



United Nations
Industrial Development Organization

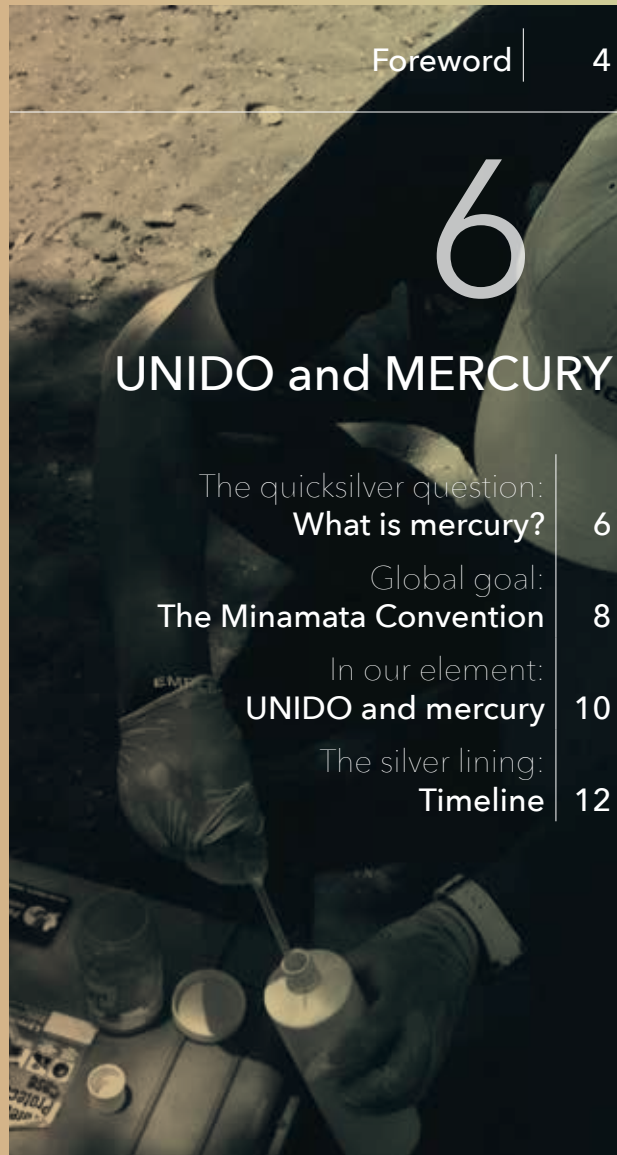
Braving the Elements:
UNIDO
and
Mercury





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and
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UNIDO and MERCURY

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Li Yong

Director General of UNIDO

UNIDO has worked to reduce and eliminate mercury in developing countries and economies in transition for more than twenty years. Starting with the artisanal and small-scale gold mining sector, UNIDO has expanded into other areas, such as zinc smelting and vinyl chloride monomer production. Since the milestone achievement of the entry into force of the Minamata Convention on Mercury in August 2017, in addition to our global commitment to the 2030 Agenda for Sustainable Development, the role of the international community and specialized agencies like UNIDO has only become more pertinent.

Mercury poisoning poses a significant danger to human health and the environment, particular to women and unborn children. UNIDO's work in supporting member states in fulfilling their commitment towards the Minamata Convention protects societies and communities from the effects of mercury and helps governments to adhere to the Convention. UNIDO has been assisting enterprises to adopt sustainable practices that reduce and eliminate mercury from the environment, in support of the further development of enterprises.

This booklet showcases a selection of UNIDO's intervention in its Mercury Programme. In compiling this knowledge product, we draw on our projects in the artisanal and small-scale gold mining sector that introduces innovative, mercury-free techniques for miners, aimed at supporting the reduction of poverty through inclusive and sustainable industrial development. In the booklet, we also show how the incorporation of gender perspectives in UNIDO interventions aimed at promoting gender equality is important, and can make a difference to the overall development impact on the community and its well-being.

UNIDO has also learned from its experience that due to the wide number of sectors impacted by mercury use, the most effective way to reduce and eliminate mercury is through partnerships. Whether we are working with international refiners to ensure responsibly mined gold, or with the public and private sector to identify ways to decommission and decontaminate chlor-alkali facilities, it is clear that working in collaboration with donors, partners and our Member States delivers the needed development results. This is just the beginning. UNIDO, together with its partners will strive to continue to find practical avenues to promote inclusive and sustainable industrial development, while protecting human health and the environment from the harmful effects of mercury.

Li Yong

The Minamata Convention is a demonstration of the power that the international community, when determined to act together, can show.

The Convention was adopted in Kumamoto, Japan, by a Conference of Plenipotentiaries in October 2013, aiming to address the devastating effects of mercury by tackling this natural element throughout its life cycle.

It was only four years before that the Governing Council of the United Nations Environment Programme adopted the historical decision to develop a legally-binding instrument to confront mercury pollution. The text was agreed at the fifth meeting of the Intergovernmental Negotiating Committee (INC).

Mercury pollution is a global problem and thus requires global action. Mercury is emitted in the air and is transported very long distances in the atmosphere. It is also released in water and soil, and does not respect geographical or political borders. The INC, governments, international organizations, industry, the private sector, non-governmental organizations, academia and civil society at large, overcame their differences and united towards a common objective of global benefit.

The Minamata tragedy in Japan strongly influenced the decision to act. The Convention is, in effect, named after the beautiful Minamata Bay in Japan, which experienced a serious and long incidence of mercury poisoning in the 1950s. The Minamata disease diagnosis and suffering continue to be repeated around the world. This is exactly what needs to be stopped. The Minamata Convention is a testimony to the international community having learned the lesson. We all speak with one voice now against further losing lives to mercury and further polluting our environment with it.

The Convention celebrated the first year of its entry into force in August, and as of today it has 101 parties. A long but fruitful path has been followed since the early 2000s when Switzerland and Norway proposed the development of an international legal framework on mercury. Today, the hardest work lies ahead, as we now must implement the Convention as effectively and rapidly as possible, to minimize the risks posed to communities and the environment.

Meeting the commitments under the Convention will support the international community's efforts towards the various Sustainable Development Goals the Convention contributes to, directly and indirectly.

The hard, serious and committed work and support of all will make it possible to progress in our common objective and, over time, make mercury history!



Rossana Silva Repetto



Rossana Silva Repetto

Executive Secretary of the Minamata Convention

The quicksilver question: What is mercury?



Did you know?

EARLY SIGNS OF SICKNESS AT MINAMATA WERE SEEN IN HOUSEHOLD CATS. THE CATS CONVULSED, AND SOMETIMES LEAPT INTO THE SEA TO THEIR DEATHS.

MERCURY HAS FASCINATED PEOPLE FOR THOUSANDS OF YEARS.

Dense and silvery-white, it is the only metal that is liquid at room temperature. It is a naturally occurring element that can be found in air, water and soil. Some mercury is released into the environment from natural sources, such as volcanic eruptions or forest fires. But the majority comes from human activity, such as gold mining, metal smelting and cement production.



MERCURY IS HIGHLY TOXIC, POSING A SERIOUS THREAT TO HUMAN HEALTH.

Since ancient Rome, humans have been aware that mercury is dangerous. Today, the World Health Organization has classified it as one of the top ten chemicals or groups of chemicals that are of major public health concern. Mercury poisoning, through inhalation or ingestion, attacks the human nervous system and can result in brain and neurological damage, memory loss, skin rashes, emotional changes, tremors, kidney, heart, vision and respiratory issues, and even death. Unborn children and infants are particularly at risk.

