
Of the total use of PVC in the world, it is estimated that almost a 1% is used in Medical Devices.
ENVIRONMENTAL POINT OF VIEW:
Presence of Chlorine in incinerated wastes always implies problems related to formation of Dioxins
Solution (applying Best Practices) → avoid Cl everywhere →reducing chlorine-containing waste at source
HEALTH CARE SYSTEM POINT OF VIEW:
The PVC/DEHP use in MDs is an example of "business as usual" for its stability and versatility which must be overcome for health reasons given the health effects of Plasticizers
A SINGLE FIXED POINT → INTERNAL CONTRADICTION→ PRECAUTIONARY PRINCIPLE
Obligation of incineration for the safest management of hazardous infectious medical waste under the Guidelines of UNEP/WHO implemented by national laws


MISALIGNMENT: the case of blood bags in PVC
DEHP
PRO
+ low prices (lower then alternatives, Medical Devices already certified Reg. 2017/745/EU, consolidated production plants and processes)
+ product performance with high characteristics (consolidated versatility during production and utilization)
+ PVC (with DEHP inside) is perfect and consolidated for long term conservation and storage for red blood cells
CONTRA
- PVC for medical devices applications needs blendings with plasticisers: DEHP is the most common PVC plasticizer between phthalates PVC/DEHP in formulations for red blood cell Bags → DEHP released in blood fluids
- DEHP is reproductive toxicant under CLP and identified as substance of very high concern (SVHC) under REACH and (for EU) as SVHC under Art. 57(f) of REACH → endocrine disrupting properties with probable serious effects to humans
LAST BARRIER TO REALIGNMENT
For blood bags intended for red blood cell (RBC) storage there are no acceptable PVC/DEHP-free alternatives available today
WHAT TYPE OF SOLUTION
Minimising plasticisers? Replacing DEHP? Replacing PVC?
Medical procedures with potential for high exposure to DEHP and BPA
Exchange transfusion of blood in neonates
Extracorporeal membrane oxygenation (ECMO) treatment of neonates and of adults
Total Parenteral Nutrition (TPN) in neonates
Multiple procedures in sick neonates
Haemodialysis
Enteral nutrition in neonates and adults
Heart transplantation or coronary artery bypass graft surgery
Massive blood transfusion of red blood cells and plasma
Peritoneal dialysis


REALIGNMENT: PVC-free blood bags
For the realignment of chemical legislation and sustainable waste management the solution is the elimination of PVC from medical devices, which presence implies the use Phthalates
Although replacements have been found for a large variety of medical products, no effective PVC-free material is yet available for widespread blood product usage
DEHP-free
Health Care Without Harm
See: https://noharm-europe.org/documents/recent-data-safer-medical-devices
http://www.pvcfreebloodbag.eu/
PVCfreeBloodBag.eu
With financial support from EU's Life+ programme
The project PVCfreeBloodBag has demonstrated that it is possible to produce a completely PVC free set of four bags with the ability to store red blood cells.
The set of bags have fulfilled the requirement specifications including a gap analysis for CE-marking, and an Economic Feasibility Study covered the themes related to the market entrance
HOW TO REACH THE "LAST MILE"?
1) SCIENTIFIC RESEARCH
Public research funding must be a priority, protecting the weakest and most exposed: premature babies and dialysis patients. The technical problems of sterilization and certification of devices for storing blood bags cannot be a barrier to replacement but a technological challenge to be overcome.
Funding for research must be a priority:
development of alternative substances and products
implementing clinical and epidemiological projects that compare the performance of these alternatives


REALIGNMENT
2) IMPLEMENTING REGULATIONS
The market authorisation process for medical devices needs increased transparency → full application of MDR Medical Devices Regulation (745/2017/EU)
Consistent technical implementation of Annex I.II.10.4 of the MDR must be ensured. The benefit-risk Assessment of the presence of hazardous chemicals in certain medical devices should therefore be subject to the most stringent conformity assessment procedures by a Notified Body
Benefit-risk assessment (Section 10.4.2.)
Justification for the presence of endocrine disrupting substances "shall be based upon":
Analysis of patient and/or user exposure
Analysis of alternatives
Benefit-risk determination
The latest relevant scientific guidelines available
Hence, medical device manufacturers need to perform a benefit-risk assessment, which may result in justification for continued use of the endocrine disruptor or its substitution.
This justification for continued use of the substance will be part of the technical documentation for the device, subject to review by Notified Bodies.
Benefit
Risk
Medical Devices Regulation 2017/745/EU
3) GREEN PUBLIC PROCUREMENT
Procurement can be a tool for chemical substitution
Dissemination of knowledge between primary users, health professionals and procurement staff should be the boost. Sustainable Procurement Guidelines should provide incentives for the substitution of hazardous chemicals in medical devices → leverage on GPP
4) TAXATION AND BAN
A progressive and targeted taxation on PVC/DEHP Med-Devices can be a powerful incentive tool for the technological goal to be achieved, up to the long-term ban
Bridging the cost gap and encourage the transition to new materials, examples are:
French ban on DEHP from tubes and pipes in paediatric, neonatal and maternity departments in hospitals
Swedish Substitution List by the Substitution Group on Chemicals is onlineupdated continuously for hazardous substances in the healthcare sector…

OECD EXPERT WORKSHOP ON THE MISALIGNMENT OF CHEMICALS AND WASTE MANAGEMENT POLICY

Discussing Case Studies *03/02/2020*

Case study from Italy: *Replacement of PVC in the use of medical devices and disposable items in hospital practice*

Thanks for your attention!

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www.iss.it

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References (last access from 23/01/2020):

Medical Devices

Recent data Safer medical devices: https://noharm-europe.org/documents/recent-data-safer-medical-devices

Non-toxic Healthcare: Alternatives to Phthalates and Bisphenol-A in Medical Devices: https://noharm-europe.org/sites/default/files/documents-files/3192/HCWH%20Europe%20report%20-%20Non-Toxic%20Healthcare.pdf (ed. 2014)

https://noharm-europe.org/sites/default/files/documents-files/6154/2019-12-03_HCWH_Non_Toxic_Healthcare_2_WEB.pdf (ed. 2019)

Endocrine Disrupting Chemicals in healthcare: Reducing exposures for patients
Report of the Workshop held in Brussels, Belgium on 03/12/2019:
https://noharm-europe.org/issues/europe/endocrine-disrupting-chemicals-healthcare-reducing-exposures-patients?mc_cid=b48d90ee2f&mc_eid=0f67ee1b84

Final version of the Guidelines on the benefit-risk assessment of the presence of phthalates in certain medical devices covering Phthalates, which are carcinogenic, mutagenic, toxic to reproduction (CMR) or have endocrine-disrupting (ED) properties, Scientific Committee on Health, Environmental and Emerging Risks – (SCHEER 2019)
https://ec.europa.eu/health/scientific_committees/consultations/public_consultations/scheer_consultation_08_it

Medical Devices Regulation 745/2017/EU (MDR)
https://eur-lex.europa.eu/legal-content/IT/TXT/?uri=CELEX%3A32017R0745

Scientific Committee on Emerging and Newly-Identified Health Risks "The safety of medical devices containing DEHP plasticized PVC or other plasticizers on neonates and other groups possibly at risk" SCENIHR (2016)
https://ec.europa.eu/health/sites/health/files/scientific_committees/emerging/docs/scenihr_o_047.pdf

References

Infectious waste management

Compendium Technologies for Treatment Destruction of Healthcare Waste, UNEP (2012):
https://it.scribd.com/document/318880569/Compendium-Technologies-for-Treatment-Destruction-of-Healthcare-Waste-2012

Safe management of wastes from health-care activities WHO (2014):
https://www.who.int/water_sanitation_health/publications/wastemanag/en/
Overview of technologies for the treatment of infectious and sharp waste from health care facilities, WHO (2019):
https://www.who.int/water_sanitation_health/publications/technologies-for-the-treatment-of-infectious-and-sharp-waste/en/

Commission Implementing Decision (EU) 2019/2010 of 12 November 2019 establishing the best available techniques (BAT) conclusions … for waste incineration, at last…
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019D2010&from=EN

WHO core principles for achieving safe and sustainable management of health-care waste WHO (2007):
https://www.who.int/water_sanitation_health/publications/hcwprinciples/en/

About European Project

European Life+ Project determined to produce a PVC-free blood bag that fulfil requirement specification, including CE-labelling and to disseminate knowledge and increase demand: http://www.pvcfreebloodbag.eu/

Letter of Intent PVC free blood transfusion at Karolinska University Hospital:
https://www.karolinska.se/contentassets/cd34d5ee19e14a118727ac7ac79b2162/letter-of-intent-demand.pdf

Economic Feasibility Study: https://pvcfreebloodbag.eu/wp-content/uploads/2017/10/Life-Economic-Feasibility-Study.pdf

BLOOD BAGS – A pilot case to stimulate eco-innovation within the healthcare sector, Final Report on
https://pvcfreebloodbag.eu/wp-content/uploads/2013/11/BloodBags_final_report_krcopy.pdf

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https://www.karolinska.se/contentassets/cd34d5ee19e14a118727ac7ac79b2162/letter-of-intent-demand.pdf

Economic Feasibility Study: https://pvcfreebloodbag.eu/wp-content/uploads/2017/10/Life-Economic-Feasibility-Study.pdf

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https://pvcfreebloodbag.eu/wp-content/uploads/2013/11/BloodBags_final_report_krcopy.pdf

Annex D. Case Study 1 - Denmark

Using second-hand chemicals that have primarily been used as process chemicals in the pharmaceutical industry

1. *Submitted by:*

    - *Marianne Lyngsaae, Brenntag Nordic*
    - *Jakob Zeuthen, Dansk Erhverv*

2. *What industry sector(s) are implicated in the case study? Please refer to the STAN industry list. Example: C17: Manufacturing - Paper and paper products.*

Pharmaceutical production 2423; Chemicals production 24; Air transport 62; Food products 15

3. *Indicate the policies and/or legislation which lead to mis-alignement within the case study, from both the chemicals policy perspective and the waste management perspective. Briefly summarise the context and intent of the policies:*

The GEAR project has explored opportunities to generate and use second-hand chemicals that have primarily been used as process chemicals in the pharmaceutical industry.

