CWFPF ROUNDTABLE MEETING

Why are Chemicals and Wastes Important for Financing Institutions? Linking Finance, Communities, and Sustainability

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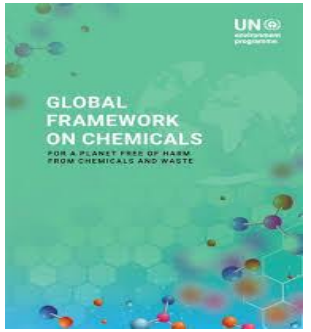
International Advisor on Chemicals and Waste



ADB

gef global environment facility INVESTING IN OUR PLANET

UNIDO

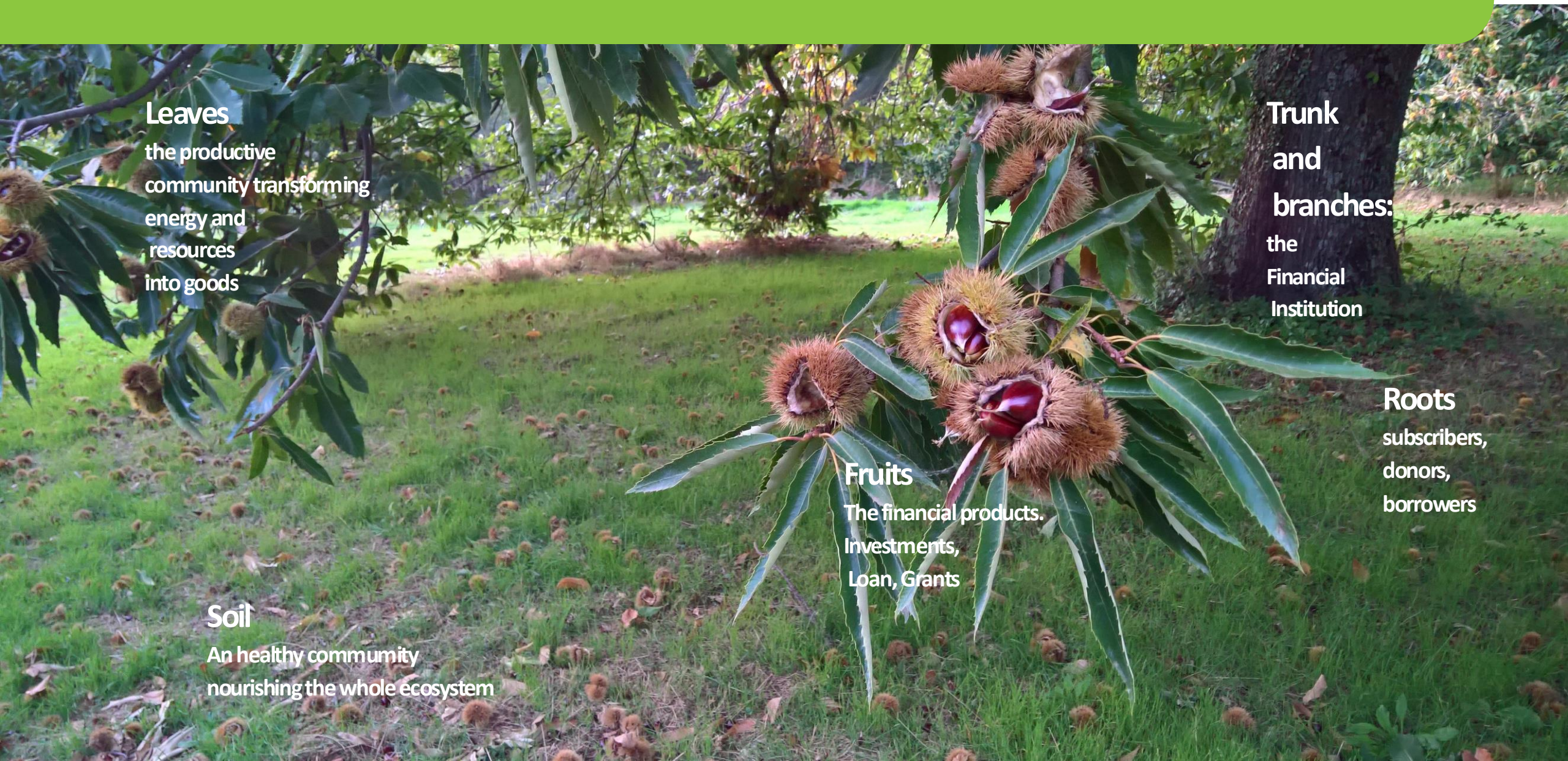
STOCKHOLM CONVENTION

MINAMATA CONVENTION ON MERCURY

Early actions cost less than late remediation

- Externalities: hidden costs borne by the community
- Market creation: bring hidden cost to light
- Finance's role: grow and harvest the orchard
- Early action = opportunity

Financing institutions: an ecosystemic perspective



GEF and the Stockholm Convention

Rise of Global regulation on toxic chemicals - early stages