DESPITE THE WARNINGS, we continue to poison our environment and our communities with mercury. In the last hundred years, human activity has doubled the amount of mercury in the top 100 meters of the ocean. An estimated 2,960 tons of mercury is still released every year. Recent studies found that children from a diverse range of places – Brazil, Canada, China, Columbia and Greenland – all showed signs of cognitive impairment from eating fish containing mercury.

THE ENVIRONMENT IS ALSO AT STAKE.

Mercury evaporates easily into the air, and once released, it remains in the environment. It can be absorbed by microorganisms and converted into highly toxic methylmercury. Methylmercury becomes more concentrated as it travels up the food chain, threatening not only particular species but overall biodiversity.

THE DANGER OF MERCURY WAS MADE CLEAR IN A TRAGIC CASE OF POISONING IN MINAMATA, JAPAN.

From 1932 to 1968, a chemical factory in the city released methylmercury into the industrial wastewater, poisoning the fish and shellfish in Minamata Bay and beyond. In 1956, with increasing numbers of people falling ill, the condition was identified as “Minamata Disease,” a neurological syndrome caused by mercury poisoning. As a result of eating the fish and shellfish from the bay, more than a thousand residents died and many more were affected by mercury-related illnesses. The effects of the pollution still continue today.




Global goal: The Minamata Convention on Mercury



Did you know?

MERCURY WAS THOUGHT TO CURE SYPHILIS. IT WAS USED FROM THE END OF THE FIFTEENTH UNTIL THE EARLY TWENTIETH CENTURY. THE SAYING WENT: "A NIGHT WITH VENUS, A LIFETIME WITH MERCURY."



Named after the city in Japan with the largest recorded incident of mercury poisoning, the Minamata Convention on Mercury demonstrates the global commitment to reduce and eliminate mercury.

The Convention, which entered into force on 16 August 2017, is a **multilateral agreement to address the human activities which lead to mercury pollution**. It aims to protect human health and the environment from the effects of mercury. Because mercury travels through air and water, it transcends the boundaries of countries and continents. An international effort is essential to combat the use of mercury in human activities.

Under the Convention, the **entire life cycle of mercury** is considered, including a ban on new mercury mines and the phasing out of existing mines, as well as restrictions on the supply and trade of mercury. The Convention includes the phase out and phase down of products and processes that use, release or emit mercury into the air, land or water. This includes the regulation of artisanal and small-scale gold mining (ASGM). Finally, the Convention features measures on environmentally sound interim storage of mercury, contaminated sites, and mercury waste disposal. Financial and technical support from donor countries and the Global Environment Facility (GEF) allows developing countries and economies in transition to adhere to the Convention's terms.

The ultimate goal of the Minamata Convention is to **make mercury history**.

Minamata Convention on Mercury
Photo by IISD/Kiara Worth

In our element: UNIDO and mercury

Did you know?

MERCURY, THE
ROMAN GOD OF
COMMERCE, TRICKERY,
AND POETRY, WAS
ALSO SAID TO GUIDE
SOULS TO THE
UNDERWORLD.



For over twenty years, UNIDO has worked to minimize the use and discharge of mercury in developing countries and economies in transition. We help communities, enterprises and governments to sustainably reduce and eliminate mercury.

We're in it for the long haul.

Back in 1994, UNIDO began its commitment to tackle mercury in the artisanal and small-scale gold mining (ASGM) sector, which is the largest contributor to global anthropogenic (human-caused) mercury emissions. UNIDO initiated projects in Ghana, the Philippines and Tanzania. Soon afterwards, our work on the **Global Mercury Project** broadened our scope in the sector, aiming for a worldwide response to the impact of mercury on the environment. We have worked in the ASGM sector ever since, and our experience has led us to develop action plans, promote a sustainable artisanal gold value chain, and assess and demonstrate pilot remediation technologies at mercury-contaminated sites.

In the last five years, UNIDO has also branched out into other sectors. To complement the development of the **Minamata Convention**, we have conducted Minamata Initial Assessments (MIAs) for developing countries to identify priority areas in mercury use and emissions. We establish interim waste storage facilities and raise awareness on the best stabilization and storage options; develop and conduct technology training programmes for mercury management; and assist countries to develop National Action Plans (NAPs) to phase out mercury in mining and industrial processes. In addition, we work to reduce emissions in industrial processes such as smelting facilities and cement production. We promote clean, safe alternatives to mercury in the manufacturing process and raise awareness of the dangers of mercury.

We can't do it alone.

Today we are proud to play a key role in the United Nations Environment Programme **Global Mercury Partnership**, not only as an active member in areas relating to mercury industrial waste, mercury in products and mercury storage, but also as a co-leader in ASGM and chlor-alkali issues.

This booklet not only showcases a selection of our recent success stories, but it also highlights some of our **exciting new partnerships and areas for future exploration.**

With our donors, partners and our Member States, we work to ensure that communities and industries are sustainable, healthy and mercury-free.

The silver lining: Timeline

UNIDO has over 20 years of experience in minimizing and eliminating mercury releases into the environment. We are helping to build a future where harmful mercury does not play a part.

Did you know?

THE ANCIENTS BELIEVED THAT ALL OTHER METALS CAME FROM MERCURY, WHICH WAS KNOWN AS "THE FIRST MATTER."

1956 - 1999

1956:

Minamata Disease is recognized in Minamata, Japan. Thousands of people are affected by severe mercury poisoning.

1966:

UNIDO is established.

1972:

The United Nations Conference on the Human Environment is held in Stockholm, Sweden.

The United Nations Environment Programme (UNEP) is established.

1994:

UNIDO begins individual projects relating to mercury in the artisanal and small-scale gold mining (ASGM) sector in Ghana, the Philippines and Tanzania.



2000

2002:

UNEP releases the first Global Mercury Assessment Report.

The Global Mercury Project is formed by UNIDO, the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF).

2003:

At the 22nd session of the UNEP Governing Council, mercury is declared a global problem and voluntary actions are called for.

2004:

The world's largest mercury mine, in Almadén, Spain, is closed after more than 2,000 years of operation.

2005:

The UNEP Global Mercury Partnership is initiated. UNIDO co-leads the ASGM and chlor-alkali areas and is an active member on areas related to mercury waste, mercury in products and mercury storage.

2007:

The Open Ended Working Group on Mercury meets to discuss the global issue of mercury, first in Bangkok, Thailand, and the following year in Nairobi, Kenya.

2008:

Norway becomes the first country to ban the use of mercury in all products.

2009:

The UNEP Governing Council calls for a legally binding instrument on mercury.

2010

2010:

An intergovernmental committee begins intensive negotiations towards what will become the Minamata Convention on Mercury.

2011:

The EU bans mercury exports.

2013:

The USA bans mercury exports.

January 2013:

The fifth of five meetings confirms the text of the Minamata Convention.

October 2013:

The Minamata Convention on Mercury is adopted and opened for signature in Kumamoto, Japan.

July 2017:

A UNIDO project is approved to reduce mercury in the production of vinyl chloride monomer (VCM) in China.

August 2017:

The Minamata Convention enters into force.

September 2017:

UNIDO takes part in the first Conference of the Parties (COP1) held in Geneva, Switzerland.

November 2018:

The second Conference of the Parties (COP2) is held in Geneva, Switzerland.