The starting point has been the European legislation, primarily the Waste Framework Directive and the REACH Regulation.

In the beginning of the project it was the corporate perception that the waste related legislation prevented the use of already used substances in other value chains.

However, through the work of the project the participants discovered that the legislative obstacles where not present to the extend they expected. A Danish guidance document and descriptions in the project material clarifies examples where cemicals can be classified as by-products or end of waste and thereby used in other value chains.

4. *Briefly summarise the case study and the mis-alignment issue that it illustrates. This could be mis-alignment leading to health and/or environmental consequences, or leading to economic consequences (e.g. impedes shift to new technologies or business models; increases cost disproportionately to a particular business sector etc.)*

The GEAR project has primarily investigated the possibility of changing the status of used process chemicals from waste to a resource called "a circular substance".

By extending the life of chemicals and by using them several times, the production of new corresponding chemicals is reduced. Today, most of these used chemicals are treated as waste and incinerated. This incineration results in a strong CO_2 emission which can be significantly reduced if companies adapt their production to the use of circular substances.

There have been two focal points: one technical and one legal.

Technically, there have been two things in focus. The first part deals with necessary changes in the production of pharmaceutical products so that the process chemicals used are isolated as early as possible in the production process and the different process chemicals are kept separate from one another.

The second technical part deals with the analysis and in particular the purification methods for process chemicals used in pharmaceutical products and which are to be used in other value chains as circular substances. It is important that there is no residue of an intermediate in the circular substance and that the cleaning methods are sustainable.

In the legal section, it has been important to lift the process chemicals used out of the waste legislation and back to being covered by REACH and CLP.

The REACH and CLP regulations create the framework for the safe use of chemicals. In addition, it is a market requirement that the circular substances be sold under the same conditions as the original ones. There are two solutions.

It is optimal to define the used circular chemicals as a by-product because they do not leave the REACH and CLP regulations and thus continue to be covered by the safe framework. If the substance used does not meet the requirements for a by-product, it may undergo a purification process before being forwarded to a new user and the substance is thus reintroduced under REACH and CLP, cf. REACH Regulatory Articles 2, 7 (d).

In the revision of the Waste Framework Directive, the European Commission stressed that the revision should support the circular agenda. It was emphasized that the by-product definition could be used in several situations. During the project there has been a good dialogue with the Danish Environmental Agency, which among other things has led to the issuance of a guidance document aimed to assist the local authorities and companies on how to use the by-product definition.

5. *What policy solutions could address the mis-alignment or lead lead to a technological solution that addresses the mis-alignment?*

Based on the experience of the GEAR project and based on the upper part of the chemical value chain, the various European laws in the field compliment each other. This underlines the importance of strong chemical regulation in the EU.

Further down the value chains, where there are items to be recycled, there may be problems getting the important information about the content of problematic chemicals. This entails the risk that the articles which are being recycled may contain substances that are to be phased out. Here there is a need for stronger legislation regulating products, with the requirement that there must be no residue of problematic chemicals.

6. *What questions/topics stemming from this case study could be addressed at the workshop?*

The importance of implementing legislation for products that ensure that a circular substance can be used safely and that there is no content of problematic chemicals.

The need to develop international guidance on cemicals classified as by-products and end of waste situations.

Also, guidance on how to classify a circular substance and what documentation there should be required to follow transboundary movements of circular substances.

7. *If applicable, what functional use code and product or article code category(ies) apply to the case study. For OECD harmonised use, product/article use codes see: http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2017)14&doclanguage=en*

8.

Solvent, Processing aids not otherwise specified, pH regulating agent, Cleaning agent, Anti-freeze agent

9. *Link(s) to relevant documentation of the case study:*

https://esrg.de/media/PDF/Study_print_090514.pdf

https://www.kemi-og-life-science.dk/media/1339/cirkulaer-oekonomi-altinget-oversaettelse-01-07-2019-003-002-002.pdf

Annex E. Case Study 2 – Colombia

Transferring hazardous waste for re-use from one company to another

1. *Submitted by:*

Diego Escobar Ocampo, Colombia, Ministry of Environment and Sustainable Development

2. *What industry sector(s) are implicated in the case study? Please refer to the STAN industry list. Example: C17: Manufacturing - Paper and paper products.*

Industry including energy [B-E] 05-39 Electricity, gas and water supply; sewerage, waste management and remediation activities [D-E] E37-39

3. *Indicate the policies and/or legislation which lead to mis-alignement within the case study, from both the chemicals policy perspective and the waste management perspective. Briefly summarise the context and intent of the policies:*

Decree 1076 of 2015. This decree compiles the Environment and Sustainable Development Regulatory Decrees in Colombia. It was issued by the Ministry of Environment and Sustainable Development (Minambiente)

Chapter 3 on Environmental Licensing regulations

Article 2.2.2.3.2.3. Activities subject to an Environmental License[1]. Competence of the Territorial Environmental Authorities

This decree establishes that the activities of "*Construction and operation of facilities whose purpose is the storage, treatment, recovery, recycling and final disposal of hazardous waste and the construction and operation hazardous waste landfills for hospital waste*" require the application and approval of an Environmental License before their development. The Territorial Environmental Authorities are in charge of granting approval or denying the environmental license.

Chapter 6- Hazardous Waste, Chapter on hazardous waste management regulations

Article 2.2.6.1.1.1. Object. This decree aims to regulate the prevention and management of hazardous waste, in the framework of integrated waste management, to protect humans health and the environment.

In this sense, this Decree establishes responsibilities and obligations for the different actors that are involved in the hazardous waste management: Generators, producers, importers of products with hazardous characteristics, transporters, waste managers, Territorial Environmental Authorities, among others.

This decree establishes the following definitions:

[1] The Environmental License is the authorization that is granted by the environmental authority, to carry out a project, work or activity, that according to the law or regulation can produce a severe impact on renewal natural resources, or the environment, or introduce considerable or notorious modifications to the landscape. The beneficiary of the License must comply with the requirements, terms, conditions and obligations established in this document regarding prevention, mitigation, correction, compensation and management of the environmental impacts of the project, work or activity.

- **Generator:** Any person, whose activity produces hazardous waste. If it is an unknown person, the generator would be the person who is in possession of the waste. The producer or importer of a product or chemical substance with hazardous characteristic, for the purposes of this decree is equated to a generator.

- **Waste manager:** It is the authorized holder to carry out the activities of storage, use and/or recovery (including recovery, recycling, or regeneration), treatment and final disposal of hazardous waste.

The obligations for the generator are (Article 2.2.6.1.3.1):

- Guarantee that the hazardous wastes generated are managed properly and to contract the storage, recovery, recycling, treatment and final disposal services, with installations who have a license, permits, authorizations and other management and control environmental instruments, according to the environmental regulations in force, among other obligations.

Among the **responsibilities of the generator**/producer it is established that (Article 2.2.6.1.3.2.):

- The generator is responsible for the hazardous waste it generates. The responsibility comprises the effluents, emissions, products and by-products, for all the impacts caused to human health and the environment.
- The extended generator responsibility goes until the hazardous waste is either recovered or reused, as raw material, or finally disposed.

Responsabilities of producer or importer (Article 2.2.6.1.3.5.):

The producer or importer of a product or chemical substance with hazardous characteristics, for the decree´s purposes, is equal to a generator, regarding the responsibilities for the management of the packaging materials of the product.

The **responsibilities of the waste manager** (Article 2.2.6.1.3.7) are, among others:

- To process and obtain the licenses, permits and authorizations of environmental nature that may be applicable.
- To provide safe and environmentally appropriate management to the hazardous waste that are accepted to carry out one or more of the management stages, in accordance with the environmental regulation in-force.
- To issue a certificate to the generator, where it is established that the hazardous waste management activity has finished, according to the contract between the parts.

4. *Briefly summarise the case study and the mis-alignment issue that it illustrates. This could be mis-alignment leading to health and/or environmental consequences, or leading to economic consequences (e.g. impedes shift to new technologies or business models; increases cost disproportionately to a particular business sector etc.)*

The mis-alignment occurs because the hazardous waste generated by a company can not be used by another company, without involving a hazardous waste manager in the process. This situation is discouraging prevention, recycling, reuse and recovering of the hazardous wastes generated in different production processes.

Decree 1076 of 2015 establishes that only the hazardous waste managers can handle surpluses, by-products or chemical substances generated in the production, if they become hazardous waste. This situation is affecting the possibility of establishing industrial parks, where these kinds of substances generated by a company can be directly used by another in its production process.

Another important aspect to take into account, is that the generator of a waste/by-product/raw material with hazardous characteristic must have a final disposal certification, which guarantees that the hazardous waste generated was properly managed. This certificate should be stored for five years and it is normally requested by the Territorial Environmental Authority in their monitoring and control activities.

The mis-alignment can be explained using the following example:

The National Center for Cleaner Production and Environmental Technologies (CNPMLTA) of Colombia operates the BORSI platform. Borsi is an online platform that aims to promote recycling, reuse and recovery of waste streams through the exchange of waste and by-products among enterprises that are brought in contact thanks to this application. The interested parties carry out purchase-sale transactions through the platform. (www.borsi.org)

Through the operation of this application it has been evidenced that there are solicitudes for the exchange or marketing of obsolete raw materials (Chemical substances that are no longer used in production processes or industrial surpluses) but these have to be cancelled or rejected by CNPMLTA, because the hazardous waste managers are the only ones, who are entitled to manage these substances.

