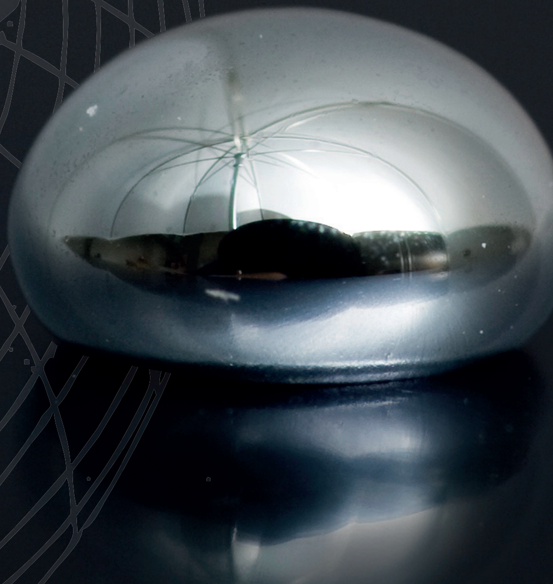
MERCURY



TIME TO ACT

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MERCURY
TIME TO ACT

Preface

This report speaks directly to governments involved in the development of the global treaty on mercury. It presents updates from the UNEP Global Mercury Assessment 2013 in short and punchy facts and figures backed by compelling graphics, that provide governments and civil society with the rationale and the imperative to act on this notorious pollutant.

The report underlines the fact that mercury remains a major global, regional and national challenge in terms of threats to human health and the environment, especially but not uniquely to the health of pregnant woman and babies world-wide through the eating of contaminated fish for example or to marine mammals in places like the Arctic.

It also underlines that the burden of disease in many ways is shifting towards developing countries such as those in areas of the world where a growing burning of coal is increasing emissions of mercury to the atmosphere.

Small-scale gold mining is also aggravating the threat, in part fueled by increased extraction using mercury to meet rising demands as a result of a high global gold price. In the mid 2000's that price was around $420 an ounce whereas today it stands at around $1,700 an ounce.

The challenge towards addressing mercury emissions is the wide variety of sources of emissions, from industrial processes to products in day-to-day use.

Indeed often unknown to many, mercury is found in electrical switches and thermostats, lamps, measuring devices and dental amalgam fillings. Mercury as a compound is used in products such as batteries, paints, soaps and creams.

In addition, mercury releases from artisanal and small-scale gold mining and coal combustion are supplemented by ones from metal smelters, chlor-alkali manufacturing and vinyl chloride monomer (VCM) production just to mention a few.

The world is acting: many mercury-containing products are already being phased out, and processes using mercury are increasingly being converted to alternative technologies.

A global, legally binding treaty translated into national laws and supported by creative financing, can accelerate and scale-up such responses and put the planet and its people on track to a more sustainable world.

The World Health Organization has concluded there are no safe limits in respect to mercury and its organic compounds and the impacts of mercury on human health have been known for centuries if not millennia.

In 2009, the Governing Council of UNEP governments showed leadership and commitment by agreeing to negotiate a global, legally-binding treaty currently approaching the final stages of negotiation for completion in 2013.

This treaty would catalyze and drive concerted international action on an environmental and human health issue brought to international recognition as a result of the infamous Minamata poisoning of fish and people in the middle of the 20th century.

I am sure this report and its straight forward presentation of the vital and fundamental facts can assist governments to conclude the negotiations successfully and adopt a treaty to begin lifting a health and environmental threat from the lives of tens of millions of people, not to mention the generations to come.

Achim Steiner
UN Under-Secretary General
and Executive Director of UNEP

“It is imperative that we act now!”

*Interview with **Minister Fernando Lugris**, Special Representative of the Minister of Foreign Affairs of Uruguay for Environmental Affairs, Chair of the Intergovernmental Negotiating Committee to develop a global legally binding instrument on mercury*

MERCURY-FREE

We sometimes hear the term “mercury-free world” which seems a contradiction because mercury is an element. Thus, mercury always will be present. What can the international community do about this?

– It is true that mercury, as an element, will always be present in our environment. Nonetheless, it is a pollutant of concern so our main aim is to reduce, and where feasible eliminate, anthropogenic emissions and releases of mercury. Over time, this will decrease the environmental load, and reduce the amount of mercury which is re-emitted.

