Webinar PCB – A Forgotten Legacy? 1 November 2016

POLYCHLORINATED BIPHENYLS (PCB) IN OPEN APPLICATIONS

UNEP

PCBs Elimination Network (PEN) 2028

Basel Convention

Rotterdam Convention

Stockholm Convention

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Outline

- Convention's provisions on PCB
- Production of PCB
- Uses of PCB
- Open applications
- PCB Elimination Network (PEN)
- Work of PEN on PCB in open applications
- Case study Switzerland

Convention's provisions on PCB

- PCB are one of the **12 initial POPs** listed in the Stockholm Convention

- **Art. 3** of the Stockholm Convention prohibits production of PCB, but PCB are still in use in many applications and stockpiled in many countries.

- According to **Annex A, Part II (f)** of the Convention

  "Parties shall endeavor to identify other articles containing more than 0.005 per cent polychlorinated biphenyls (e.g. cable-sheaths, cured caulk and painted objects) and manage them in a manner protective human health and the environment (according with paragraph 1 of Article 6)".

Effects of PCB on the environment:

Travel **long distances**

Persistent

Toxic to animals

Bio-accumulate in the food chain

Effects of PCB on human health:

- Can increase *risk of cancer*
- Can interfere the *hormone system*
- Can lead to *failure of reproduction*
- Can suppress the *immune system*

Production of PCB

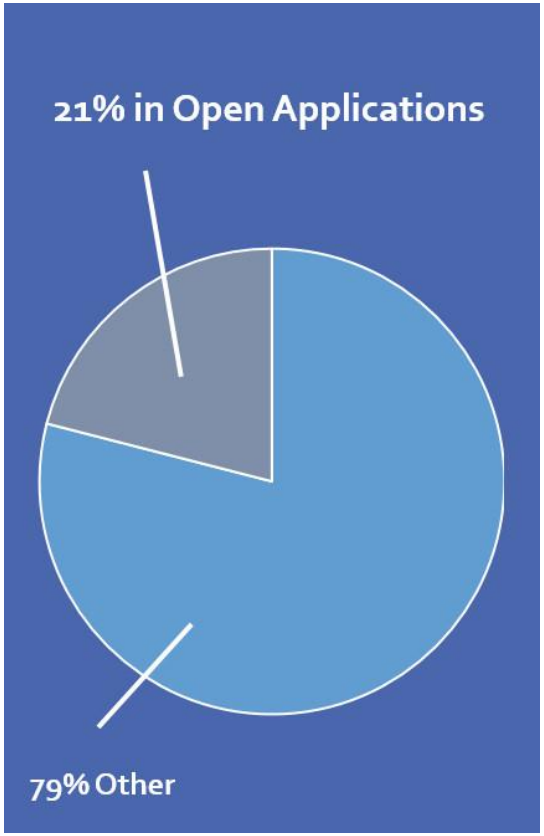
- PCB were manufactured worldwide by a small number of companies in mostly industrialized countries and were/are found in a **wide range of applications (between 1 and 1.5 million tonnes)**

- Globally, the PCB production peaked in the 1960s and 1970s. Between 1983 and 1993, the production of PCB was stopped in many countries

