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Non-combustion technology for PCB management: Experiences and Lessons learned in the Asia-Pacific Region

11 October 2023



UNIDO's mandate



UNIDO is the specialized agency of the United Nations that promotes and accelerates **industrial development** through economic competitiveness, shared prosperity and environmental sustainability;



UNIDO's mandate is to **foster SDG 9: "Industry, Innovation and Infrastructure"** by promoting and accelerating **Inclusive and Sustainable Industrial Development (ISID)** in its Member States;



Assists member states to meet **Environmental Convention-related obligations** focusing on industry-related provisions



UNIDO Focus Areas

Ending hunger by helping businesses from farm to fork

Stopping climate breakdown by using renewable energy and energy efficiency to reduce industrial greenhouse gas emissions

Supporting sustainable supply chains so that developing country producers get a fair deal and scarce resources are preserved.





Directorate of Technical Cooperation and Sustainable Industrial Development Division of Circular Economy and Chemicals Management

Contributes to greener and more circular industries and products by minimizing both resource use along value chains and the emission of pollutants to the environment

Operational Units:

**Circular Economy
and Resource
Efficiency**

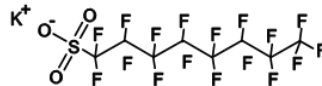
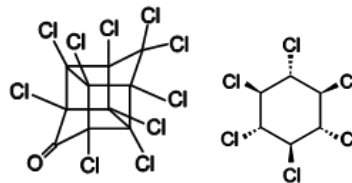
**Montreal
Protocol**

**Responsible
Chemicals and
Materials
Management**

Stockholm Convention on POPs



- The Convention was adopted and opened for signature during the **Stockholm Conference of May 22-23, 2001**. To date: **152 signatories** and **186 parties**
- **Overarching objective:** Protection of human health and the environment
- The Convention is **legally binding**, global in scope and multimedia in coverage. The **GEF is the Funding Instrument**.
- **34 POPs** listed (Dirty Dozen, Nasty Nines, +13 new chemicals)



The “new POPs”

The Dirty Dozen

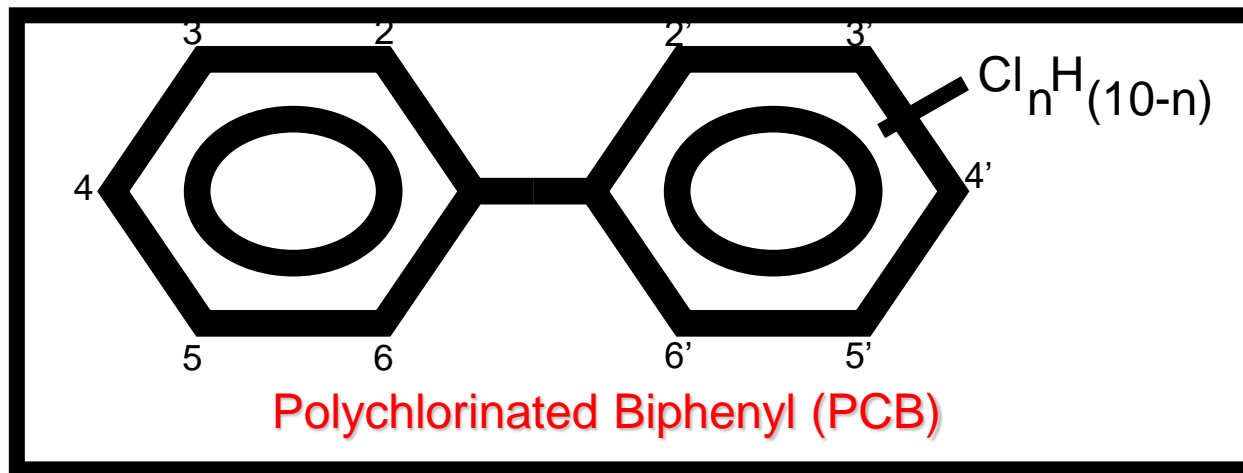
- Aldrin
- Chlordane
- DDT
- Dieldrin
- Endrin
- Heptachlor
- Hexachlorobenzene
- Mirex
- Toxaphene
- Polychlorinated Biphenyls
- Dioxins
- Furans