– While there will be mercury in the environment, whether it is considered to be a supply will depend on whether there is a demand. If there are still essential uses which require mercury, there will need to be a source of mercury. The aim of the international community is to reduce uses as viable alternatives to mercury become available. Over time, this will reduce the demand for mercury, cutting the market and the interest in mercury supply. Yes, mercury will always be with us and there is significant supply in circulation today. Thus, rather than to continue primary mining of mercury, we should be looking at the supply that is already in circulation for use until viable alternatives are found. The mercury that is obtained from decommissioned chlor-alkali plants and other processes or products as they are phased out and have no further use, should be moved immediately to environmentally sound disposal facilities.

ARTISANAL AND SMALL-SCALE GOLD MINING, LIGHT BULBS, AND PLASTICS

The very good news is that all uses of mercury will continue to decline. But there are exceptions, such as mercury use in artisanal and small-scale gold mining (ASGM), in lighting manufacture and in the production of plastics that use vinyl chloride monomer (VCM). What can be done to reduce its use in these particular areas?

– These three areas are notable as ones where challenges still exist in terms of the availability and accessibility to viable, cost-effective and efficient alternatives. ASGM is recognized as a major challenge – but not just in regard to mercury issues. There are a broad range of environmental and health challenges posed by this activity, including the role of the sector in socio-economic development. While taking into account the impacts on national development and poverty reduction, we must move to set national goals and reduction targets, and take action to eliminate the activities identified as being responsible for the greatest emissions and releases of mercury. Other actions should work towards formalization of the sector, which is a largely unregulated and an often unknown sector of work. This includes labour laws, which may serve to protect workers.

“Our main aim is to reduce or eliminate anthropogenic emissions and releases of mercury.”

– In relation to the use of mercury in some compact fluorescent lamps, at this stage, no affordable and available alternative is currently available at the global level. Nonetheless, we need to be working to phase these out and push the market towards alternatives. In the interim, it should also be noted that, where power is generated by coal combustion, the provision of energy efficient lighting can result in significant reductions in the emissions of mercury through decreased power consumption, which may (even with mercury-containing fluorescent lamps) result in a lower net mercury release or emission to the environment. The effects on the environment of mercury-containing products such as these lamps can also be minimized by the implementation of environmentally sound management of mercury-containing waste. Waste separation programmes and recycling activities are able to reduce the mercury made available to the environment from such products.

– VCM using the mercury process is another where there is no commercially viable alternative at this point in time. The demand for polyvinyl chloride is very high in some countries, particularly where there are extensive building projects, and in some countries the viable sources of raw materials for VCM mean that mercury use is needed. Nonetheless, measures to minimize emissions and releases should be applied immediately, as well as a plan for eventual phasing out as alternatives are found. It is my expectation that, over time, all of these uses will become increasingly limited, and eventually will cease.

UNINTENDED EMISSIONS

About half of the global anthropogenic mercury emissions come from the burning of coal, metals production and the production of cement. What concrete mechanisms exist to address this?

– The control of mercury emissions from major sources has been one of the key areas of discussion in the intergovernmental negotiations. Various mechanisms and approaches to reduce mercury emissions have been discussed and discussions continue on a variety of measures including the use of best available techniques and best environmental practices, the use of emission limit values, the establishment of national goals and the use of national implementation plans to set out action plans for managing emissions. It should also be recognized that many countries already have controls in place to reduce mercury emissions – either as stand-alone controls, or as part of a multipollutant strategy.

CLEAN-UP OF CONTAMINATED SITES

Once emitted or released, mercury persists in the environment where it circulates between air, water, sediments, soil and living creatures. It can travel long distances to areas far from any production or use, like the Arctic and Antarctic regions. Mercury levels are continuing to rise in some species in large areas of the Arctic, despite reductions in emissions from human activities over the past 15–30 years in some parts of the world. High exposure to mercury is a serious risk to humans worldwide through the food chain. Solving these problems could be costly, particularly related to remediation. Will this get sufficient attention and money in the next 20 years to fix?

– One of the key approaches to addressing the issue of contaminated sites is to prevent their occurrence in the future. Many of the measures we are already putting in place and hope to increase, are working towards reducing emissions to air, water and land, by reducing the use of mercury in products and processes, and ensuring the sound management of mercury-containing waste. These measures are designed to reduce contamination of the environment, and thus to also reduce re-emissions in the future. Reduction and eventual elimination of primary mercury mining will also avoid contamination from these sites. It is very challenging, at this stage, to predict what the global situation will be over the next 20 years, and to say whether there will be adequate funding to completely solve the burden of many years of industrialized activity. However, I can say with some confidence, that should we succeed in properly implementing many of the measures currently in place and under discussion, we will be reducing the future burden of mercury pollution as well as its associated costs to humanity and the environment.

HEALTH

The global burden of diseases attributed to exposure to hazardous chemicals is already significant and is likely to become more serious. Infants, children and pregnant women are the most vulnerable to the health effects of mercury. What are the concrete measures to reduce health risks?