- From scientific evidence and after major disasters (e.g. Seveso, Bhopal), nations strengthened chemical safety laws.
- This culminated in the Stockholm Convention on POPs (adopted 2001, in force 2004).
- It targeted 12 of the most hazardous substances—PCBs, dioxins, and several pesticides—for global elimination.
- During this period, the GEF supported action through its first three replenishment cycles, laying the groundwork for national implementation and regulatory reform.

Drums containing PCB contaminated oil in Rwanda

Gef and the Stockholm Convention

The Second Cycle: Industrial Chemicals, Plastics, and E-Waste

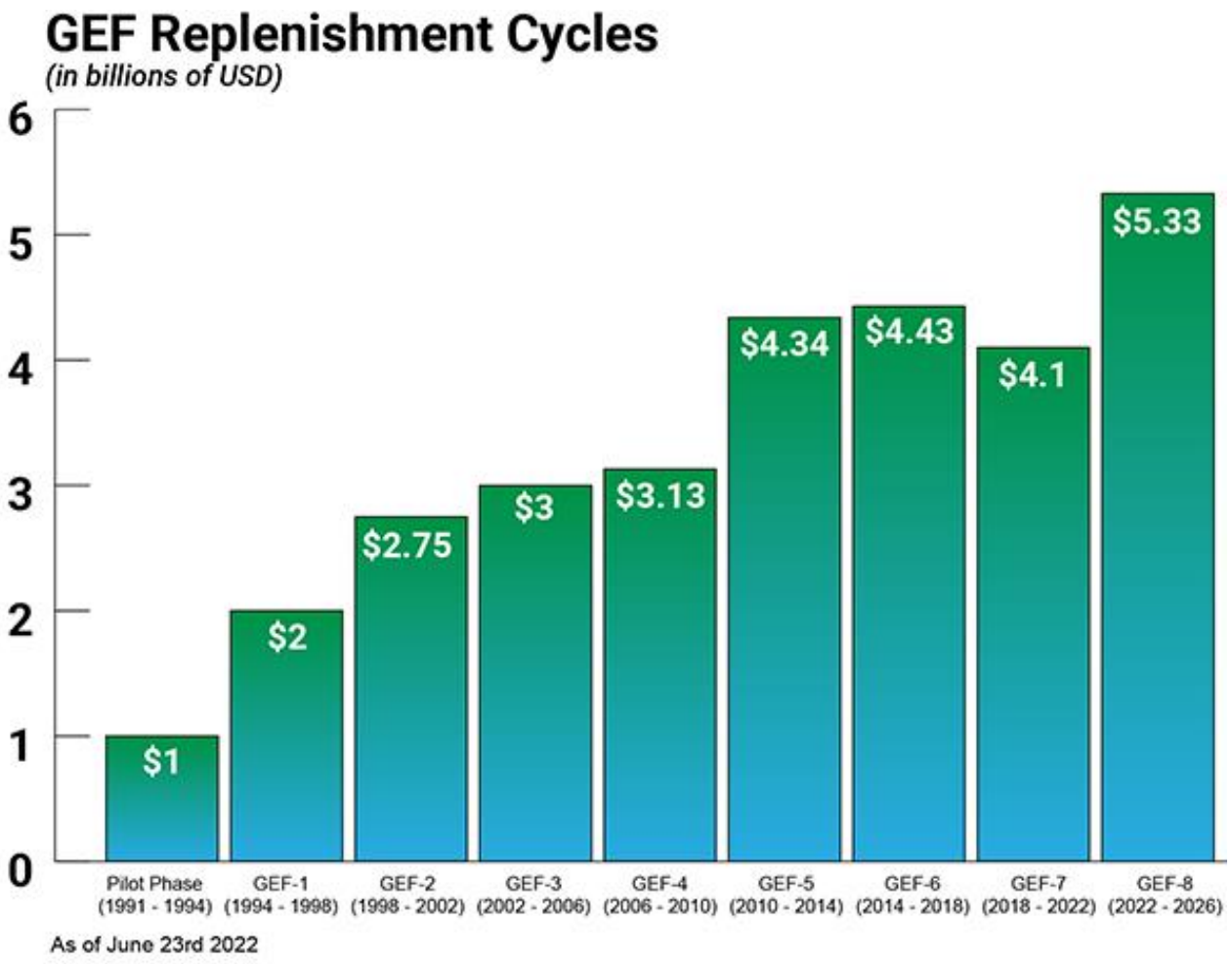
As regulation matured, new threats emerged—industrial chemicals (e.g., PFAS, MCCP, SCCP), plastic pollution, e-waste—often with complex lifecycles, social implications and transboundary impacts.