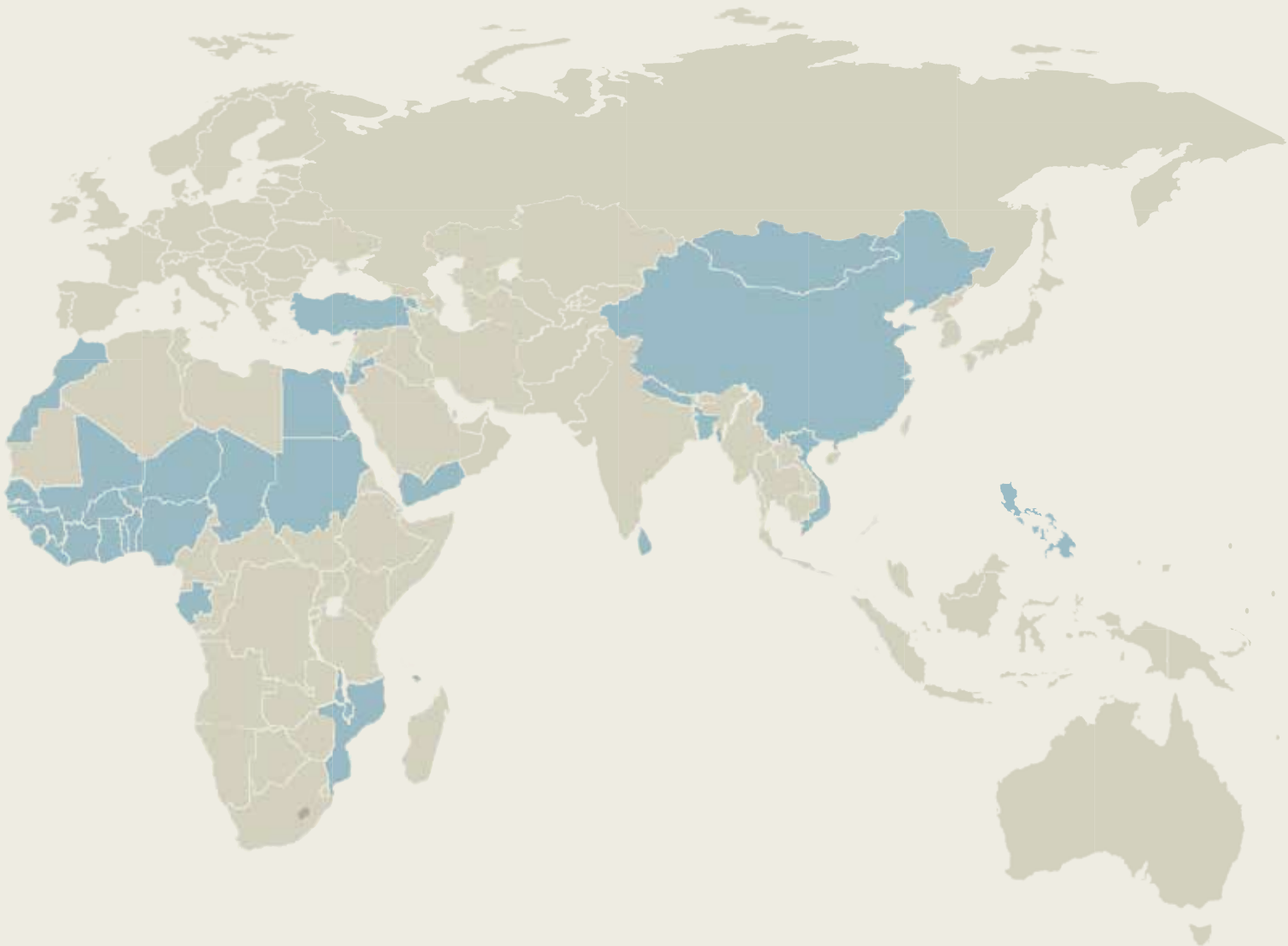


Our mercury projects:

Did you know?

THE ROMANS SENT CRIMINALS AND SLAVES TO MINE MERCURY IN THE CINNABAR MINES OF ALMADÉN, SPAIN. THIS FATE WAS SEEN TO BE SIMILAR TO A DEATH SENTENCE.

Armenia, Bangladesh, Benin, Burkina Faso, Cape Verde, Chad, China, Colombia, the Comoros, Costa Rica, Dominica, the Economic Community of West African States (ECOWAS), Ecuador, Egypt, Gabon, Ghana, Guatemala, Guinea, Jordan, Malawi, Mali, Mongolia, Morocco, Mozambique, Nepal, the Niger, Nigeria, Peru, the Philippines, Saint Kitts and Nevis, Saint Lucia, Sao Tome and Principe, Senegal, Sri Lanka, the Sudan, Suriname, Togo, Trinidad and Tobago, Turkey, Viet Nam, Yemen.



Our plan

At UNIDO, all our projects strive towards inclusive and sustainable industrial development.

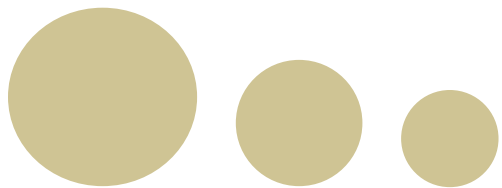


Going for goals

In our quest to get rid of mercury, UNIDO is committed to the Sustainable Development Goals.