– The global burden of disease related to mercury is well-recognized and is a major driving force for international action. Governments have recognized that mercury poses a global threat to human health and the environment. In considering this, it should be recognized that the greatest health risks from mercury arise from the consumption of fish with high levels of methyl mercury, particularly by members of vulnerable groups. The World Health Organization (WHO) has been closely involved in developing background information utilized in the negotiations, and has come out with policy papers on issues such as health risks associated with the use of mercury in, for example, dental amalgam and vaccines. I rely on their expert input in this regard.

– International action is directly addressing the major health concerns through the reduction of emissions and releases to the environment. This includes reduction from point sources, and overall reductions seen with the decreased use of mercury-containing products, decreased use of processes utilizing mercury, sound waste management, and a structural approach to reducing the use of mercury in ASGM. These measures will reduce the mercury levels in fish as environmental levels go down. In some species of fish, this reduction may be seen quite quickly, while in other species, levels will decrease more slowly as a factor of their size, age and diet. However, much of the mercury emitted historically will continue to impact the environment for years to come. It is thus imperative that we act now to reduce future emissions and releases to the maximum extent possible in order to stop adding more to the global environment.

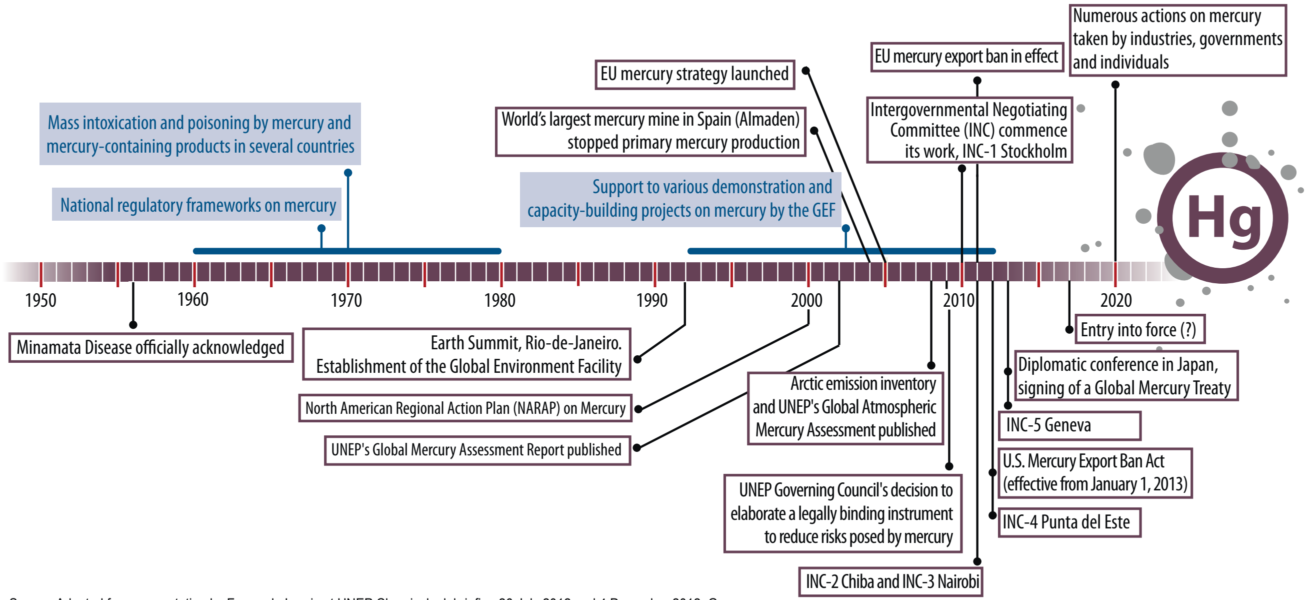
“I am confident that we will deliver measurable results for human health and the environment.”

IN 25 YEARS

Will you – let’s say 25 years from now – be able to look back and say ‘mission accomplished’ on mercury?

