



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

CIRCULAR ECONOMY and the Stockholm Convention Division

Department of
Environment





UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

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About this publication

The aim of this publication is to introduce the work of UNIDO's Stockholm Convention Division and ways in which it supports the circular economy. The reduction and elimination of Persistent Organic Pollutants (POPs) from industrial activities is crucial to achieve a circular economy approach. Removing hazardous chemicals from products and processes will facilitate the replacement, reduction, reuse and recycling of both products and materials, promoting circularity and maximizing environmental and social gains.

This publication is part of a series by UNIDO showcasing ways in which to facilitate the uptake of circular economy practices, as well as views on how to simultaneously improve environmental sustainability and advance economic development in developing and middle income countries.

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1 | Retaining Value in Sustainable Industry

UNIDO's mandate is to promote and accelerate Inclusive and Sustainable Industrial Development (ISID) (SDG 9) in developing countries and economies in transition by contributing to poverty reduction, economic growth, and sustainable development.

UNIDO is fully committed to contributing to the achievement of the Sustainable Development Goals (SDGs), including responsible consumption and production (SDG 12) and climate action (SDG 13), while delivering on its mandate to support Member States in achieving ISID.

The building blocks of a circular economy have existed for decades now and already underpin many of our technical assistance projects, policy advice and innovation initiatives. Circular economy practices, therefore, fully complement UNIDO's mandate and we are dedicated to supporting Member States in introducing such practices into their economies and industrial value chains to help improve resource productivity and minimize waste.

Today's manufacturing takes materials from the materials supply chain and turns them into products. Within current consumption patterns, these products usually have only one lifetime, after which they are discarded. This "take-make-use-discard" model – also known as the linear economy – is enormously inefficient. It not only depletes the planet's limited resources and creates a multitude of waste, pollution and health issues, it also makes a substantial contribution to greenhouse gas (GHG) emissions.

An economy achieving full circularity is an ideal. It enables stakeholders to aim high when setting their vision, priorities and strategies for inculcating circular practices within their industries and societies for a better future.

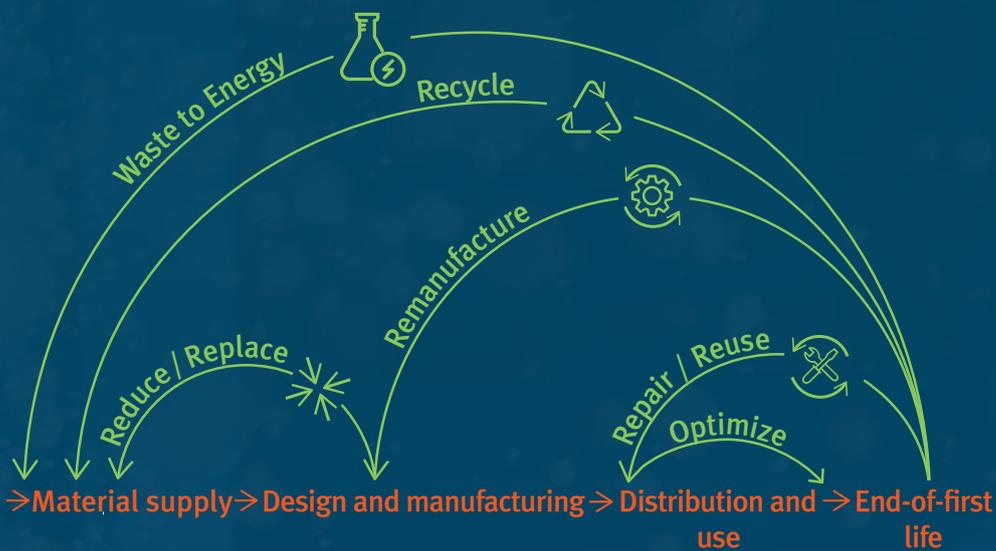
Through circular practices and business models – reduce, replace, regenerate biomass, repair, refurbish, re-manufacture, reuse and recycle, product-as-service, and waste-to-energy – everything gets additional lifetimes, is reused as an input material, part or component, or energy source, or as a last resort, disposed of.

The retained value in products and resources continue to create new business opportunities, income and jobs many times, and not only once as in a linear industrial system, where products usually end up in landfills at the end of their first life with negative impacts on health and the environment.