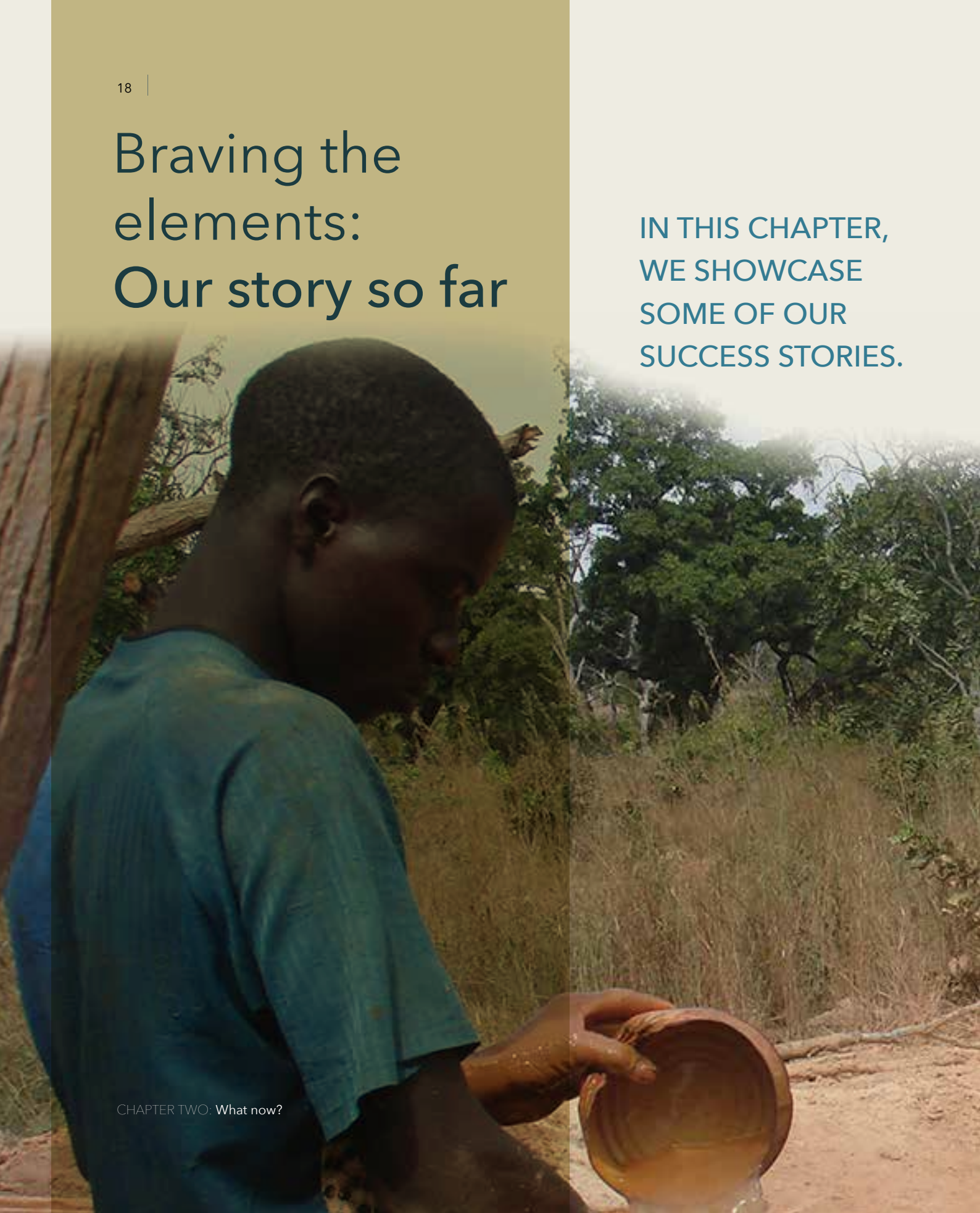


Each story in Chapter Two highlights a particular goal in relation to our work on the Minamata Convention.



Braving the elements: Our story so far

IN THIS CHAPTER,
WE SHOWCASE
SOME OF OUR
SUCCESS STORIES.



From working with artisanal and small-scale gold miners in Senegal, to assisting zinc smelting companies in China, UNIDO has helped communities, enterprises and governments to reduce and eliminate the harmful effects of mercury worldwide.

The projects featured in this chapter are funded by the Global Environment Facility.



GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

Golden opportunity: Artisanal and small-scale gold mining in Senegal



“We are happy. The people of our community are now less exposed to mercury.”

CHAPTER TWO: What now?



In Kedougou, Senegal, a large community has developed around an artisanal and small-scale gold mining (ASGM) operation. Because these mining activities use mercury, they endanger the health of the entire community.

There are many communities around the world like Kedougou. Between 12 and 15 million people in over 80 countries depend on ASGM for their livelihoods. These mining operations are usually informal and located in rural areas. Today, ASGM is the main source of anthropogenic mercury emissions in the world.

Mercury is often used by miners to separate gold from other minerals. By adding mercury, the miner creates an amalgam consisting mostly of gold and mercury, which can then be burnt off with a flame, leaving the gold behind. Although inefficient, it is a cheap, easy and fast process. But when the mercury is burnt off, gaseous mercury is produced. Miners and their communities are exposed to mercury, which contaminates the surrounding environment, including lakes and rivers.

A UNIDO project introduced a processing plant which can extract gold without using mercury. In Kedougou, UNIDO trained eight operators to use the mercury-free processing plant to process the ore. Miners pay a fee for each bag of ore processed, and receive the extracted gold in return. At the time of this article, over 4,500 artisanal miners and community members had brought ore to be treated at the project site.

“We are happy,” said the President of the Federation of Kedougou Gold Miners, Mahamoudou Dramé. *“As a result of this project, many miners have eliminated the use of mercury in their activities. Therefore, the people of our community are now less exposed to mercury.”*

As part of integrating mercury-free technologies, UNIDO also helped to formalize the ASGM sector in Kedougou and assisted in the establishment of a new business model. Although the old system, using mercury, was fast – miners could crush ore and make cash by the end of the day – the new model is sustainable. Miners now earn more money on a regular basis, allowing them to plan for the longer term and eventually invest in useful items like motorcycles and houses.

The project also ensured that women had important roles in the process. Women were trained to mine surface gold deposits while the men mined underground. They also use some of the water extracted for gold processing to grow vegetables to feed the community.

To raise awareness of the dangers of mercury and the possibilities of alternative processes, a weekly radio programme was established on a local station, specifically addressing artisanal miners.

Today, the processing plant in Kedougou continues to process ore, providing an environmentally friendly, sustainable solution for the miners and the wider community.



Testing our mettle: Zinc smelting in China



“The technologies and environmentally sound practices have been piloted successfully.”

CHAPTER TWO: What now?



In many ores, mercury is present as an impurity. During extraction and processing - such as burning or smelting - large quantities of mercury are released into the environment. In the process of zinc smelting, mercury emissions usually concentrate in wastewater and exhaust gas.

For China, it was particularly important to come up with a solution to this issue. China has the world's second largest reserve of zinc and is the largest zinc producer. Worldwide, non-ferrous metal production is the third largest source of anthropogenic mercury emissions, amounting to more than 13 per cent of the total.

UNIDO established the first multilateral project to address mercury in the zinc sector in China. In a cooperation between UNIDO and the Foreign Economic Cooperation Office (FECO) in the Ministry of Environmental Protection, along with research assistance from universities, a thorough analysis of the sector was undertaken on both the national and international level. *"As China is the largest producer and consumer of zinc, a detailed insight into this sector has significant value,"* said FECO project coordinator Wang Zuguang.

Two pilot plants were selected to test the best available technologies and practices. Shuikoushan Nonferrous Metals Group, located in Hunan Province, is one of the largest state-owned enterprises for metal mining, ore dressing, smelting, processing and associated trades in China. By installing

cost-effective equipment to reduce mercury and adopting best practice technologies, the plant dramatically reduced its mercury emissions.

For exhaust gas, the plant invested in mercury-removal equipment in the smelter, while for wastewater, new special filters sieved out some of the mercury before it could be transferred to the water treatment station. Since the upgrade, the plant has reduced mercury emissions by around 1,200 kg a year, cutting its mercury emissions in wastewater by 30 per cent, and more than halving emissions in exhaust gas.

The second plant, in Sha'anxi Province in central China, primarily produced emissions in wastewater. The upgrade of the wastewater treatment system included introducing a settlement system, an acid clay filter system and a wastewater recycling system. At the end of the project, the plant showed it could reduce its mercury emissions by over 5,000 kg a year, 4,800 kg of which was in wastewater. In addition, the company now recycles around 80 tons of mud acid, which contains about 20 per cent of mercury content.

The demonstration plants both showed the possibility of dramatically reducing mercury in the zinc sector. Mr. Zuguang noted, *"The technologies and environmentally sound practices have been piloted successfully - and have the potential to be scaled up for greater coverage and impacts elsewhere in the country."*



Mapping mercury: A national action plan for Peru



“This project has shown the real impact of mercury releases on the environment and human health.”

CHAPTER TWO: What now?



Peru is a vast and diverse country, featuring mountains, jungle and coastline. It is also the largest producer of gold in Latin America, and the fifth largest producer worldwide. An ancestral activity, artisanal and small-scale gold mining has continued to grow considerably since the 1980s. Mining plays a significant role in the Peruvian economy, comprising 14 per cent of GDP and two thirds of national exports.

In a country with varied mining conditions, it was always going to be a big challenge to know where to begin with phasing out mercury. Mining in Peru ranges from the Amazon jungle to the Andes and the coastline. Because emissions and releases vary depending on different terrain, technologies and techniques, each region needed to be analyzed carefully in order to ensure the most effective methods of reducing mercury use and emissions.