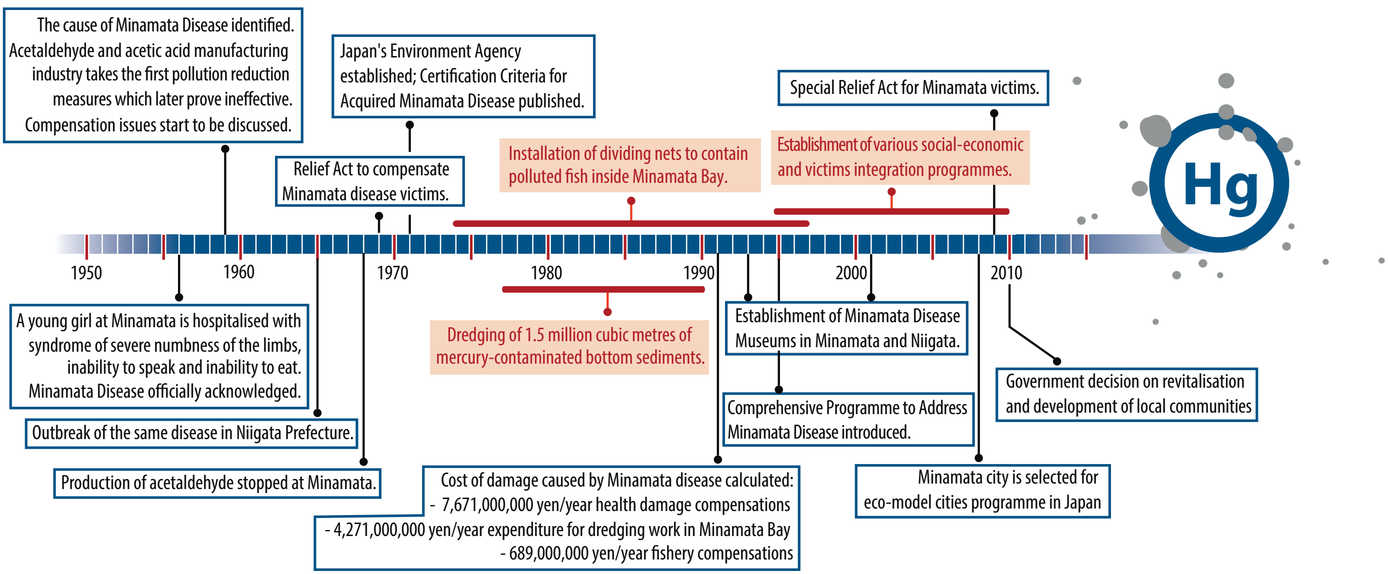
– I am confident that through international legal action and through partnering with stakeholders, we will be able to produce significant decreases in environmental levels of mercury. In many ways, the mercury instrument has a flying start as there has been a long period of voluntary activities delivered through the United Nations Environment Programme (UNEP) Global Mercury Partnership, as well as actions taken domestically in a number of countries to address mercury pollution. Mercury is on the global radar and many of the controls required are minor adjustments to controls already implemented to address other pollutants. Many mercury-containing products already have viable alternatives, and we are likely to see a dramatically shrinking market for more of them within the next 10 years. Of course, there are changes which will only occur over time. I am proud of the work and dedication of the international community and am confident that in the future we will deliver measurable results for human health and the environment.

Global mercury events timeline



Source: Adapted from presentation by Fernando Lugris at UNEP Chemicals debriefing 26 July 2012 and 4 December 2012, Geneva. "Outcomes of the 4th session of the Intergovernmental Negotiating Committee to prepare a global legally binding instrument on mercury". Designed by Zoï Environment Network / GRID-Arendal, December 2012.

Minamata mercury events timeline



Source: Adapted from The lessons from Minamata Disease and Mercury Management in Japan, Ministry of Environment Japan, 2011. → http://www.env.go.jp/en/chemi/mercury/experience_of_japan.pdf
Designed by Zoï Environment Network / GRID-Arendal, December 2012.

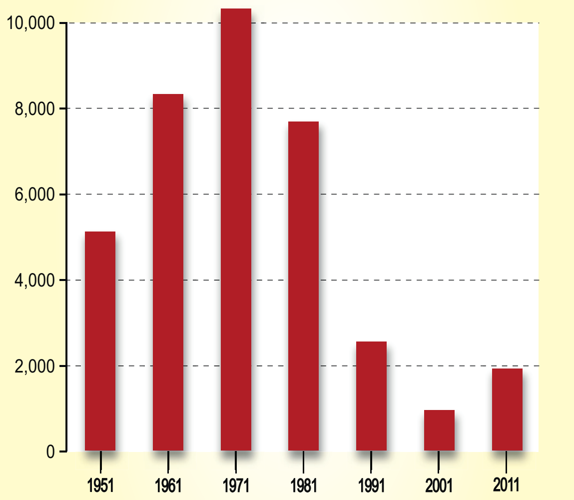
Background on Mercury

Mercury, also known as quicksilver, is a heavy, silvery-white metal which is liquid at room temperature and evaporates easily. In nature it is usually found in the form of cinnabar, used in the past as a red pigment. Cinnabar deposits have been mined for centuries to produce mercury, but cinnabar and other natural forms of mercury can also occur in deposits of other metals such as lead and zinc. They may also be found in small amounts in a wide range of rocks including coal and limestone. Mercury can be released into the air, water and soil through industrial processes including mining, metal and cement production, and through fuel extraction and the combustion of fossil fuels.