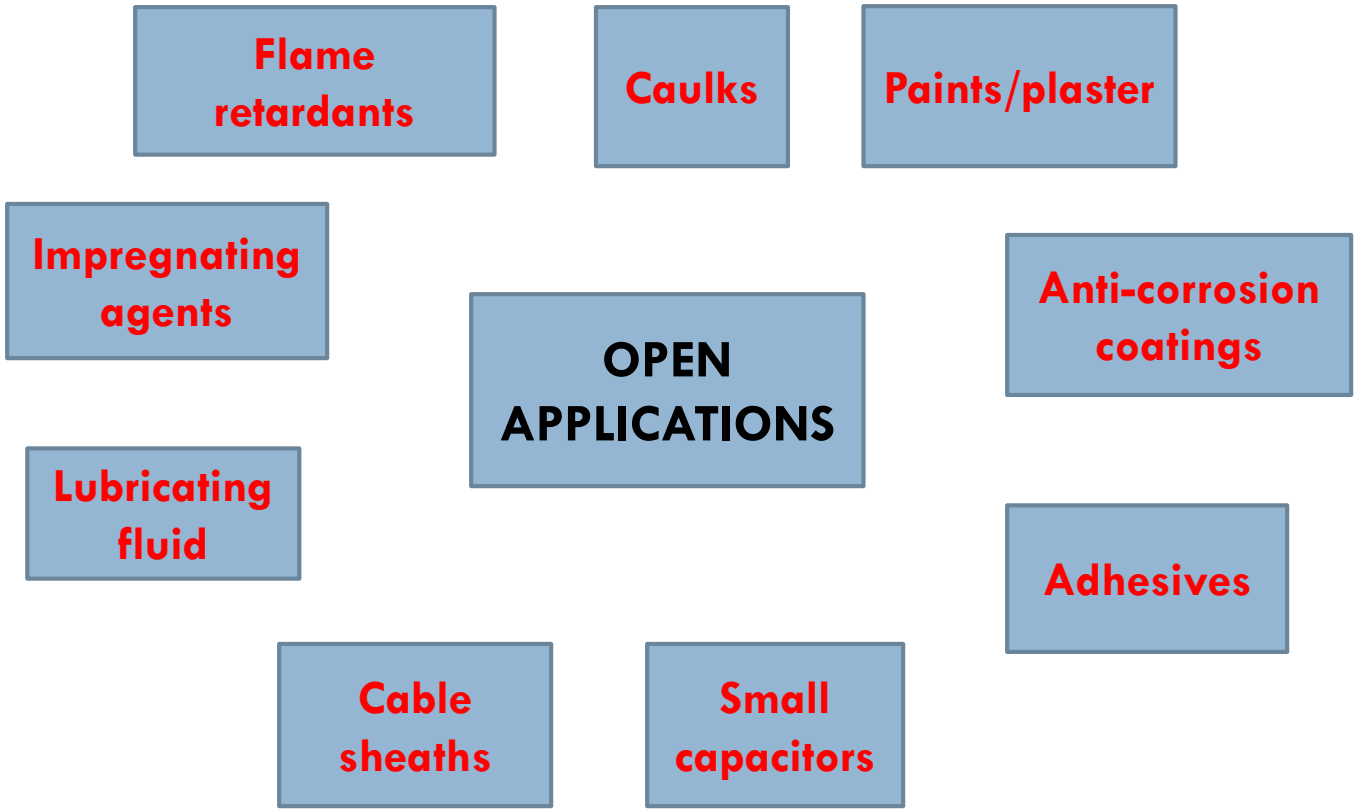
- In some countries it had already been regulated since the early 1970s

Uses of PCB

- **Closed applications:** mainly transformers and capacitors
- **Open and partially open applications**
- It is estimated that approximately 21% of produced PCB were used in open applications (Breivik, K., et al., 2007).



Open applications



Characteristics and risks

PCB were widely used to act as:

- Flame retardants, plasticisers, coolants and lubricants, impregnating agents and coats

High risk:

- In fire: formation of dibenzo-p-dioxins and dibenzofurans
- Leaking, flaking, deterioration
- Inexpert removal and inappropriate disposal

→ **Direct exposure to humans**

PCB in caulks (sealants)

Examples of use:

- **Objects:** Houses, residential and public buildings, industries, power plants, water reservoirs, military bases etc.

- **Applications:** Joints in buildings and other structures, caulks between prefabricated concrete panels, sealants around windows, door frames and vents, etc.

PCB as lubricating fluid in oils and grease

Examples of use:

- **Materials:** Electrical equipment, air/gas compressors, heat transfer, hydraulic systems, vacuum pumps, oil-impregnated gaskets/filters, brake linings, oils, etc.

- **Objects**: Industries, plants, mines, private and public buildings, natural gas pipelines, etc.

PCB in cables and cable sheaths

Examples of use:

- **Materials:** Electrical cables, both PVC and lead jacket, any kind of cable sheaths, etc.

- **Objects:** Harbours, airports, military bases, auto salvage yards, auto crushing, recycling sites (shredders), landfills, industrial sites, etc.

PCB in paints and plaster

Examples of use (indoor and outdoor):

- **Applications:** Paint and plaster, emulsion priming and top coats for use on concrete or plasterwork
- **Objects:** Houses, residential and public buildings, (dams, industries, power plants, military bases etc.