In this sense, the actual regulation restricts this kind of transactions by limiting the prevention, recycling, reuse and recovery of these chemical substances and it even contradicts its own objective. (Article 2.2.6.1.1.1).

The hazardous waste management process becomes an only commercial activity, where the waste manager charges the waste generator for the service provided, regardless of whether the process used is the least convenient in the waste management hierarchy.

In the Ministry of Environment and Sustainable Development we are evidencing that with the actual regulation we are promoting the hazardous waste landfilling and without any other kind of waste management alternatives. Also the chemical substances lose all their economic value and their recovery potential and become a hazardous waste that must be handled by a hazardous waste disposer.

5. *What policy solutions could address the mis-alignment or lead lead to a technological solution that addresses the mis-alignment?*

A possible alternative could be to establish an intermediate process, where the chemical substances are offered under the conditions that are generated in the production process, and if there exists a company interested in buying or using this substance, the exchange or commercialization process can be promoted, without an intermediary, like the hazardous waste manager. In this way, the recycling/ reuse/ recovery alternatives can be favoured over final disposal.

In order to provide transparent and clear information, and to guarantee that the chemical substances are soundly managed, it is necessary to create a public access system, where the population can be informed about what substances were used, the quantities and the processes involved. Making this information public would allow the follow-up of the process to assure environmental and sound management of chemical substances.

We were also considering, from the normative point of view, to create a tax to landfilling for some priority streams, in order to promote their recycling, reuse or recovery, where it is feasible, thus preventing them from becoming hazardous waste that has to be landfilled.

6. *What questions/topics stemming from this case study could be addressed at the workshop?*

- How can, from a normative point of view, the recycling of chemical substances, surpluses or by-products be promoted to prevent them from becoming hazardous waste?
- How could be clearer, more informed and transparent processes be established in order to assure that the recycling/recovery is carried out properly?

7. *If applicable, what functional use code and product or article code category(ies) apply to the case study. For OECD harmonised use, product/article use codes see: http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2017)14&doclanguage=en*

8. *Link(s) to relevant documentation of the case study:*

http://www.parquesnacionales.gov.co/portal/wp-content/uploads/2013/08/Decreto-Unico-Reglamentario-Sector-Ambiental-1076-Mayo-2015.pdf

www.borsi.org

ANNEX 1. Examples of surpluses, chemicals, wastes and by-products published through BORSI platform

SUBSTANCES	QUANTITY
ALOX 575 (Codehydrase II)	247 kg
Aluminium oxide	2825 kg
Ammonium chloride	13,5 kg
Biocide (quaternary ammonium)	102 kg
Boiler oils (acpm burners)	(55 gallons/week)
Caprylic acid	8 kg
Carbomer	10 kg
Cyclohexanone	184 kg
Depleted hydrochloric acid	4000 kg/month
Diethanolamine	361 kg
Dilute ammonia solution.	variable
DOWANOL (dipropylene glycol methyl ether)	715 kg
Electrostatic paint (powder)	700 kg
Electrostatic painting (different colors)	1500 kg
Ethylene glycol monoethylene ether	1 kg
Ethylenediaminetetraacetic acid (EDTA),	13 kg
EUPERALN PK 3000 (glycol distearate (and) laureth-4 (and) cocamidopropyl betaine)	10 kg
Ferrous chloride	6000 kg/month
Flexographic ink mixed with alcohol	1000 kg
Glacial acetic acid	38 kg
Glycerin	63 kg
Glycolic acid	11 kg
GLYOXAL 40	663 kg
Hydrofluoric acid (40%)	1 kg
Hydroxyethyl cellulose	30 kg
Industrial glues	9000 kg
Iron oxide in spheres generated in the hydrochloric acid recovery process	90.000 kg
Isobutanol	61 kg
Isobutyl acetate	10 kg
KRESOX (fungicide)	41.500 kg
Laboratory reagents: acids, alcohols, hidroxides, salts,etc	1 lt
Malic acid	24 kg
Mixture of sulfonic and lauric acids	7000 kg/month
Monoammonium phosphate (MAP)	809 kg
NACCONOL 90g (sodium c10-13 alkyl benzenesulfonate)	90 kg
Nitric acid	1 kg
Nitrile dust from lithography rollers	300 kg/month
Orthophosphoric acid	1 kg
Oxalic acid	29 kg

SUBSTANCES	QUANTITY
Polyol - isocyanate mixture	10 kg
Polypropylene pellets (from inks)	500 kg/month
Potassium chlorate	331 kg
Potassium peroxymonosulfate	18 kg
PROBLEND TR ST70	12.5 kg
Propylamine	3600 kg
SHARPLESS 225 (dialkyl thiourea)	154 kg
Silver nitrate	0,5 kg
Sodium bicarbonate	500 kg
Sodium fluorosilicate	24 kg
Sodium gluconate	41 kg
Sodium lauroamphoacetate (MACKAM I)	12,4
Sodium lignosulfonate	23 kg
Sodium sulfide	4 kg
Sodium tetraborate	0,5 kg
Stearyl alcohol	12,4
Sulfuric acid	500 kg
Sulfuric and chlorhydric acid (it contains iron and zinc traces)	25.000 kg/month
Tetrahydrofuran	66 kg
Tetrahydrothiophene	130 gal
Waste coming from steel production	10.000 kg

Annex F. Case Study 3 – Germany

Management of construction and demolition waste containing asbestos

1. *Submitted by:*

Dr. Michael Siemann, Head of Division Pollutants, Mineral Wastes, Landfilling. Germany, Federal Ministry for Environment, Nature Conservation and Nuclear Safety

2. *What industry sector(s) are implicated in the case study? Please refer to the STAN industry list. Example: C17: Manufacturing - Paper and paper products.*

F: Construction

3. *Indicate the policies and/or legislation which lead to mis-alignement within the case study, from both the chemicals policy perspective and the waste management perspective. Briefly summarise the context and intent of the policies:*

Construction and demolition waste (CDW) containing asbestos

Recycling and end-of-waste in Circular Economy legislation

The recycling of construction and demolition waste containing asbestos is only permitted if the asbestos has been properly and safely separated from the CDW prior to recycling. CDW containing asbestos may not be fed into sorting and treatment plants, even if the calculated proportion of fibers is less than 0.1mass-%.

CDW containing asbestos cannot reach the end of their waste characteristics and thus attain product status, as they do not meet the requirements laid down in the German Circular Economy Act (KrWG) or Art. 6 of the DIRECTIVE 2008/98/EC. The use of this waste as a substitute building material in technical structures is generally inadmissible, as the harmlessness of this recovery cannot be assumed. Recycling waste containing asbestos in landfill construction or placing it on the market as a substitute for landfill construction material is also inadmissible in accordance with the requirements of the German Landfill Ordinance.

CDW containing asbestos under REACH

Furthermore, according to the REACH Regulation Annex XVII, the manufacture, placing on the market and use of asbestos fibers and of articles and mixtures containing these fibers added intentionally is prohibited. The REACH Regulation does not specify any limitation of the mass fraction. The criterion "added intentionally" is retained even if the asbestos fibers have only been added once (e.g. during the construction of a building). A recycler can therefore not claim that he did not intentionally add the asbestos fibers and that the prohibitions under the REACH Regulation do not apply to him. Only rocks and soils are excluded from the scope of REACH according to the above explanations.

Since CDW containing asbestos may not be re-used or used for recycling or other recovery, it must be disposed of in landfills.

Different status for recycling material from CDW and natural rocks containing asbestos

While the placing on the market of RC material containing asbestos is not permitted even at contents < 0.1 mass-%, the mining and placing on the market of rocks with natural asbestos contents < 0.1 mass-% is permitted in Germany according to the Ordinance on Hazardous Substances. The re-use, recycling and recovery of such rocks or mixtures of such rocks with rubble from buildings and structures is allowed, if the asbestos is only in the rocks and < 0.1 mass-% in total. Therefore, rocks containing asbestos are treated differently from RC building materials both in use and in recycling or recovery - even if both materials contain < 0.1 mass % asbestos.

4. *Briefly summarise the case study and the mis-alignment issue that it illustrates. This could be mis-alignment leading to health and/or environmental consequences, or leading to economic consequences (e.g. impedes shift to new technologies or business models; increases cost disproportionately to a particular business sector etc.)*

Construction and demolition waste is by far the largest waste stream in Germany and most other OECD countries. E.g. in 2016 in Germany, a total of 215 million tons of mineral CDW was generated, of which 125 million tons was soil and stones and 58 million tons construction waste. Usually, over 90% of this mineral CDW is recycled to RC building materials. However, this is not permitted in the case of proven or known asbestos contamination of the material.

Between about 1950 and the ban on asbestos in 1993, asbestos fibers were added to many building products such as spacers or tension sleeves, but also to building chemicals such as plasters, tile adhesives or fillers. Buildings and structures in which building products containing asbestos were used are now increasingly reaching the phase of renovation or demolition due to their age. Since it is often technically impossible or economically unreasonable to separate asbestos-containing building products from conventional building rubble, the disposal of this mineral CDW with low asbestos content poses a major challenge for the waste management industry. Unlike in some other European countries, such as France, a systematic preliminary investigation of buildings and structures on asbestos is currently not mandatory in Germany.

In the past, the selective deconstruction of well-known asbestos cement products, such as Eternit slabs, was the main focus in the construction and demolition sectors. The fact that construction chemicals such as plasters, adhesives and levelling compounds can also contain asbestos was, in Germany, only increasingly addressed in the context of the so called "National Asbestos Dialogue", a co-initiative of the 3 Federal Ministries for Labor (BMAS), Construction (BMI) and Environment (BMU). If these construction chemicals remain undetected before demolition, there is a hogh propability that building and demolition materials containing asbestos could end up in recycling plants where they could contaminate asbestos-free materials.

