Global NIP Update Webinar “Activity Options for Action Plans for Stockholm Convention NIPs: Brominated, chlorinated, and other POPs plastic additives”, 22. January 2026, 14:00 -16:30 CET

Action Plan Considerations for Management and Control of POPs Plastic Additives and related Plastics and Resources in Major Sectors

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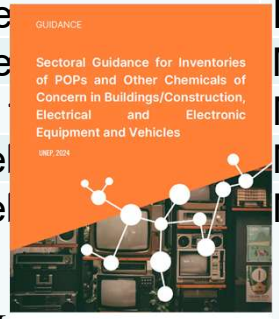
A wide range of POPs have been used in **the three sectors** (EEE, transport and construction) and for plastic additive POPs (POP-BDEs, DP and UV-328) they were the major use, for SCCP/MCCP a main use.

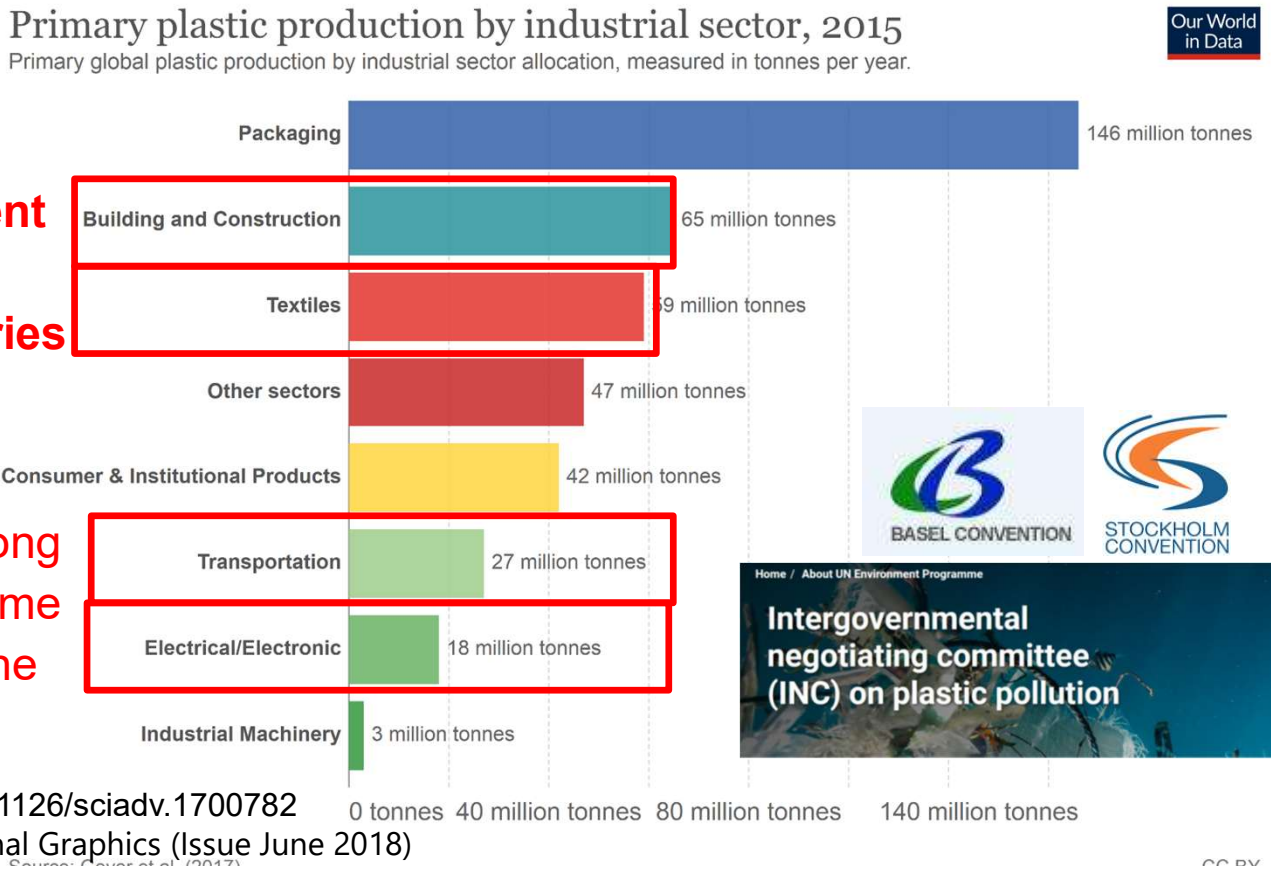
POP (main production & use period)*	Building & Construction Sector	Electronics	Transport Sector
c-PentaBDE (1970-2004)	Former use	Minor former use	Major former use
c-OctaBDE (1970-2004)	Minor former use	**Major use**	Minor former use
decaBDE (since 1970s)	**Major use**	**Major use**	**Major use**
HBCD (1980 to 2021)	**Major former use**	Minor former use	Minor former use
HBB (1970 to 1976)	Not relevant	Minor former use	Minor former use
SCCP (Since 1930s)	**Major use**	Minor use	Minor use
MCCP (Since 1930s)	**Major use**	Use	Use
PFOS (1960 to 2012)**	Former use	Former use	Former use
PFOA (since 1960s)	Former use	Minor use in product	Use
PFHxS (1960 to 2021)	Former use	Forme	Former use
PCB (1940 to 1980)	**Major former use**	Forme	Minor former use
PCN (1930 to 1970s)	Minor former use	Minor	Minor former use
PCP (1930 to 2015)	Major former use	Not re	Minor former use
DDT, aldrin, dieldrin, lindane, endosulfan, mirex (1940 to 2000)	Former use	Not re	Not relevant
Dechlorane Plus (DP)	Use	Use	Use



*Main period for production/use in these sectors;**Major production/use stopped 2002 by 3M.

Managing POPs in plastics can trigger better plastic management

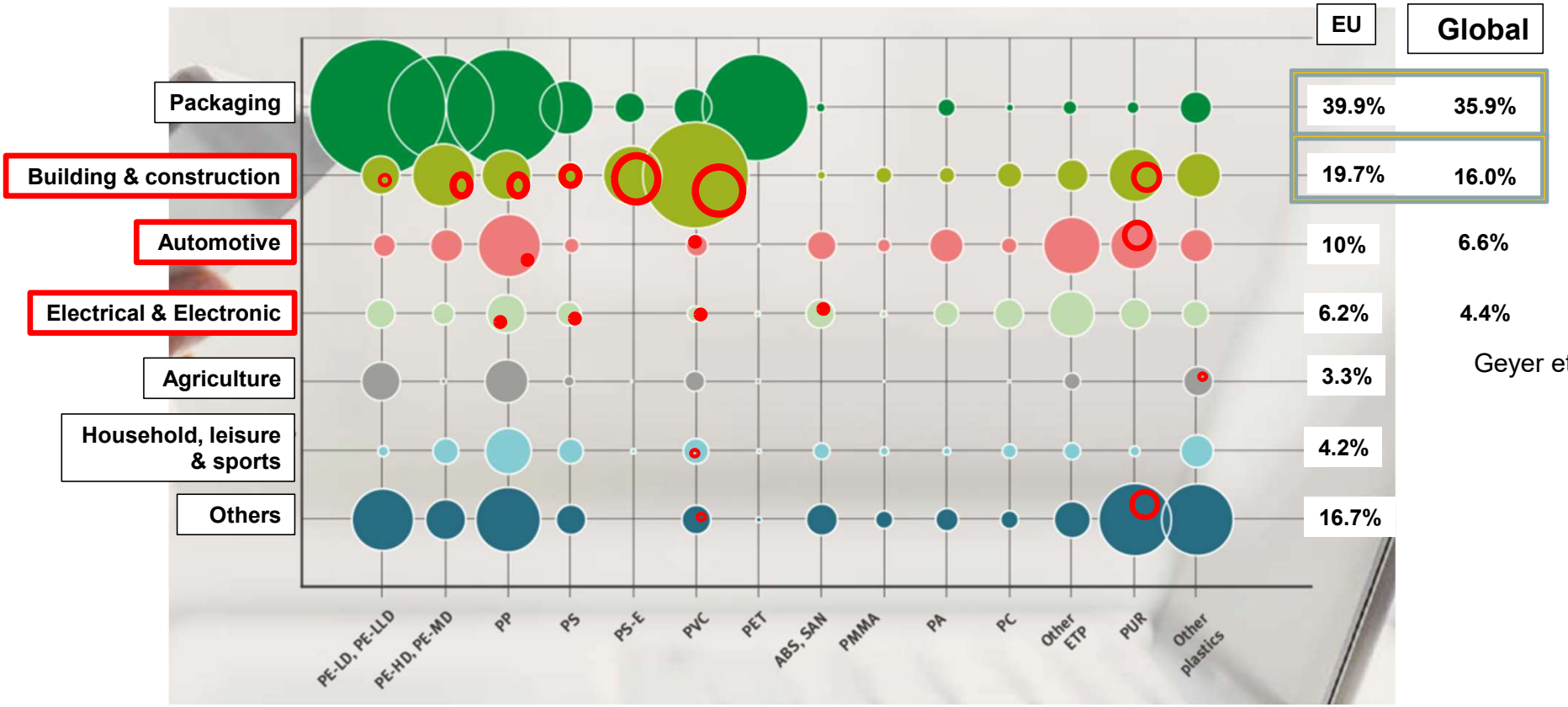
- **More than 50%** of **plastic stocks** are in electronics, transport & buildings and a part contains POPs.
- **Inventory and the right activities to managing POPs in major affected plastic use sectors can improve** the management **of plastics in these sectors** and **result in depollution of these plastics**.
- **Action plans on POPs and their implementation** can become an **excellent synergy** with the **upcoming Plastic Treaty**! **The POPs management in these sectors requires the overall management of these waste categories and the related plastics**.
- And we do not have a plastic treaty yet and it is not clear if it will become a strong treaty including chemicals. So for the time being the Stockholm Convention and the Basel Convention can fill this gap with ambitious action plans.



Geyer et al. (2017) 10.1126/sciadv.1700782
Reproduced by National Graphics (Issue June 2018)

Major plastics and their applications and link to POP plastic additives

- **Only a share of plastics** in **major use sectors** (EEE, transport, buildings) **contains POPs additives**.
- **For recycling**, the polymers in the major use sectors (here compiled for Europe) need to be separated.
- **POP/CoC use-frequency** often unknown – can be high as for EPS/XPS in buildings or low. Need analysis!



Geyer et al. (2017)

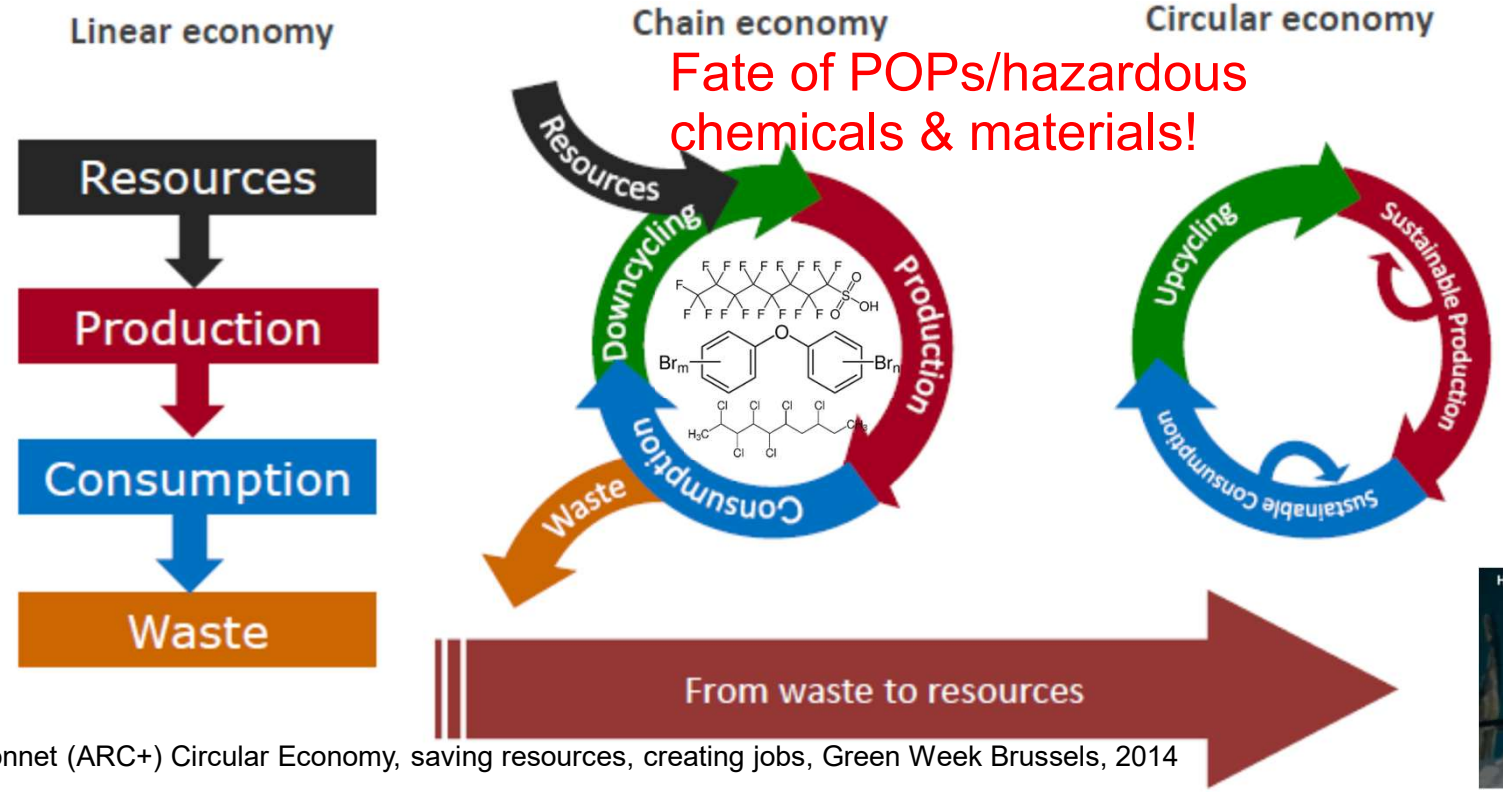
PlasticsEurope (2017) https://plasticseurope.org/wp-content/uploads/2021/10/2017-Plastics-the-facts.pdf

Please note: The **red circles** were added to the original figure and indicate that these polymers in these uses are known to partly contain POPs.

Need of elimination of hazardous chemicals for a Circular Economy

Considering the **waste & plastic crises and the limits of resources**, humanity needs to move to (a more) circular economy (stressed by UN Organisations, GEF, the EU and Plastic Treaty)

https://www.unep.org/news-and-stories/story/plastic-treaty-progress-puts-spotlight-circular-economy



Bonnet (ARC+) Circular Economy, saving resources, creating jobs, Green Week Brussels, 2014

United Nations Framework Convention on Climate Change

Convention on Biological Diversity

UN environment programme Global Framework on Chemicals

STOCKHOLM CONVENTION

BASEL CONVENTION

When moving to a (more) Circular Economy, then POPs and other chemicals of concern need to be controlled and phased out. Best within a **global approach** (BRS & Plastic Treaty).