Mercury has been used since antiquity. Archaeologists have recovered traces from Mayan tombs and from the remains of Islamic Spain (Bank, 2012). The first emperor of unified China is said to have died after ingesting mercury pills intended to give him eternal life (Asia History website). Metallic mercury is still used in some herbal and religious remedies in Latin America, Asia and Caribbean rituals (ATSDR, 1999).

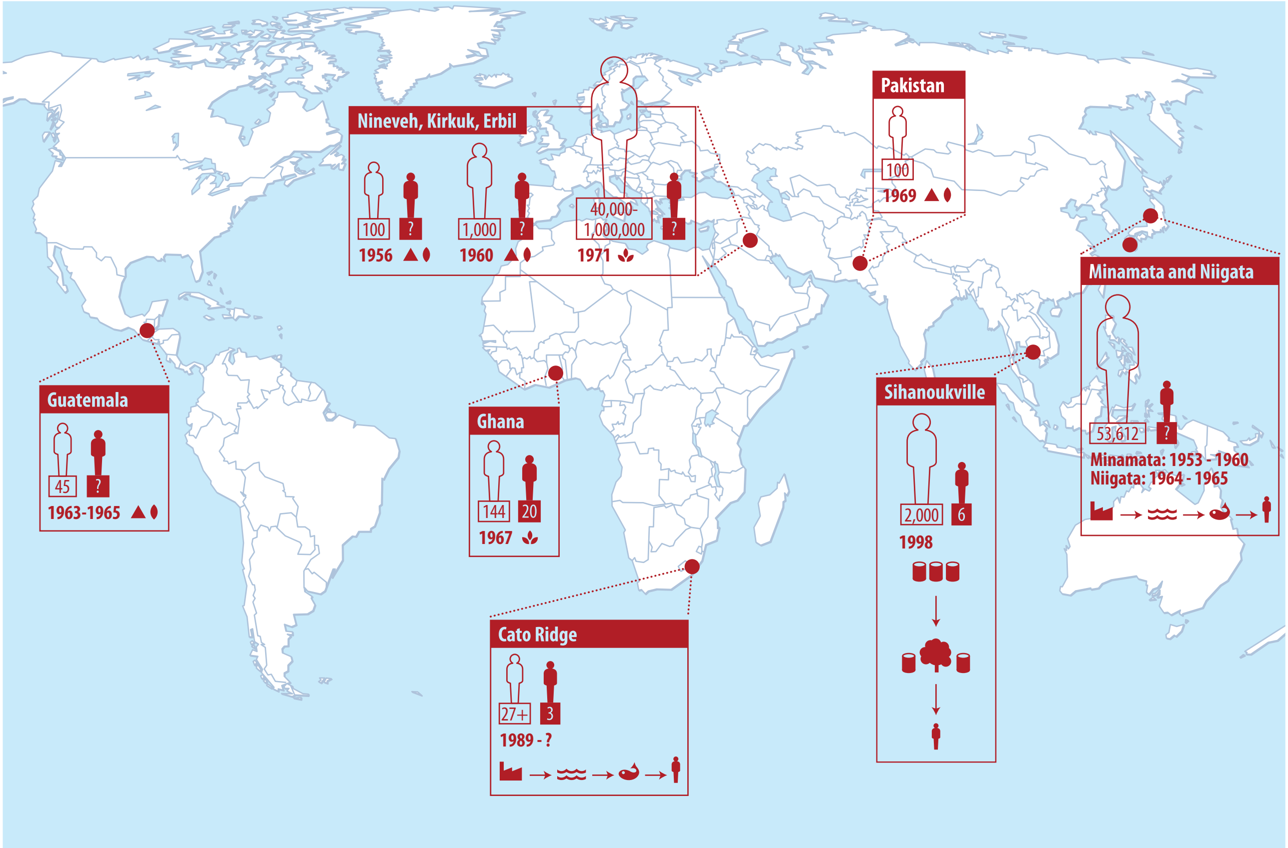
Global annual mercury mining production

Hg in metric tonnes



Source: Adapted from USGS, Mercury Statistics and information, "Mineral Commodity Summaries".
Designed by Zoï Environment Network / GRID-Arendal, December 2012.

Mercury is a heavy, silvery-white metal which is liquid at room temperature and evaporates easily.