The Nasty Nines

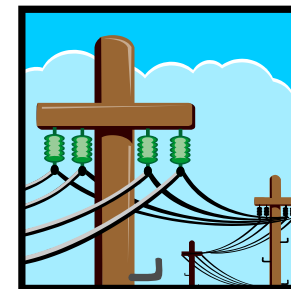
- Pentabromodiphenyl ether
- Octabromodiphenyl ether
- Chlordecone
- Lindane
- Alpha-hexachlorocyclohexane
- Beta-hexachlorocyclohexane
- Perfluorooctane sulfonic acid (PFOS), its salts and Perfluorooctane sulfonyl fluoride (PFOSF)
- Hexabromobiphenyl
- Pentachlorobenzene

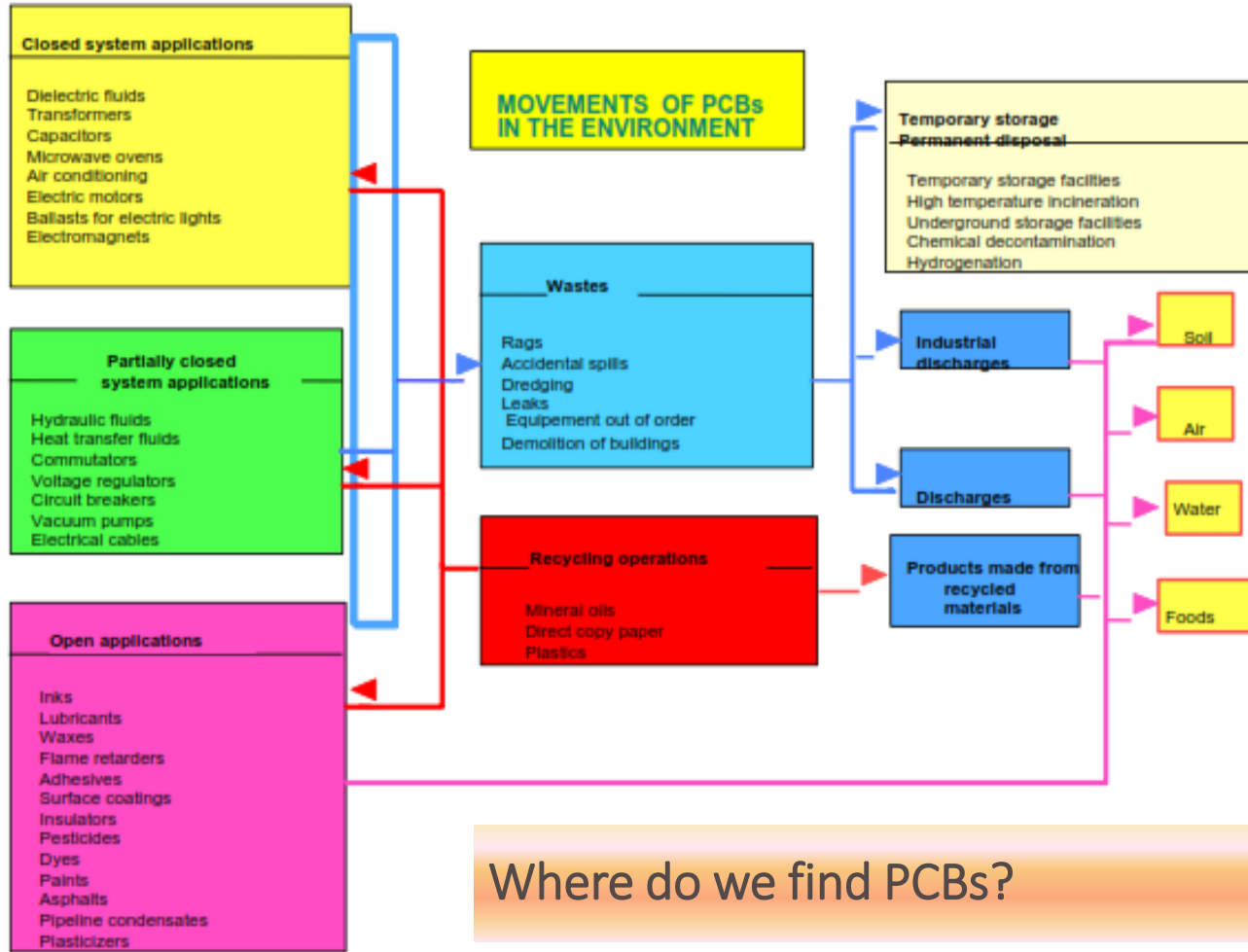
The New POPs

- Decabromodiphenyl ether
- Hexabromocyclododecane
- Hexabromodiphenyl ether and heptabromodiphenyl ether (Commercial octabromodiphenyl ether)
- Hexachlorobutadiene
- Pentachlorophenol and its salts and esters
- Polychlorinated naphthalenes
- Short-chain chlorinated paraffins (SCCPs)
- Technical endosulfan and its related isomers
- Dicofol
- Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds
- Methoxychlor
- Dechlorane Plus
- UV-328



- ❖ Production since 1929 and ceased in the 80s
- ❖ 1.5 Million tonnes produced
- ❖ Main use: **dielectric fluid**



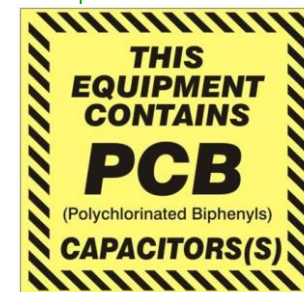


Where do we find PCBs?



Properties of PCBs

- Colourless or yellowish and viscous
- Low water solubility, highly soluble in organic solvents, oils or fats
- **High dielectric constant**, high thermal conductivity and high flash points
- **Chemically inert**
- Density varies from 1.182 to 1.566





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Stockholm Convention provisions on PCBs

- **Elimination of use by 2025**
- Reduce exposures and risks
- No export or import unless for ESM
- No recovery for purpose of reuse if > 50 ppm PCBs
- **Final disposal by 2028**



UNIDO POPs Program core activity areas

1. Policies for POPs Management (also **NIPs** and **NIP Updates**)
2. Promotion and demonstration of **Best Available Techniques and Best Environmental Practice (BAT/BEP)** to reduce unintentionally-produced POPs (uPOPs)
3. Management of **Polychlorinated biphenyls (PCBs)** management and technology transfer non-combustion technologies
4. Production of **POPs alternatives (green and sustainable chemistry)**
5. Management of **recycling chains** with potential for POPs recycling or formation (**circular green economy**)
6. Area-based eco-effective chemical management models and **eco-industrial parks (industrial symbiosis)**