UNIDO defines circular economy as an industrial economy that routes materials, parts and products back into use several times and creates more value and less waste. It is an alternative in which value is maintained for as long as possible, products are designed to last, and the generation of waste is minimized.

- Linear supply chain
- Circular economy practices



ECONOMIC OUTCOME: increased resource productivity	ENVIRONMENTAL OUTCOME: reduced environmental impact	SOCIAL OUTCOME: improved well-being
Reduced production costs and improved competitiveness	Reduced emissions of greenhouse gases	New jobs and incomes
New business activities and models	Reduced emissions of pollutants and end-of-life waste	Improved health and working conditions
New markets and investment opportunities	Quality of ecosystem services ensured	New partnerships and collaborations
Enhanced consumer loyalty	Natural resources (water, land and materials) preserved	Innovations and technologies that make life easier
Increased long-term availability of supply	Biodiversity safeguarded	

2 | Circular Economy and the Stockholm Convention Division

Toxic chemicals have been used in industrial processes for decades, and continue to be used and released today, in everything from fertilizers to waste incineration. The Stockholm Convention on Persistent Organic Pollutants (POPs) seeks to protect human health and the environment from these chemicals. The UNIDO Stockholm Convention Division (SCD) supports developing and transition countries to implement the Convention by promoting best practice in POPs management.

Through a combination of capacity building, technology transfer, and waste management efforts, the Division seeks to contribute towards reducing and, where possible, eliminating the release of POPs into the environment in industrial processes – an ongoing challenge for countries across the world. UNIDO stands ready to support countries in their efforts in this area, as in China, where a UNIDO project will seek to achieve the phase out and improved management of HBCD in the foam sector.



An aerial photograph of a city, likely Stockholm, showing a dense residential area with many small buildings and a prominent tall, dark skyscraper in the background. A large, thick plume of white smoke or steam rises from the background, partially obscuring the sky. The overall scene is hazy and atmospheric.

In order to achieve POPs reduction and/or elimination, SCD works with businesses to promote industrial solutions that make sense, in terms of both economic and environmental impact. In parallel, SCD works with governments globally to support them in ensuring that the adequate legal frameworks are in place to protect people and the environment from significant threats, such as POPs.

Marrying positive environmental impact with increasing prosperity, and affecting structural change through policies and legislation that matter, are at the heart of how both the Division, and more broadly, the Organization, makes a difference.

From extending product lifetimes, to ensuring the safe recycling of goods through the substitution of POPs, there are many examples of circular economy practices in UNIDO's SCD programme. As governments across the world continue to encourage the adoption of circular economy practices in the name of enhanced resource efficiency and reduced pollution intensity, UNIDO's Stockholm Convention Division will continue to adopt such approaches to create multiple environmental and economic benefits.

While there remains some way to go before circular economy practices replace the dominance of unsustainable linear patterns in industry today, UNIDO and its SC Division remain persistent in facilitating this step change. For us, there is simply very little choice left.

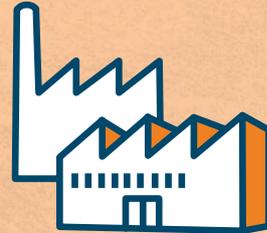
3 | SCD in Action!

these figures cover the period
July 2017 – June 2018



1,339

Materials
recycled/reused
in metric tons



Number
of new
businesses

117



4,718 companies
adopting BEP

Unintentional POPs safeguarded

228,786 mg

POPs safeguarded

77,670 metric tons PCB, pesticides,
DDT





231

environmental policies
and regulations
approved



100,235

women trained

Unintentional POPs avoided

161,930

 mg

POPs eliminated/discontinued

11,568

 metric tons PCB,
pesticides, DDT

4 | From Action to Impact

The services of the UNIDO Stockholm Convention Division (SCD) work to encourage the adoption of sustainable industrial solutions for pollution reduction and circular economy by designing and implementing a wide range of projects tailored to developing countries and economies in transition. The following case studies provide a snapshot of some of the Division's projects, which form part of a much larger and growing portfolio of circular economy projects, as just one element of UNIDO's broader work on circular economy.

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partner countries,
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Policies for POPs management

Ensuring sustainability through legal advice and regulatory assistance

As a first step in addressing any releases of POPs, but in particular releases stemming from waste and recycling operations, UNIDO helps developing countries and countries in transition to formulate or update their Stockholm Convention National Implementation Plan (NIP). This Plan highlights sources of Persistent Organic Pollutants releases, including those from waste management processes, among others. It also alerts governments to the need to act to decrease releases through enhanced waste management practices, while providing a legal basis for waste separation, waste treatment and recycling. In this way, the NIP then serves as the basis for establishing

new recycling industries to help to achieve the reduction needed. This, in turn, creates prosperity and jobs.