Assessment and management of other chemicals of concern

- There are a **range of other chemicals of concern (CoC)** in e.g. **EEE/WEEE related to other MEAs** which can be addressed in a synergistic way **in integrated action plans and management**.
- This includes e.g., **F-gases** in **refrigerators/freezer and AirCon** which are **partly ODS and GHGs**.

Chemical of Concern	MEA; SAICM/GFC	Short description	Use in EEE	Relevance
Heavy metals (e.g., Hg, Pb, Cd, Hg, Sb)	GFC, Minamata Convention, **UNEA**	Toxic metals, neurodevelopmental disorder	Used in a variety of EEE products	**High**
BFRs	GFC, ECHA	Many BFRs are PBTs	Flame retardants	**High**
Polycyclic aromatic hydrocarbon (PAHs)	UNECE LRTAP Convention	Many PAHs are carcinogenic, mutagenic, or toxic for reproduction	Unintentional trace contaminants in black plastics and rubber parts;	Medium
All other PFASs (not POPs)	GFC Issue of concern	very persistent, very mobile (compounds or degradation product)	FR(PFBS); NIAS in fluoropolymers (thermal degradation products)	Medium
Phthalates	GFC Issue of concern	Certain phthalates are EDCs and reprotoxic	Plasticiser in cables and other plastic parts (mainly PVC)	Medium
Halogenated OPFR	GFC Issue of concern	Certain halogenated OPFR are carcinogen or toxic for reproduction	Major flame retardants in casings and other plastic parts	Medium
Asbestos	Rotterdam Conv. Annex III	Classified as carcinogenic to humans	Electrical panels, wire insulation, cable wrap and electrical paper	Medium
CFCs, HCFCs, HFCs	Montreal Protocol; UNFCCC	Ozone depleting substances; GHG	Refrigerants in air conditioner, cooling equipment; heat pumps	**High**
Plastics	Plastics Treaty; Basel Convention	Environmental/marine pollutant; haz. additives; source open waste burning	Casings, cables, printed circuit boards and others	**High**

United Nations Framework Convention on Climate Change

STOCKHOLM CONVENTION

BASEL CONVENTION

MONTREAL PROTOCOL

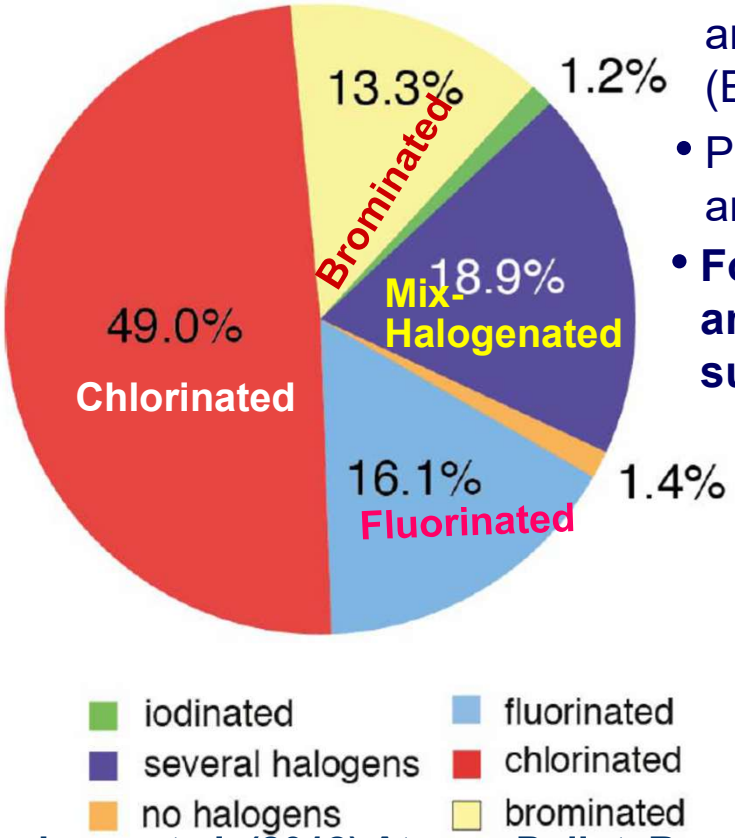
MINAMATA CONVENTION ON MERCURY

UNEP (2024) Sectoral guidance for inventory of POPs and other CoCs

How many potential POPs are in use?

Approx. 100,000 chemicals in chemical databases have been scientifically evaluated according to the POP criteria in Annex D of the Stockholm Convention, with the following results:

574 Potential POPs



Scheringer et al. (2012) Atmos. Pollut. Res. 3, 383–391.

- Today many chemicals in use have POPs-like/PBT properties and many of them are used in consumer goods often in plastics (EEE, cars, buildings, furniture, textiles, synthetic carpets).
- PBTs in products pose a risk for human health, the environment and the recycling/recovery flows.
- **For an improvement of the situation, chlorinated, brominated and fluorinated PBTs need to be managed and systematically substituted with green & sustainable alternatives (Action Plan).**

STOCKHOLM CONVENTION

UN environment programme Global Framework on Chemicals

saicm

https://wedocs.unep.org/items/7b58b5e6-25f9-4a5a-b512-37f7cfc2f6e6

How many chemicals of concern are used/present in plastics?

IPCP prepared for UNEP in 2023 the report "*Chemicals in plastics – A Technical Report*" with following key findings:

- >13,000 (update 16325) chemicals are present in plastics (5,776 additives, 3,498 processing aids, 1,975 starting substances & 1,788 non-intentionally added substances).
- >3,200 (update 4200) are chemicals of potential concern (with certain hazard properties considering GHS/CLP).
- Need of sustainable alternatives for clean material cycles.

Available online at www.sciencedirect.com
ScienceDirect
Current Opinion in Green and Sustainable Chemistry
ELSEVIER
https://doi.org/10.1016/j.cogsc.2021.100513

Enabling a circular economy for chemicals in plastics

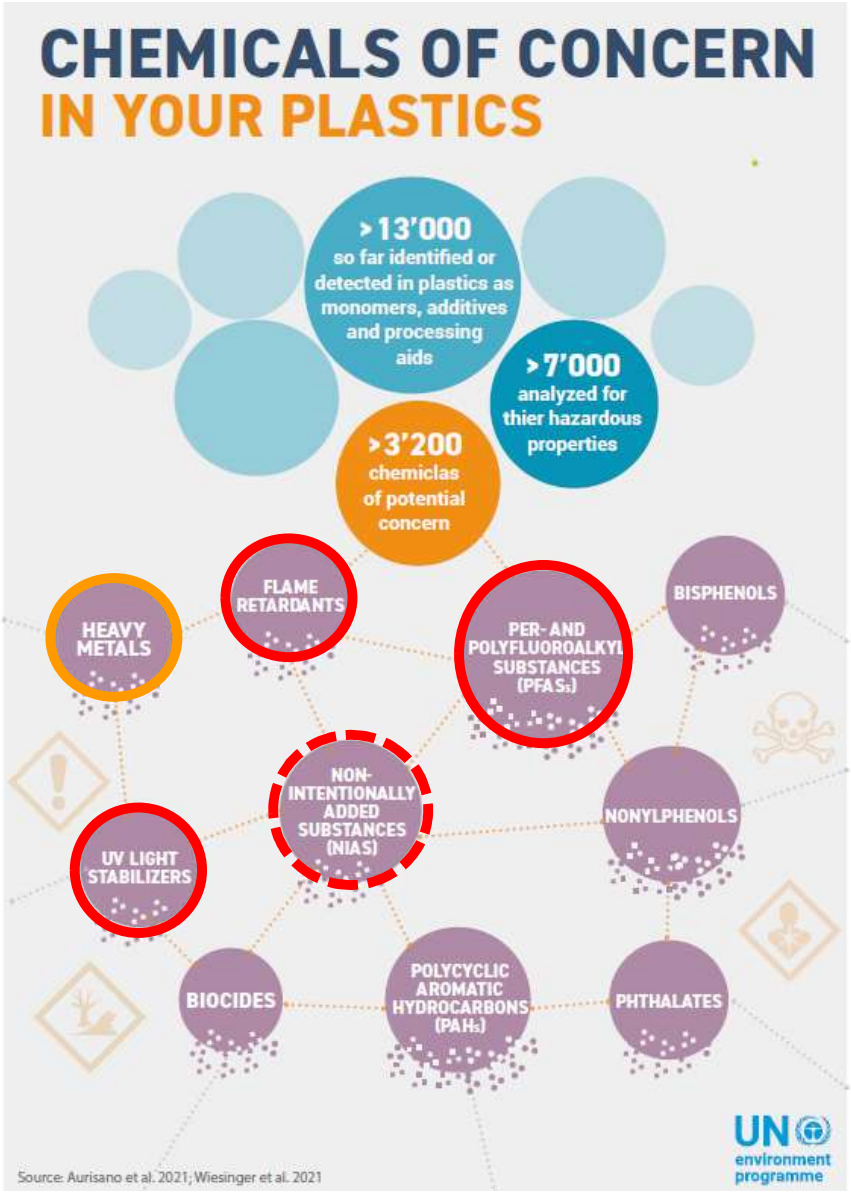
Nicolò Aurisano[1], Roland Weber[2] and Peter Fantke[1]

Deep Dive into Plastic Monomers, Additives, and Processing Aids
Helene Wiesinger,* Zhanyun Wang,* and Stefanie Hellweg
https://doi.org/10.1021/acs.est.1c00976
Environmental Science & Technology

Analysis
https://doi.org/10.1038/s41586-025-09184-8

Mapping the chemical complexity of plastics

L. Monclús[1,2]✉, H. P. H. Arp[1,2], K. J. Groh[3], A. Faltynkova[1], M. E. Løseth[2], J. Muncke[4], Z. Wang[5], R. Wolf[2], L. Zimmermann[4] & M. Wagner[1]✉

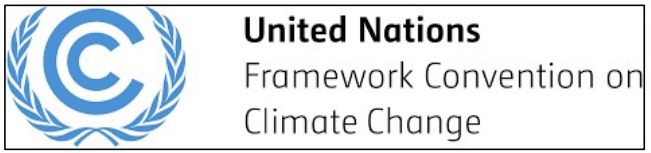


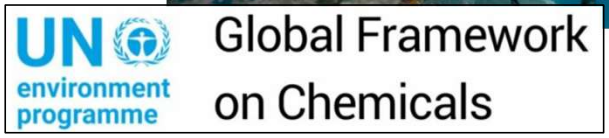
Action Plan consideration: Waste management and resource management

- **The direct exposure risk from POPs in stored or transported plastic waste is relatively small (<<PCB s or pesticides). Therefore the waste plastics containing POPs need not necessarily be categorized as hazardous waste (e.g. HBCD in EPS in Germany).**
- An aim of the SC BAT/BEP guidance is to separate POPs-containing plastic fraction for ESM and to facilitate the recycling of non-impacted plastic materials (please see BAT/BEP).

An action plan for POPs plastic additives should be a basis for:

- An environmentally sound management of POPs impacted plastics in the major affected sectors.
- **The recycling and recovery of non-impacted plastics** and polymer fractions in these sectors and that the recycled materials do not lead to exposure of recyclers and consumers (**no recycling into sensitive uses since the separation is never perfect**; see SC PBDE BAT/BEP guidance).
- **Support the overall waste management and recycling** of these major waste categories (WEEE, ELVs, CDW), to prevent contaminated sites and remediate contaminated sites already present.



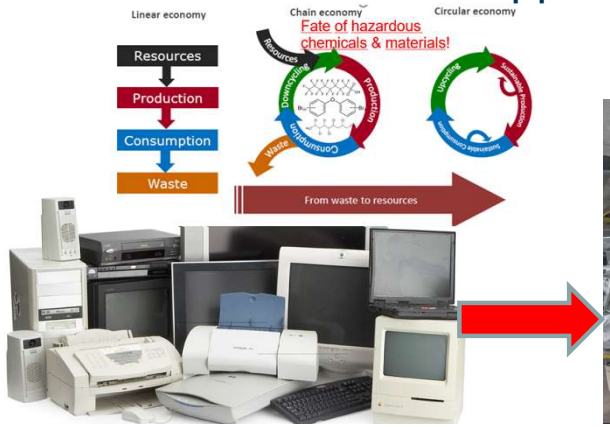


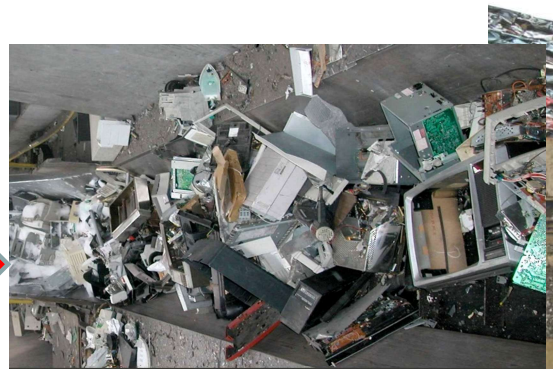
1. Regulatory framework for POP-BFRs and other POPs plastic additives and impacted product/waste categories

Objective: Established regulatory frame for management of POP-BFRs, UV-328, Dechlorane Plus, and related articles and waste categories including robust financing.

Recommended activity options:

- Inclusion of PBDEs, PBB, HBCD, UV-328, and Dechlorane Plus in the list of banned or restricted substances. Consider needed exemptions when restricting these POPs.
- Assessment of regulatory framework for these substances and the products and waste sectors containing these substances (WEEE, ELV and CDW) and need of improvement.
- Set low POP content limits and unintentional trace contaminant limits for POP-plastic additives.
- **Assessment of the flame retardant strategy** of the EU/ECHA to regulate certain chemicals as a group and assess the possible usefulness of the approach for the country.





1. Regulatory framework for POP-BFRs and other POPs plastic additives and impacted product/waste categories

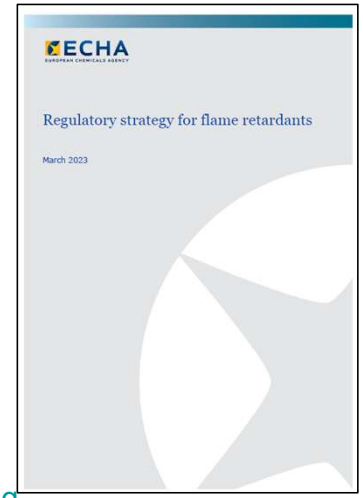
Some background information on the recommended activity options:

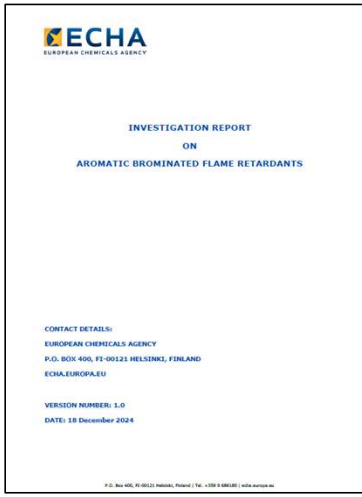
- **Assessment of the flame retardant strategy of the EU/ECHA to regulate certain chemicals as a group and assess the possible usefulness of the approach for the country.**

Background: 03/2023 ECHA published regulatory strategy for flame retardants.