Mercury pollution already poses a significant problem in Peru. In the Madre de Dios region, more than half of the major lakes and more than one third of the swamps are seriously impacted. It is estimated that more than 180 tons of mercury are dumped into the environment every year.

With the assistance of the Government of Peru, UNIDO began an extensive inventory of the mining areas, as an essential step in the National Action Plan (NAP). This inventory included an extensive study of the different regions, followed by a thorough

assessment in the field. At the same time, an assessment of the health service was carried out, revealing that throughout the country, knowledge of mercury contamination and pollution was low. The project instigated new activities including drafting a public health strategy, as well as awareness raising to demonstrate the harmfulness of mercury and the promotion of safe alternatives.

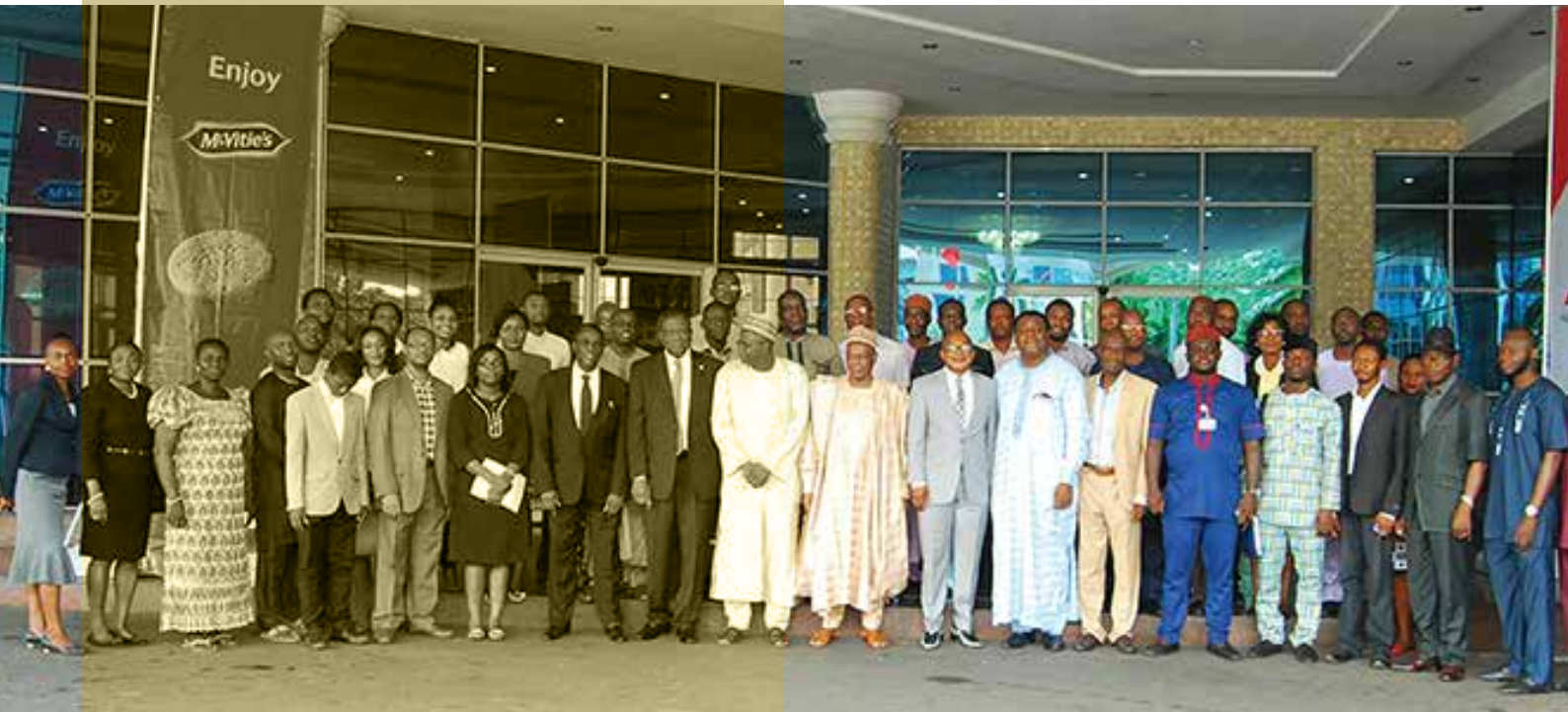
“The project is of high relevance because it has shown the real impact of mercury releases on the environment and human health, mainly due to precarious practices used in the ASGM sector,” stated **Vilma Morales Quillama**, the Project Coordinator from the Ministry of Environment. *“It has also shown that the gold production from ASGM is far higher than official figures.”*

Gender was considered from the very beginning of the project. Special training for women and men ensured that both women and men will be a key part of the subsequent policies.

The project brought all the stakeholders together to create a dialogue. **The resulting national plan will be a vital tool for policymakers to design effective policy for the ASGM sector, to stop the pollution of lakes and rivers, support awareness raising activities to protect the health of miners and local communities, and to ensure a safer, cleaner environment for the population.**



Double trouble: Minamata initial assessment in Nigeria



“An opportunity to contribute to chemicals management in the country.”

CHAPTER TWO: What now?



Like in other developing countries, artisanal and small-scale mining is common in Nigeria. Over 90 per cent of the solid mineral extraction in Nigeria comes from unregulated artisanal and small-scale mining. Most gold mining occurs near or in the proximity of river systems, leading to a high risk of pollution. Mercury is often used in ASGM in Nigeria, putting the communities – and particularly women and children – at risk.

With the Federal Ministry of the Environment and the United Nations Institute on Training and Research (UNITAR), UNIDO carried out an initial assessment in Nigeria to identify priority areas in mercury usage and emissions, and to ensure that Nigeria could fulfil its obligations under the Minamata Convention. The assessment was designed to fill critical data gaps and raise awareness of the dangers associated with ASGM. An independent evaluation noted that the initial assessment had been a success: *“Being an emerging field, this is an opportunity to contribute to long-term processes for chemicals management in the country.”*

But in Nigeria, mercury is not the only problem associated with mining. In 2010, unregulated artisanal gold mining sparked a lead poisoning epidemic in the north-western state of Zamfara. Over the course of six months, at least 400 children under the age of five died. In the affected communities, despite national and international intervention, by 2013 the death toll had risen higher. Adults also died. It is considered to be the worst case of lead poisoning in modern history.

Nigeria is the only country known to have a particular type of ore that contains high quantities of lead. When members of the mining community grind ore, the dust disperses into the air and soil. Contaminated

soils and dust continue to affect men, women and children in Nigeria. The dual exposure to lead and mercury that occurs during mining is still an under-researched area. Because of a lack of formalization and an absence of regulations in the sector, chronic health issues, child labor, gender inequality and adverse environmental impacts persist.

For UNIDO, it became clear during the initial assessment that the dangers of mercury cannot be addressed separately from the issue of lead. A key component of the project was to raise awareness of the risks.

The work is ongoing. As part of the National Action Plan (NAP) for Nigeria, UNIDO has been working with the World Health Organization (WHO) to find a solution for the problem of double exposure to mercury and lead. UNIDO coordinates with Doctors Without Borders (MSF) to ensure that there are first aid sites near the miners, to provide information on good health practices as well as treatment for adults and children. **For every initiative, women mining associations have been directly involved, in recognition of the fact that in Nigeria, four out of ten miners are women.**

To coordinate efforts in the country, UNIDO also co-chairs a donors’ committee, ensuring that all international interventions in the area are complementary. The committee works to minimize overlap between projects and to maximize impact.