Main approach

In assisting countries with formulating or updating their NIP, UNIDO can help to link sectoral priorities to wider policies, such as circular economy. At national level, POPs and broader toxic substance consideration is integrated with circular economy and recycling policies. At project level, improving the regulatory framework addresses the need to create an effective waste management system, including a strong recycling industry.



60+ projects in 69 countries
from 2015–2019

This project aims, through a coordinated intervention, to strengthen the legal and institutional framework, create business opportunities and invest in the sector for the creation of green jobs.

Professor Joseph SEKA SEKA,
Ministry of Environment and
Sustainable Development, Cote d'Ivoire

Results and Impact

Building strong legal and institutional frameworks is central to UNIDO's project on the "Sound Management of Unintentional POPs and PBDEs" executed by the Republic of Côte d'Ivoire's Ministry of Environment. The project aims to reduce Unintentional POPs and polybrominated diphenyl ethers (PBDE) emissions from the national industrial waste sector by providing a regulatory framework conducive to the safe and sound management of POPs-contaminated waste electrical and electronic equipment (WEEE) and end-of-life vehicle (ELV) components.

A bill on industrial waste management and several decrees will also be drafted under the project. This will serve to strengthen the links between relevant legislative frameworks and circular economy, hazardous chemicals and POPs management, and will be further promoted by targeted awareness campaigns.





Clean Recycling

Enhancing resource use in an environmentally sound way

Intentionally produced Persistent Organic Pollutants (POPs) are present in a wide range of products from cars to computers. This poses a serious threat to public health and the environment. UNIDO addresses these threats by supporting recycling industries through the introduction of environmentally sound management (ESM) systems. These systems ensure that operations meet the best applicable recycling standards, national regulations and international treaties so that recyclable materials conform to high quality specifications.

Main Approach

Improving the collection, treatment and recycling of POPs-containing waste supports a circular economy approach by promoting the preventive 4-R paradigm (replace, reduce, reuse, recycle).



This project is fundamental because we want to be part of the bioeconomy, where the circular economy is integrated into the productive matrix of the country.

Tarsicio Granizo,
former Minister of Environment,
Ecuador

Results and Impact

Electronic or electrical products that have reached the end of their “useful” life are commonly known as e-waste and often contain POPs. As the fastest-growing waste stream in the world, e-waste continues to represent a threat to both the environment and global human health. UNIDO is working with partners on a project co-funded by the GEF to support 13 countries across Latin America with addressing this issue.

The UNIDO-GEF project on “Strengthening of National Initiatives and Enhancement of Regional Cooperation for the Environmentally Sound Management of POPs in WEEE” assists the countries both technically and financially, advising on policies, business plans, legislation, technology, and awareness-raising. A circular economy approach will support national industries providing recycling services and high quality recyclable materials, generating significant numbers of direct decent jobs and work opportunities. At the same time, the project will help to protect the environment from hazardous wastes, chemicals and emissions, recovering raw materials and providing affordable refurbished products.



PCB Decontamination

Neutralizing dangerous substances

Ensuring clean and safe recycling that avoids the recycling of materials containing toxic chemicals is central to the work of UNIDO's Stockholm Convention Division. The electric grids that power industry contain transformers. In some cases, these transformers use oils that contain polychlorinated biphenyls (PCBs). In the case of transformer oils, uninformed recycling practices have led to increased PCB contamination, posing a serious threat to human health and wildlife.

In order to address this increased contamination threat, UNIDO promotes the establishment of environmentally sound PCB management systems by enhancing national legal, institutional and technical capacities for PCB management.

The adoption of best working practices, international standards and protocols and technology transfer will prevent further cross-contamination of equipment with PCBs and the introduction of PCBs into the environment.

Main approach

The installation of a treatment facility for PCB-containing transformers in the Republic of North Macedonia promotes a circular economy approach by removing toxic substances from transformers and extending their in-service lifetime, or alternatively recovering the transformer oil and recycling the cleaned metals.



*Projects in 19 countries
from 2015–2019*

We are the first country in the region to establish a PCB treatment facility, enabling the decontamination and reuse of PCBs-laced transformer oils.

