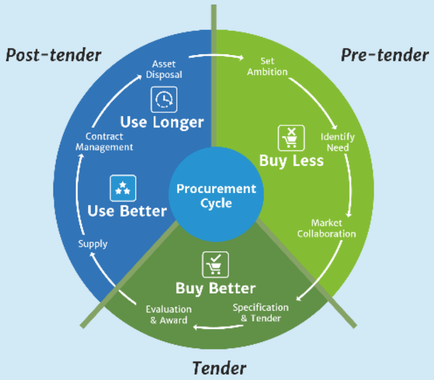
Circular & Fair ICT Pact

CFIT Position Paper
Addressing Chemicals of Concern (CoCs)

About CFIT

The Circular and Fair ICT (CFIT) Pact is a government-driven, procurement-led international partnership and program advancing circularity, fairness, and sustainability in the ICT sector. It brings together public organizations that coordinate and procure ICT within their countries or regions, alongside supporting organizations that provide expertise, tools, and guidance. Through CFIT, participants share knowledge, align and harmonize criteria and guidelines, develop practical tools, and engage with the market to drive more sustainable ICT practices. CFIT is an action under the Sustainable Public Procurement (SPP) Programme of the United Nations Environment Programme (UNEP) One Planet Network.



1 Introduction

1.1 Purpose and scope

This position paper sets out the Circular and Fair ICT (CFIT) Pact's view on how chemicals of concern in ICT (Information and Communications Technology) devices may affect CFIT's efforts to advance circular and fair ICT procurement in the public sector. It also seeks to inform further discussion on how those impacts can be mitigated. CFIT identifies chemicals of concern (CoCs) as a key cross-cutting area that impacts circularity, fairness, and climate impact reduction. CFIT participants have emphasised the need for clearer guidance on managing CoCs in line with circular and fair principles. This position paper sets out the role of CoCs in sustainable ICT procurement and how CFIT participants can begin to address them in alignment with their sustainability objectives. ICT is a subset of electrical and electronic equipment (EEE) which are both ubiquitous and chemically complex. In a world where rapid technological advancement continues to drive consumption and product turnover, several chemicals present in devices, for example, lead, mercury, cadmium, brominated flame retardants (BFRs), and polyvinyl chloride (PVC), pose risks to the environment and human health. The impacts of PFAS chemicals are also becoming more recognised.

The position paper also reflects on work undertaken through the Strategic Approach to International Chemicals Management (SAICM)[1] and the Global Environment Facility Project on Global Best Practices on Emerging Policy Issues of Concern (GEF) project[2], notably, the guidance for procurers published in 2022[3]. It also contributes to the ongoing work of the UNEP Global Framework on Chemicals - for a Planet Free of Harm from Chemicals and Waste[4], which superseded SAICM in 2023.

1.2 Chemicals of concern in ICT

CoCs are increasingly emerging as an important aspect of circular and fair ICT, yet very often they are not addressed as a central issue in sustainable ICT procurement. In production and recycling, these substances pose risks to human health and the environment through their long-lasting presence and toxicity. They can also hinder compliance with sustainability goals throughout the product lifecycle, from extraction and production through to recycling. From a circularity perspective, the presence of CoCs can restrict opportunities for safe reuse, refurbishment and recycling, making it more difficult to close material loops and retain the economic value of products and materials. As the global demand for ICT products grows, these risks will rise proportionately. Generation of global electronic waste (e-waste) is projected to grow significantly in the coming decades, from 62 million metric tons in 2022 to 82 million metric tons in 2030.

1.3 Health, social and environmental impacts

There is often a lack of transparency concerning the environmental, social and human health impacts of CoCs in the lifecycles of ICT hardware and devices. The range of CoCs used in the production of ICT products presents a significant challenge for procurers, especially when identifying the upstream (production and sourcing of products) and downstream (use and disposal of electronic products) impacts.

ICT hardware and devices comprise many different materials and components, each containing a wide range of chemicals at varying concentrations. Additional chemicals may also have been used during manufacturing and assembly. While these chemicals provide specific and important functions, some of them have human health, social, and environmental impacts:

- Health impacts may be related to exposure of workers to toxic substances, unsafe and unhealthy working conditions, and unhealthy living conditions for local communities.
- Social impacts that have been associated with CoCs used in production include disproportionate exposure (e.g. women, children, low-income communities, and workers in informal sectors), chronic health burdens through long-term exposure, low wages, long working hours, temporary contracts during mining, manufacturing, and recycling.
- Environmental impacts may include illegal dumping, biodiversity loss and destruction of fragile ecosystems, excessive water use, and pollution of water, soil and air with toxic substances, including heavy metals, metalloids, and halogenated hydrocarbons[5].