PCBs in adhesives

Examples of use:

- **Applications:** Floor adhesives, adhesive in exposed concrete, etc.
- **Objects**: Houses, residential and public buildings, industries, power plants, military bases, etc.

PCBs in anti-corrosion coatings and ASR — other industries

Examples of use:

- **Applications:** Vessels, submarines, airplanes, cars, grain silos, window frames, valves, flanges etc.
- **Objects:** Harbours, airports, military bases, auto salvage yards, auto crushing, recycling sites (shredders), scrap dealers, landfills, industrial sites etc.

PCBs in surface coatings - Floors

Examples of use:

- **Applications:** Concrete paints and coatings, emulsion priming and top coats for use on concrete or plasterwork, resistant industrial floors, highway marking paints, etc.
- **Objects**: Houses, residential and public buildings, industrial plants, power plants, military bases, motorways, etc.

PCBs in anti-corrosion coatings - indoor and outdoor

Examples of use:

- **Applications:** Steel supports, steel structures, radiators, pipes, oil fuel tanks, machines, devices, etc.
- **Objects:** Houses, residential and public buildings, industries, power plants, military bases, etc.
- Power plants and pipelines

PCBs and Asbestos

- PCB applications were often installed together with Asbestos materials. Typical examples are fluorescent lights (PCB ballast), with an Asbestos cardboard used as flame-retardant.

Examples of use:

- **Materials**: Fluorescent light ballasts, plaster on walls and façades, floor adhesives etc.
- **Objects**: Houses, residential and public buildings, industries, power plants, military bases, etc.

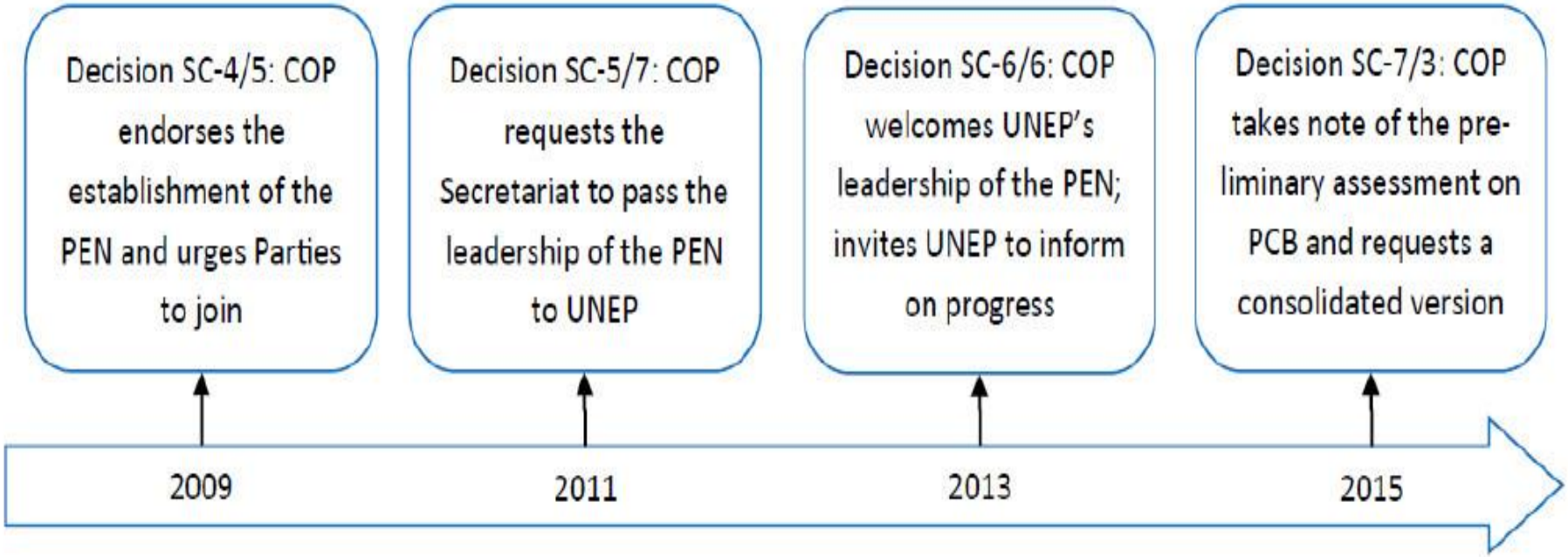
PCB and Asbestos 'Galbestos' in roofing and siding materials