A Paint manufactury in Viet Nam using SCCP

More than 40 chemicals have been listed so far under the Stockholm Convention, and the GEF has begun recognizing certain waste categories—such as plastic waste—as global environmental threats.

- **Plastic waste as a global threat.**
- **E-waste chrisis.**
- **POPs BFR and some PFAS.**

The Stockholm Convention and the GEF replenishment cycles



Type of C&W GEF projects undertaken in the first 6 cycles:

- Inventory and disposal of legacy stockpiles (PCB and pesticides)
- Clean-up of pesticide contaminated soil
- Some reduction of contaminated waste and U-POPs

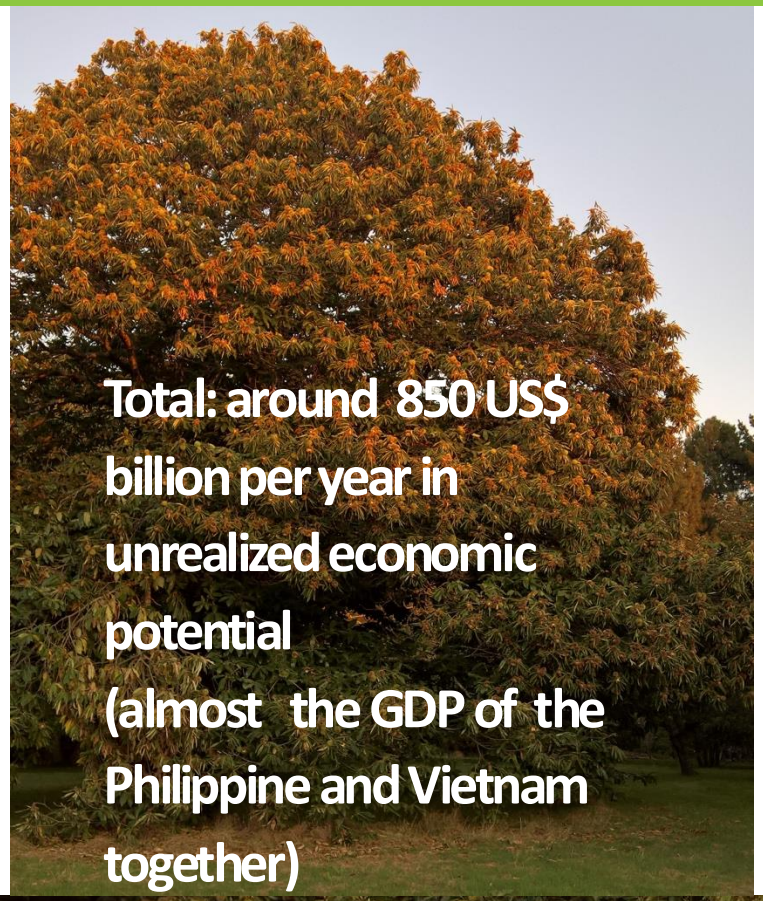
Type of C&W GEF projects undertaken in GEF 7 and 8:

- More focused on upstream minimisation (waste prevention, POPs avoidance)
- Addressing the new “industrial” POPs with larger “bankability potential”
- Not only POPs, but also plastic waste and e-waste

Around 15% of the GEF 8 budget allocated to the C&W focal area (800 M USD).

The financial value of what we discard

Not taking into account environmental damage costs



E-waste:

- 62 billion USD/year in recoverable materials (GEM 2024)
- Only 22% properly collected and recycled, only 1% of available critical minerals recovered.

Plastic waste:

- 353 million tonnes/year (OECD 2022) Conservatively valued US$ 45–50 billion/year based on energy and secondary resin value. Only 9% recycled.

Organic waste.

- ~1.3 billion tonnes/year of food waste (FAO) Estimated US$ 750 billion/year in lost economic value. (production costs, GHG emissions, land use, and energy losses).

Baldè et al (2024) - UNITAR: The Global E-waste Monitor
OECD (2022) Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options
FAO (2013) Food Wastage Footprint

Monetized cost of chemical pollution - global level

Category	Annual / Period Cost Estimate	Source
Air pollution	~ USD 5.11 trillion in welfare losses worldwide (2019 data)	World Bank & Institute for Health Metrics and Evaluation (IHME), Cost of Air Pollution report (2020)
Health costs of air pollution	~ USD 2.9 trillion annually in welfare losses	CREA, Air Pollution Costs (2020)
Chemical pollution overall	> USD 4-6 trillion annually in global welfare costs (health + productivity)	Landrigan et al., The Lancet Commission on Pollution and Health (2018)
Global cost of inaction to prevent chemical exposure	over 10% of the global GDP	UNEP, the Global Chemical Outlook II (2019)
Exposure to Endocrine Disrupting chemicals	Median of 209 billion USD	Trasande et. al, Estimating Burden and Disease Costs of Exposure to Endocrine-Disrupting Chemicals in the EU (2014)
Total monetized benefit of air polluton control (USA) from 1970 to 1990	USD 1 trillion/yr benefit compared to a cost of USD 25 billion/yr	UNEP, the Global Chemical Outlook II (2019)

Are Environmental investments profitable for enterprises?

Outcome of some statistical surveys.

- Mining companies investing in sound waste management have a better ROA (1).
- Firms reducing toxic chemical releases report higher profitability (2).
- Firms investing in CSR or ESG have a better ROE (3,4).

Medium / Long term investments require a consistent and stable regulatory framework.

[1] M. B. Fakoya, "Investment in hazardous solid waste reduction and financial performance of selected companies listed in the Johannesburg Stock Exchange Socially Responsible Investment Index," Sustainable Production and Consumption, vol. 23, pp. 21–29, July 2020, doi: 10.1016/j.spc.2020.03.007.