12/2024, ECHA published **a report on aromatic brominated flame retardants (ABFR),** highlighting that the use in articles poses significant environmental risks, as ABFRs exhibit PBT properties or are vPvB. The report also noted that some alternatives to ABFR, including organophosphorus flame retardants (OPFR), may present hazardous characteristics for human health and the environment.

- The EU Commission has now given ECHA a dual mandate:
  - **Preparation of a restriction dossier on all non-polymeric additive aromatic BFR.**
  - Preparation of an investigation report on organophosphorus flame retardants (OPFR) and other flame retardants. Report expected (12/2026).

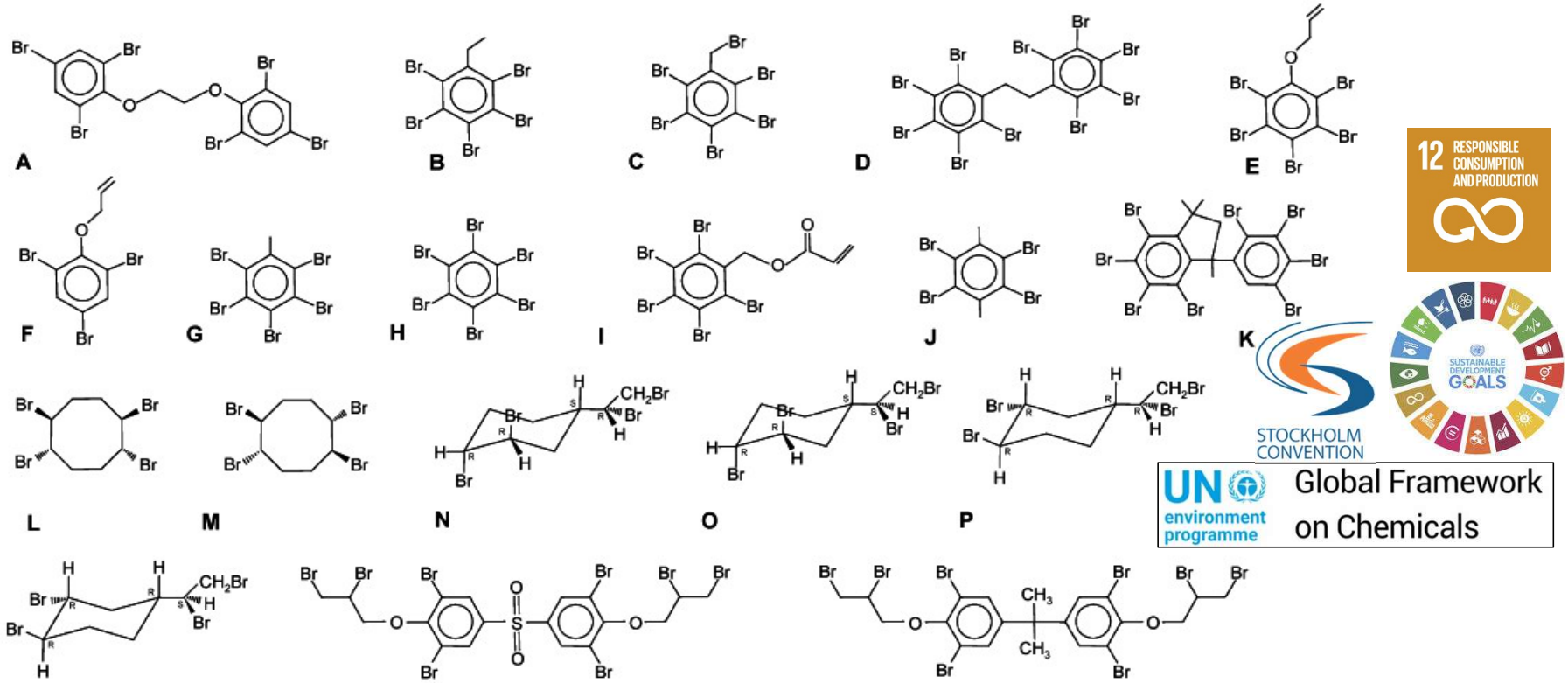


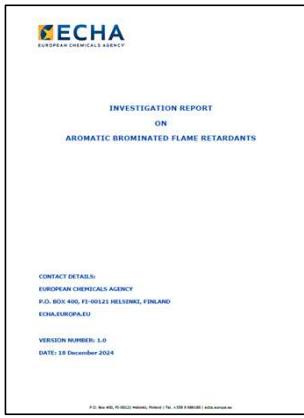


https://echa.europa.eu/de/-/echa-identifies-certain-brominated-flame-retardants-as-candidates-for-restriction
https://echa.europa.eu/documents/10162/17233/rest_aromatic_brominated_flame_retardants_investig

Other Brominated Flame Retardants (BFRs)

- Approx. 75 BFR on the market as alternatives (Fisk et al 2003).
- Many of them are persistent polybrominated aromatic chemicals
- The European Chemical Agency: “Regulatory Strategy for Flame Retardants” aim to restrict all aromatic BFR additives https://echa.europa.eu/de/-/echa-identifies-certain-brominated-flame-retardants-as-candidates-for-restriction





Structures of BFRs addressed by Gauthier (Gauthier, Potter *et al.* ES&T 2009)

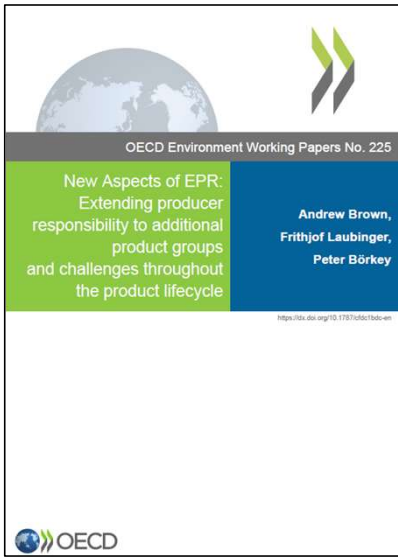
1. Regulatory framework for POP-BFRs and other POPs plastic additives and impacted product/waste categories

Objective: Established regulatory frame for management of POP-BFRs, UV-328, Dechlorane Plus, and related articles and waste categories **including robust financing.**

Background: Sustainable financing is essential for environmentally sound management of waste. One of the main instruments is extended producer responsibility (EPR).

Recommended activity options:

- **Development of regulatory frames of POPs-containing products and wastes considering EPR.**
  - Development of regulatory frame for EEE/WEEE considering EPR (see e.g. EU WEEE Directive; Regulations in Ghana).
  - Development of a regulatory frame for vehicles considering EPR (importation, ELV management; e.g. EU ELV Directive).
  - Development of regulatory frame for the construction sector considering including EPR (see OECD document; EU docs).
- We invited today Mr. Alexander Batteiger the Head of Global Action Partnership for EPR @OECD, who will give some insights on international EPR activities and support options.



2. Refining of the inventory for POPs plastic additives, other CoCs, and resources of related major products and wastes

Objective: Robust inventory of the use of POPs plastic additives (PBDEs, HBCD, Dechlorane Plus, UV-328) and the stock and wastes of related products with appropriate databases for information management and for waste management planning.

Recommended activity options:

Develop or refine sectoral inventories considering all relevant POPs, other chemicals of concern and major resources for circular economy:

- Inventory of the current production & use of POPs plastic additives (UV-328, DP, DecaBDE, ABFRs)
- Refine inventory for POPs, other CoCs and resources in EEE/WEEE (dynamic MFA/SFA).
- Refine inventory for POPs, other CoCs and resources in vehicles (dynamic MFA/SFA).
- Develop inventory for POPs in buildings & construction (POP plastic additive and POP in wood) as well as other CoCs and resources (dynamic MFA/SFA).
- Assess the need of POPs inventory in other (minor) uses (e.g. textiles, furniture) depending on flammability standards.
- Data management for stocks and waste containing POPs, plastics and resources.

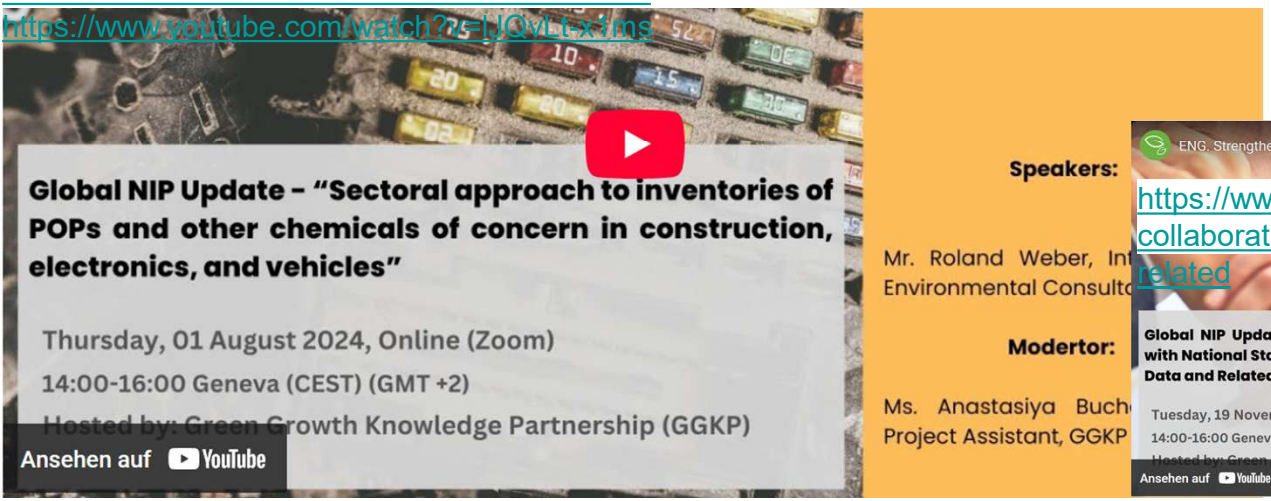
2. Refining of the inventory for POPs plastic additives, other CoCs, and resources of related major products and wastes

Objective: Robust inventory of the use of POPs plastic additives (PBDEs, HBCD, Dechlorane Plus, UV-328) and the stocks and wastes of related products and resources with appropriate databases for information management and for waste management planning.

- **Recorded GGKP webinar on Sectoral Approach to inventories of POPs and CoCs**.
- **Recorded GGKP webinar** on the methodology to address gaps in POP data and statistical offices.

https://www.greenpolicyplatform.org/webinar/sectoral-approach-inventories-pops-and-other-chemicals-concern-construction-electronics-and

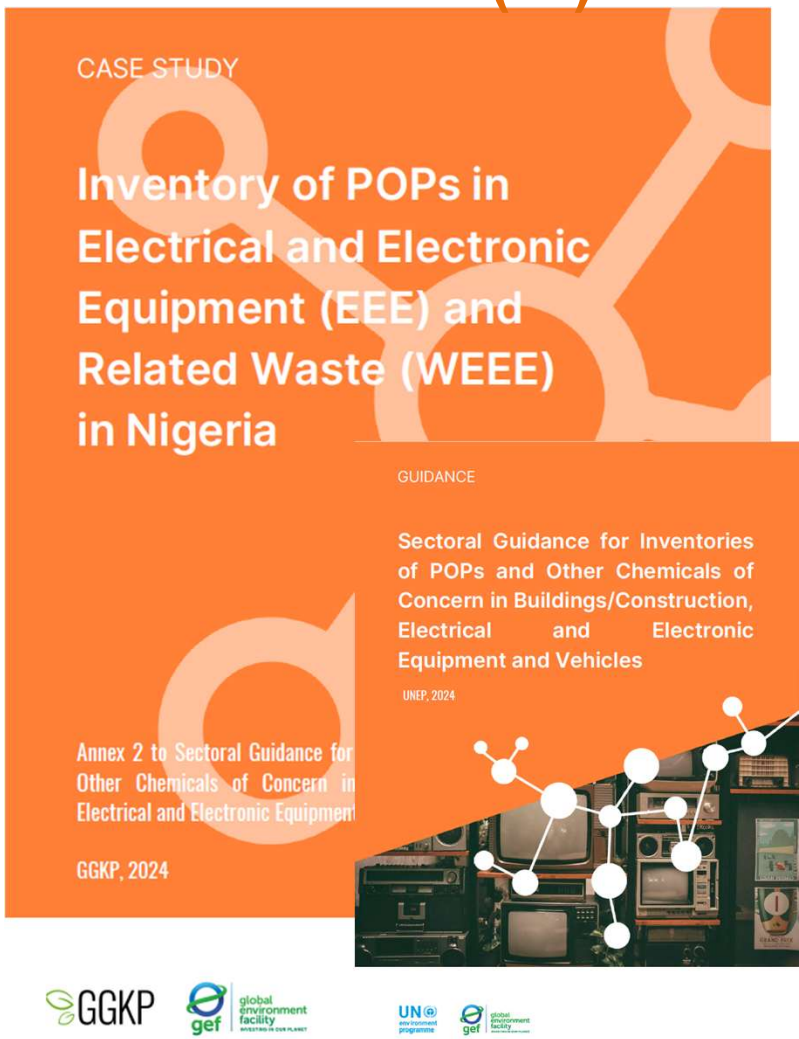
https://www.youtube.com/watch?v=IJQvLt-x1ms



https://www.greenpolicyplatform.org/webinar/strengthening-collaboration-national-statistical-offices-address-gaps-pops-data-and-related

Inventory Case Study Annexes Sectoral POPs Guidance: (W)EEE

Annex 2: Inventory of POPs in Electrical and Electronic Equipment (EEE) and Related Wastes (WEEE) in Nigeria[1]