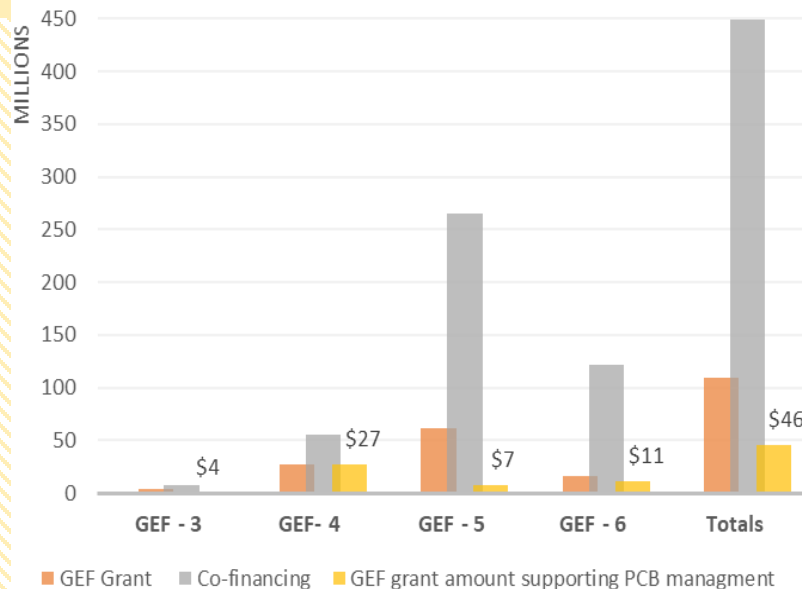




UNIDO-GEF Partnership on PCB Management

AFR [2]	ASP [8]	EECA [10]	LAC [13]
Morocco (2)	Philippines (2)	Georgia	Paraguay
Congo	Sri Lanka	Belarus	Guatemala
	Bangladesh	Kazakhstan	Bolivia
	Lao	Russia	Antigua-Barbados
	Indonesia	Serbia	Peru
	India	Ukraine (2)	Antigua And Barbuda
	Nepal	Armenia (2)	Barbados
	Mongolia	Azerbaijan	Belize
		North Macedonia	St. Kitts And Nevis
		Romania	St. Lucia
			St. Vincent and Grenadines
			Suriname
			Trinidad and Tobago

UNIDO-GEF PCB Cluster





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SUSTAINABLE DEVELOPMENT GOAL 9
INDUSTRY, INNOVATION AND INFRASTRUCTURE



What is UNIDO's approach on **PCB Management?**



PROJECT DESIGN

- **Environmentally Sound Management (ESM) and Disposal of PCBs**
- **Overcome the barriers that impede the implementation of PCB-related obligations of the SC**
 - **Capacity building**
 - **Regulatory/Policy framework**
 - **Information dissemination and awareness raising**
- **Disposal Technologies**
- **Public Private Partnerships**
- **GEF-funded**





Validation activity (inventory)