In Germany, about 80 % of the buildings and structures are built before 1993 (ban on asbestos). By experience, in approx. 25% of samples from buildings and structures in Germany, asbestos is detected. Thus, about 20 % of all buildings and structures in Germany may contain asbestos in components or construction chemicals.

5. *What policy solutions could address the mis-alignment or lead lead to a technological solution that addresses the mis-alignment?*

Harminization of legislation in circular economy, legislation for hazardous matrials and legislation for chemicals and products. Equal legislation for natural rocks and RC-materials

6. *What questions/topics stemming from this case study could be addressed at the workshop?*

1. Inspection obligation
   a. Is there an obligation to check buildings for asbestos prior to demolition or renovation in OECD countries?
   b. Is there an obligation to inspect or analyze asbestos when construction and demolition waste enters the recycling yard?
2. Asbestos-free, asbestos-containing
   a. How is asbestos-free and/or asbestos-containing defined in OECD countries?
   b. How is the absence of asbestos from construction and demolition waste verified and documented?
   c. Is there a standard analytical procedure to analyze asbestos in CDW?
3. Classification of CDW containing asbestos according to the list of wastes

a. How are the following CDWs classified in OECD countries (which key in list of wastes)?
   i. building rubble contaminated with asbestos-containing construction chemicals (tile adhesive, grout, plaster)
   ii. building rubble with parts (spacers, clamping sleeves) containing asbestos
   iii. building rubble from asbestos cement (shingles, corrugated roofs, flower tubs, line pipes)
b. Is it possible to classify CDW with < 0.1 mass-% asbestos with a non-hazardous key (e.g. 17 01 01 concrete in European list of wastes) in OECD countries?

4. Classification of CDW containing asbestos as hazardous or non-hazardous
   a. Is CDW containing asbestos generally classified as hazardous in OECD countries, independent from the concentration of asbestos?
   b. Is CDW with < 0.1 mass-% asbestos classified as hazardous waste?
   c. Is 17 06 05*seen as an absolute hazardous (AH) entry or as a hazardous mirror (HM) entry?
5. Handling natural rocks containing asbestos
   a. Is the mining and placing on the market of rocks containing < 0.1 mass-% asbestos allowed in OECD countries?
   b. Is the recycling of such natural material or CDW containing such material allowed in OECD countries?
   c. Is the placing on the market of RC building material containing rocks with < 0.1 mass-% asbestos allowed in OECD countries?

7. If applicable, what functional use code and product or article code category(ies) apply to the case study. For OECD harmonised use, product/article use codes see: http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2017)14&doclanguage=en

Not applicable

8. Link(s) to relevant documentation of the case study:

Annex G. Case Study 4 – Belgium

Safety and environmental impacts of rubber infill used in sport fields

1. *Submitted by:*

   Ministry of Health, Belgium

2. *What industry sector(s) are implicated in the case study? Please refer to the STAN industry list. Example: C17: Manufacturing - Paper and paper products.*

> Section E 3830 Materials recovery (reclaiming of rubber such as used tires to produce secondary raw material)
>
> (Section C 221 Manufacture of rubber products ; 2211 Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres ; 2219 Manufacture of other rubber products)

3. *Indicate the policies and/or legislation which lead to mis-alignement within the case study, from both the chemicals policy perspective and the waste management perspective. Briefly summarise the context and intent of the policies:*

> The take-back obligation (EPR / extended producer responsibility system) in Belgium for tyres promotes the reuse, recycling (material recovery) and energy recovery of used tyres; the disposal is prohibited. The used tyres are largely material recovered, especially as rubber infill for sports pitches.
>
> Only in the Flanders Region end-of-waste (EOW) criteria (management measures) have been established for rubber infill for sport pitches, in order to protect the environment.
>
> There are no EU wide EOW criteria.
>
> In the EU Regulation REACH strict PAHs standards apply for (new) tyres and for (new and recycled) consumer products made of rubber, in order to protect health. The PAHs standards for rubber infill (mixture) are actually much less strict. A restriction proposal for 8 PAHs in rubber granules is under examination but the environmental and health impact of some other organic and some inorganic substances should also be investigated.

4. *Briefly summarise the case study and the mis-alignment issue that it illustrates. This could be mis-alignment leading to health and/or environmental consequences, or leading to economic consequences (e.g. impedes shift to new technologies or business models; increases cost disproportionately to a particular business sector etc.)*

> In recent years, concerns have arisen as a result of scientific publications and media reports on the safety of playing sports on artificial turf pitches and on the environmental impact of the rubber infill.
>
> Different consequences could be identified :

- Especially when the use changes (tyre -> rubber infill), the impact on environment and health is unknown and should be assessed for that use (by tyre manufacturer or recycler or EPR organism), in order to avoid uncertainties.
- Remarketing products that contain substances of concern endangers humans and environment, negatively impact the image of secondary raw materials and will slow down the evolution towards non-toxic circular material flows~~.~~
- No EU wide criteria for rubber infill result in rubber infill for sports pitches retaining the waste status in some countries/regions and product criteria would not be applicable.

5. *What policy solutions could address the mis-alignment or lead lead to a technological solution that addresses the mis-alignment?*

The case shows the importance of the fact hat the tyre manufacturer / recycler / EPR organism needs to carefully assess the use of recycled chemicals as such, in (recycled) mixtures and (recycled) articles (e.g. rubber tiles), especially when the use changes (tyres -> rubber infill).

6. *What questions/topics stemming from this case study could be addressed at the workshop?*

- Life cycle thinking is important in the Circular Economy. In this case the use changes. Is it the responsibility of the tyre manufacturer or the recycler or the EPR organism to asses the risks on health and environment ?
- Wouldn't it be appropriate to consider retreading and rebuilding tyres instead of recycling to rubber granulate ?
- How can be avoided that the image of secondary raw materials are negatively affected by the uncertainties about the risks on health and environment ?

7. *If applicable, what functional use code and product or article code category(ies) apply to the case study. For OECD harmonised use, product/article use codes see: http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2017)14&doclanguage=en*

N/A

8. *Link(s) to relevant documentation of the case study:*

- ECHA website : https://echa.europa.eu/hot-topics/granules-mulches-on-pitches-playgrounds
- REACH restriction entry 50 : https://echa.europa.eu/documents/10162/176064a8-0896-4124-87e1-75cdf2008d59
- (only in Dutch) EOW criteria in Flanders : https://navigator.emis.vito.be/mijn-navigator?woId=44093 : Onderafdeling 5.3.6. Voorwaarden voor het gebruik van rubbergranulaat van gerecycleerde afvalbanden als instrooimateriaal in kunstgrasvelden

Annex H. Case Study 5 – United States

Recycling of paper products contaminated with PCBs in the inks and pigments

1. *Submitted by:*

Doug Krapas, Environmental Manager, Inland Empire Paper Company, and member of the Spokane River Regional Toxics Task Force

Lauren Heine, Northwest Green Chemistry

2. *What industry sector(s) are implicated in the case study? Please refer to the [STAN industry list](). Example: C17: Manufacturing - Paper and paper products.*

C17: Manufacturing - Paper and paper products, through the recycling of paper products contaminated with PCBs in the inks and pigments used for printing

Due to the ubiquitous nature of PCBs, this issue also affects all municipal wastewater and stormwater systems resulting in pathways to the environment, the burden of which for clean-up is paid for by all citizens and ratepayers.

3. *Indicate the policies and/or legislation which lead to misalignment within the case study, from both the chemicals policy perspective and the waste management perspective. Briefly summarise the context and intent of the policies:*

U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory and the U.S. Clean Water Act (CWA):

SUBCHAPTER R - TOXIC SUBSTANCES CONTROL ACT, PART 761

…pigments that contain 50 ppm or greater PCB may be processed, distributed in commerce, and used in a manner other than a totally enclosed manner until January 1, 1982…40 C.F.R. § 761.3 (g), Reserved after 1999

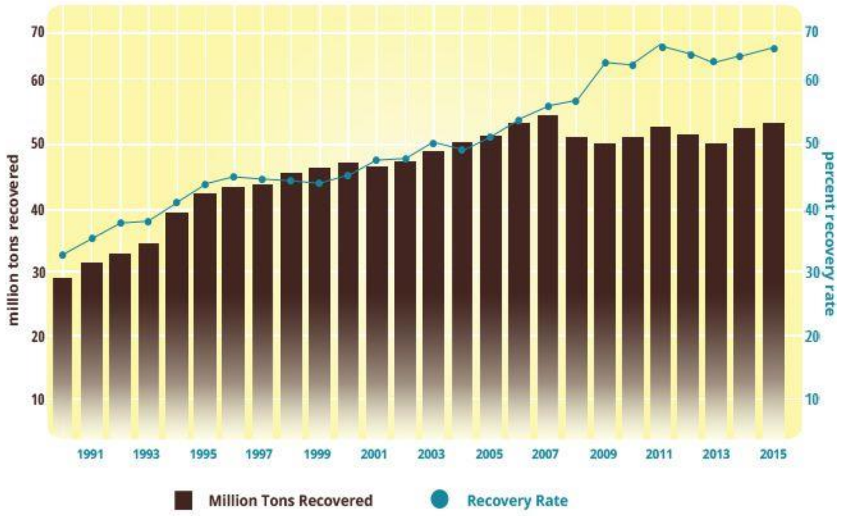
The concentration of inadvertently generated PCBs in products leaving any manufacturing site or imported into the United States must have an annual average of less than 25 ppm, with a 50 ppm maximum" 40 C.F.R. § 761.3 (1)

Current TSCA regulations allow exclusions for the use of pigments and inks to contain PCB concentrations up to 50 ppm. These PCB containing pigments and inks are used in printing of newspapers, magazines, and numerous other printed materials. Paper recyclers of old newsprint, magazine and other waste paper products receive these PCB containing products that ultimately end up in the wastewater discharge of the recyclers. Although PCB concentrations in the recycler's discharge are millions or billions of times lower than the Federal allowance, they are unable to meet stringent water quality standards being set in parts per quadrillion. There are no known commercially available technologies for the removal of PCBs to the levels necessary to meet these water quality criteria, so the only alternative for compliance may be the elimination of paper recycling.