With the mining communities, the Government, and other experts in the field, UNIDO is continuing its work in Nigeria. **The goal is not only to reduce and eliminate mercury, but also to find better solutions to the combined contamination of mercury and lead, so that small mining communities can work safely, without damaging the health of children and adults.**



Polemical chemical: VCM production in China



“The project will reduce releases of mercury to the environment: a worthy goal.”

CHAPTER TWO: What now?



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



Records show that China has used mercury since the sixth century BC. Today, China is the world's largest consumer and producer of mercury, responsible for around 50 per cent of the world's total usage.

Polyvinyl chloride (PVC) is a plastic with a vast range of uses, from pipes to flooring, and clothing to debit cards. The industrial chemical vinyl chloride monomer (VCM) is required to produce PVC. **The VCM sector in China is responsible for more than half of the mercury consumption in China, amounting to 30 per cent of global mercury use.**

After signing the Minamata Convention on 10 October 2013, the Government of China made a commitment to reduce mercury in the VCM sector by 50 per cent by 2020. China is one of the largest consumers of VCM worldwide. In other countries, PVC is manufactured through a petroleum or natural gas-based process that does not require mercury. However, in China, a coal-based process is used, which requires mercury as a catalyst to spark a chemical reaction.

The Foreign Economic Cooperation Office (FECO) and UNIDO have come together to begin to confront this problem. Because UNIDO had already worked with the Government to implement multilateral environmental agreements, the institutional capacity and relationships were already in place to tackle mercury. **What is now known as "the VCM project" has three goals: to reduce the mercury used in VCM production; to reduce mercury emissions and releases to the environment; and ultimately, to pilot mercury-free technologies.** The aim is not only to achieve the 50 per cent reduction of mercury by 2020, but also to achieve a 90 per cent recovery rate of mercury.

Four companies have been selected to demonstrate the best available techniques and best environmental practices to reduce mercury usage and emissions. **UNIDO is also working to pilot alternative mercury-free technologies, aiming towards an entirely mercury-free process.** For the companies, there are economic benefits to adopting these technologies. Mercury-free companies will benefit from a reduction in costs associated with mercury management, such as treating wastewater, decontaminating parts and transporting and disposing hazardous waste. Using a potential catalyst based on a precious metal in place of mercury will likely require a significant initial investment. However, operational costs will be lower.

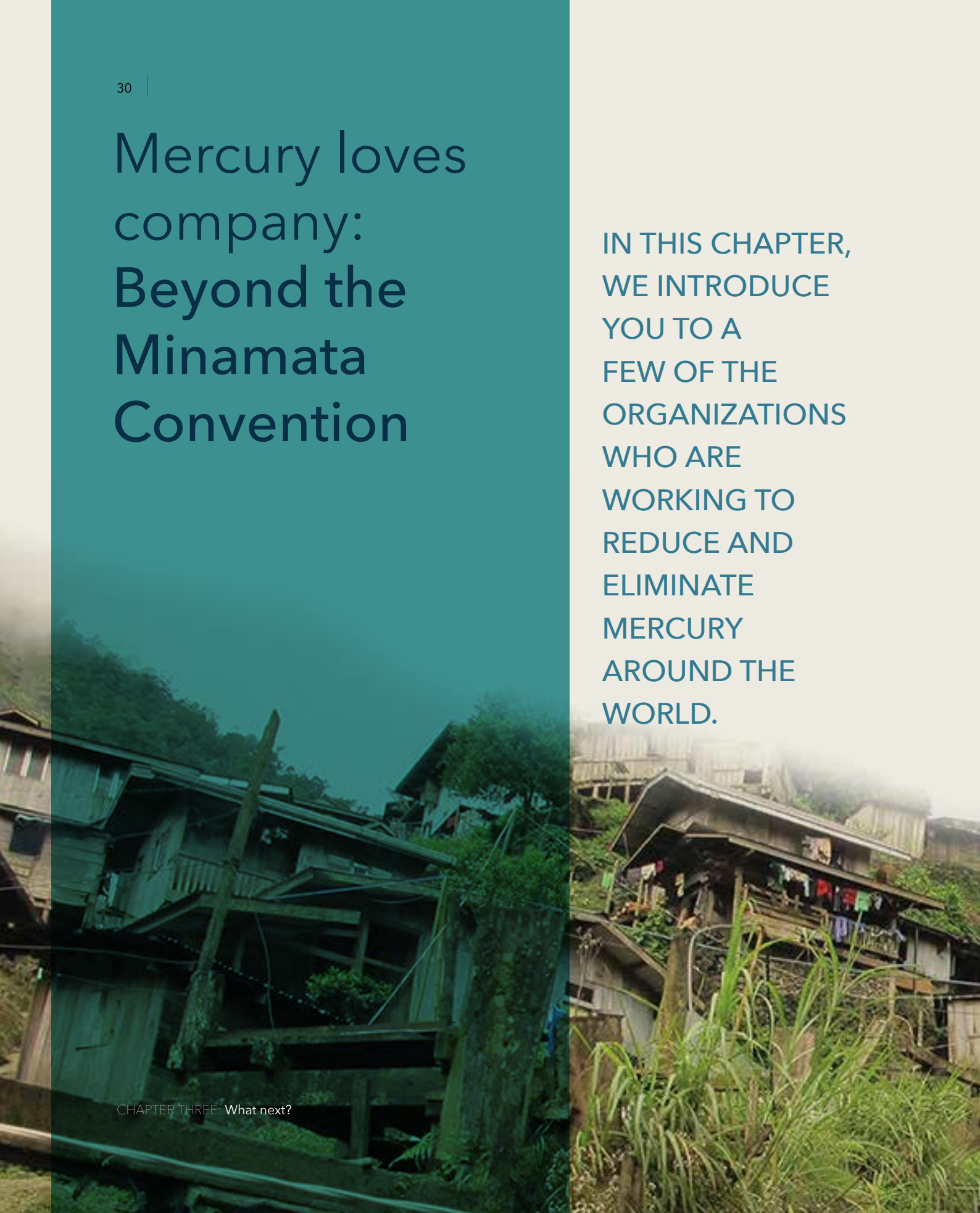
"The commitment China made to the Convention is unique and bold," said the Chief Technical Advisor of the project, and former President of the American Chemical Society, **William Carroll**. He listed three major benefits of the VCM project, including helping China to meet its obligations under the Minamata Convention, and making VCM manufacturing in China more benign. *"Third, and most important,"* he said. *"The project will work to reduce emissions and releases of mercury to the environment, a worthy goal in any event."*

Not only will the project make existing VCM industries greener, it will also introduce new cleaner production processes and new technologies. New businesses and gender-balanced jobs will be created. Finally, the project will help to protect the local and global community from the toxic effects of mercury.



Mercury loves company: Beyond the Minamata Convention

IN THIS CHAPTER,
WE INTRODUCE
YOU TO A
FEW OF THE
ORGANIZATIONS
WHO ARE
WORKING TO
REDUCE AND
ELIMINATE
MERCURY
AROUND THE
WORLD.



Our work
on the Minamata
Convention is related
to so many areas
beyond mercury.



We can't do this work alone. With our experience, and with the help of others, we are determined to build a sustainable, mercury-free future.