Safeguarding PCB stockpiles onsite



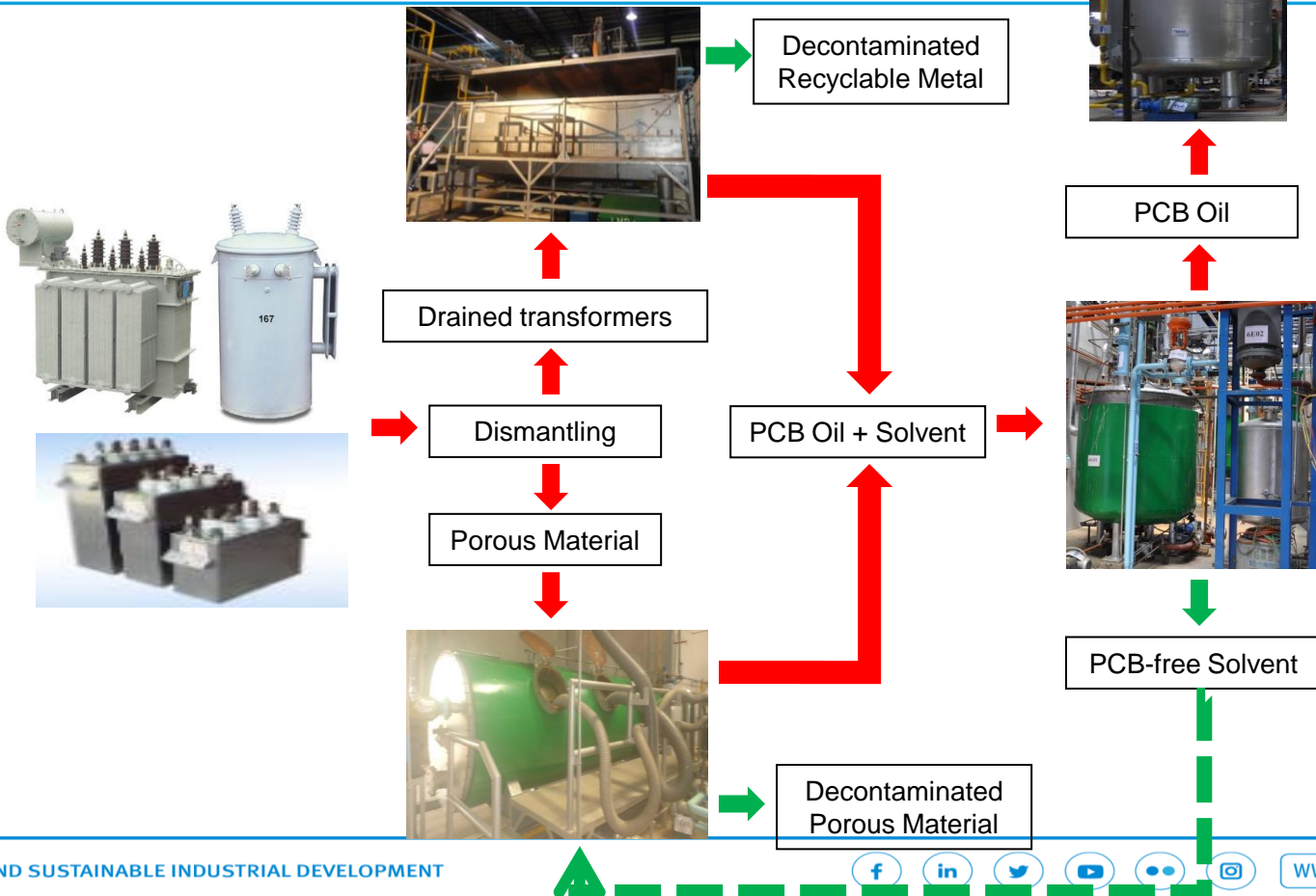
Training and Coaching Sessions



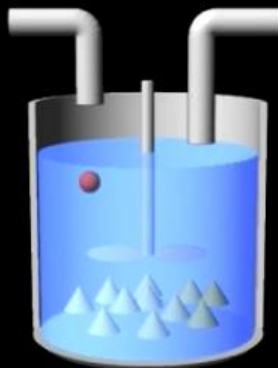
Awareness raising and community involvement

Reframing PCB non-combustion technologies

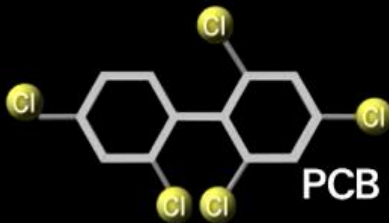
- Traditional option -> **INCINERATION**
- In developing countries,
 1. Mostly low-level PCBs are found
 2. Limited budget for replacing PCB- contaminated equipment and oil
 3. Challenges on transport of wastes and equipment
- Non-combustion technologies offer
 1. On-line or on-site treatment
 2. Cleaned equipment and oil are reusable
- Therefore, **a resource-efficient and practical option.**



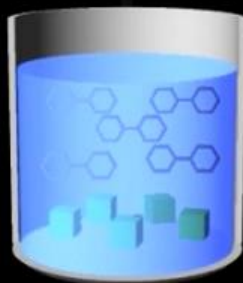
Sodium (Na)