It is also important to note that these same pigments are also used in the manufacture of commercial paint products. Congener fingerprint correlations suggest that leaching of PCB-containing paints are a likely source of PCB contamination directly into receiving waters, stormwater and into municipal wastewater treatment systems.

The U.S. Clean Water Act (CWA) requires that water bodies meet certain water quality criteria established by either Federal or State laws. The current PCB water quality criteria for WA State is 7 parts per quadrillion which is over 7 billion times lower than the TSCA threshold for excluded PCB products (50 ppm). The water quality criteria for PCBs are extremely low and not conducive for efficient and effective removal. There are no commercially available technologies that are effective for reducing PCBs to this level.

Additionally, many states and cities in the U.S. have adopted mandatory recycling policies. Due to these programs, recovery rates in the U.S. are approaching 70%:



The stringent water quality standards being imposed across the U.S. for PCBs is a threat to the future of paper recycling as mills would need to eliminate the source of PCBs coming into their facilities via recycled paper products that are printed with inks allowable under TSCA. It is important to note that paper mills have the capability to remove and destroy over 90% of the PCBs coming into their facilities, but unfortunately that is not sufficient to meet the imposed water quality standards.

4. *Briefly summarise the case study and the mis-alignment issue that it illustrates. This could be mis-alignment leading to health and/or environmental consequences, or leading to economic consequences (e.g. impedes shift to new technologies or business models; increases cost disproportionately to a particular business sector etc.)*

Prior to 1991, Inland Empire Paper Company's (IEP) effluent stream was free of PCBs as confirmed by the Washington State Department of Ecology (Ecology) Class II inspections and NPDES permit application testing. Furthermore, US EPA research studies performed from 1976 to 1978 showed no conclusive evidence of PCBs in pulp and paper mills processing "virgin" wood stock. The State of New York also performed a study of PCBs in paper mill effluents during the period 1976 to 1978. All mills using virgin stock (wood chips, etc.) were eliminated from the study as they found no potential for PCBs in those effluents. IEP used only virgin wood fibre for pulp manufacturing until 1991.

In the 1980's there was a movement towards recycling of paper, resulting in customer demand for recycled fibre in IEP's finished paper products. In addition, a law was enacted in California that required publishers to include a minimum percentage of recycled fibre content:

CA PUBLIC RESOURCES CODE, ARTICLE 2. Recycled-Content Newsprint

42760.

On and after January 1, 1991, every consumer of newsprint in California shall ensure that at least 25 percent of all newsprint used by that consumer of newsprint is made from recycled-content newsprint, if recycled-content newsprint is available at a price comparable to that of newsprint made from virgin material, if the recycled-content newsprint meets the quality standards established by the board pursuant to Section 42775, and if the recycled-content newsprint is available within a reasonable period of time.

42761.

The percentage of newsprint used which is made from recycled-content newsprint shall be calculated in tons used on an annual basis and shall increase to:

(a) Thirty percent on and after January 1, 1994.

(b) Thirty-five percent on and after January 1, 1996.

(c) Forty percent on and after January 1, 1998.

(d) Fifty percent on and after January 1, 2000.

In order to remain a viable business and meet this demand, IEP invested into a new recycling process that began production in September 1991.

In May 2001, Ecology sampled effluents and collected biosolids from five (5) municipal and industrial dischargers to the Spokane River for PCB analysis. Low-level PCB detections were reported from all of the municipal and industrial discharges. Total PCB congeners for IEP's effluent sample were reported at 2,436 pg/L (picograms per Litre), a concentration that is 20.5 million times lower than the TSCA threshold for excluded PCB products (50 ppm).

The Spokane River is on the §303(d) listing for impaired water bodies for PCB contamination. As a result, Ecology is responsible for the development of a water quality attainment plan. The current water quality standard (WQS) for PCBs in WA State is 7.0 parts per quadrillion. This WQS concentration is below current detection limits and is over 7 billion times lower than the TSCA threshold for excluded PCB products (50 ppm). The presence of PCBs in IEP's discharge is ultimately due to the allowance provided by the Federal TSCA guidelines.

The PCB concentrations in IEP's effluent are extremely low and not conducive for efficient and effective removal. There are no commercially available technologies that are effective for reducing already low levels of PCBs to the stringent WQS levels. Currently, the only viable alternative for reducing PCBs from IEP's effluent is the elimination of the recycling process.

Elimination of the recycling process at IEP has the potential to set a precedent throughout the rest of the pulp and paper industry with the elimination or significant reduction of paper recycling in the United States. Furthermore, elimination of recycling may cause IEP irreparable harm due to its inability to offer recycled content paper products. Elimination of paper recycling does not solve the PCB problem, but simply moves it from one location within the environment to another. The enormous amount of paper currently being recycled would need to be disposed of through landfills or incineration, potentially re-entering the environment through groundwater contamination or air emissions.

This same problem exists for municipal wastewater and stormwater systems where the TSCA allowable PCBs are entering their systems via consumer products. The only option available for these types of treatment systems is end-of-pipe technologies that are extremely expensive and insufficient to attain stringent water quality standards, requiring investment in perpetuity.

5. What policy solutions could address the misalignment or lead to a technological solution that addresses the mis-alignment?

Due to the extreme misalignment between policies promoting paper recycling, and the Federal TSCA allowance and CWA water quality standards that are millions or even billions of times apart, will require a host of solutions to resolve. The SRRTTF in cooperation with Northwest Green Chemistry recently conducted a workshop to explore solutions with many different stakeholders. Some of the more significant solutions discussed at this workshop are presented below:

Suggestion #1: Develop/Use Alternatives to PCB-Containing Products:

The trace amount of PCBs that are present in various pigments are not used in the manufacture of these pigments, but are inadvertently produced as a by-product through the complex reaction of chlorinated solvents used in the manufacturing process. Alternative methods using non-chlorinated solvents are available to manufacture pigments that are currently produced using chlorinated solvents in some cases.

Suggestion #2: Reduce the TSCA/Global Allowance for PCBs:

Modify the TSCA regulations to reduce the allowable levels of PCBs in products from the current 50 ppm maximum/25 ppm average to a lower threshold. Industry experts believe that most of the pigments manufactured today using improved quality control methods can be produced at much lower levels than the current TSCA allowance. This will likely require global consideration since most pigments are manufactured outside the U.S. Suggest working with pigment manufacturers to establish a lower, more reasonable PCB allowance standard that is consistent with modern manufacturing methods.

Suggestion #3: Incentivize the Research and Development of Non-Chlorinated Alternatives:

The manufacturing of pigments used in paints and inks is an international industry. Most base pigments are manufactured overseas. Incentivize the international community to research and develop non-chlorinated alternatives to the current PCB containing products. Encourage pigment manufacturers to develop alternative manufacturing processes or eliminate certain PCB-containing pigments. In order to provide these incentives, we need to remove or reduce the regulatory constraints that currently make the development of new products prohibitively burdensome and expensive.

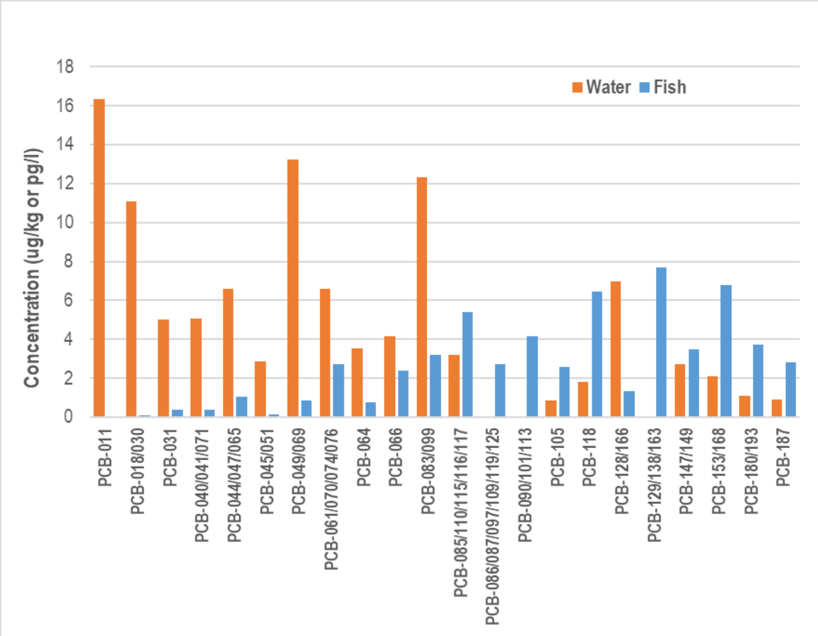
Suggestion #4: Reassess the Current Use Authorizations:

Reassess the current use authorizations for certain PCB uses to determine whether they may now pose an unreasonable risk to human health and the environment. Section 6(e)(2)(B) of the Toxics Substance Control Act (TSCA) provides EPA with the authority to issue regulations allowing the use and distribution in commerce of PCBs in a manner other than in a totally enclosed manner, if the EPA Administrator finds that the use and distribution in commerce will not present an unreasonable risk of injury to health or the environment. The 50 ppm level for excluded products in the TSCA regulations has allowed for the use of chemical products that have entered the ecosystem through the recycling process and other pathways that now present an unreasonable risk of injury to health and the environment. Therefore, U.S. EPA is obligated to make changes to its rules and regulations to protect human health and the environment.