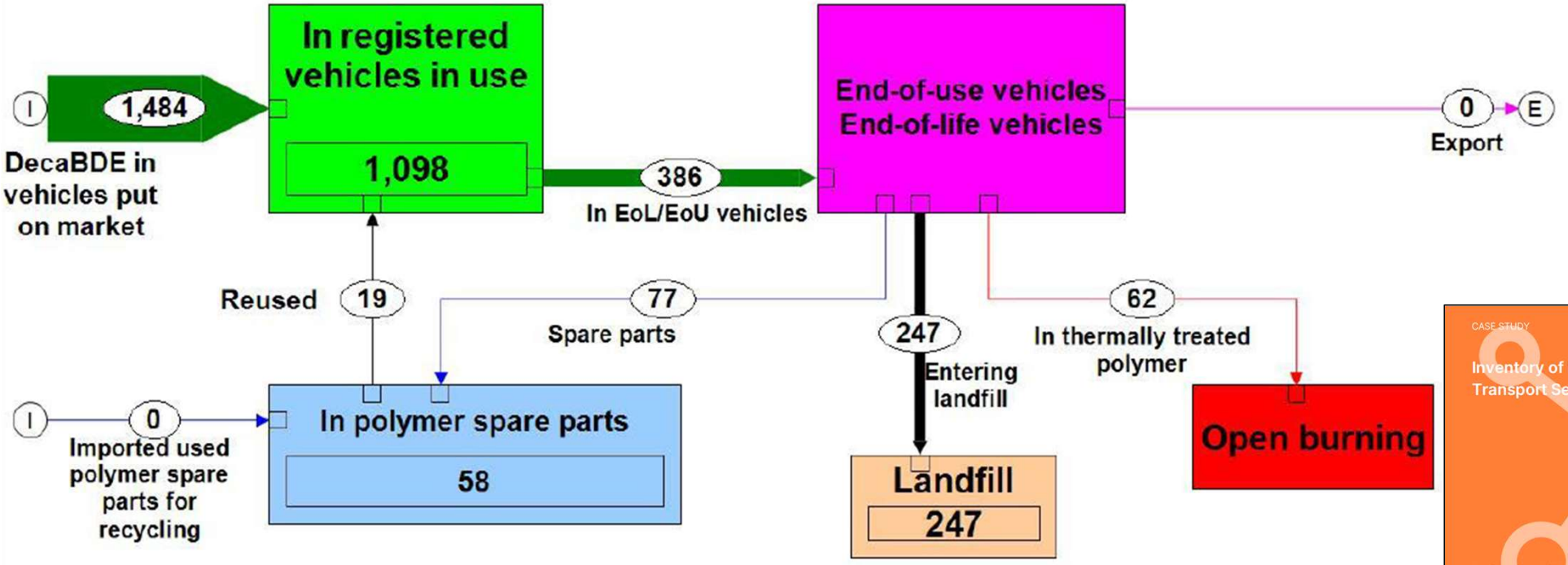
https://www.greenpolicyplatform.org/case-studies/inventory-pops-electrical-and-electronic-equipment-eee-and-related-waste-

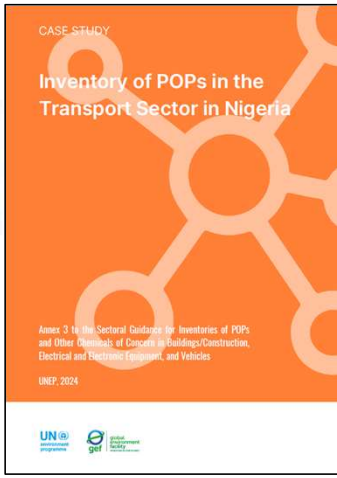
Annex 3[1]: INVENTORY OF POPs IN THE TRANSPORT SECTOR IN NIGERIA

https://www.greenpolicyplatform.org/case-studies/inventory-pops-transport-sector-nigeria

Inventory Case Study Annexes Sectoral POPs Guidance: Transport

- **The dynamic Substance Flow Analysis showed that the largest share of decaBDE in Nigeria's transport sector was still in registered vehicles (1098 t; 74%) in use in the inventory year 2020.**
- In the waste stream it is estimated that most of ELV plastics/textiles containing decaBDE entered landfills (64%) followed by the reuse in spare parts (20%) and open burning (16%).

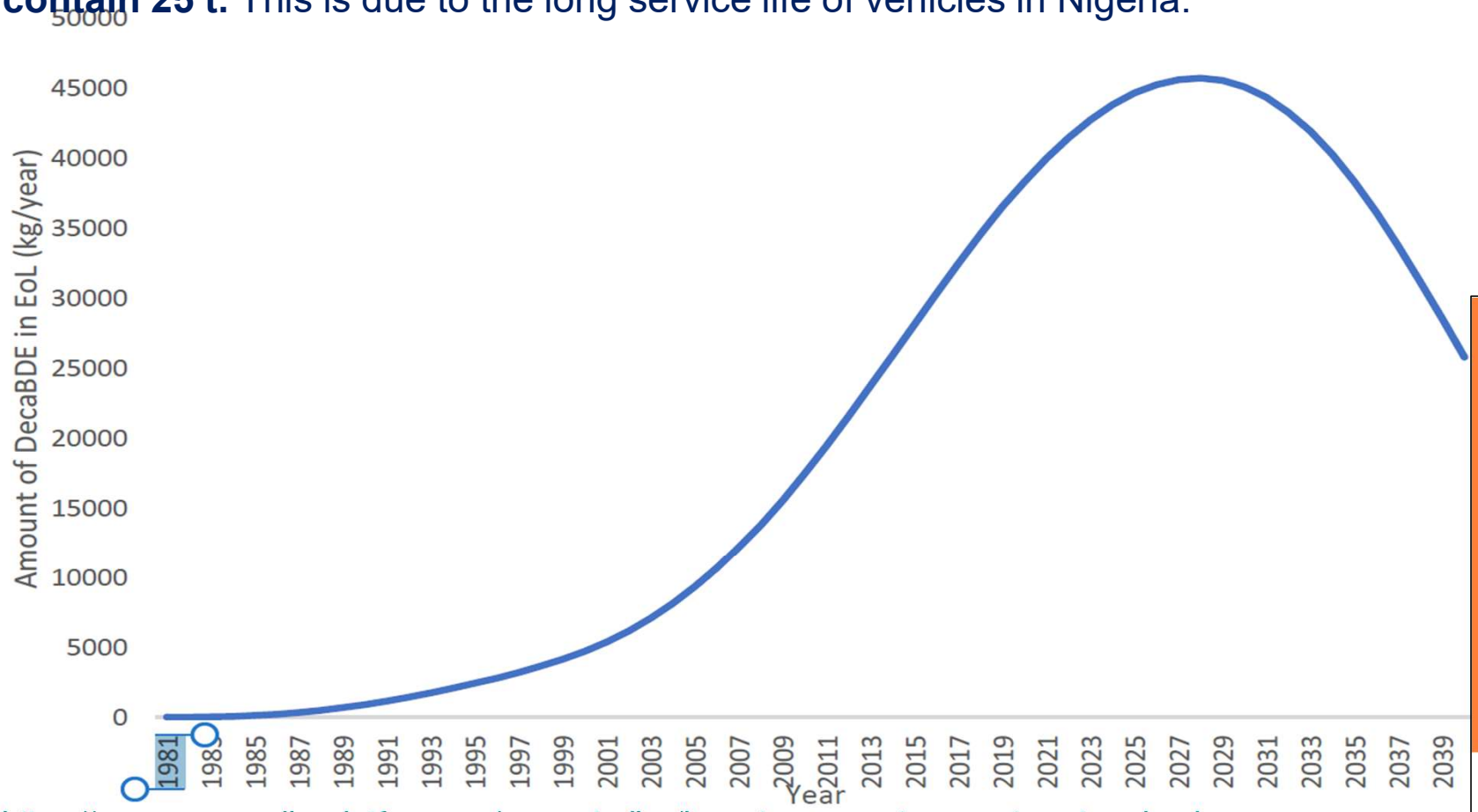




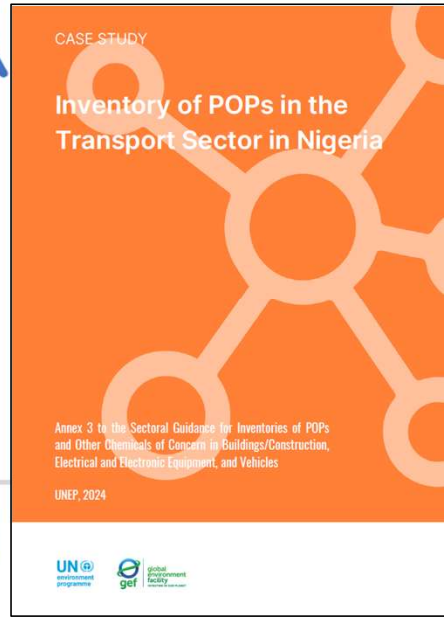
https://www.greenpolicyplatform.org/case-studies/inventory-pops-transport-sector-nigeria

Inventory Case Study Annexes Sectoral POPs Guidance: Transport

The **dynamic SFA** also revealed that the peak decaBDE in Nigeria's vehicles that reach their end of life is **in 2028 with approximately 46 tonnes**. The amount of **decaBDE in ELVs in 2040 is estimated to still contain 25 t.** This is due to the long service life of vehicles in Nigeria.



https://www.greenpolicyplatform.org/case-studies/inventory-pops-transport-sector-nigeria



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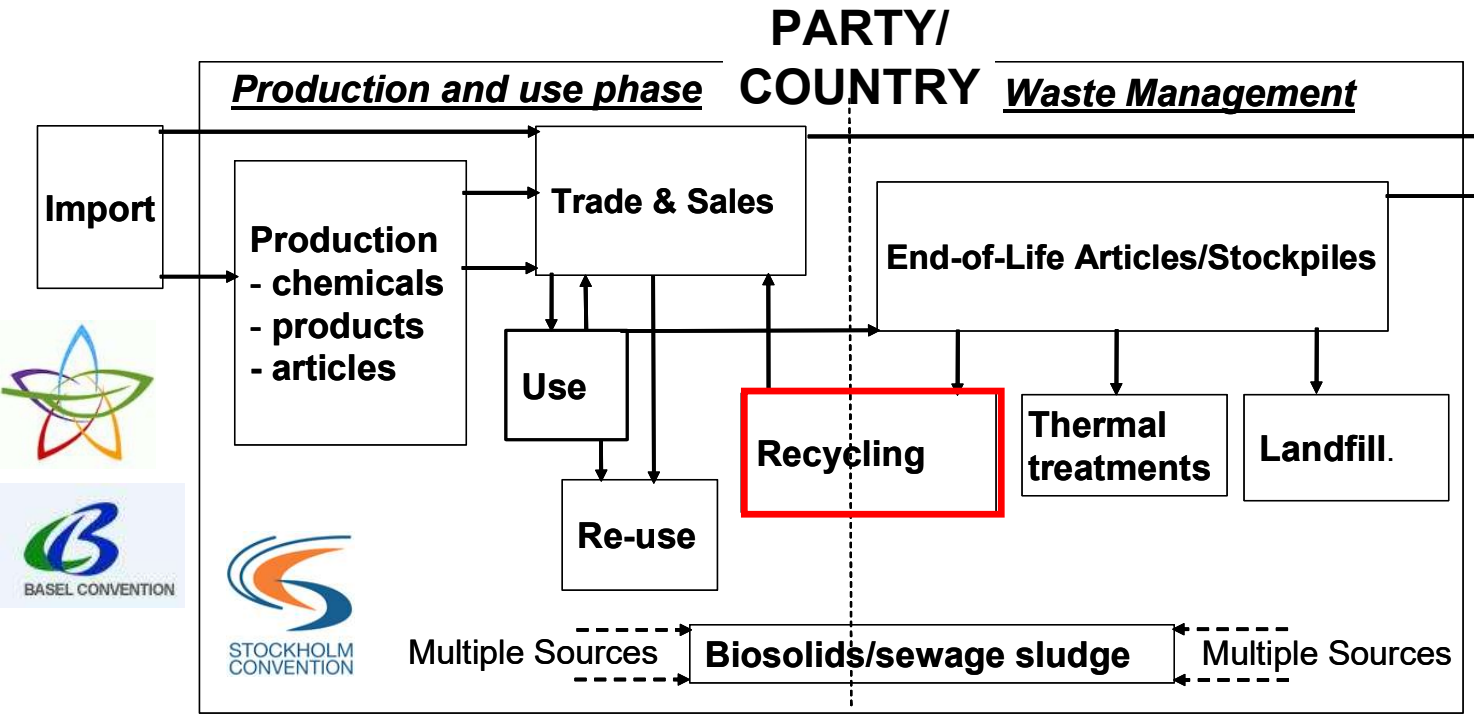
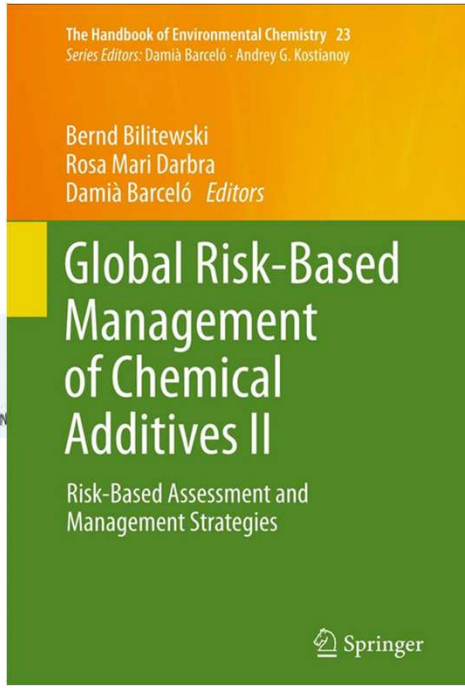
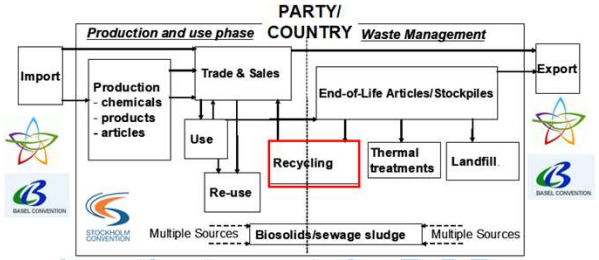
- **Action plans should address POP plastic additives and other EoC** in products along the entire life cycle.
- Control should start with import (synergy Rotterdam; **but challenges to control POPs in products**) and production and end with waste management and recycling.





EU research project RiskCycle

3. Life cycle management of stocks and waste in major sectors that contain POPs-plastic additives (1)



Objective: Sound Life Cycle Management of product and waste categories that contain POPs plastic additives (EEE/WEEE, ELVs, CDW, and possibly textiles, furniture et al.) established.