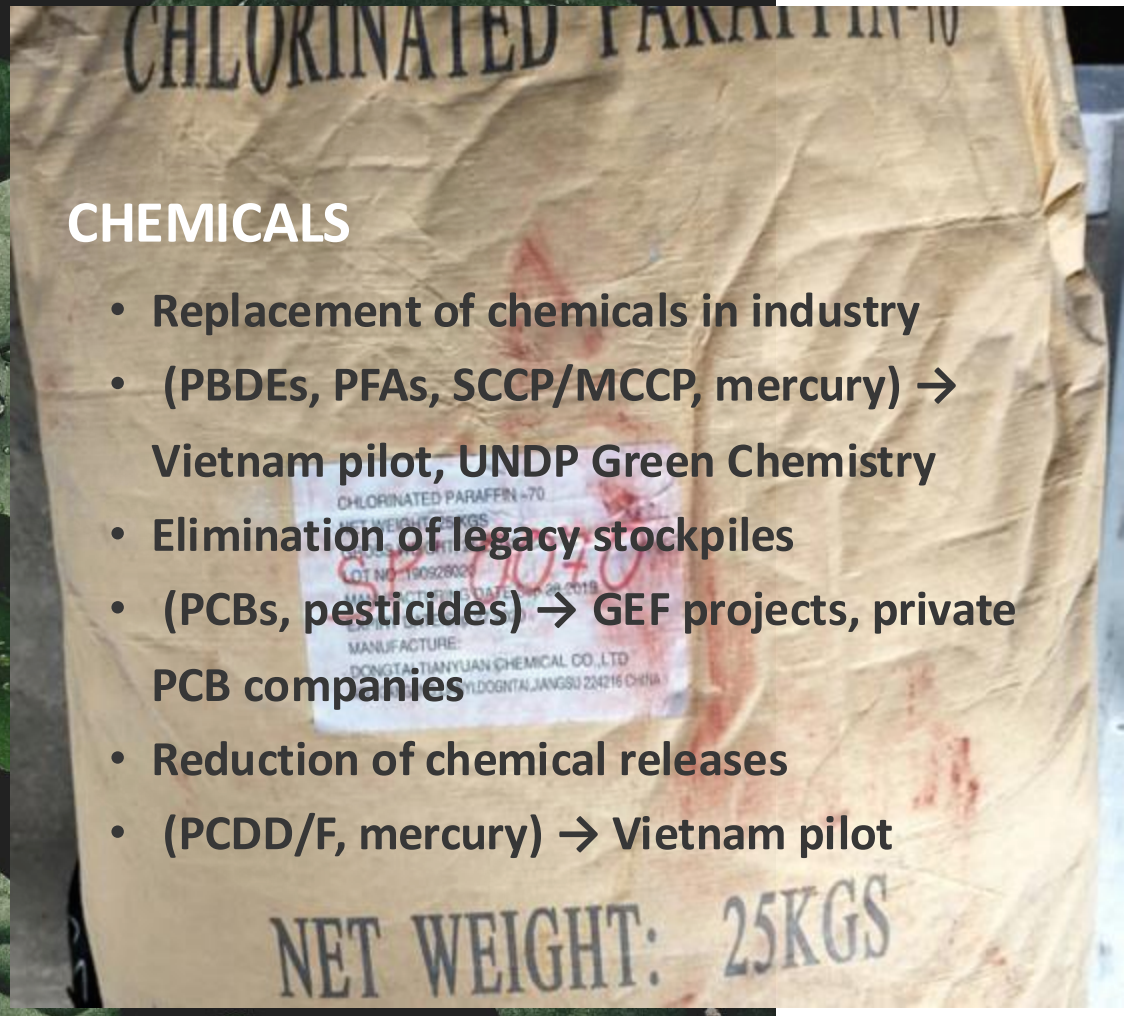
[2] L. L. Eng, M. G. Fikru, and T. Vichitsarawong, "The impact of toxic chemical releases and their management on financial performance," Advances in Accounting, vol. 53, p. 100529, June 2021, doi: 10.1016/j.adiac.2021.100529.

[3] J. Tao, P. Shan, J. Liang, and L. Zhang, "Influence Mechanism between Corporate Social Responsibility and Financial Sustainability: Empirical Evidence from China," Sustainability, vol. 16, no. 6, p. 2406, Jan. 2024, doi: 10.3390/su16062406.

[4] C. De Lucia, P. Pazienza, and M. Bartlett, "Does Good ESG Lead to Better Financial Performances by Firms? Machine Learning and Logistic Regression Models of Public Enterprises in Europe," Sustainability, vol. 12, no. 13, p. 5317, Jan. 2020, doi: 10.3390/su12135317.