PCB Elimination Network (PEN)

- The PCB Elimination Network (PEN) is a multi-stakeholder mechanism that promotes and encourages the environmentally sound management (ESM) of PCB

PCB Elimination Network (PEN)

- The PEN was transferred from the Secretariat of the Stockholm Convention to UNEP' Chemicals and Waste Branch in 2011 (COP-5)



Become a member of the PEN

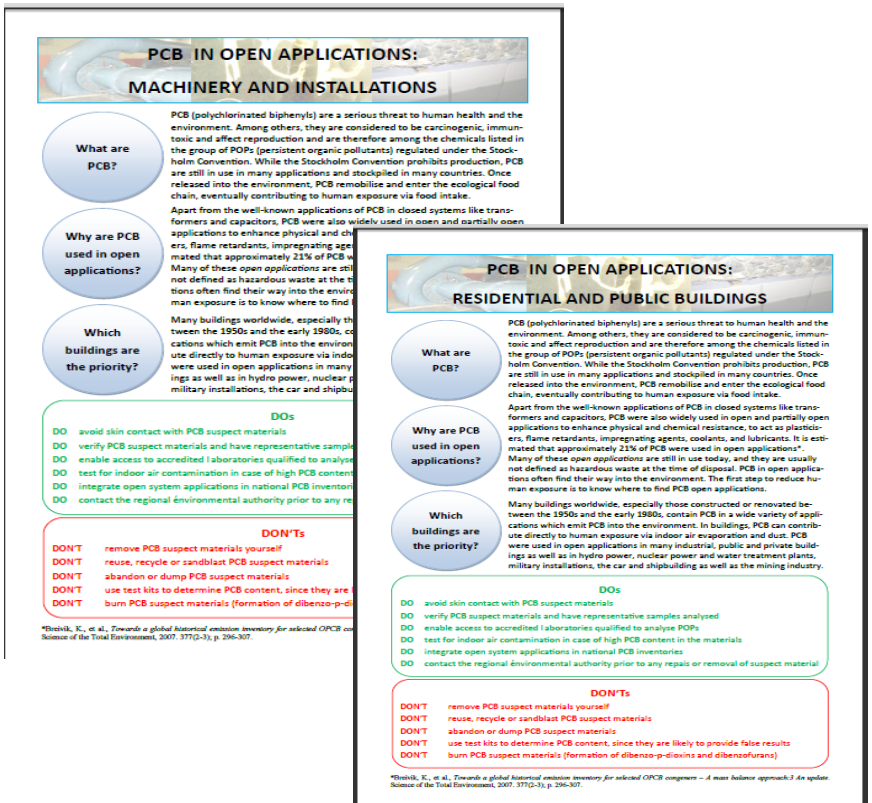
Membership of the PEN is open to:

- Governments
- Intergovernmental organizations
- Donors
- PCB holders
- Non-governmental organizations
- Industry, experts/academia
- Business sectors relevant to PCB

To apply: please send an e-mail to the **Secretariat of the PEN** (UNEP's Chemicals and Waste Branch): **science.chemicals@unep.org**