17 PARTNERSHIPS
FOR THE GOALS



Good as gold: The international gold supply chain



Mercury is not the only concern in artisanal and small-scale gold mining. Poverty is also a major problem, as many miners earn very little income. ASGM is often unregulated and unsustainable; illegal practices such as child labor are common. It is estimated that 12 to 15 million miners around the world are involved in ASGM, including between 4 and 5 million women and children.

With the help of our partners, we are linking artisanal and small-scale miners to the international gold supply chain. One example is the GEF Global Opportunities for Long-term Development (GOLD) programme, which not only supports mining communities to sustainably eliminate mercury, but also connects miners to international markets and supply chains. This includes building strong partnerships with the private sector, including major jewellers, electronic manufacturers, and gold refiners. The GEF GOLD programme - implemented by UNEP, UNIDO, UNDP and Conservation International - also promotes sustainable, mercury-free gold.

A FEW WORDS FROM: Argor-Heraeus

As part of Heraeus Precious Metals, Argor-Heraeus is the largest global provider of services in the precious metal industry. The company plays an important role in the value chain, situated between the source and the consumer. Today, the origin of material plays a vital role for the consumer.

Argor-Heraeus is proud to support UNIDO by sourcing responsibly mined artisanal gold in order to bring it to the mainstream market, guaranteeing offtake and a fair market price to artisanal and small-scale gold mining (ASGM) communities. The common objective of eliminating mercury can be therefore accelerated by linking the market to the source with as few intermediaries as possible, thus maximizing value for the producing ASGM communities.



Minds meet: Capacity building



Getting rid of mercury means finding the best ways to develop new skills for individuals, communities, enterprises and governments. It means building strong relationships and finding the most effective methods to sustainably reduce and eliminate mercury from the environment. We also work with countries that have not yet ratified the Minamata Convention to help them to join the fight against mercury. Capacity-building is a major building block in all our projects, both in and outside the Convention.

A FEW WORDS FROM: Switzerland

In cooperation with UNIDO, the Swiss Confederation funds a global project to assist developing countries and economies in transition to reduce and eliminate mercury. The project features interventions all around the world, and includes countries that have not yet ratified the Minamata Convention. Switzerland also seeks synergies with the other major chemicals and waste agreements, the Basel, Rotterdam and Stockholm Conventions.

The global project is needs-based, identifying and responding to the specific requirements of individual countries and regions. It complements other interventions related to the Minamata Convention, building relationships through meetings and workshops, and initiating studies to lay the groundwork for future projects. Regional meetings and workshops provide a forum for countries to discuss and work through questions relevant to each country. In cooperation with UNIDO, the ongoing project has included: assistance to update national guidelines on mercury-containing lamps in Bangladesh;

an extensive study of gold and mercury trade regulations and taxation in West Africa; assistance to update national regulations in Malawi in accordance with all the chemicals and waste conventions; and management of mercury-containing waste in Costa Rica. An international waste management meeting was also held in September 2018 in Austria, featuring a broad range of stakeholders.

The Swiss Confederation has long been working on chemicals and waste issues. Along with Norway, Switzerland pushed for many years for a legally binding agreement on mercury. The Minamata Secretariat is currently located in Geneva, where the final text of the Convention was approved, and where the other major chemicals and waste agreements are all located.

Having worked on ASGM projects before the Minamata Convention, Switzerland has a long-standing commitment to ensure sustainable management of mercury, alongside all hazardous chemicals and waste. With UNIDO, that commitment is being realized.

So far, the project includes:

ALGERIA,
ANTIGUA AND
BARBUDA, ARMENIA,
COSTA RICA, BANGLADESH,
DOMINICA, THE ECONOMIC
COMMUNITY OF WEST AFRICAN
STATES (ECOWAS), EGYPT, JORDAN,
MALAWI, MOROCCO, THE
PHILIPPINES, SAINT KITTS AND
NEVIS, SAINT LUCIA, SURINAME,
TRINIDAD AND TOBAGO,
TUNISIA, VIET NAM.

Mortar matters: Cement production

The cement industry is crucial for the development and expansion of cities.

Today, emerging global markets are constructing more cement plants, creating a significant increase in mercury emissions as well as other environmental impacts. Current challenges include establishing inventories of mercury and baseline scenarios, introducing best available techniques and practices, and increasing risk awareness in the industry.

Mercury is often present in the raw materials used for cement production, such as limestone, as well as in the fuels consumed during the combustion process. While most mercury is released into the air, some can be released into the soil, waste or into cement.

UNIDO is helping not just to reduce and eliminate mercury, but to minimize all environmental impacts arising from the sector. Building on our experience under the Stockholm Convention, UNIDO is currently working on a cement baseline project that will establish an inventory of the cement sector in China. We are looking forward to working with other experts, such as the Cement Sustainability Initiative, to reduce and eliminate mercury, cut CO₂ emissions, and increase energy efficiency.



A FEW WORDS FROM: The Cement Sustainability Initiative

The Cement Sustainability Initiative (CSI) has always been aware and responsive regarding the way to handle mercury emissions from cement manufacturing. As early as 2012, when CSI published its first guidelines for measuring emissions, some clear measurement and reporting recommendations were developed for mercury. Then, the CSI established a specific cement mercury partnership with the United Nations Environment Programme (UNEP), setting up a working plan as well as gathering all the best available technologies to mitigate the emissions of mercury.

The CSI also initiated a cooperation with UNIDO in setting up a cement sustainability knowledge sharing platform with a more specific focus on the use of alternative fuels and raw materials (co-processing).

Aware of the know-how of UNIDO in that domain, the CSI and UNIDO worked to develop some communication and training modules, particularly in China, and the CSI is looking forward to pursuing and enhancing this cooperation in the future.



Making the cut: Chlor-alkali



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Chlorine is used to make computer chips, plastic and to sanitize our swimming pools and drinking water. There are three main technologies used for producing chlorine, one of which is the mercury cell process. Today, there are around 40 to 55 plants around the world still using mercury. Even the plants not in use are heavily contaminated and continue to release mercury into the environment. Decommissioning and decontaminating a chlor-alkali plant is an expensive process that takes several years.

As co-chair of the Global Mercury Partnership on chlor-alkali matters, UNIDO is stimulating discussion of the technological issues involved in decommissioning and decontaminating the remaining plants. We have strong inputs from the private sector, and we are working to secure private finance to decommission and decontaminate chlor-alkali plants around the world, and to rid the world of harmful mercury.

A FEW WORDS FROM: The United States Environmental Protection Agency

The Global Mercury Partnership is a voluntary multi-stakeholder partnership initiated in 2005 to take immediate actions to protect human health and the environment from the releases of mercury and its compounds.

The Environmental Protection Agency (EPA) leads the United States Government participation in the partnership, serving as co-lead for the chlor-alkali and product partnership areas, and co-chairing the Partnership Advisory Group.

Mercury cell chlor-alkali production remains a significant use of mercury globally. Mercury cell facilities, which close or convert to non-mercury technologies require careful site management as well as management of any excess mercury.

The partnership area provides economic, technical and educational information on conversion and closure to chlor-alkali production facility partners, governments, and other stakeholders. It promotes commercially competitive and environmentally responsible solutions for eliminating mercury in chlor-alkali production.

Along with UNIDO, the United States Environmental Protection Agency and other members of the chlor-alkali partnership area are collaborating to identify resource options for assisting with conversion and plant closure. Working in concert with facility owners, governments and technology providers, the goal of phasing out mercury use within the timeframe envisioned by the Minamata Convention is highly achievable.