The field of play

UNIDO/ADB CWFPF pilots and other examples



CHEMICALS

- Replacement of chemicals in industry
- (PBDEs, PFAs, SCCP/MCCP, mercury) → Vietnam pilot, UNDP Green Chemistry
- Elimination of legacy stockpiles
- (PCBs, pesticides) → GEF projects, private PCB companies
- Reduction of chemical releases
- (PCDD/F, mercury) → Vietnam pilot

WASTE

- Upstream waste reduction
- (packaging, plastics, e-waste) → Thailand pilot, GEM program, pharma waste pilot
- Enhanced collection & safe processing
- (healthcare, e-waste, plastic, pharma) → various cases
- Recycling & upcycling
- (PET bottle-to-bottle, textiles pilot)
- Waste-to-energy
- (Vietnam pilot; Mhin Khai plastic)

UNIDO - CWFPF pilot 1: Philippines - Textile waste upcycling

Technical aspects of the intervention

A pure mechanical process, producing yarn from garment cutting residues (PTRI technology)
Waste reduction (at origin, through training and/or laser cutting service) (supported by ERBD
Textile waste classification by fiber and color (at origin)
A up-to-date machinery established in the TayTay textile hub (@Bayo textile) to undertake

- shredding (of textile waste),
- Fiber opening
- Yarning
- Spinning

Main Features:

- **10–12 t/day textile waste recyded**
- **PTRI patented mechanical process (no water, no chemicals)**
- **Local jobs + smart cutting + segregation support**

Environmental benefits

Avoided use of dyes, dyeing auxiliaries, finishing agents, crosslinkers, softeners, PFAS finishes, formaldehyde resins, APEO surfactants, carriers, salts, etc.

Avoided release of

- dyehouse effluent loads (color, COD/BOD, AOX), volatile emissions from solvent finishes, and sludge with hazardous constituents.

Global Environmental Benefits (GEB)

- **38,000 tons of CO_2e** avoided over two years, equivalent to the annual emissions of about 8,300 passenger cars.
- **63 kg of PFAS avoided,** corresponding to 0.6–6 million garments no longer requiring PFAS finishes.

UNIDO - CWFPF pilot 1: Philippines - Textile waste upcycling

Financial sustainability considerations

Local market vs. export to China		
	Case A: Export	Case B: Domestic market
Net price (after shipping)	0.44 - 0.72 USD / kg	1.0 - 1.3 USD/Kg
Annual Revenue (USD)	0.9 - 1.5 M USD	2.1 - 2.7 M USD
Risks	Price discount + logistics	Quality + certification
Benefits	Market entry pathway	Higher margin, jobs, import substitution

Co - processing of non -recyclable plastic waste.
The Mhin-Khai case

UNIDO - CWFPF pilot 2: Viet Nam: GHG, U-POPs and mercury reduction through waste co-processing

Downstream mercury reduction

- Dust Shuttling
- Fabric Filter with sorbent injection
- Dust Shuttling
- May ensure around 50%/70% of Hg reduction (300-480 Kg in 2 yr for a 2.5 millio tons clinker capacity plant)

Upstream mercury reduction

- Selective mining
- Coal purification / washing
- Low Hg Alternative fuel / co-processing
- May bring as co-benefit CO2 and U-POPs reduction
- 60,000 t of CO2 avoided and additional 5-7 kg of HG

Break-even in 5yr or less

The careful pre - treatment and selection of alternative fuel is key for the success

Plastic waste calorific value higher than coal.

UNIDO - CWFPF pilot 3: Thailand: E-waste management and the Right to Repair

- GEB: 1000 t of E-waste treated, 84t diverted, 14,000 tonnes CO_2 avoided
- POPs & mercury releases reduced

Baseline

- 420,000 tons of E-waste/yr
- 57 million discarded phones/yr
- 60,000 tons of computer/yr
- Equivalent to one mobile phone each 15 month and one PC each 30 months per capita

Dual strategy for the pilot

- **Upstream:**
  - strengthen the repair ecosystem (20 shops trained and supported)
- **Downstream:**
  - expand the collection network in Bangkok (from 52 to 250 points, +500 t recycled per year

UNIDO - CWFPF pilot 3: Thailand, Recycling vs. Repair

Recycling = unavoidable, high volume, shrinking returns (less precious metal content), strategic for critical minerals.