Global cases of mercury poisoning incidents

Nature of contamination

Contaminated flour

Contaminated wheat seeds

Contaminated grain

Illegal import of waste and inadequate storage

Contaminated seafood

Affected people

Fatalities

? No information or uncertainties

Source: Adapted from A Small Dose of Toxicology, Steven Gilbert, 2011, Chapter 9; Adapted from Mercury Rising, Dan Olmsted, 2007, United Press International Inc. (> http://www2.citypaper.com/news/story.asp?id=13317); The Three Modern Faces of Mercury, Thomas Clarkson, Department of Environmental Medicine, University of Rochester School of Medicine, Reviews, 2002 (> http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1241144/pdf/ehp110s-000011.pdf); Methylmercury Posioning in Iraq, Bakir, et al., Science, Vol. 20, 1973, pp. 230-241 (> http://www.sciencemag.org/content/181/4096/230.full.pdf); The Three Modern Faces of Mercury, Thomas Clarkson, Department of Environmental Medicine, University of Rochester School of Medicine, Reviews, 2002 (> http://www.ncbi.nlm.nih.gov/pubmed/11114126); Morphum Environment, Dr. Ron McDowall (> http://www.mcdowall.co.nz/ron/Site/Project_Gallery_-_Illegal_dumping_cambodia.html#0); BBC, 1999 (> http://news.bbc.co.uk/2/hi/asia-pacific/310362.stm); University of Michigan (> University of Michigan); The Independent, 1994 (> http://www.independent.co.uk/news/uk/families-sue-over-mercury-poisoning-1403679.html); Lessons from Minamata Disease and Mercury Management in Japan, 2011, Ministry of the Environment, Japan (> www.env.go.jp/chemi/tmms/pr-m/mat01/en_full.pdf)

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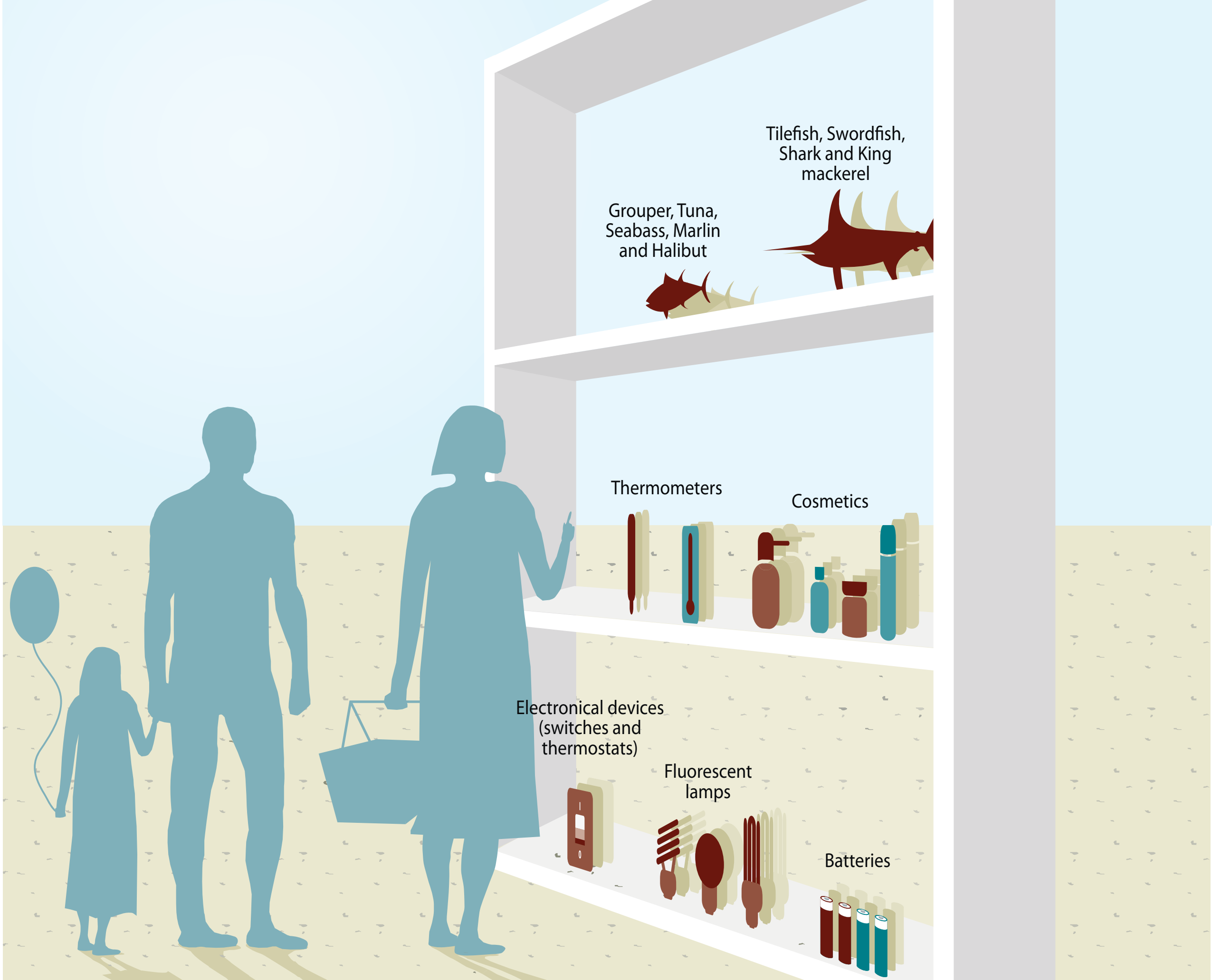
Mercury in food and products