Suggestion #5: Monochloro-biphenyls and Dichloro-biphenyls should be excluded from total PCB regulation:

Mono and dichloro-biphenyls have generally been regarded as having lower bioaccumulation and human health and environmental impacts than more highly substituted PCB congeners. Information published in peer reviewed literature and presented by U.S. EPA and the Agency for Toxic Substances and Disease Registry (ATSDR) shows that the physical/chemical properties of mono and dichloro-biphenyls do not favour the accumulation of these congeners in biological tissues, including fish, relative to more highly chlorinated PCB congeners. Further, these congeners generally play a smaller role in concerns over PCB contamination in aquatic systems. Research on the fate and transport of PCBs in the aquatic environment has established that the bioaccumulation of PCB congeners in aquatic organisms including fish is related to the degree of chlorine substitution.

PCB congener data from the Spokane River published by the Washington State Department of Ecology indicates that mono and dichloro-biphenlys comprise a small component of total PCB found in fish. Work performed by the Spokane River Regional Toxics Task Force found that although lower congener levels were prevalent in the water column there was little to no bioaccumulation in fish tissue:



In addition to lower expected bioaccumulation, the level of human and environmental health concern attributed to mono and dichloro-biphenyls is generally also lower than that of more highly chlorinated congeners. For example, none of these congeners are among the 12 congeners identified by U.S. EPA as "dioxin-like" that are generally considered to pose the largest PCB related environmental and human health concerns. EPA, in a summary of conclusions from their 1996 cancer reassessment, states, "The types of PCBs that tend to bioaccumulate in fish and other animals and bind to sediments happen to be the most carcinogenic components of PCB mixtures." (However, it is important to note that comprehensive toxicological data for each individual congener are not currently available.)

Further, in U.S. EPA's "Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories," only one of 18 congeners recommended for quantitation to support the development of fish consumption advisories is a dichloro-biphenyl (2,4'-CB, PCB-8). The recommendation to include this congener is based on a NOAA procedure for using congener data to estimate total PCB concentrations rather than on specific toxicity concerns. No mono- or dichlorobiphenyl congeners are identified as either first or second priorities "for potential environmental importance based on potential for toxicity, frequency of occurrence in environmental samples, and relative abundance in animal tissues."

A significant percentage of PCB congeners associated with the recycling process are monochloro, dichloro, trichloro and tetrachloro-biphenyls. The lower chlorine congeners are known to have lower toxicity and are not as persistent and bio-accumulative as higher chlorine congeners, resulting in a low potential for exposure to humans. Because of this low risk factor, monochlorinated and dichlorinated biphenyls are not regulated in the European Union and Canada.

If it is determined the environmental benefit of recycling outweighs that of not recycling, provide the recyclers of paper an offset or exclusion for PCBs attributable to those allowable under the TSCA regulations.

Suggestion #6: Holistic Regulatory View:

Challenge regulatory agencies to consider a more holistic view of the environmental, time-cost-benefit and socio-economic effects of implementing their conflicting regulations (TSCA/CWA, State recycling laws/WQS, etc.). Agencies need to set attainable regulatory goals/standards to incentivize industry to drive technological solutions. Agencies need to perform cradle-to-grave life cycle assessments to determine overall environmental benefit.

Suggestion #7: Market Drivers:

Encourage end-users to adopt policies for printed materials to use alternative inks and pigment formulations that are non-chlorinated thus reducing the potential for PCBs in their finished products.

Encourage end-users to adopt purchasing policies with lower PCB thresholds for products both purchased and manufactured by their companies.

Educate all of those along the supply chain on this issue and encourage reducing the potential for PCBs in their finished products.

Increase public awareness of this issue to provide consumers with options for purchasing products with reduced levels of PCBs.

6. *What questions/topics stemming from this case study could be addressed at the workshop?*

Bring inks, pigments and dye industries to the table to determine if alternative non-PCB or lower than what is current allowed products are available for distribution in commerce. Several U.S. companies have taken it upon themselves to lower their own procurement levels well below the current TSCA allowance.

Work with end users of inks, pigments and dyes to determine if non chlorinated products can supplant the current chlorinated products.

Encourage enforcement of regulated levels of PCB. The U.S. EPA requires that suppliers self-report. A study performed in Japan by METI found a number of pigments exceeded regulated limits.

7. *If applicable, what functional use code and product or article code category(ies) apply to the case study. For OECD harmonised use, product/article use codes see: http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2017)14&doclanguage=en*

Ink toner and colorant products

8. *Link(s) to relevant documentation of the case study:*

Nestler, A., Heine, L., and Montgomery, A. (June 28, 2019). Pigments and inadvertent polychlorinated biphenyls (iPCBs): Advancing no and low iPCB pigments for newsprint, and paper and paperboard packaging. Prepared for the Spokane River Regional Toxics Task Force. Retrieved from http://srrttf.org/wp-content/uploads/2019/07/Final20190628_iPCBs-and-Pigments.pdf

Heine, L., and Trebilcock, C. (October 16, 2018). Inadvertent PCBs in Pigments: Market Innovation for a Circular Economy. Prepared for the Spokane River Regional Toxics Task Force. Retrieved from http://srrttf.org/wp-content/uploads/2019/07/NGC-inadvertant-PCB-White-Paper-for-SRRTTF-20181016.pdf

Japan Ministry of Economy, Trade, and Industry (METI). (2012). Administrative Guidance for Manufacture/Import etc., of Organic Pigments Containing By-product PCBs. Retrieved 5/30/2019 from https://www.meti.go.jp/policy/chemical_management/english/cscl/files/publications/revie w/guidance_for_pigments_120213.pdf

Rodenburg, Lisa, Jia Guo and Robert Christie. (2015) "Polychlorinated biphenyls in pigments:" Coloration Technology. Retrieved from https://ecology.wa.gov/DOE/files/5e/5eba04f9- d41f-4e9f-ad9c-a98a01a431ca.pdf

Washington State Chemical Action Plan; https://ecology.wa.gov/Waste-Toxics/Reducing-toxic-chemicals/Addressing-priority-toxic-chemicals/PCBs

Grossman, 2013. Elizabeth. Nonlegacy PCBs: Manufacturing By-Products Get a Second Look. Environmental Health Perspectives. March 121(3). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3621189/

Spokane Regional Toxics Task Force; http://srrttf.org

Annex I. Case Study 6 – United Kingdom

Interaction of the EU POPs Regulation requirements with the requirements of waste legislation for managing electronics and electrical waste (WEEE)

1. *Submitted by:*

   Max Folkett, Policy Advisor - Department for Environment, Food and Rural Affairs, United Kingdom

2. *What industry sector(s) are implicated in the case study? Please refer to the [STAN industry list](). Example: C17: Manufacturing - Paper and paper products.*

The waste management industry – E37-39

3. *Indicate the policies and/or legislation which lead to mis-alignement within the case study, from both the chemicals policy perspective and the waste management perspective. Briefly summarise the context and intent of the policies:*

<u>The Stockholm Convention, The EU POPs Regulation</u>

The Stockholm Convention aims to eliminate or restrict the production and use of POPs. The EU POPs Regulation includes requirements to ensure that POPs in wastes are destroyed or irreversibly transformed, to ensure they do not enter the environment but also to protect secondary raw material streams.

There is no requirement to stop using articles already in use before the ban was in place but, when those articles become waste, the requirement to destroy POPs applies. This would prevent re-use of those articles, unless the article could be collected and handled in a way that ensures it never becomes waste.

The regulation also includes a requirement to trace POPs through the waste chain in accordance with hazardous waste tracking provisions in the Waste Framework Directive.

<u>The EU circular economy package (amending various directives including the Waste Framework Directive), the EU List of Waste and the WEEE Directive</u>

The EU circular economy package seeks to increase the time in which resources are in productive use and the WEEE Directive aims specifically to improve the end of life management of electronics and electrical waste, including by increasing re-use. There are provisions to ensure that producers finance the costs for the collection, treatment, recovery and environmentally sound disposal of WEEE. The WEEE Directive also includes minimum treatment standards, including a requirement to remove and separately collect WEEE plastic containing brominated flame retardants.

The Waste Framework Directive and implementing legislation set out a hierarchy of waste management options. This 'waste hierarchy' prioritises 'preparation for re-use' ahead of recycling, other recovery and disposal operations. There is extensive (and growing) policy in place to encourage re-use and initiatives to do so are well established across the public, private and third sector for a range of articles, including second hand furniture and electrical equipment.

The List of Waste Regulations set out a strict approach to waste classification that applies across the EU. Many wastes are either 'hazardous' or 'non-hazardous' depending on their composition, however, some waste types are 'absolute hazardous' or 'absolute non-hazardous' - composition is not assessed. Waste classification is the foundation of waste management practice in the UK. The assigned waste code and non-hazardous/hazardous status governs the regulatory processes that apply to waste movements as well as the waste management options available.

<u>The UK Climate Change Act.</u>

Finally, the Climate Change Act seeks to move the UK on a trajectory towards net zero carbon through the application of carbon budgets which seek to limit emissions of greenhouse gases from various sources.

4. *Briefly summarise the case study and the mis-alignment issue that it illustrates. This could be mis-alignment leading to health and/or environmental consequences, or leading to economic consequences (e.g. impedes shift to new technologies or business models; increases cost disproportionately to a particular business sector etc.)*

Title: <u>The interaction of the EU POPs Regulation requirements with the requirements of waste legislation</u>

This case study focuses on the interaction between the EU POPs Regulation and waste legislation, with a particular focus on brominated flame retardants in the WEEE waste stream and waste furniture.

Background

The 2005 WEEE Directive required the removal of brominated flame retardants from WEEE. A recent study undertaken by the Industry Council for Electronic Equipment Recycling (ICER) of WEEE items and plastics arriving at recycling sites has confirmed the presence of POPs and highlighted the need for change in waste management practice. Results are still emerging but in particular, Cathode Ray Tube (CRT) and Flat Panel Display (FPD) screen equipment and small mixed WEEE are affected. The UK waste management industry is adapting to address this issue, which has highlighted the following challenges.