Recommended activity options:

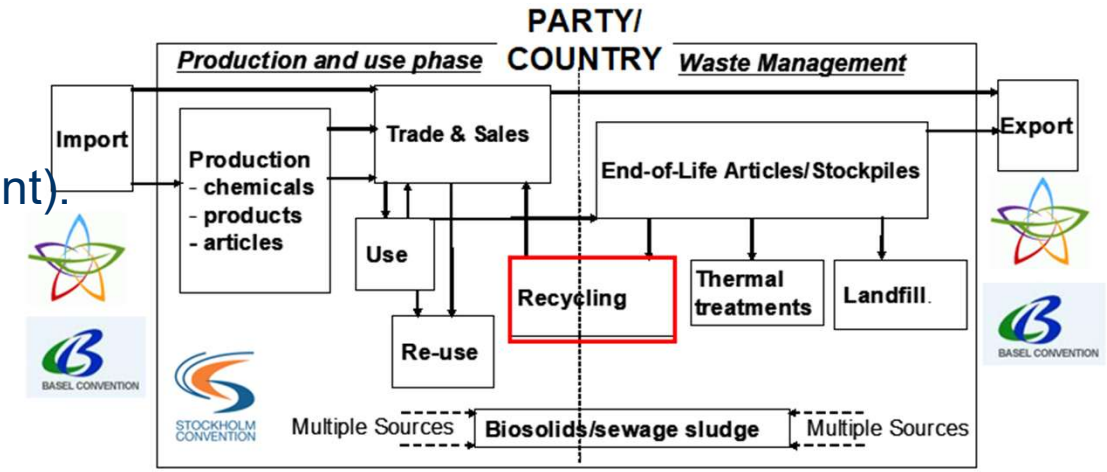
- Compilation of information on the management of products and waste containing POPs in major sectors, and the fate of these POPs and other pollutants.
- **Assessment of recycling and separation options for POP impacted plastic products** and waste categories and possible integration in a general plastic management/recycling strategy.
- **Assessment of the management and destruction options** for waste plastics of major waste categories that contain POPs (WEEE, ELV, and CDW) in the county and the region.
- **Environmentally sound management** of POP/CoC containing **plastics & other polymer in WEEE including financing**, collection, treatment according to waste hierarchy, within the frame of **hazardous substance and resource management** throughout the life cycle of EEE.
- **Environmentally sound management** of POPs/CoC containing **plastics & other polymers** in **ELVs**, including financing, collection and treatment according to the waste hierarchy, within the frame of **hazardous substance and resource** management of vehicles.

3. Life cycle management of stocks and waste in major sectors that contain POPs-plastic additives (2)

Objective: Sound Life Cycle Management of product and waste categories that contain POPs plastic additives (EEE/WEEE, ELVs, CDW, possibly textiles, furniture et al.) established.

Recommended activity options:

- ESM of **POP-containing plastic and other polymer in construction and demolition waste (CDW) within the larger frame of** hazardous substance & resource management in **CDW**.
- ESM of **POP-containing plastic/polymer in other uses found relevant in the country** (e.g. textiles, leather, furniture, mattresses).
- **Environmentally sound disposal of POP-containing plastic waste** (best linked to a larger national strategy of plastic management).



3. Life cycle management of stocks and waste in major sectors that contain POPs-plastic additives (2)

Objective: Sound Life Cycle Management of product and waste categories that contain POPs plastic additives (EEE/WEEE, ELVs, CDW, possibly textiles, furniture et al.) established.

Guidance documents for managing POPs-containing plastics

- Within the Basel Convention a Technical Guidance on the environmentally sound management of plastic wastes have been published. https://www.basel.int/Portals/4/download.aspx?d=UNEP-CHW-WAST-GUID-ESM-PlasticWastes-20230512.English.pdf
- Within the Stockholm Convention a BAT/BEP guidance relevant to PBDEs and DP has been developed in which separation of POP-BFR and POP-CFR plastic additives is described https://www.pops.int/Implementation/BATandBEP(new)/IntentionalPOPsreleases/BATandBEPGuidance/tabid/9644/Default.aspx

Full scale WEEE plastic recycling plants with POP separation

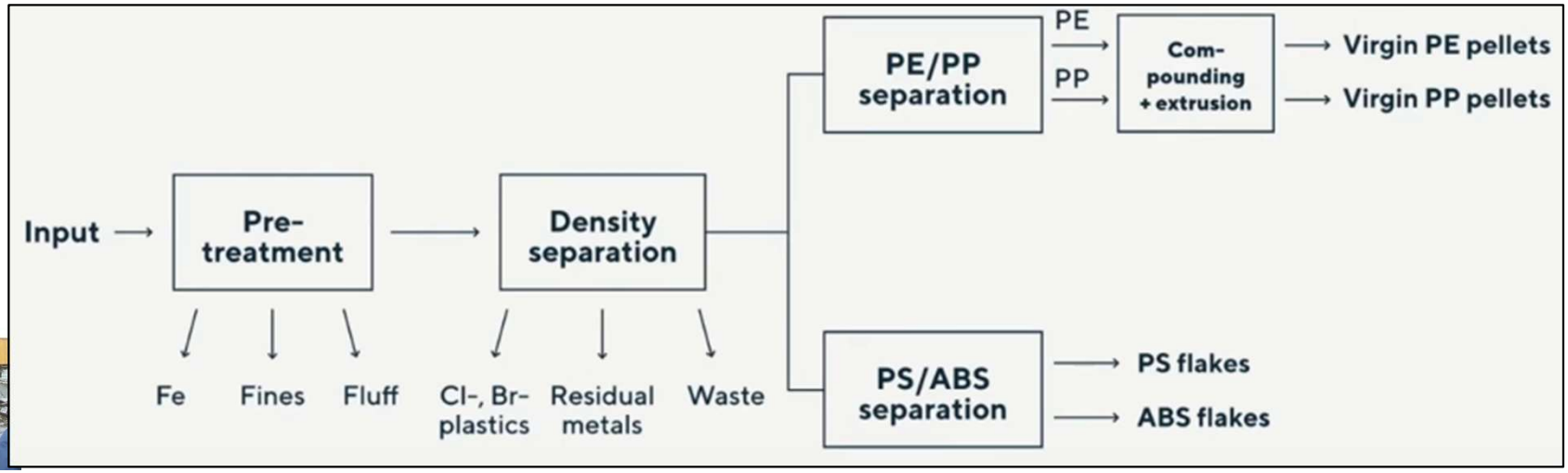
A range of recycling plants for WEEE plastic are operating full scale since several years, They can separate POPs/BFRs/CFR containing plastic and separate polymers to produce recyclates.

WEEE input (country)	Separation techniques	Polymers Separated	Quality of sep.polymers	PBDE/BFR/DP/CFR Elimination*	Reference
Mixed plastic from WEEE (Austria, China)	Not disclosed	Low-BFR types of ABS, HIPS and PP	Good (Customer specified)	Yes; BFR fraction incinerated	MBA Polymers (2012) & MGG Polymers (2018)
Small EEE, White goods (Switzerland)	Includes XRT	BFR and PVC free polymers	Good	Yes	RUAG Technology (2012)
WEEE plastics (UK)	Undisclosed	Low-BFR types of ABS and HIPS	Good	Yes	Morton (2007)
WEEE plastics (Austria, Germany)	Undisclosed (incl. S/F and Electrostatic)	Low-BFR types of PP, ABS, HIPS	Good	Yes	Bage Plastics GmbH (2012, 2020)
WEEE plastics (The Netherlands)	Undisclosed (incl. S/F& Electrostatic)	Low-BFR types of PP, ABS, HIPS	Good	Yes	CloseWEEE (2017) Coolrec
WEEE plastics (Sweden)	Undisclosed (incl. S/F& Electrostatic)	Low-BFR types of PP, ABS, HIPS	Good	Yes	NONTOX (2020)
WEEE plastics	Undisclosed (incl.	Low-BFR types of	Good	Yes	NONTOX (2020)

Full scale recycling plants for separating POPs containing plastics

- In Europe some full- scale facilities have been developed which can separate different types of plastic from ELVs. The major company is Galloo (BE) or WIPAG/MOCOM (DE).
- The company Ad Rem which provided the technology for the Galloo plant, is exporting their treatment system for end-of-life vehicles and separation of shredded waste (e.g. Japan).
- In these plants, sink & float technology is used to separate the brominated, chlorinated and fluorinated plastic fraction which are disposed (e.g. incinerated). Non/low-impacted plastics which are separated by sink float to a PE, PP fraction and a HIPS/ABS fraction which are further separated by other technologies.

Simplified recycling scheme for separation of plastics from ELV and WEEE engineered by Ad Rem https://www.youtube.com/watch?v=NfGHfeh3Piw

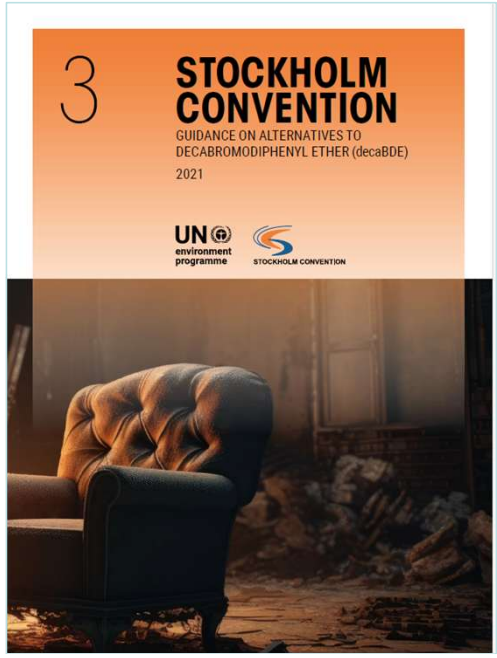


4. Assessment and selection of alternatives to POP plastic additives (1)

Objective: Alternatives for POP plastic additives in exempted uses are assessed by a science-based approach and are substituted by the most sustainable chemical & non-chemical solution.

Recommended activity options:

- Compilation of information on more sustainable chemical alternatives to POPs plastic additives (considering BRS guidance documents, activities of POPRC; UNEP BAT/BEP guidance).
- Compilation of information on non-chemical alternatives (e.g. alternatives to EPS insulation; SC BAT/BEP guidance; POPRC docs).
- Education and capacity building on alternatives assessment.
- Selection of the most sustainable/green alternative chemicals and non-chemical solutions in the different uses.
- Phase in of sustainable chemicals and non-chemical alternatives.



Education and capacity building on alternatives assessment

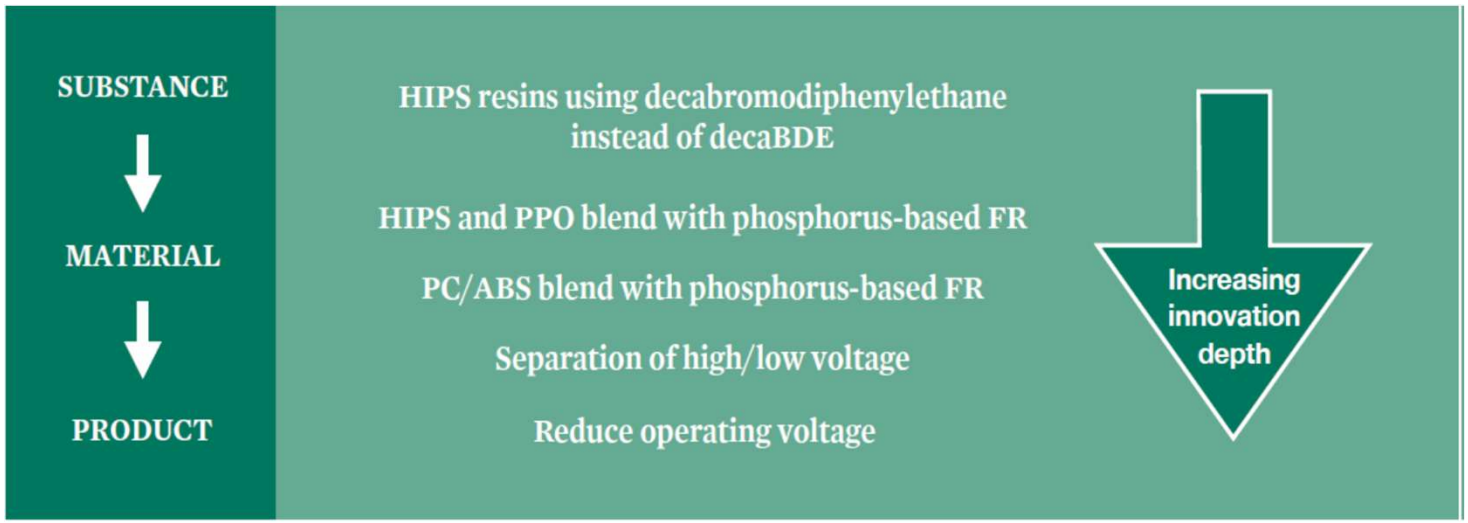
Substitution of DecaBDE in Plastics of Electronics

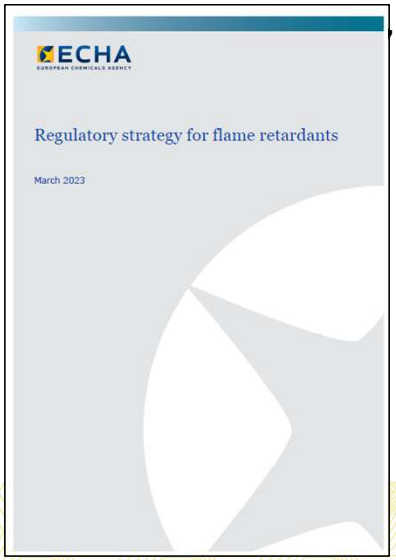
Substitution can take place at three levels:

A. Flame Retardant Substitution: This approach involves identifying a drop-in chemical substitute for the DecaBDE (e.g. DBDPE but it is vPvB & SVHC).

B. Resin/Material Substitution: This approach involves changing the resin and changing the chemical used as the flame retardant.

C. Product Redesign: This approach involves changes to the actual product design to minimize or eliminate the need for flame retardant chemicals (e.g. barrier material; heat source reduction like reduced operation voltage).





Education and capacity building on alternatives assessment

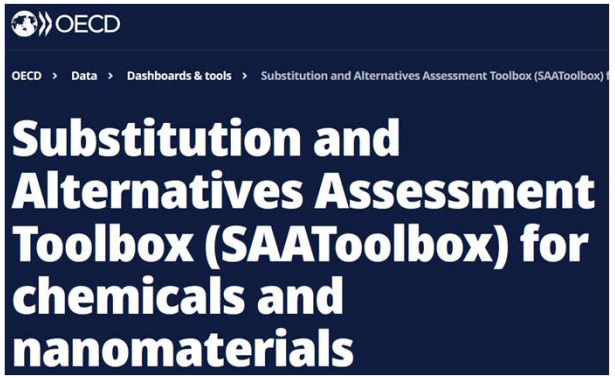
Current and recommended substitution practice to avoid regrettable substitutes

Current practice		Recommended practice
Voluntary, some producers	Phase-out agreement	Binding, cross-sector, global
Known, similar substances	Inventory of alternatives	Structurally different substances
Incomplete assessment	Assessment of alternatives	Complete assessment incl. life cycle impacts
Incremental substitution	Selection of alternatives	Fundamental substitution
No or slow phase-out	Phase-out implementation	Effective phase-out

From incremental to fundamental substitution in chemical alternatives assessment http://dx.doi.org/10.1016/j.scp.2015.08.001

Peter Fantke [a], Roland Weber [b], Martin Scheringer [c,d,*]

https://www.subsportplus.eu/EN/Home/Home_node



https://www.oecd.org/en/data/tools/substitution-and-alternatives-assessment-toolbox-for-chemicals-and-

4. Assessment and selection of alternatives to POP plastic additives (2)

Objective: Alternatives for POP plastic additives in exempted uses are assessed by a science-based approach and are substituted by the most sustainable chemical & non-chemical solution.