1.4 Current regulatory landscape

The use of CoCs is governed by a multilayered global regulatory landscape of international treaties, regional directives, and national regulations. Key international frameworks like the Globally Harmonized System (GHS) and the Stockholm Convention on Persistent Organic Pollutants (POPs) set the groundwork for hazard identification, classification, and communication. These initiatives aim to standardize the assessment and management of chemicals globally, ensuring that hazardous substances are consistently controlled despite differences in local enforcement. This international effort is complemented by regional and national regulations that further tailor these broad principles to unique market and environmental needs.

In the European Union, the chemicals regulatory environment is very stringent, primarily characterised by regulations such as REACH (Registration, Evaluation, Authorisation, and Restriction of Chemicals), the CLP (Classification, Labelling, and Packaging) Regulation and – specific to electrical and electronic equipment – the RoHS (Restriction of Hazardous Substances in Electrical and Electronic Equipment) Directive. These frameworks require manufacturers and importers to provide extensive data on chemical substances, making it possible to evaluate these substances and restrict them where necessary. Moreover, the European Commission has been advancing new initiatives, such as clarifying the definition of "essential use" for harmful chemicals, to phase out the most dangerous substances from use while still permitting them in critical applications where no alternatives exist. These measures are part of the EU's broader zero-pollution ambition that seeks to push industries toward safer, more sustainable practices.

In other regions, such as North America, Asia-Pacific, and Australia, regulatory frameworks like the U.S. Toxic Substances Control Act (TSCA), China's Decree 591, South Korea's Chemicals Control Act (CCA), and Australia's National Industrial Chemicals Notification and Assessment Scheme (NICNAS) play pivotal roles. These systems mandate comprehensive risk assessments, strict controls on the manufacturing, importation, and use of chemicals, and robust reporting requirements. Recent global trends indicate that these regions are tightening their regulations to address emerging risks and align progressively with evolving international standards.

Collectively, this layered regulatory landscape fosters an environment where the management and reduction of CoCs are integral to protecting human health and the environment, and stimulates industries to innovate toward safer alternatives.

However, regulatory approaches tend to focus on restricting the most hazardous substances without providing clear guidance on what should be used instead. This increases the risk of regrettable substitution, where the alternative materials later prove to have similar or worse health or environmental impacts, and in turn become restricted, potentially undermining circularity and resale value.

2 Common CoCs in ICT

ICT hardware manufacturing relies on a wide range of chemicals. The main CoCs typically associated with common ICT product groups are shown below. It is important to note that there is no single official regulatory list of CoCs organised by ICT product type, the table therefore draws on the sources listed in the final column.

ICT Product Group	Typical Components containing CoCs	Main Chemicals of Concern (Examples)	Primary Sources
Laptops	printed circuit board assemblies, Li-ion battery, display, cables, metal chassis	lead (Pb); cadmium (Cd); mercury (Hg – legacy CCFL); hexavalent chromium (Cr6+); PBB; PBDE; phthalates (DEHP, BBP, DBP, DIBP); cobalt compounds; nickel; TBBPA	RoHS Annex II; REACH SVHC; IEC 62474 DSL; ECHA SCIP
Desktop PCs	motherboard, power supply, housing plastics, cables	lead; PBB/PBDE; TBBPA; antimony trioxide; hexavalent chromium; phthalates; nickel	RoHS Annex II; REACH SVHC; IEC 62474 DSL
Mobile Phones	high-density printed circuit board assemblies, Li-ion battery, touchscreen, connectors	cobalt compounds; lead; nickel; beryllium; TBBPA; antimony trioxide; Phthalates; indium tin oxide	REACH SVHC; RoHS Annex II; IEC 62474 DSL; ECHA SCIP
Tablets	printed circuit board assemblies, Li-ion battery, display module, housing	cobalt compounds; lead; TBBPA; antimony trioxide; nickel; phthalates; indium tin oxide	RoHS Annex II; REACH SVHC; IEC 62474 DSL
Servers	large multilayer printed circuit board assemblies, steel chassis, connectors, power supplies	lead; TBBPA; antimony trioxide; Hexavalent chromium; nickel; beryllium; phthalates; cobalt compounds	RoHS Annex II; REACH SVHC; IEC 62474 DSL
Monitors (LCD)	backlight system, printed circuit board assemblies, housing plastics, display glass	mercury (legacy CCFL); lead; TBBPA; antimony trioxide; indium tin oxide; phthalates; nickel	RoHS Annex II; REACH SVHC; IEC 62474 DSL; ECHA SCIP

Within this broader set of CoCs, per- and polyfluoroalkyl substances (PFAS) are an important emerging group of chemicals for the ICT sector. PFAS may be present in certain components, materials, and manufacturing processes, and are of particular concern due to their persistence in the environment and their potential impacts across the lifecycle, from upstream exposure of workers and communities to downstream end-of-life treatment and recycling.