Sources: adapted from UNEP, Mercury Awareness Raising Package, accessed on line in September 2012 (http://www.unep.org/hazardoussubstances); US Food and Drug Administration website on Mercury Levels in Commercial Fish and Shellfish (1990-2010) (http://www.fda.gov/food/foodsafety/product-specificinformation/seafood/foodbornepathogenscontaminants/methylmercury/ucm115644.htm)
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Most of the world's estimated 600,000 tonnes of mercury deposits are found in a handful of countries.

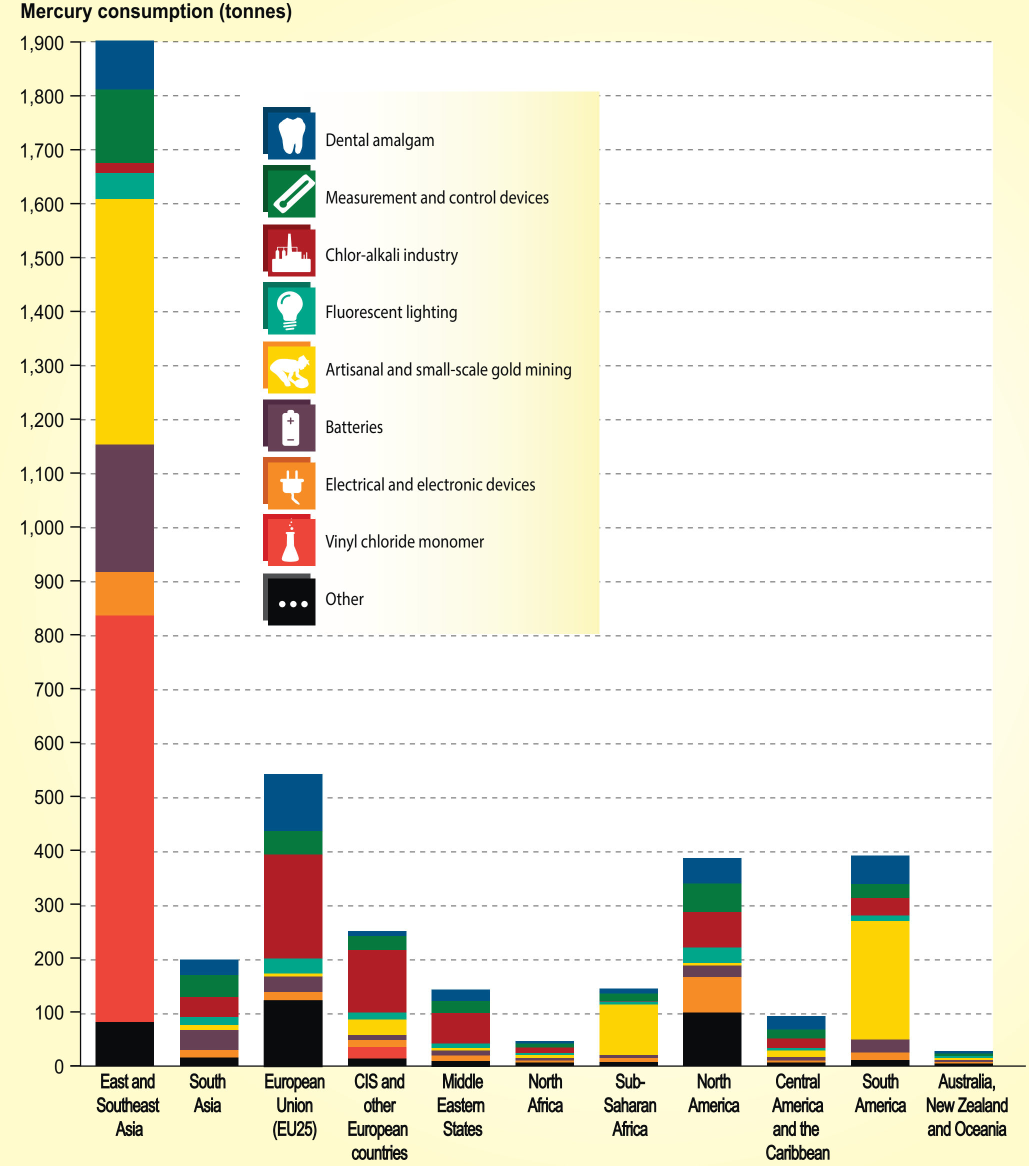
Even now, mercury is commonplace in daily life. Electrical and electronic devices, switches (including thermostats) and relays, measuring and control equipment, energy-efficient fluorescent light bulbs, batteries, mascara, skin-lightening creams and other cosmetics which contain mercury, dental fillings and a host of other consumables are used across the globe. Food products obtained from fish, terrestrial mammals and other products such as rice can contain mercury. It is still widely used in health care equipment, where much of it is used for measuring, and in blood pressure devices and thermometers, although their use is declining. There are safe and cost-effective replacements for mercury for many health care applications and for pharmaceuticals, and goals have been set to phase out some mercury-containing devices altogether. For instance, the UNEP Mercury Products Partnership, a mechanism for delivery of immediate actions, has set the goal of reducing demand for mercury-containing fever thermometers and blood pressure devices by at least 70 per cent by 2017.