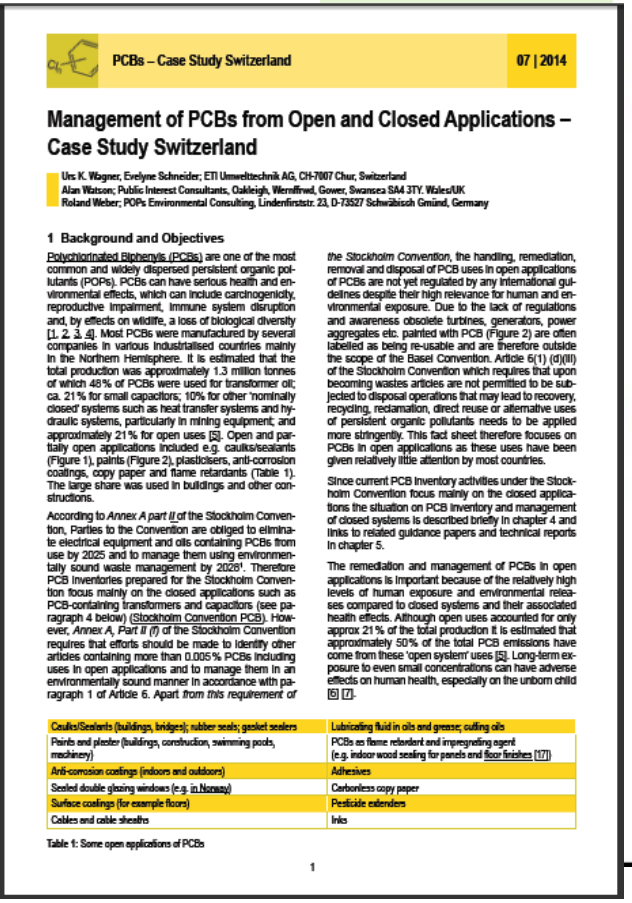
Work on Open Applications

- The PEN works by producing guidance material and factsheets to countries phasing out and disposing of PCB http://chm.pops.int/Implementation/PCBs/Guidance/tabid/665/Default.aspx



Case study Switzerland

http://www.global-chemicals-waste-platform.net/chemicals-in-products/persistant-organic-pollutants-pop/polychlorinated-biphenyls-pcb.html



PCBs – Case Study Switzerland 07 | 2014

Management of PCBs from Open and Closed Applications – Case Study Switzerland

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1 Background and Objectives

Polychlorinated Biphenyls (PCBs) are one of the most common and widely dispersed persistent organic pollutants (POPs). PCBs can have serious health and environmental effects, which can include carcinogenicity, reproductive impairment, immune system disruption and, by effects on wildlife, a loss of biological diversity [1, 2, 3, 4]. Most PCBs were manufactured by several companies in various industrialised countries mainly in the Northern Hemisphere. It is estimated that the total production was approximately 1.3 million tonnes, of which 48% of PCBs were used for transformer oil; ca. 21% for small capacitors; 10% for other 'nominally closed' systems such as heat transfer systems and hydraulic systems, particularly in mining equipment; and approximately 21% for open uses [5]. Open and partially open applications included e.g. caulks/sealants (Figure 1), paints (Figure 2), plasticisers, anti-corrosion coatings, copy paper and flame retardants (Table 1). The large share was used in buildings and other constructions.

According to *Annex A part II* of the Stockholm Convention, Parties to the Convention are obliged to eliminate electrical equipment and oils containing PCBs from use by 2025 and to manage them using environmentally sound waste management by 2028[1]. Therefore PCB inventories prepared for the Stockholm Convention focus mainly on the closed applications such as PCB-containing transformers and capacitors (see paragraph 4 below) (Stockholm Convention PCB). However, *Annex A, Part II (f)* of the Stockholm Convention requires that efforts should be made to identify other articles containing more than 0.005% PCBs including uses in open applications and to manage them in an environmentally sound manner in accordance with paragraph 1 of Article 6. Apart *from this requirement of the Stockholm Convention*, the handling, remediation, removal and disposal of PCB uses in open applications of PCBs are not yet regulated by any international guidelines despite their high relevance for human and environmental exposure. Due to the lack of regulations and awareness obsolete turbines, generators, power aggregates etc. painted with PCB (Figure 2) are often labelled as being re-usable and are therefore outside the scope of the Basel Convention. Article 6(1) (d)(iii) of the Stockholm Convention which requires that upon becoming wastes articles are not permitted to be subjected to disposal operations that may lead to recovery, recycling, reclamation, direct reuse or alternative uses of persistent organic pollutants needs to be applied more stringently. This fact sheet therefore focuses on PCBs in open applications as these uses have been given relatively little attention by most countries.

Since current PCB inventory activities under the Stockholm Convention focus mainly on the closed applications the situation on PCB inventory and management of closed systems is described briefly in chapter 4 and links to related guidance papers and technical reports in chapter 5.

The remediation and management of PCBs in open applications is important because of the relatively high levels of human exposure and environmental releases compared to closed systems and their associated health effects. Although open uses accounted for only approx 21% of the total production it is estimated that approximately 50% of the total PCB emissions have come from these 'open system' uses [5]. Long-term exposure to even small concentrations can have adverse effects on human health, especially on the unborn child [6] [7].