Electronics Watch, through extensive consultation, has identified sixteen chemicals to be used with caution and recommends that public buyers discontinue the use of these chemicals in their supply chains[6].

3 Challenges for procurers

Managing CoCs is still not routinely integrated into sustainable procurement strategies that aim to promote the production and use of greener products. Many organisations lack a lifecycle approach to managing the impacts of chemicals in products, which makes it harder for procurement to address CoCs proactively and undermines broader sustainability and circularity goals. The lifecycle characteristics of CoCs further reinforce the need for better supply chain transparency and active management of related chemical risks. This can be achieved, for example, by means of hazard assessments, proactive safer substitutions, and responsible end-of-life management.

One of the primary challenges for procurers is the lack of transparency and consistent data on the chemical composition of products. Many suppliers of ICT struggle to provide comprehensive and detailed information, whether directly from manufacturers or indirectly through resellers. This is frequently caused by fragmented reporting practices, inadequate data, or concerns over protecting intellectual property. This information gap makes it difficult for procurement officers to assess whether suppliers meet the expected standards, compare products based on their chemical risks and ensure that indirect supply chains are also compliant and safe.

Another significant challenge stems from the dynamic nature of the regulatory environment. Lists of CoCs continue to change as new hazardous substances are identified and international, regional, and national frameworks are revised. This variability means that procurement teams must navigate a patchwork of regulations. The inconsistency across jurisdictions increases the administrative burden for suppliers. It also complicates efforts to maintain cross-border supply chains that are uniformly sustainable and compliant. This reduces the impact of mitigation measures and adds costs that buyers may end up paying.

The integration of chemical risk management into the procurement process itself also represents a challenge to procurers. Many traditional procurement practices are optimised for cost, efficiency, and performance rather than for environmental safety or long-term sustainability. Changing this mindset requires significant shifts in procurement policies, additional training and increased awareness of existing Type I ecolabels (e.g. Blue Angel, EPEAT, TCO Certified) which include criteria restricting or discouraging the use of certain CoCs as well as standardised declarations (e.g. IEC 62474, IPC-1752A) and digital platforms that support full lifecycle assessments. These transitions in procurement are essential for promoting safer materials and for encouraging suppliers to innovate. However, they are resource-intensive, add complexity and potential delays to the procurement cycle.

Key implications for procurement:

1. CoCs can inhibit circularity by limiting opportunities for the safe reuse, refurbishment and recycling of ICT devices and their components, thereby making it more difficult to close material loops and retain material value.
2. When hazardous substances are present in ICT devices, they can pose risks to human health and the environment during manufacturing, use, and disposal.
3. The production and management of certain COCs may contribute to lifecycle greenhouse gas emissions. Where CoCs inhibit reuse, refurbishment or recycling,

they may also indirectly increase the lifecycle carbon footprint of ICT by increasing demand for virgin materials and new products.
4. The impact of hazardous substances in ICT can lead to stricter regulations, increased costs for safe handling, and reduced opportunities for material recovery.

4 Addressing CoCs in Procurement

Following the CFIT principles and a staged approach to the procurement cycle, several phases of the procurement cycle offer opportunities to manage CoCs.

Pre-tender: focus on establishing clear sustainability requirements and aligning product specifications with reduced chemical risks, where possible.

For example:

- Integrate lifecycle thinking in procurement and consider the role of extended producer responsibility (EPR) schemes and circular economy models to ensure safer disposal, recycling, and reuse.
- Encourage sustainable design and manufacturing through procurement actions. For example, use green chemistry principles to reduce or eliminate harmful chemicals, and promote design for disassembly to ease recycling and reduce waste.
- Focus on safer substitutions for both product and process chemicals, recognising that relying solely on a chemical-restriction approach may still result in regrettable substitutions.
- Conduct market analyses and risk assessments, and establish baseline criteria for acceptable chemical use. Procurement policies can thereby create incentives for safer product formulations and support early supplier engagement on chemicals management.

Tender: focus on incorporating the relevant pre-defined chemical criteria directly into the tender documents[1].

For example:

- Require suppliers to submit detailed declarations (often following standards such as IEC 62474 or equivalent protocols), so that potential issues are identified early through standardised disclosures.
- Specify products with recognised Type I ecolabels (e.g. Blue Angel, EPEAT, TCO Certified).
- Consider innovation procurement to encourage the development of alternative materials (e.g. non-toxic flame retardants, lead-free solders) and the use of secondary and/or renewable resources where possible.

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[1] Criteria addressing Chemicals of Concern in ICT can be highly context-specific, depending on the product being procured. The UNEP SAICM guidance (Sustainable Procurement of Electronics: A Progressive Approach to Chemicals of Concern) provides a broad set of example criteria for different product groups.