Recommended activity option:

- **Science based assessment** if any **exemption for the use of POP plastic additives is needed**.
- **Notification of the BRS Secretariat /COP** on the **needed of exemption** with the **appropriate information** (What exemption(s), estimated quantity of production/use, Purpose of production / use, reason for exemption).
- **Periodic review** to **assess the need for continued exemptions and assess alternatives**. **Stop exemption and use by more sustainable alternatives as soon as feasible**.

https://chm.pops.int/Implementation/Exemptions/SpecificExemptions/DecabromodiphenyletherRoSE/tabid/7593/Default.aspx
https://chm.pops.int/Implementation/Exemptions/SpecificExemptions/DechloranePlus/tabid/10238/Default.aspx
https://chm.pops.int/Implementation/Exemptions/SpecificExemptions/UV328/tabid/10277/Default.aspx

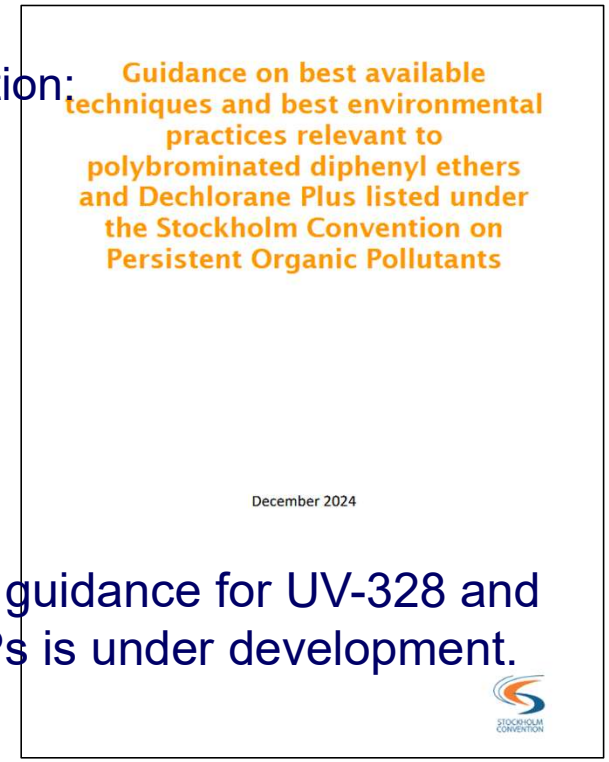
5. Application of BAT/BEP in exempted uses of POPs plastic additives

Objective: BAT/BEP is applied if exempted POPs are used (possibly e.g. DecaBDE, UV-328, MCCP, UV-328, DP) and release and exposure is minimized.

Recommended activity options:

- Define and implement BAT/BEP for production of POP plastic additives including release limits and develop related control of production, releases and waste.
- Apply BAT/BEP for exempted uses of POPs plastic additives in production:
  - For DecaBDE in plastic in vehicle spare parts (and others)
  - Dechlorane Plus in exempted use
  - UV-328 in exempted uses
- **Possibly labelling** of new products containing exempted POPs.

Please note: Alternatives for almost all uses are available for POPs plastic additives DecaBDE, DP and UV-328. (For exempted uses of MCCP see action plan for SCCP/MCCP)



BAT/BEP guidance for UV-328 and for MCCPs is under development.

International Labour Organization

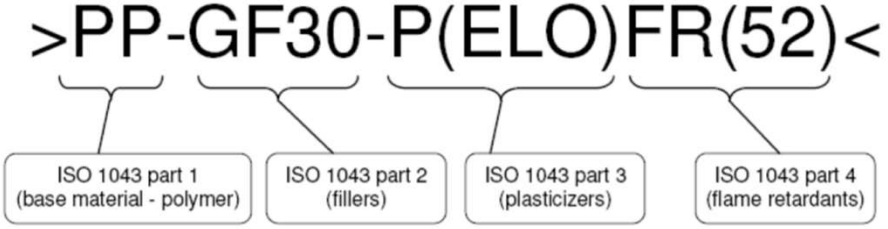
STOCKHOLM CONVENTION

UN environment programme Global Framework on Chemicals

5. Application of BAT/BEP in exempted uses of POPs plastic additives
ISO standard for labelling of plastic – option to label POPs in plastic

- **ISO standards have been developed for labelling of plastics (ISO 11469)** based on definitions in the ISO 1043 series (see Table).
- The ISO 1043 series consists of 4 standards (see Table):
  - **Part 1 on polymers** (ISO 1043-1, 2011),
  - **Part 2 on fillers and reinforcing** (ISO 1043-2, 2011),
  - **Part 3 on plasticizers** (ISO 1043-3, 2016) and
  - **Part 4 on flame retardants** (ISO 1043-4, 2021)

Example of a plastic marking according to ISO11469 (Tecchio et al. 2018)



Tecchio et al. (2018) Procedia CIRP, 69, 716-721.

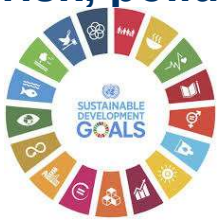
ISO Standard	Title/content
ISO 11469:2016	Plastics — Generic identification and marking of plastics products
ISO 1043-1:2011	Plastics – Symbols & abbrev. terms – Part1:Basic polymers their special characteristics
ISO 1043-2:2011	Plastics – Symbols and abbreviated terms – Part 2: Fillers and reinforcing materials
ISO 1043-3:2016	Plastics – Symbols and abbreviated terms – Part 3: Plasticizers
ISO 1043-4:2021	Plastics – Symbols and abbreviated terms – Part 4: Flame retardants
ISO 1629:2013	Rubber and latices – Nomenclature
ISO 18064:2022	Thermoplastic elastomers – Nomenclature and abbreviated terms

6. Education/awareness raising on POPs plastic additives in the major use sectors within general awareness on CoCs in products (1)

Objective: Education/Awareness of major stakeholders on POPs-containing products and waste created (integrated in the frame on awareness of chemicals in products (GFC/SAICM synergy).

Recommended activity options:

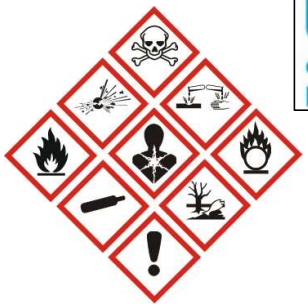
- **Develop a strategy to raise awareness** on the impact of POP and other CoCs on health, the environment, and recycling in the life cycle of EEE, vehicles, buildings, textiles and other product categories considering gender mainstreaming and vulnerable populations.
- **Developing awareness raising and education materials** on POPs & other CoCs in EEE, ELVs, buildings, textiles and possibly others for different stakeholders (considering available materials).
- Awareness raising and education for stakeholders (policy makers, industry, recyclers, research and public) on POPs in these products **within a larger education activity on chemicals in products and chemicals in LC of electronics (GFC synergy; synergy to SDG 12)**.
- Awareness raising of the public on POPs impacted plastic **within a general awareness on plastic risk, pollution and sustainable consumption.**



6. Education/awareness raising on POPs plastic additives in the major use sectors within general awareness on CoCs in products (2)

Objective: Built knowledge and capacity for the management of POPs-impacted products and waste within life cycle management (LCM) of hazardous substances in EEE, vehicles, buildings, textiles and possibly others.

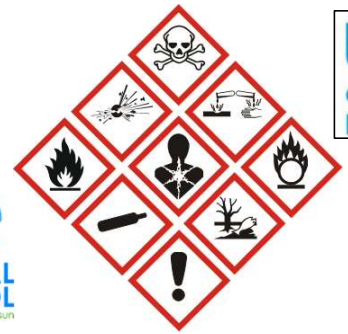
- **Capacity building of authorities and institutions** for developing the regulatory frame for lifecycle management of EEE, ELVs, construction sector and other sectors.
- **Develop training materials** and programs for the **enforcement of the policy and regulatory frame** for WEEE, ELV, CDW & other impacted waste and related POPs management.
- **Capacity building for implementation of the regulatory frames for managing WEEE, ELVs, CDW and other impacted wastes and implementation in the individual sectors.**
- **Training/education for customs** authorities on the control of imports of (W)EEE, cars, and possibly other relevant POPs containing products and waste.



6. Education and training for relevant stakeholder groups on life cycle management of POPs containing products (3)

Objective: Built knowledge and capacity for handling of POPs in production and POP-impacted materials and wastes within the life cycle management of hazardous substances in EEE, vehicles, buildings, furniture, and textiles.

- **Development of education and training materials** for the management and handling of POPs/CoCs **(**EEE, vehicles, buildings, textiles, furniture) (considering available materials).
- **Capacity building of the handling and management for POPs** and **training of workers in production, in recycling and waste management** for relevant sectors within the life cycle management of CoCs in EEE, vehicles, buildings, furniture, textiles.



6. Education and training for relevant stakeholder groups on life cycle management of POPs-containing products – **E-waste**

Objective: Built knowledge and capacity for management of POPs impacted products and waste withinthe life cycle management (LCM) of hazardous substances in EEE, vehicles, buildings, textiles and possibly others.

- **Education and training materials on E-waste has been compiled in "The E-waste Challenge Massive Open Online Course (MOOC)"**

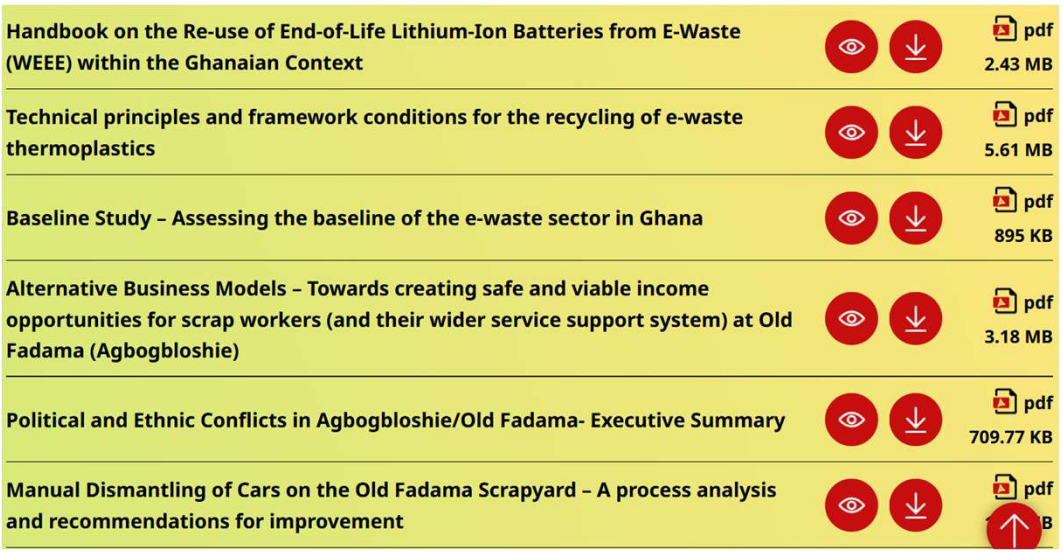
The E-waste Challenge Massive Open Online Course (MOOC)

https://www.basel.int/Implementation/Ewaste/MOOC/tabid/4966/Default.aspx

6. Education and training for relevant stakeholder groups on life cycle management of POPs-containing products – **E-waste**

Objective: Built knowledge and capacity for management of POPs impacted products and waste within the life cycle management (LCM) of hazardous substances in EEE, vehicles, buildings, textiles and possibly others.

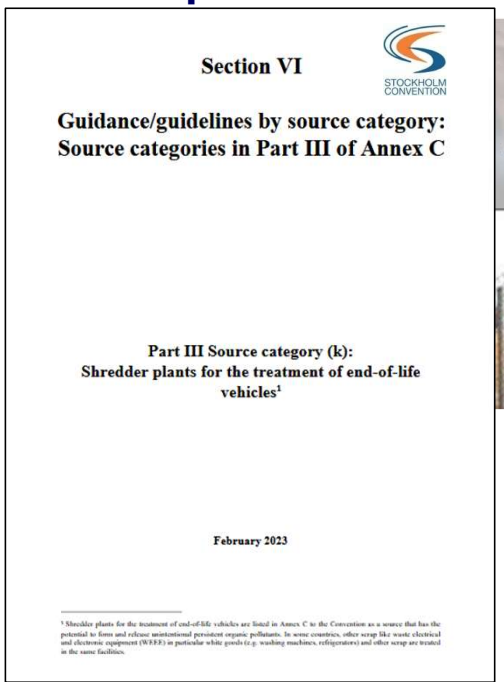
- **Education and training materials on E-waste** has also been developed & published in the frame of the **GIZ lighthouse project on e-waste management in Ghana** (2017 to 2026) including **12 guidance documents of different aspects of e-waste recycling in a low income country**).



https://www.giz.de/en/projects/recycling-and-disposal-waste-electrical-equipment-environmentally-

6. Education and training for relevant stakeholder groups on life cycle management of POPs-containing products - **ELVs**

- Some guidance documents for end-of-life vehicle management have been published in recent years including for low- and middle income countries. A practitioner's guideline from the ISLANDS project.
- A first project on recovery of plastics from ELVs in Ghana is currently established and GIZ published a first report on manual dismantling of cars/ELVs in Ghana.
- **Within improved recycling activities, plastics can be separated and recovered and POPs and other pollutants can be managed.**


Section VI

STOCKHOLM CONVENTION

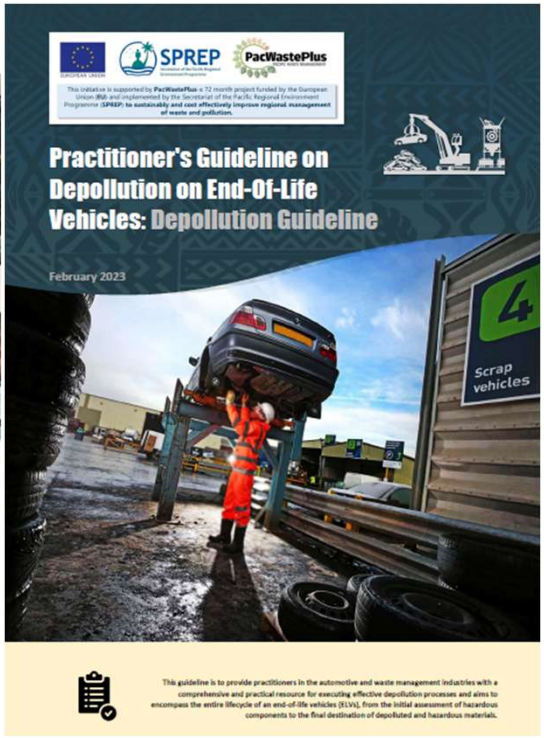
Guidance/guidelines by source category: Source categories in Part III of Annex C

Part III Source category (k): Shredder plants for the treatment of end-of-life vehicles[1]

February 2023

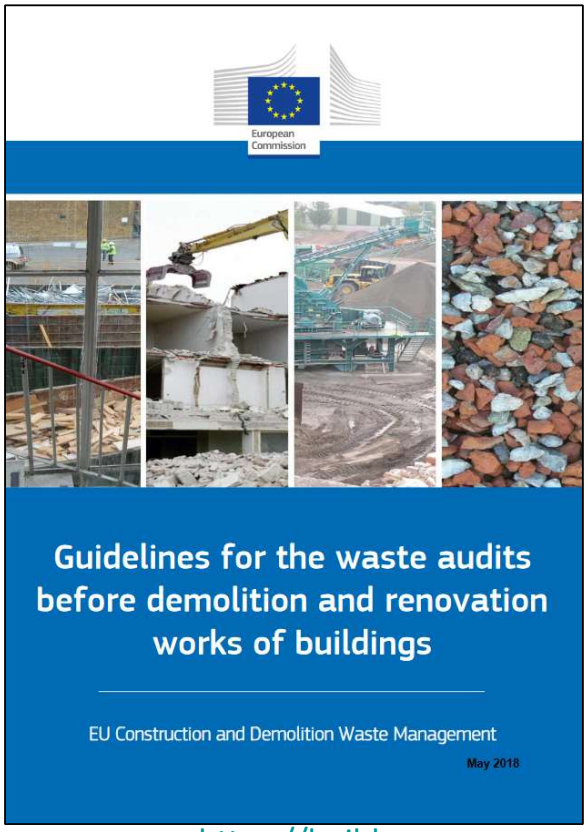
[1] Shredder plants for the treatment of end-of-life vehicles are listed in Annex C to the Convention as a source that has the potential to form and release unintentional persistent organic pollutants. In some countries, other scrap like waste electrical and electronic equipment (WEEE) in particular white goods (e.g. washing machines, refrigerators) and other scrap are treated in the same facilities.