End game: Waste management



Here at UNIDO we strive towards a circular economy, where nothing is wasted. It is essential to consider the entire life cycle of our products and resources. While the Minamata Convention does not allow the manufacturing, import and export of particular products containing mercury, the question of mercury waste remains. UNIDO helps countries to prevent creating waste that contains mercury, as well as to identify long-term solutions for mercury waste. Key issues include interim storage, treatment and final disposal.

In September 2018, UNIDO held a technology and knowledge transfer meeting to discuss mercury waste management issues. Supported by the Swiss Confederation and the Government of Japan, the event was held in Vienna, and featured representatives from governments, the waste management sector, financial institutions, UN agencies, Convention Secretariats and academia.

A FEW WORDS FROM: Nomura Kohsan

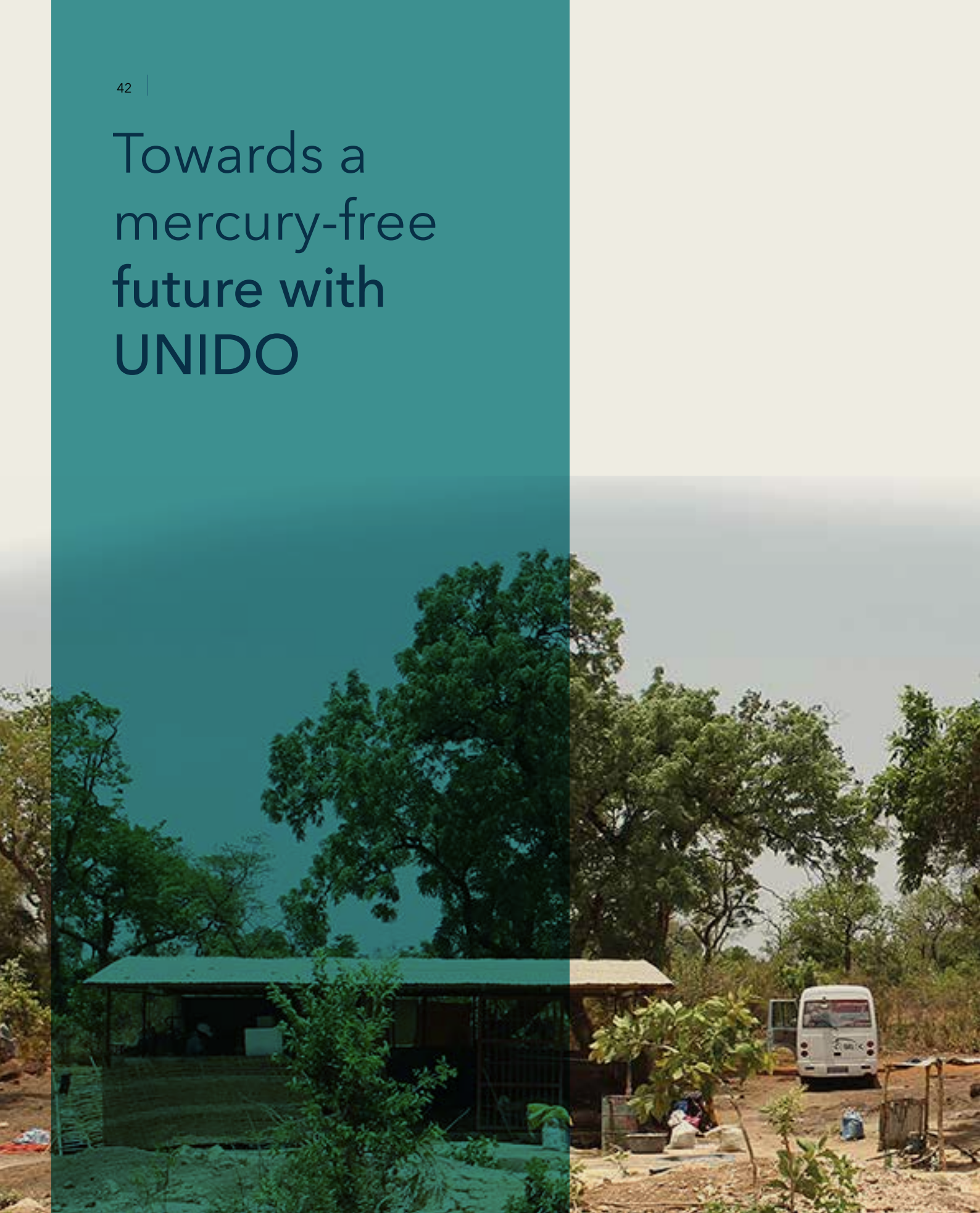
Nomura Kohsan has devoted more than 40 years to the treatment and disposal of mercury-containing waste, using mercury refining technology from a predecessor's long history of mercury mining. The waste includes fluorescent lamps, dry cell batteries, sphygmomanometers and other medical devices, metal mercury, mercury sludge, activated carbon and catalysts that have absorbed mercury. The company also recycles mercury-containing waste. Currently Nomura Kohsan imports mercury waste from Asian countries that do not have adequate facilities, in order to properly treat and dispose of the waste in accordance with the Basel Convention.

Furthermore, Nomura Kohsan will contribute to promoting the appropriate disposal of mercury waste worldwide, notably through the Memorandum of Understanding with UNIDO for the promotion of the Minamata Convention in developing countries.

Through technical cooperation, not only can countries around the world mitigate the health problems and environmental risks caused by mercury and mercury waste, but they can also safely dispose of metal mercury, with Nomura Kohsan's mercury stabilization technology.



Towards a mercury-free future with UNIDO



THIS IS
JUST THE
BEGINNING.

As our stories show, **mercury pollution is often a result of industry.** Through industrial processes like zinc smelting, VCM manufacturing, chlor-alkali and cement production, mercury is emitted into the environment. During the processing of natural resources in artisanal and small-scale gold mining, mercury is released into the air, soil and water.

At UNIDO, we are committed to industrial development that is sustainable and mercury-free. We are discovering more innovative ways to help communities, enterprises and governments all over the world – from tiny artisanal gold mining communities in Nigeria to vast VCM production companies in China – to thrive without using mercury.

This work wouldn't be possible without our donors and partners. We have introduced just a few of the organizations that we work with in this booklet. We call on others to join us and help rid the world of mercury pollution.

Our current and future work on mercury has synergies with many other areas, like the international gold value chain, human health, circular economy and alleviating poverty. **This isn't just a fight against mercury. It's a fight for a more inclusive, more sustainable world.**

OUR JOURNEY CONTINUES.
WE HOPE YOU WILL JOIN US.



IN GOOD COMPANY

We couldn't do this work without our donors and partners.

French Facility for Global Environment (FFEM)

Global Environment Facility (GEF)

Government of Switzerland

Argor-Heraeus S.A.

Nomura Kohsan Co. Ltd.

Strategic Approach to International Chemicals Management (SAICM)

United States Department of State (DOS)

Alliance for Responsible Mining (ARM)

Artisanal Gold Council (AGC)

Ban Toxics

Biodiversity Research Initiative (BRI)

Government of Japan

International Labour Organization (ILO)

Natural Resources Defence Council (NRDC)

Minas de Almadén y Arrayanes S.A. (MAYASA)

Secretariat of the Basel, Rotterdam and Stockholm Conventions (BRS)

Secretariat of the Minamata Convention on Mercury

United Nations Development Programme (UNDP)

United Nations Environment Programme (UNEP)

United Nations Institute for Training and Research (UNITAR)

United Nations University (UNU)

World Bank (WB)

World Health Organization (WHO)



You can read more about our latest news here:

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