Caulks/Sealants (buildings, bridges); rubber seals; gasket sealers	Lubricating fluid in oils and grease; cutting oils
Paints and plaster (buildings, construction, swimming pools, machinery)	PCBs as flame retardant and impregnating agent (e.g. indoor wood sealing for panels and floor finishes [17])
Anti-corrosion coatings (indoors and outdoors)	Adhesives
Sealed double glazing windows (e.g. in Norway)	Carbonless copy paper
Surface coatings (for example floors)	Pesticide extenders
Cables and cable sheaths	Inks

Table 1: Some open applications of PCBs

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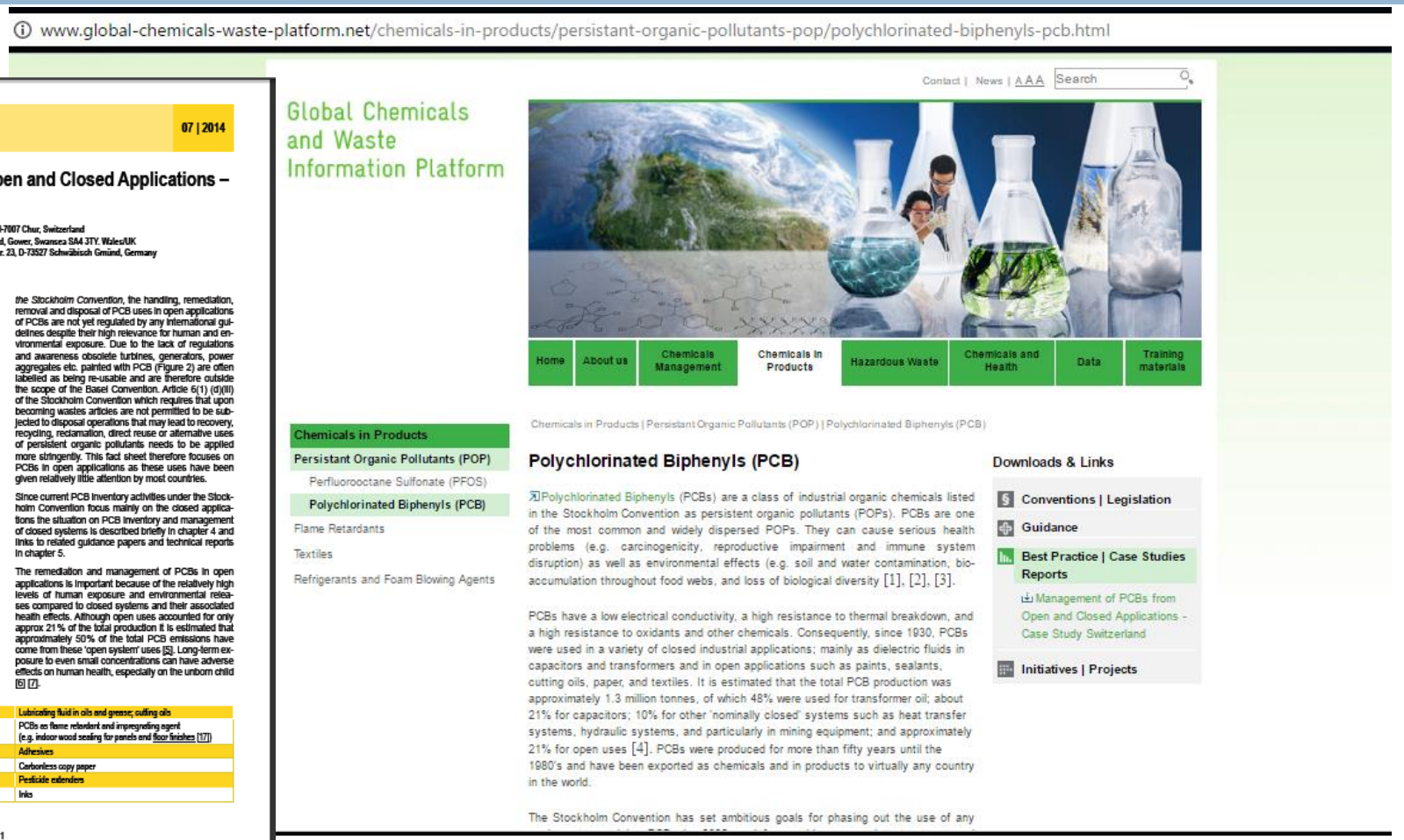

Thank You!!

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