Impact on recycling targets

Annex V of the EU WEEE Directive sets out minimum targets for recycling and recovery. CRTs, FPDs and small mixed WEEE are treated as WEEE under the Directive. A proportion of this WEEE is plastic (Approx. 20% of CRTs, 30% of FPDs and 25-40% by weight of small mixed WEEE is plastic) which can be recycled/recovered.

EEE producers report that it may not be possible to comply with recovery and/or recycling targets and meet the POPs Regulation requirement to destroy POPs contaminated plastic.

Impact on re-use

One of the aims of the Waste Framework Directive is to raise waste management up the hierarchy. There are provisions in place to ensure that at the waste recycling and recovery stage hazardous substances are taken out of the waste chain, where necessary, and new materials and products comply with product legislation (for example REACH and RoHS). Those provisions do not apply to preparation for re-use, which is consistent with the objective of extending the life of articles and maximising re-use. However, there are safeguards in place in that if a preparation for re-use activity were posing a risk to the environment or human health, MS could act to stop the activity and divert waste to an option lower down the hierarchy, if that is the Best Overall Environmental Option.

The WEEE Directive also has maximising re-use as an objective, while also recognising the need to ensure that brominated flame retardants do not enter material streams.

In contrast to this waste legislation, the POPs Regulations require that articles containing POPs above low POP concentrations are managed in a way that ensures destruction (or irreversible transformation) of the POPs when they become waste. There is no provision for preparation for re-use. Potentially, this means that items of WEEE are taken out of use permanently sooner than they would otherwise be if POPs were not present.

Impact on carbon emissions

Currently, incineration (with or without energy recovery) is the only commercially available option for destroying POPs waste in the UK. It has been estimated by the EEE industry that incinerating one tonne of plastic will result in an additional two tonnes of CO2 being emitted. Further, it is understood that, in order to comply with emissions standards, it can be necessary to carefully control inputs to incinerators, avoiding inputs of large amounts of plastic.

Waste classification and the challenge of tracing POPs through the waste chain

The List of Waste Regulations set out a strict approach to waste classification that applies across the EU. Many wastes are either 'hazardous' or 'non-hazardous' depending on their composition, however, some waste types are 'absolute hazardous' or 'absolute non-hazardous' - composition is not assessed. For example, 20 03 07 bulky [municipal] waste is an absolute non-hazardous waste. This code and description would apply to a waste sofa containing POPs at levels that would require destruction.

The non-hazardous classification means that enhanced record keeping and traceability requirements that the WFD requires for hazardous waste are not mandatory. Implementation of these requirements for non-hazardous POPs waste will be a challenge.

5. *What policy solutions could address the mis-alignment or lead lead to a technological solution that addresses the mis-alignment?*

The following comments are to inform discussion and do not necessarily represent policy of UK Governments.

1. Review and, if necessary, amendment of recovery and recycling targets to reflect requirements to destroy POPs.
2. A clear position where there is conflict. For example, whether the need to destroy POPs and prevent SVHCs re-entering the materials cycle takes priority over re-use and recycling.
3. Consider whether re-use of articles containing POPs could be re-used if their environmentally sound management, including POPs destruction, could be guaranteed at the end of their life. In considering this a detailed understanding of re-use markets would be required, including export markets.
4. A harmonised system for waste classification that ensures that, where any legislation requires additional control on waste, that waste is either classified as 'hazardous' or in some other way that makes it clear that it is subject to enhanced controls.
5. An active approach to identifying future waste management challenges, including the composition of future waste streams, so that innovation and investment lead to provision of infrastructure that can meet the combined objectives of chemical and waste legislation. As there is an international market for waste management discussions would ideally take place at an appropriate level.
6. Research and development of technology to destroy or irreversibly transform POPs that has a lower carbon footprint and better emissions profile than incineration.
7. Where producer responsibility regulations are in place, consider a fee mechanism that provides for a fund that can be used for relevant work, such as environmental projects or work to support sector wide compliance. Such a fund exists in the UK – the WEEE fund https://www.weeefund.uk/ . This has funded work to investigate the composition of WEEE referred to above.

8. *What questions/topics stemming from this case study could be addressed at the workshop?*

- How can waste classification systems be adapted to better enable compliance with all legislation that applies to waste?
- What can we do to ensure that markets deliver the waste management infrastructure required to meet future waste challenges?

9. *If applicable, what functional use code and product or article code category(ies) apply to the case study. For OECD harmonised use, product/article use codes see:*

http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2017)14&doclanguage=en

AC5e, AC13e, AC14e

10. Link(s) to relevant documentation of the case study:

Annex J. Case Study 7 – Colombia

Defining the management of hazardous substances from electronics and electrical waste

1. *Submitted by:*

Diego Escobar Ocampo, Colombia, Ministry of Environment and Sustainable Development

2. *What industry sector(s) are implicated in the case study? Please refer to the STAN industry list. Example: C17: Manufacturing - Paper and paper products.*

C19-23 Chemical, rubber, plastics, fuel products and other non-metallic mineral products

C22 Rubber and plastics products

C22-23 Rubber and plastics products, and other non-metallic mineral products [CG]

E37-39 Sewerage, waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services.

3. *Indicate the policies and/or legislation which lead to mis-alignement within the case study, from both the chemicals policy perspective and the waste management perspective. Briefly summarise the context and intent of the policies:*

Law 1672 of 2013 (Integral Management of Waste Electrical and Electronic Equipment)

With this Law, issued by the Congress of Colombia, the country has a new instrument which establishes guidelines for the adoption of a public policy of integrated waste management of electrical and electronic equipment (e-waste). This Law introduces the principle of Extended Producer Responsibility (EPR) and one of its main objectives is to encourage the recovery and recycling of e-waste.

Decree 284/2018 aims to regulate the integrated management of Waste Electrical and Electronic Equipment (WEEE) , to prevent and minimise the negative impacts on health and the environment.

Resolution 0076 of 2019 adopts the Terms of Reference of the Environmental Impact Assessment (EIA) to apply to an Environmental License of projects for the construction and operation of facilities intended for the storage, treatment, recycling and recovery of Waste Electric and Electronic Equipment (WEEE).

National Policy for the Environmental Sound Management of WEEE (2017).

4. *Briefly summarise the case study and the mis-alignment issue that it illustrates. This could be mis-alignment leading to health and/or environmental consequences, or leading to economic consequences (e.g. impedes shift to new technologies or business models; increases cost disproportionately to a particular business sector etc.)*

The Ministry of Environment and Sustainable Development has recently established a regulatory and policy framework concerning the Waste Electrical and Electronic Equipment (WEEE) management: Law 1672 of 2013, Decree 284 of 2018, Resolution 076 of 2019, and WEEE Policy 2017.

Although the above mentioned legal framework establishes that in case that some components of the WEEE were considered hazardous waste, these must be managed according to that condition; there is no specific regulation that defines under what conditions WEEE has become a hazardous waste or which are the management options for these components or substances according to their hazardous characteristics.

The most commonly used references in Latin-America to establish regulations about WEEE management are the EU Directives (2012/19 and 2011/65), and according to these Directives, some Brominated Flame Retardants (BFR) are considered as hazardous substances.

Directive 2011/65 establishes: "*Even if waste WEEE were collected separately and submitted to recycling processes, its content of mercury, cadmium, lead, chromium VI, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) would be likely to pose risks to health or the environment, especially when treated in less than optimal conditions*".

The Annex VII of the Directive 2012/19/EU establishes that plastics containing brominated flame retardants, have to be removed from any separately collected WEEE, in order to treat the materials and components of waste electrical and electronic equipment separately.

Within the Colombian National Regulation, apart from Resolution 0076 of 2019 (Terms of reference for Licensing of new WEEE management facilities), there is no mention in the legal framework, that hazardous components or substances of WEEE should be removed from the equipment prior to their treatment due to their hazardous characteristics, or which are the thresholds to consider a WEEE as a hazardous waste due to BFR content.

In particular, in the case of the Brominated flame retardants (BFR), there are no defined thresholds for specific substances, such as PBB, PBDE, HBCD, BFR, which are covered by the Stockholm Convention as Persistent Organic Pollutants (POPs).

As a result of this significant lack in the legal framework to determine if a WEEE can be considered a hazardous waste and the corresponding thresholds, the WEEE managers are not able to accomplish an environmental sound management of these wastes, because they cannot sort or treat the plastic that might contain BFR separately.

This specific situation can also affect to both formal and informal recyclers, who recover the plastic materials, without taking into account the origin of these plastic elements and sell them to plastic recyclers, causing that BFR containing plastics could be used in a wide range of applications, ranging from toys, learning materials, kitchenware, among other household items.

Another important aspect that has to be considered is that in the formal sector, the main recycling options are limited because of the possibility of having BFR content in plastic products, setting these plastics apart, and leaving them without any management options.

5. *What policy solutions could address the mis-alignment or lead lead to a technological solution that addresses the mis-alignment?*

To establish a legal framework to define when waste electric and electronic equipment (WEEE) can be considered hazardous waste, according to maximum thresholds of certain hazardous substances contained in the WEEE.

To establish a regulation to define the technical requirements and the analytical methods to be used to determine and quantify BFR content in materials to be recycled.

To develop technical guidelines and demonstrative projects for the identification, sorting and recycling of plastics coming from WEEE.

6. *What questions/topics stemming from this case study could be addressed at the workshop?*

What problems, needs and challenges have been identified by the OECD member countries regarding the setting and control of the BFR limits in plastics to be recycled? How has the private sector been strengthened to overcome and accomplish these identified issues? What lessons learned could be shared in the establishment of limits and enforcement of controls for the WEEE managers?.