Stevo Temelkovski,
Deputy Minister of Environment
and Physical Planning,
Republic of North Macedonia

Results and Impact

Owing to a lack of in-country treatment options and rising overseas disposal costs, PCB-containing waste was being discharged and introduced into the environment in the Republic of North Macedonia.

UNIDO works with a number of industry partners, including the national power distribution company "EVN" on the "Phasing out of PCBs and PCB-containing equipment". From policy framework improvement to detailed PCB inventories, the project established bases for sound PCB management throughout the entire life-cycle (inventory, usage, handling, storage, transportation and disposal). Environmental officers were trained on sound

PCB management, a secure temporary PCB storage facility was established, and PCB-containing transformers were treated using newly-installed technology, extending the lifetime of equipment and oils.





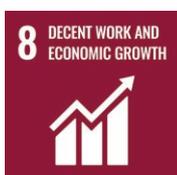
Toxic-free manufacturing

Safer production for people and the planet

In manufacturing, POPs are sometimes used as inputs, or are present as contaminants, becoming ingredients in products. UNIDO supports the manufacture and introduction of alternative chemicals and non-chemical solutions for industries worldwide. This is with the aim of eliminating risks to human health and the environment.

Main Approach

Many of the Best Available Techniques and Best Environmental Practices (BAT/BEP) advocated by UNIDO support a circular economy approach by promoting the recycling of industrial outputs, for example, while helping industries to minimize releases of Unintentional POPs.



Projects in 14 countries
from 2015–2019

There was a large amount of chemical wastage and inefficiency before the new machines arrived. Now the chemist has to make only 2 trials and no longer 16 trials for a week or more.

Mr. Birhanu G/Medhine,
Processing Department Head,
KTSC

Results and Impact

Pesticides, dyestuffs/pigments, effluent water and sludge are all potential sources of Unintentional POPs (dioxin/furan) releases in the textile industry. UNIDO's Pilot Demonstration Project on the "Implementation of Best Available Techniques and Best Environmental Practices (BAT/BEP) in the Textile Industry" was successful in demonstrating how circular economy practices to promote cleaner production could help the textile industry in Ethiopia to become more resource-efficient and also reduce releases of POPs. At Kombolcha Textile Share Company (KTSC), one of the country's largest integrated textile factories, extensive analysis

determined a range of ways in which KTSC could lead the way in a unified industry-wide approach to achieving reduced POPs releases in the dyeing and finishing activities of textile processes, including through the adoption of greener technologies.



Emission-free Processes

Kinder to the environment and company budgets

Power plant operations, waste incineration and smelting are just some of the industrial processes that generate emissions of Unintentional POPs and other toxic pollutants. Listed under the Stockholm Convention, these processes are also highly energy-intensive. This presents an opportunity for UNIDO to explore the synergistic reduction of POPs and greenhouse gases through the adoption of circular economy practices.

Main Approach

The application of Best Available Techniques and Best Environmental Practices (BAT/BEP) in the value chain of secondary or alternative materials, including waste as fuel, supports circular economy by minimizing resource use and enhancing energy efficiency. These measures also prevent unwanted emissions of environmentally harmful and health-hazardous substances.

9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



*Projects in 19 countries
from 2015–2019*

This project will boost environmentally friendly production and sustainably benefit the local community, whilst helping Thailand to enter the industry 4.0 scheme.

Wisanu Tubtiang,
Director General of the Department of
Primary Industries and Mines (DPIM)

Results and Impact

The recycling of metals is an important and well-established economic industrial activity. However, the production of secondary metals from scrap through high temperature metallurgical processes can lead to the enhanced formation and release of Unintentional POPs and other pollutants, such as mercury. When other materials attached to scrap metals, such as paint, are brought to a high temperature, this can lead to the formation of highly toxic Dioxins and Furans, owing to their fluorine/chlorine content.

UNIDO works with the Department of Primary Industries and Mines under the Ministry of Industry of Thailand (DPIM-MoI) on the GEF-funded project "Greening the scrap metal value chain through promotion of BAT/BEP to reduce Unintentional POPs releases from Recycling Facilities." This project aims to remove many of the existing technical and institutional barriers to adopting environmentally sustainable approaches to the recycling of scrap metal along the entire value chain. It also aims to link, wherever possible, energy efficiency improvements (related to improved profitability) with an effective and economic reduction of Unintentional POPs releases.







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