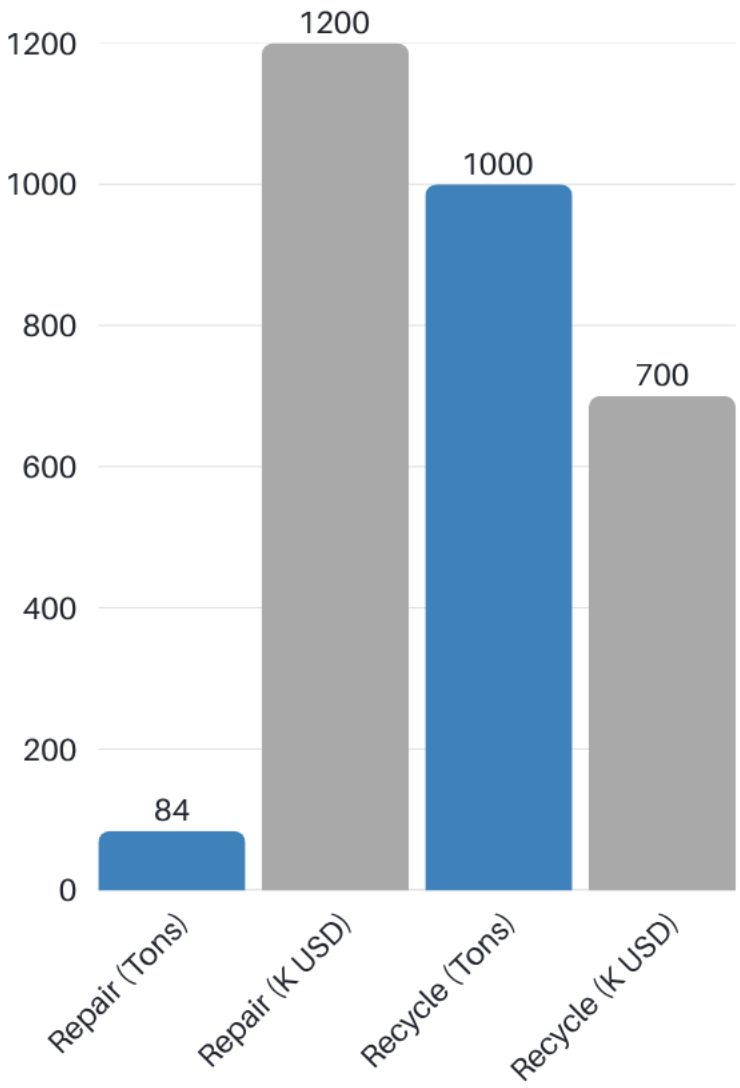
Repair = low volume, high profitability, scalable, socially relevant, expanding.

Conflicts & solutions

- Small shops create jobs, circularity, community value, **however:**
- Each 3 devices repaired = 1 device not sold by the manufacturers.
- **Repairability is becoming a brand value for manufacturers.**

Financing pathways:

- Sovereign loans → government programs (training, collection system).
- Microfinance → repair shops (fast, grassroots impact).



The financial dilemma of waste avoidance.

Recycling can't be the only solution

- **Share of secondary materials fell:** 7.2% → 6.9% (CGR 2025).
- **Plastic: doubled since 2000** (156 → 353 Mt); only 9% recycled (OECD)
- **E-waste: rising** 5× faster than formal recycling (GEM 2024).
- **Rare earths:** just 1% demand met by recycling. (GEM 2024)