- Balance compliance with incentives for innovation and risk reduction in tender award criteria. This can help give greater weight to suppliers with robust chemicals management practices, thus translating strategic objectives into concrete contractual terms.

Post-tender: focus on ensuring that monitoring, compliance, and continuous improvement are embedded in contract management, where relevant.

For example:

- Engage in active oversight to verify that suppliers maintain the stipulated standards throughout the contract period, including during product use and at end-of-life.
- Consider regular audits and performance reviews to help detect any deviations from the chemical safety benchmarks set during the earlier stages.
- Use contract-management mechanisms to drive continuous improvement and inform future ICT purchasing decisions.

Figure 1 summarises some proactive strategies to consider during the ICT procurement cycle.

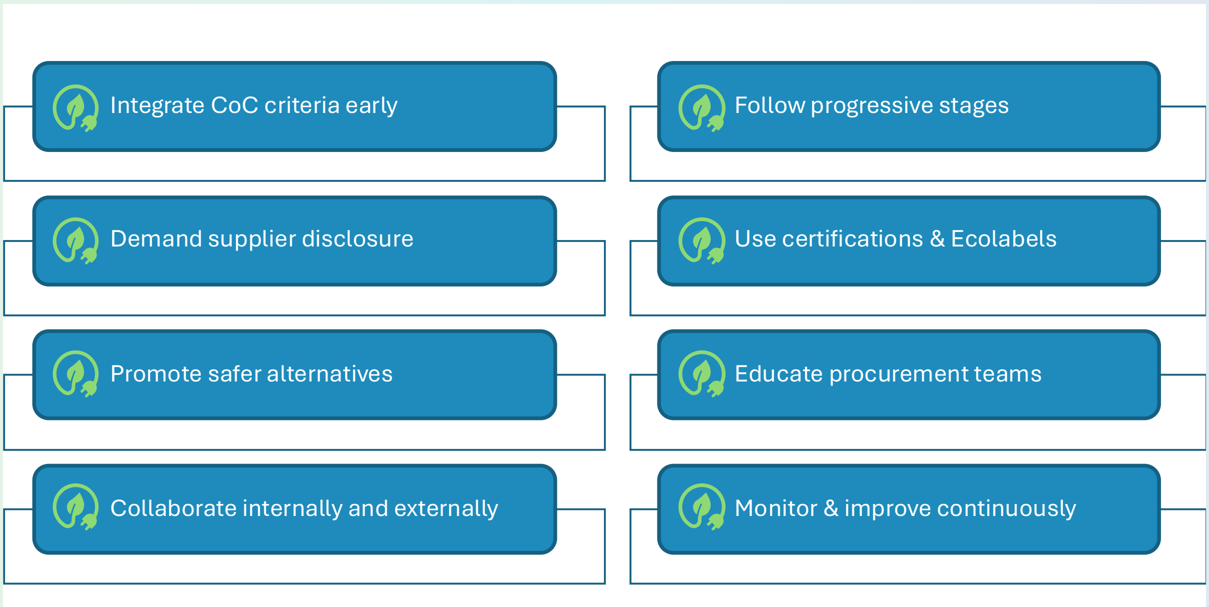

Figure 1. Proactive strategies for addressing CoCs

5 Next steps

CFIT recognises that further work is required to:

1. Provide a clearer breakdown of safer alternatives available for CoCs in ICT devices, including laptops, desktop PCs, mobile phones, tablets, servers and monitors.
2. Identify real-world examples that showcase these principles in action.
3. Provide guidance to help CFIT participants understand the impacts on circularity, fairness, and climate impact reduction, and proactively manage and mitigate risks associated with CoCs through their ICT procurement.
4. Collaborate with relevant ecolabel organisations, standards bodies and other stakeholders to promote proactive action throughout the procurement cycle and reduce the impacts of CoCs on human health and on the ability to close material loops. Recognising the complexity of addressing CoCs for individual procuring organisations, CFIT aims to incorporate ambitious, regularly reviewed criteria on this topic.
5. Raise awareness of emerging evidence on chemical hazards and the development of safer alternatives, while also addressing occupational health and safety risks associated with CoCs across the value chain.

6 References and further reading

[1] UNEP SAICM

[2] UNEP SAICM Global Best Practices on Emerging Chemical Policy Issues of Concern under the Strategic Approach to International Chemicals Management

[3] UNEP (2022). Sustainable Procurement of Electronics: A Progressive Approach to Chemicals of Concern.

[4] UNEP Global Framework on Chemicals

[5] Circular Flanders (2020). Impacts of the ICT Supply Chain: Make ICT Fair

[6] Electronics Watch How to Protect Workers from Chemical Hazards in Electronics Supply Chains: Guidance for Public Buyers V. 1.0 (2020), P. 30.