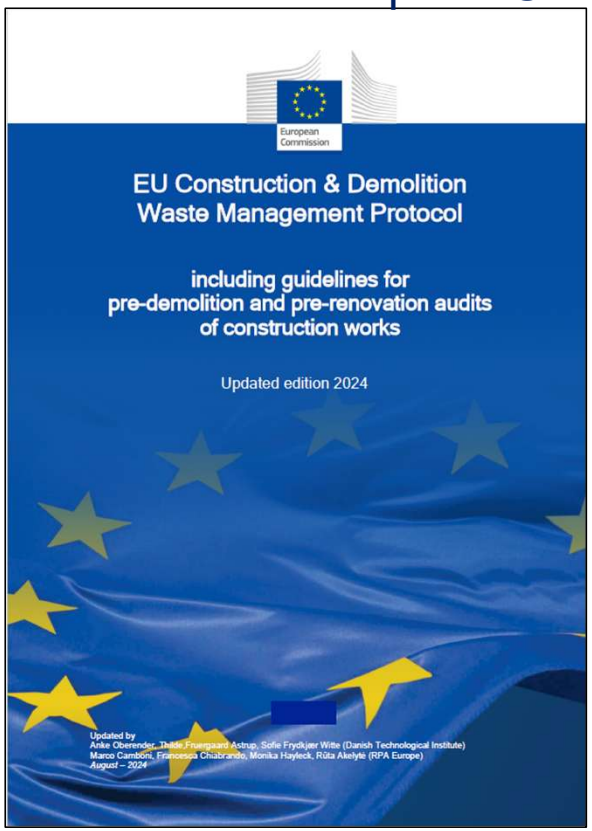
GIZ (2022) https://www.giz.de/de/downloads/giz2022-en-manual-dismantling-of-cars-ghana.pdf

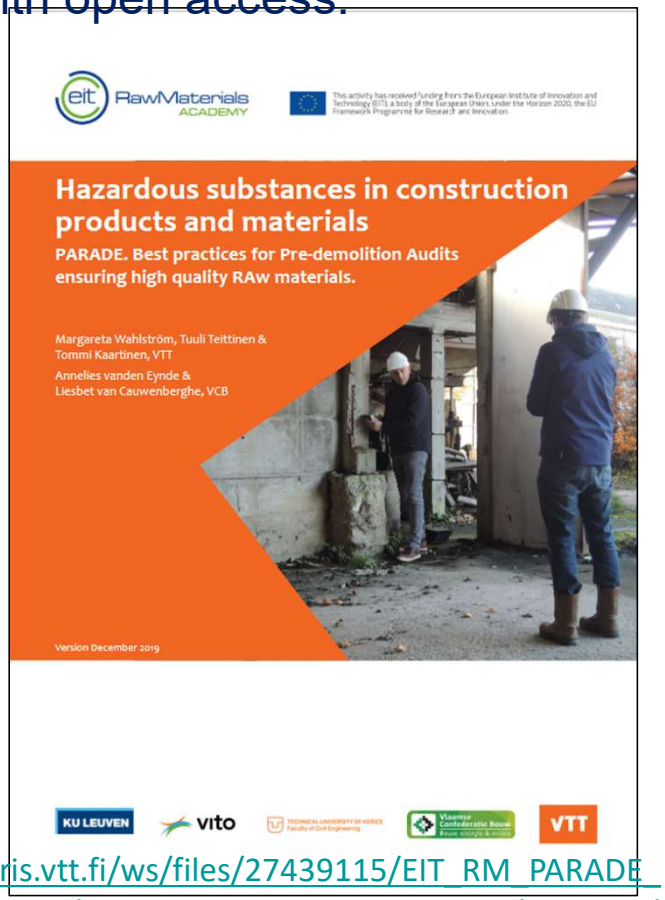


6. Education and training for relevant stakeholder groups on life cycle management of POPs-containing products - **CDW**

- Robust guidance documents on the assessment, **deconstruction of buildings containing pollutants**, were developed/published in the European Union with open access.







https://build-up.ec.europa.eu/en/resources-and-tools/publications/eu-construction-demolition-waste-management-protocol-2024-updated

https://cris.vtt.fi/ws/files/27439115/EIT_RM_PARADE_Hazardous_substances_in_construction_Final_2019.pdf

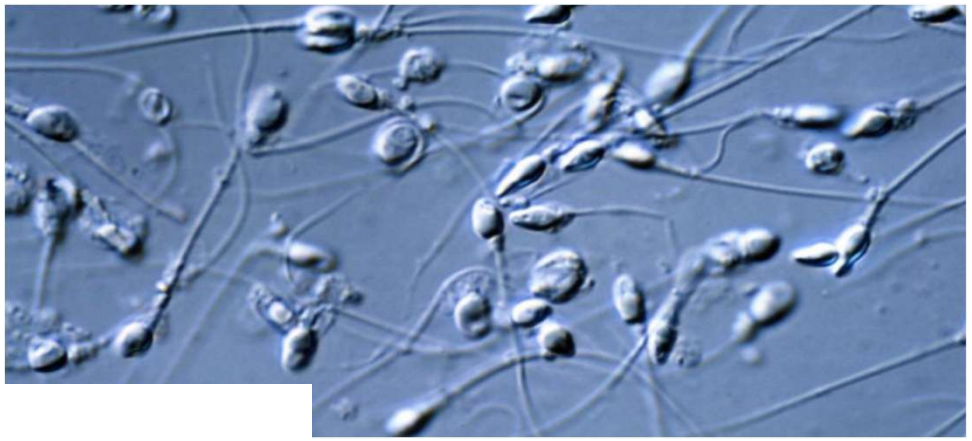
6. Education & awareness raising on POPs plastic additives within general awareness on CoCs in products

Chemicals which cause a decrease in sperm quality

Men's sperm quality in Europe has decreased by ~50% in the past 60 years!

There are 29 chemicals or chemical groups relevant to male reproductive health with a focus on deterioration of sperm quality and many are POPs or plastic additives:

- **Androgen receptor antagonists:** Bisphenols A, F, S; n-butyl paraben; **PBDE 99, 100, 183, 209; PCB 118, 126;** chlorpyrifos, vinclozolin, procymidone, fenitrothione
- **Suppression of testosterone synthesis**: Phthalates DEHP, DnBP, BBzP, DiNP; acrylamide
- **AhR activation: Dioxins (PCDD/Fs), Polychlorinated biphenyls: PCB 118, 126, 169.**
- **Disruption of prostaglandin signaling**: **Paracetamol**
- **Inhibition of steroidogenic enzymes**: linuron
- Further chemicals with effects on the sperm quality related to materials in buildings with unknown mode of action: **PFOS/PFOA, organophosphate esters**

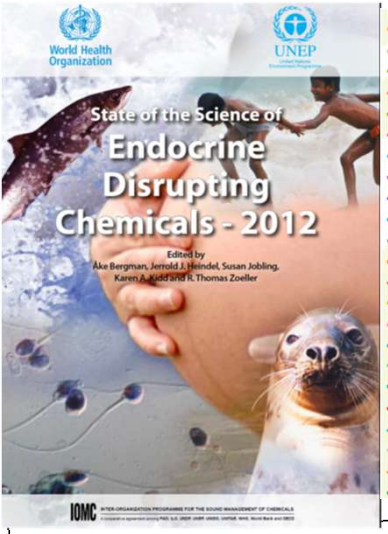


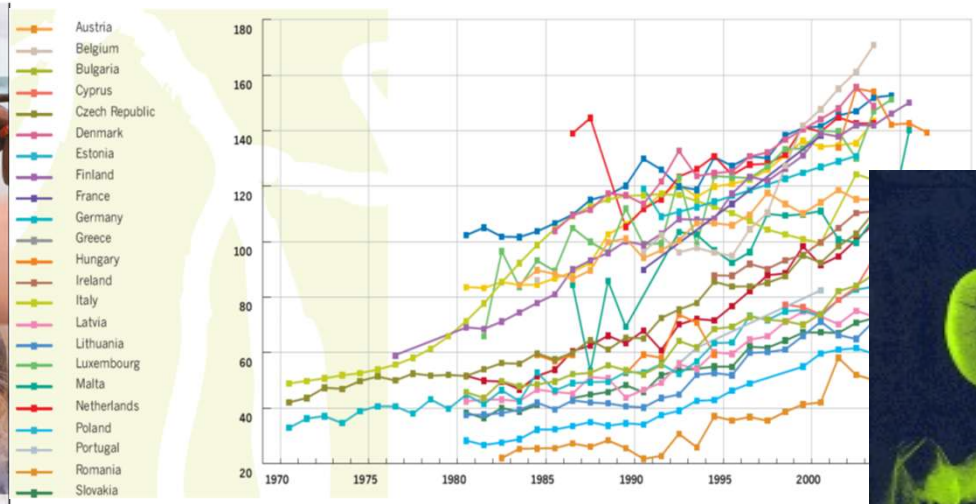
The study has open access:

Kortenkamp et al. (2022) Environ. Int. 165, 107322.

6. Education & awareness raising on POPs plastic additives within general awareness on CoCs in products

- Certain plastic additives including POPs plastic additives **impact on women's health such as breast cancer (e. g. PBDEs).**
- **They can also impact on the next generation including decreased IQ (Herbstman et al. 2010).**
- **Good awareness materials from the UN, science community, Woman NGOs (WECF).**

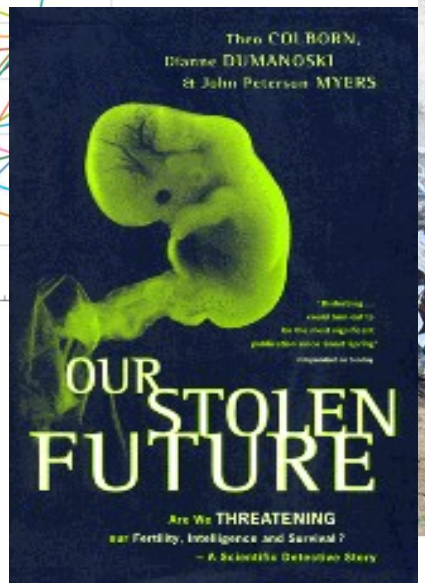


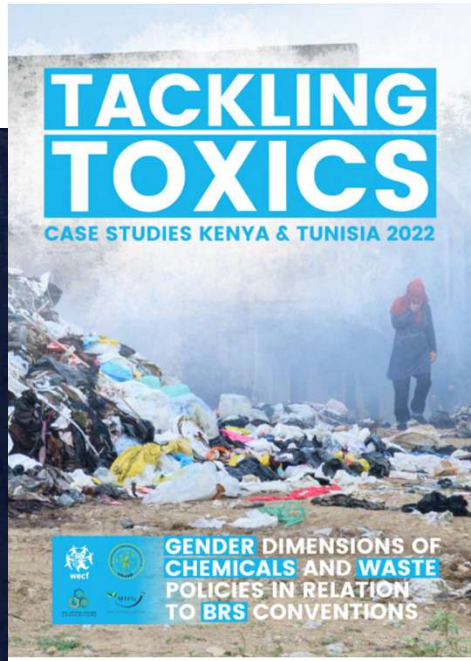


A breast cancer case-control study of polybrominated diphenyl ether (PBDE) serum levels among California women

https://doi.org/10.1016/j.envint.2019.03.0

Susan Hurley[1,2], **Debbie Goldberg**[1,2], **June-Soo Park**[3], **Myrto Petreas**[3], **Leslie Bernstein**[4], **Hoda Anton-Culver**[5], **Susan L. Neuhausen**[4], **David O. Nelson**[2], and **Peggy Reynolds**[1,2,6]





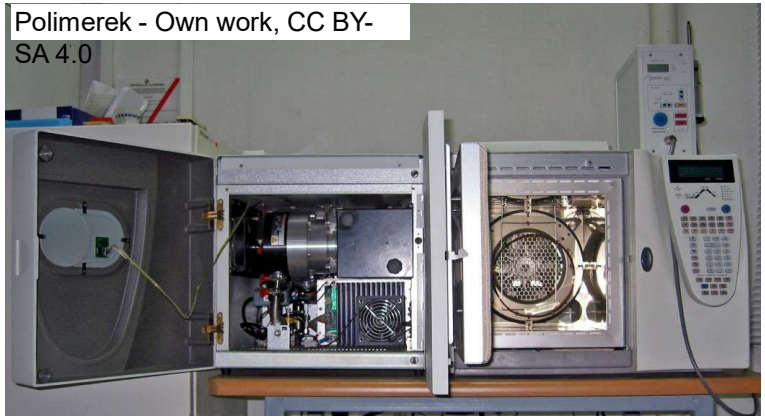
https://www.wecf.org/resources

7. Analysis and monitoring of POP-BFR and other POPs/CoCs in the technosphere and other priority areas

Objective: Established monitoring of POP-BFRs and other POPs and CoCs in plastics and other priority areas in the major sectors and in recycling.