PCB



De-chlorination Process



De-chlorination Process

Regeneration of treated PCB-contaminated oil



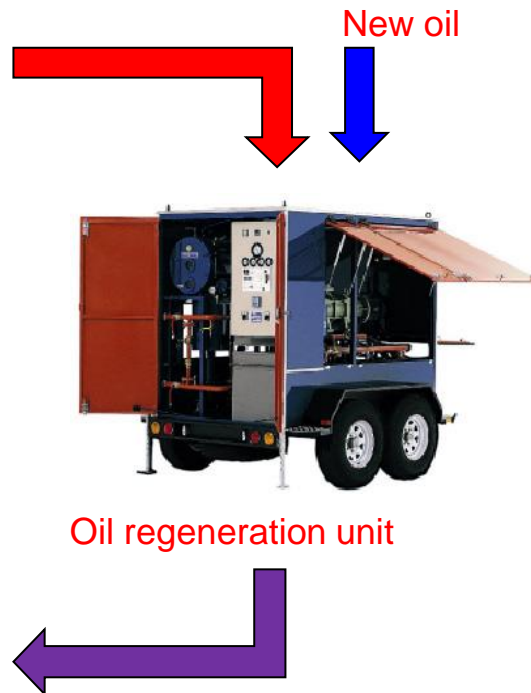
Power transformers



Capacitors



Distribution transformers





Philippine noncom facility



Macedonia noncom facility



Mongolia noncom facility



India mobile noncom facility

India static noncom facility

Pilot PCB treatment facility:

- GEF grant: USD 6,000,000
- A non-Combustion PCBs Disposal technology: De-chlorination, Decontamination, Oil Regeneration, etc.
- Public-Private-Partnership: > USD 2 millions Private Investment (DOWA-PPLI).





Report on progress on PCB elimination*

NATIONAL REPORTS	
Number of Parties	186 Parties
Number of reporting Parties (at least 1 report)	123 Parties
5th National Report	83 Parties
Number of non-reporting Parties	63 Parties
ELIMINATION	
Parties with local elimination	41 Parties
Parties exporting PCB	101 Parties
Total local elimination	331,445 tons
Total export	259,889 tons
Total elimination	591,334 tons
INVENTORY NR	
Complete inventory	45 Parties
Preliminary inventory	40 Parties
Currently being developed	23 Parties
No	14 Parties
NonR	63 Parties
Parties with GEF projects (PCB, NIPs, EA)	123 Parties



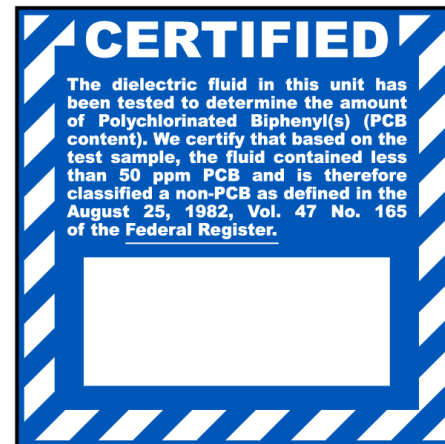
Asia-Pacific Region (49 countries)

- 21 **National reports** in the 5th round. (22 countries have not submitted any report)
- 10 countries have reported local elimination – **83, 530 ton** (73k correspond to Japan)
- 16 countries have reported PCB exports (Basel or Stockholm Conventions)– **9,091 ton** (Iran, Qatar, Singapore, R. of Korea, Kazakhstan, Philippines, Thailand, China).
- Only 8 countries have informed of complete inventories, and 14 informed preliminary inventories or are currently under development. Only 6 countries have reported quantitative data.
- **Initial National Implementation Plans** have been presented. The majority of countries have not updated their NIPs.
- At least 37 countries have received **support from the GEF** with national, regional or global projects.



Key insights

- Country ownership
- Stakeholders' commitment
- Information dissemination and awareness
- Start with a good inventory
- No ***“one size fits all”*** solution
- Protection of human health and the environment





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<https://drive.google.com/file/d/1bTEt5GafD3WOBWfxEYliiv3jzGuKjO2/view?usp=sharing>



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THANK YOU!