Neeed to untap the waste prevention economy

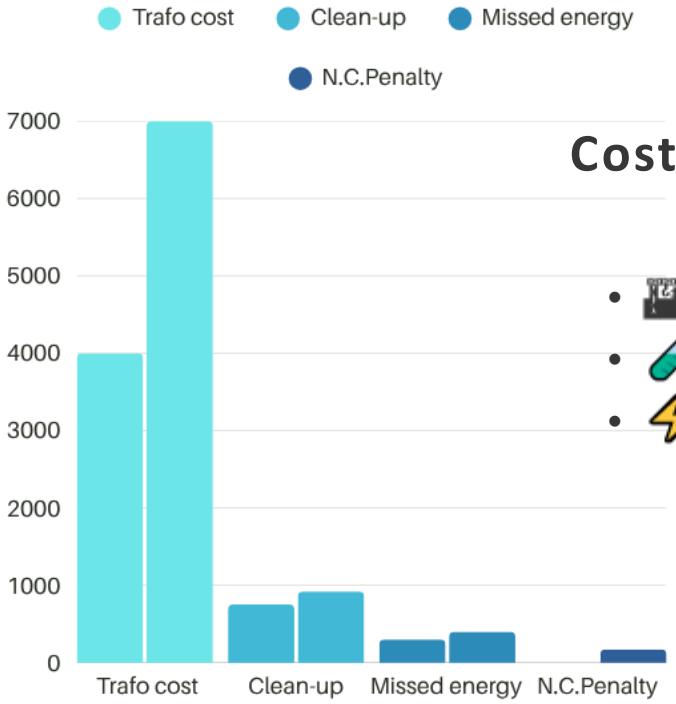
- **Circular by design** (products built for reuse & repair).
- **Repair:** extend product lifetimes.
- **Avoid** single-use packaging & goods.
- **Shift to services** (leasing, sharing, refill).

Who benefits of waste avoidance?

- **SMEs vs. large corporations: different winners.**
- **Economy becomes decoupled from material throughput.**
- **High job creation potential, higher-value than recycling (see previous slide)**
- **Financing tools: sovereign loans + microfinance.**

The PCB case: A missed business?

PCB = Poly Chlorinated Biphenyls



Costs for a 100 kVA transformer

- 🏭 A equipment cost (100 kVA): USD 4,000–7,000
- 🧪 Decontamination: ≥ USD 750
- ⚡ Missed energy if stopped: USD 300/day

Penalties

- PH Philippines: max fine USD 171 per firm (RA 6969)
- ID Indonesia: no authority for penalties
- 🌎 Many developing countries: no penalties for non-compliance
- 📜 Stockholm Convention: establishes general rules, not specific penalties

Replacement of hazardous chemical in manufacturing

(potential examples for pilots under CWFPF in Vietnam)

Replacement of Chlorinated Paraffins in Paint Manufacturing

- ❌ SCCPs (flame retardants, plasticizers) → replaced with MCCPs
- 🔧 New mixing line for high-density chemicals (GEF-supported, ~300k USD)

Outcome:

- Investment in new equipment
- No increase in production costs
- Expanded export share (compliance with buyer standards)
- Firm using “POPs free” as brand value

Replacement of CrVI and PFOS in the plating industry

- ❌ A CrVI plating line with PFOS as anti mist agent completely replaced with a CrIII POPs free line
- 🔧 Large investment required by the factory owner to comply with international rules (SC)
- The new plating line costed around 1.2 M USD of which 300K supported by GEF)

Outcome:

- Investment in new equipment
- 10% increase in product price
- Challenging test phase
- Expanded export share (compliance with buyer standards)

Chemical replacement carries risk but brings competitive advantage.
F.I. may build on the competitive advantage to guide toward sustainable solutions.
PFAS free products reshaping competitiveness in the coming decade

UNIDO - CWFPF pilot 4: Philippines Expired Pharmaceuticals & AMR Prevention – A Multi-Stakeholder Challenge

Problem

- AMR = major global health threat.
- EPP leak into soil, water, ecosystems.
- Manufacturer, pharmacies, doctors, hospitals, patients involved.

Pilot (Philippines)

- Collection & disposal: households + healthcare.
- Modular wastewater treatment (pharma + PFAS).
- GEBs: 1.5–8.3 t/yr antibiotics, 3.5–19 t/yr endocrine disruptors prevented.

Key message

- Not profit, but prevention.
- FIs support governments to build systems that cut health costs & protect ecosystems.

Final Remarks

Take Action

Thank you!

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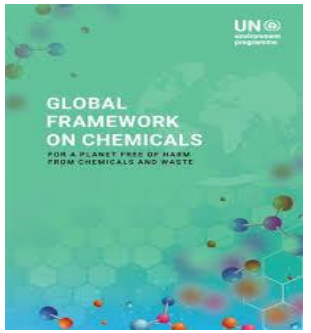

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