Recommended activity options:

- **Assessment of options for monitoring of POPs plastic additives** (BFRs, CFRs, UV-328) in the country or region (international collaboration or development of own capacity).
- Establishment of a monitoring approach for POPs plastic additives and other CoCs in plastics.
- Monitoring of POPs and CoCs in major product categories, related wastes and recycling.
- Improvement of inventory by monitoring where relevant gaps have been identified (Tier III).
- Possibly monitoring of humans, biota and environment for POPs plastic additives for effectiveness evaluation and in priority areas (e.g. contaminated sites) (participate GMP).

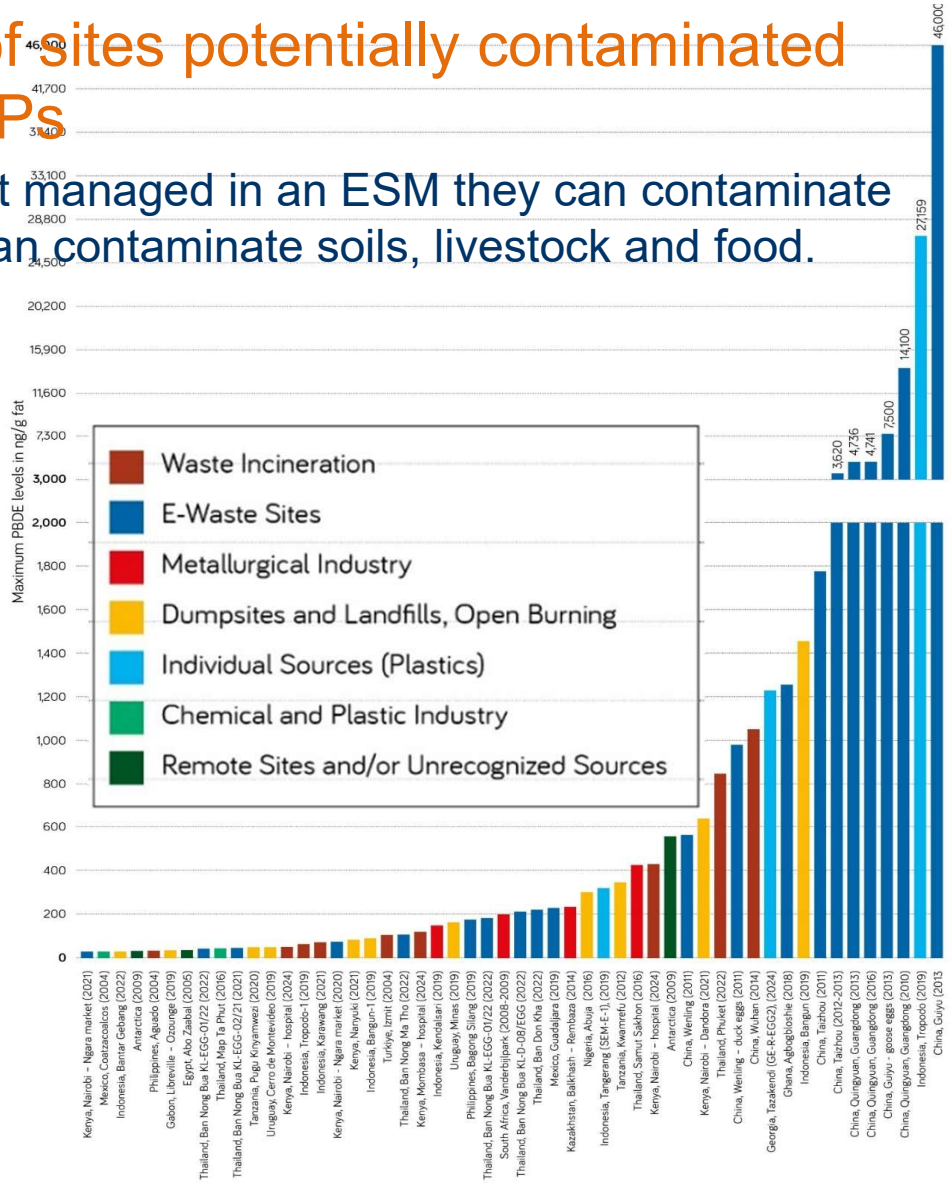


8. Assessment, management, database of sites potentially contaminated with POPs plastic additives and other POPs

Background: If e-waste, ELVs or waste plastics are not managed in an ESM they can contaminate the environment by releasing POP and metals, which can contaminate soils, livestock and food.

PBDE in global egg monitoring: E-waste sites

- **PBDE levels in eggs were highest in flocks living on/ near e-waste recycling areas** (up to ppm/fat content).
- The **highest PBDE-contaminated chicken egg** was sampled 2013 in Guiyu (China) and contained 46,000 ng PBDE/g fat and a duck egg also from Guiyu with 7500 ng/g fat (Zeng et al. 2016). Another study at three WEEE recycling sites in China also reported high levels of PBDEs of 3220 to 14,100 ng/g fat (Zheng et al. 2012).
- **Eggs were also sampled in Agbogbloshie/Accra, Ghana, which is one of the largest e-waste recycling sites in Africa. Eggs from a household on the scrap yard contained 1258 ng PBDE/g fat.**



Petrlik et al. (2025) Emerging Contaminants 11, 100567
https://doi.org/10.1016/j.emcon.2025.100567

8. Assessment, management, database of sites potentially contaminated with POPs plastic additives and other POPs

Background: If e-waste, ELVs or waste plastics are not managed in an ESM they can contaminate the environment by releasing POP and metals, which can contaminate soils, livestock and food.

- Also the **highest PBDD/F-contamination (PBDD/F in POPRC)** of pooled eggs was **503 pg TEQ/g fat** detected in the **chicken flock at an e-waste and ELV dismantling site in Ghana** (Agbogbloshie). These eggs also had the highest PCDD/F-TEQ ever measured (856 pg PCDD/F-TEQ/g fat).
- **The second- and third-highest levels of PBDD/F-TEQ in eggs were found in egg samples from an e-waste dismantling site in Thailand (81.3 and 30.4 pg TEQ/g fat**).

Petrlik et al. (2022) Emerging Contaminants https://doi.org/10.1016/j.emcon.2022.05.001

8. Assessment, management, database of sites potentially contaminated with POPs plastic additives and other POPs

Background: If e-waste and ELVs are not managed in an environmentally sound manner it can heavily contaminate the environment and result in POP and metal contaminated sites an food.

- The PCDD/F-PCB-TEQs were between 20.4 to 856 pg TEQ/g and therefore **all eggs exceeded the EU regulatory limit**. The **mean TEQ was 308.4 pg TEQ/kg fat were by far the highest mean/median of all source categories.**
- Three of the eggs from African sites had TEQ levels above 500 pg TEQ/g fat (**>100 times above regulatory limits**). For **the highest contaminated eggs** from Agbogbloshie (**Ghana**) containing a total of 1156 pg TEQ/g fat, **a child (15 kg) eating one egg** (7 g fat) **is exposed to more dioxins than the FAO/WHO** consider **tolerable: intake for 230 days** and the **EU consider** a **tolerable intake for 5 years.**

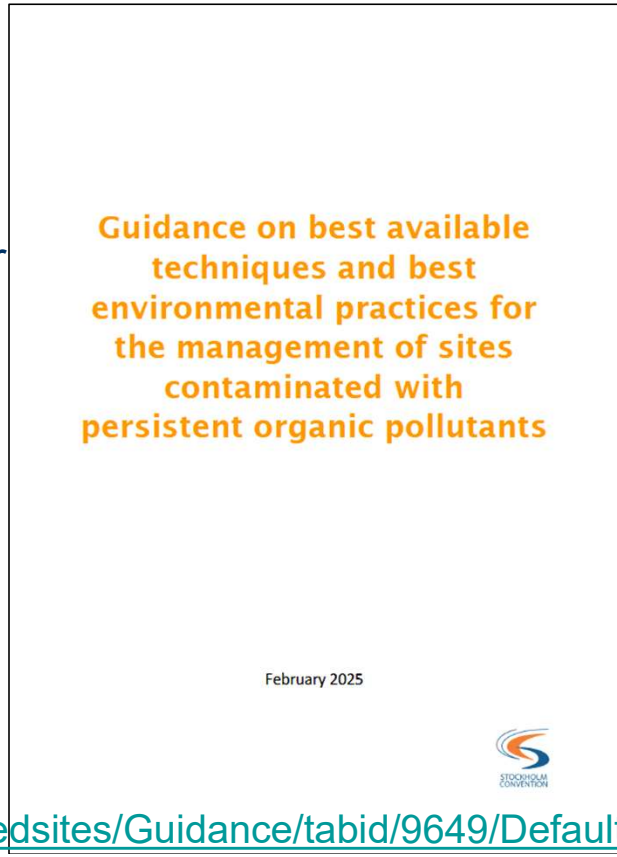
Petrlik et al. (2022) Emerging Contaminants https://doi.org/10.1016/j.emcon.2022.05.001

8. Assessment, management, database of sites potentially contaminated with POPs plastic additives and other POPs

Objective: Sites potentially contaminated with POP-BFRs and other POPs (incl. PBDD/Fs) are identified, assessed and contaminated sites secured and possibly remediated.

Recommended activity options:

- Train and upgrade skills of personnel in identification, assessment, securing and remediation of contaminated sites.
- Analytical confirmation of POP plastic additives, PBDD/F, and other POP contamination, for the identified locations (priority list)
- Develop strategies for the environmentally sound management of POPs contaminated sites.
- Take measures to secure the contaminated sites to stop human exposure and environmental releases.
- Identification of clean-up measures and possibly initiate the clean-up, starting with high priority sites.

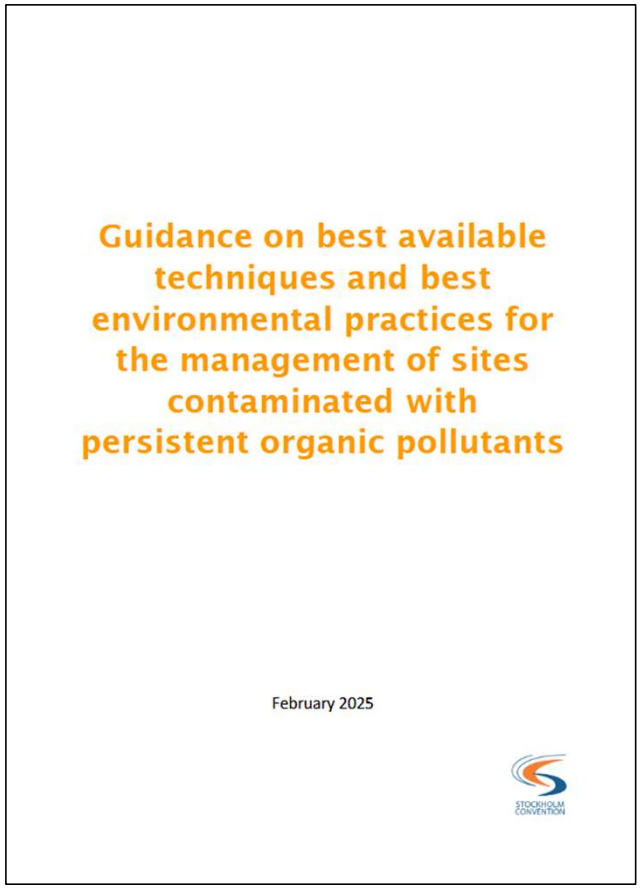


https://www.pops.int/Implementation/BATandBEP/POPscontaminatedsites/Guidance/tabid/9649/Defaul

POP contaminated site BAT/BEP guidance (2025)

Module	Title	English
	Executive Summary and Introduction	
1	Background on POPs Contaminated Sites	
2	Principles and Approaches for POPs Contaminated Sites Management and Remediation	
3	Site Investigation, Assessment and Conceptual Site Model	
4	Environmental Risk Assessment	
5	Remediation Technologies and Techniques	
6	Technology Selection Tool for remedial options to be used in Phase 3 - the Remediation Assessment	
7	Stakeholder Engagement, Public and Worker Safety and Health	
8	Contaminated Sites Remediation and Monitoring and Aftercare	
9	Getting Started: Legislation, Policy, Inventory Development and Financing Remediation	
10	Case study - Environmental Management Plan Lâm Hoá site, Viet	

The guidance consists of nine modules, an executive summary and a first case study.



https://www.pops.int/Implementation/BATandBEP/POPscontaminatedsites/Guidance/tabid/9649/Default.aspx

Thank you for your attention ! Questions?

More Information https://www.thegef.org/; https://en.wikipedia.org/wiki/Triple_planetary_crisis

Basel Convention: www.basel.int

Rotterdam Convention: www.pic.int

Stockholm Convention: http://chm.pops.int/;

Montreal Protocol/Vienna Convention: http://ozone.unep.org

GFC: https://www.chemicalsframework.org/ **FAO:** www.fao.org **WHO** www.who.int/

Climate Convention https://unfccc.int/ **Biodiversity Convention:** https://www.cbd.int/

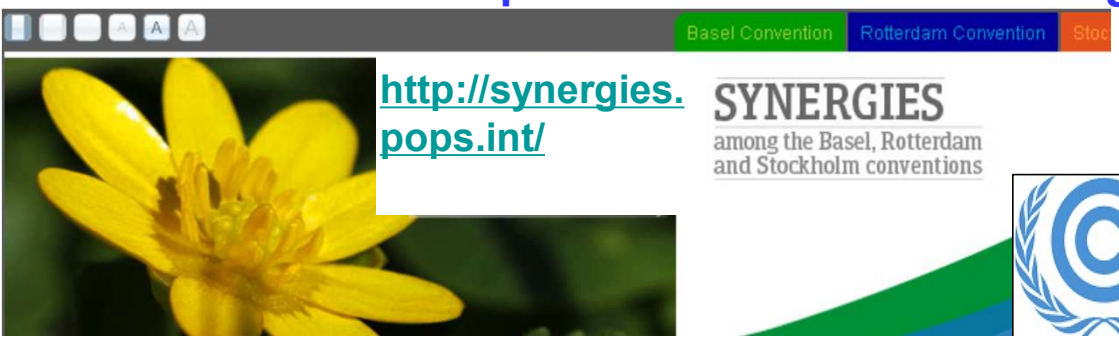
OECD/IOMC: http://www.oecd.org/chemicalsafety/

Science:; https://www.ipcc.ch/; https://www.ipbes.net/; https://www.unep.org/isp-cwp; https://www.ipcp.ch/

Industry: http://www.suschem.org/; https://icca-chem.org/; https://cefic.org/

NGO: www.ipcp.ch; www.ipen.org; www.ciel.org/; www.ban.org; www.chemsec.org; www.wecf.org

Better-world-links: http://www.betterworldlinks.org/



http://synergies.pops.int/

SYNERGIES among the Basel, Rotterdam and Stockholm conventions

UN environment programme Global Framework on Chemicals

GREEN GROWTH Knowledge Partnership

United Nations Framework Convention on Climate Change

Convention on Biological Diversity