7. *If applicable, what functional use code and product or article code category(ies) apply to the case study. For OECD harmonised use, product/article use codes see: http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2017)14&doclanguage=en*

8. *Link(s) to relevant documentation of the case study:*

http://www.minambiente.gov.co/images/AsuntosambientalesySectorialyUrbana/pdf/e-book_rae_/Politica_RAEE.pdf

Annex K. Case Study 8 – Italy

Replacement of PVC in the use of medical devices and disposable items in hospital practice for the final management of waste

1. *Submitted by:*

   Federica Tommasi, Italian National Institute of Health

2. *What industry sector(s) are implicated in the case study? Please refer to the STAN industry list. Example: C17: Manufacturing - Paper and paper products.*

CG 22: *Rubber and plastics products*

3. *Indicate the policies and/or legislation which lead to mis-alignement within the case study, from both the chemicals policy perspective and the waste management perspective. Briefly summarise the context and intent of the policies:*

1) analysis and replacement of PVC in the use of medical devices and consumables in hospital practice thinking about the final management related to thermal combustion, and human health in the clinical uses.

Using PVC plastics in Medical Devices posed a real concern about the presence of plasticizers for human health and lastly the theme related to the thermal combustion of sanitary wastes containing Cl (Chlorine).

Regarding on the EU New Medical Device Regulation (REGULATION (EU) 2017/745 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 5 April 2017 on medical devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directives 90/385/EEC and 93/42/EEC), at page 96 reports us the regulatory and technical issue in points: 10.4.1 letters (a) and (b) as themes of concern, and at point 10.4.2 the road ahead in the way of sustainability.

On the other hand we have:

- *WHO guidelines "Safe management of wastes from health care activities"*
  WHO (2014). Safe management of wastes from health care activities. World Health Organization, Geneva. (http://www.who.int/water_sanitation_health/publications/wastemanag/en/ accessed October 2019).
- *UNEP "Compendium of Technologies for Treatment/Destruction of Health care Waste"*
  UNEP (2012). Compendium of Technologies for Treatment/ Destruction of Health care Waste. (https://www.unenvironment.org/ resources/report/compendium-technologies-treatmentdestruction-health care-waste →accessed October 2019). This document also takes into account other UN documents, including WHO policy and core principles on health care waste management as reported in:
  WHO (2007). WHO core principles for achieving safe and sustainable management of health care waste. World health Organization, Geneva. (http://www.who.int/water_sanitation_health/medicalwaste/ hcwprinciples.pdf accessed October 2019)
  WHO (2004). Safe health care waste management: Policy paper. World Health Organization, Geneva. (http://www.who.int/water_ sanitation_health/publications/hcwmpolicy/en accessed October 2019).

- *the recommendations of the Stockholm Convention on waste incineration →UNEP (2007). Guidelines on Best Available Techniques and provisional guidance on Best Environmental Practices relevant to Article 5 and Annex C of the Stockholm Convention on Persistent Organic Pollutant. (http://chm.pops.int/Implementation/BATandBEP/BATBEPGuidelinesArticle5/tabid/187/Defaultspx en accessed October 2019).*
- *And the World Health Assembly (WHA) Resolution on WASH in Health Care Facilities (WHA, 2019) (https://www.unwater.org/ministers-of-health-approve-resolution-on-wash-in-health-care-facilities/ accessed October 2019). and input from manufacturers of treatment technologies*

Which demonstrates the fact that it is important to contemplate environmental protection, maintaining the minimum standards necessary to guarantee sanitation in the management of medical waste, having in any case to minimize the environmental impacts linked to the emissions of chlorinated products that may originate from the obligatory thermal combustion plants used to reduce the health risk.

Attached File on the related study: "The art of buying what is not available on the market BLOOD BAGS – A pilot case to stimulate eco-innovation within the healthcare sector" is a Report that gives us some good ideas on this focused issue.

4. *Briefly summarise the case study and the mis-alignment issue that it illustrates. This could be mis-alignment leading to health and/or environmental consequences, or leading to economic consequences (e.g. impedes shift to new technologies or business models; increases cost disproportionately to a particular business sector etc.)*

This precise case study give us the opportunity to develop a methodology in substituting a critical polymer like PVC with something more sustainable, with benefits for Human Health and a sound environmental choice thinking about the management of the related sanitary wastes

There are currently no blood bags available on the market that does not contain PVC or phthalates, even though we know that PVC containing softening phthalates affects our environment and our health adversely. PVC can cause environmental problems in both the manufacturing and waste stages, which include emissions of heavy metal stabilizers and phthalates and release of dioxins and greenhouse gases during combustion. A blood bag made of PVC usually contains up to 40 percent of the plasticizer DEHP (Di(2-ethylhexyl)phthalate) which is classified as toxic to reproduction and has recently also been classified as an endocrine disrupting chemical, etc.

5. *What policy solutions could address the mis-alignment or lead lead to a technological solution that addresses the mis-alignment?*

First fase: disincentives (with taxation, first and foremost) to the use of PVC, and corresponding incentives for non-plasticizing materials and in a

Second phase: the banning of PVC in such applications as market feedback that is shifting to the greener solution

6. *What questions/topics stemming from this case study could be addressed at the workshop?*

How to implement the PVC-Free blood bag market in a definitive and lasting way also with the aid of scientific research

7. *If applicable, what functional use code and product or article code category(ies) apply to the case study. For OECD harmonised use, product/article use codes see: http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2017)14&doclanguage=en*

AC14g

8. *Link(s) to relevant documentation of the case study:*

Medical Devices

- *Recent data Safer medical devices:*

  https://noharm-europe.org/documents/recent-data-safer-medical-devices

- *Non-toxic Healthcare: Alternatives to Phthalates and Bisphenol-A in Medical Devices:*

  https://noharm-europe.org/sites/default/files/documents-files/3192/HCWH%20Europe%20report%20-%20Non-Toxic%20Healthcare.pdf (ed. 2014)

  https://noharm-europe.org/sites/default/files/documents-files/6154/2019-12-03_HCWH_Non_Toxic_Healthcare_2_WEB.pdf (ed. 2019)

- *Endocrine Disrupting Chemicals in healthcare: Reducing exposures for patientsReport of the Workshop held in Brussels, Belgium on 03/12/2019:*

  https://noharm-europe.org/issues/europe/endocrine-disrupting-chemicals-healthcare-reducing-exposures-patients?mc_cid=b48d90ee2f&mc_eid=0f67ee1b84

- *Final version of the Guidelines on the benefit-risk assessment of the presence of phthalates in certain medical devices covering Phthalates, which are carcinogenic, mutagenic, toxic to reproduction (CMR) or have endocrine-disrupting (ED) properties, Scientific Committee on Health, Environmental and Emerging Risks – (SCHEER 2019):*

  https://ec.europa.eu/health/scientific_committees/consultations/public_consultations/scheer_consultation_08_it

- *Medical Devices Regulation 745/2017/EU (MDR)*

  https://eur-lex.europa.eu/legal-content/IT/TXT/?uri=CELEX%3A32017R0745

- *Scientific Committee on Emerging and Newly-Identified Health Risks "The safety of medical devices containing DEHP plasticized PVC or other plasticizers on neonates and other groups possibly at risk" SCENIHR (2016)*

  https://ec.europa.eu/health/sites/health/files/scientific_committees/emerging/docs/scenihr_o_047.pdf

Infectious waste management

- *Compendium Technologies for Treatment Destruction of Healthcare Waste, UNEP (2012):*

  https://it.scribd.com/document/318880569/Compendium-Technologies-for-Treatment-Destruction-of-Healthcare-Waste-2012

- *Safe management of wastes from health-care activities WHO (2014):*

  https://www.who.int/water_sanitation_health/publications/wastemanag/en/

- *Overview of technologies for the treatment of infectious and sharp waste from health care facilities, WHO (2019):*

  https://www.who.int/water_sanitation_health/publications/technologies-for-the-treatment-of-infectious-and-sharp-waste/en/

- *http://www.who.int/water_ sanitation_health/publications/hcwmpolicy/en*

- *https://www.unwater.org/ministers-of-health-approve-resolution-on-wash-in-health-care-facilities/*

- *Commission Implementing Decision (EU) 2019/2010 of 12 November 2019 establishing the best available techniques (BAT) conclusions … for waste incineration, at last…*

  https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019D2010&from=EN

- *http://chm.pops.int/Implementation/BATandBEP/ BATBEPGuidelinesArticle5/tabid/187/Defaultspx en*

- ***WHO core principles** for achieving safe and sustainable management of health-care waste WHO (2007):*

  https://www.who.int/water_sanitation_health/publications/hcwprinciples/en/

- *UNEP core Principles for termal treatment and destruction of health-care waste:*

  https://www.unenvironment.org/resources/report/compendium-technologies-treatmentdestruction-health care-waste

  About European Project

- *European Life+ Project determined to produce a PVC-free blood bag that fulfil requirement specification, including CE-labelling and to disseminate knowledge and increase demand: http://www.pvcfreebloodbag.eu/*

- *Letter of Intent PVC free blood transfusion at Karolinska University Hospital:*

  https://www.karolinska.se/contentassets/cd34d5ee19e14a118727ac7ac79b2162/letter-of-intent-demand.pdf

- *Economic Feasibility Study:*

  https://pvcfreebloodbag.eu/wp-content/uploads/2017/10/Life-Economic-Feasibility-Study.pdf

- *BLOOD BAGS – A pilot case to stimulate eco-innovation within the healthcare sector, Final Report on blood bags:*

  https://pvcfreebloodbag.eu/wp-content/uploads/2013/11/BloodBags_final_report_krcopy.pdf

- *https://www.karolinska.se/en/karolinska-university-hospital/about-karolinska/environment-and-sustainability/pvc-free-blood-bag/*