Most of the world's estimated 600,000 tonnes of mercury deposits are found in a handful of countries, including China, Kyrgyzstan, Mexico, Peru, Russia, Slovenia, Spain and Ukraine (USGS, 2012). Primary mining (where mercury is the target ore, not extracted as a by-product) is now limited to even fewer countries, with only one (Kyrgyzstan) still exporting.

In 2005, UNEP estimated global annual mercury demand at between 3,000 and 3,900 tonnes (UNEP, 2006). Demand has fallen significantly in the last 50 years, from 9,000 tonnes a year in the 1960s to 7,000 in the 1980s and 4,000 a decade later (UNEP, 2006). A growing understanding of the risks posed by the toxicity of mercury, the increasing availability of substitutes and international action mean that many uses of mercury are now disappearing.

Given present trends, it appears likely that most uses of mercury will continue to decline except in artisanal and small-scale gold mining (ASGM) and in the production of vinyl chloride monomer (VCM) which together accounts for around 45 per cent of all global demand.

Global mercury consumption in 2005



Source: Adapted from UNEP, Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport, 2013.
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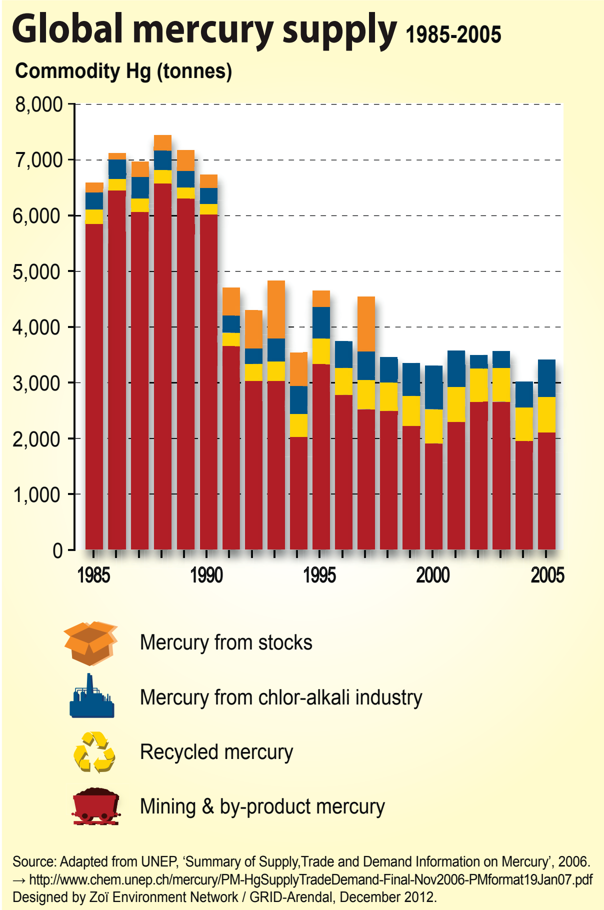
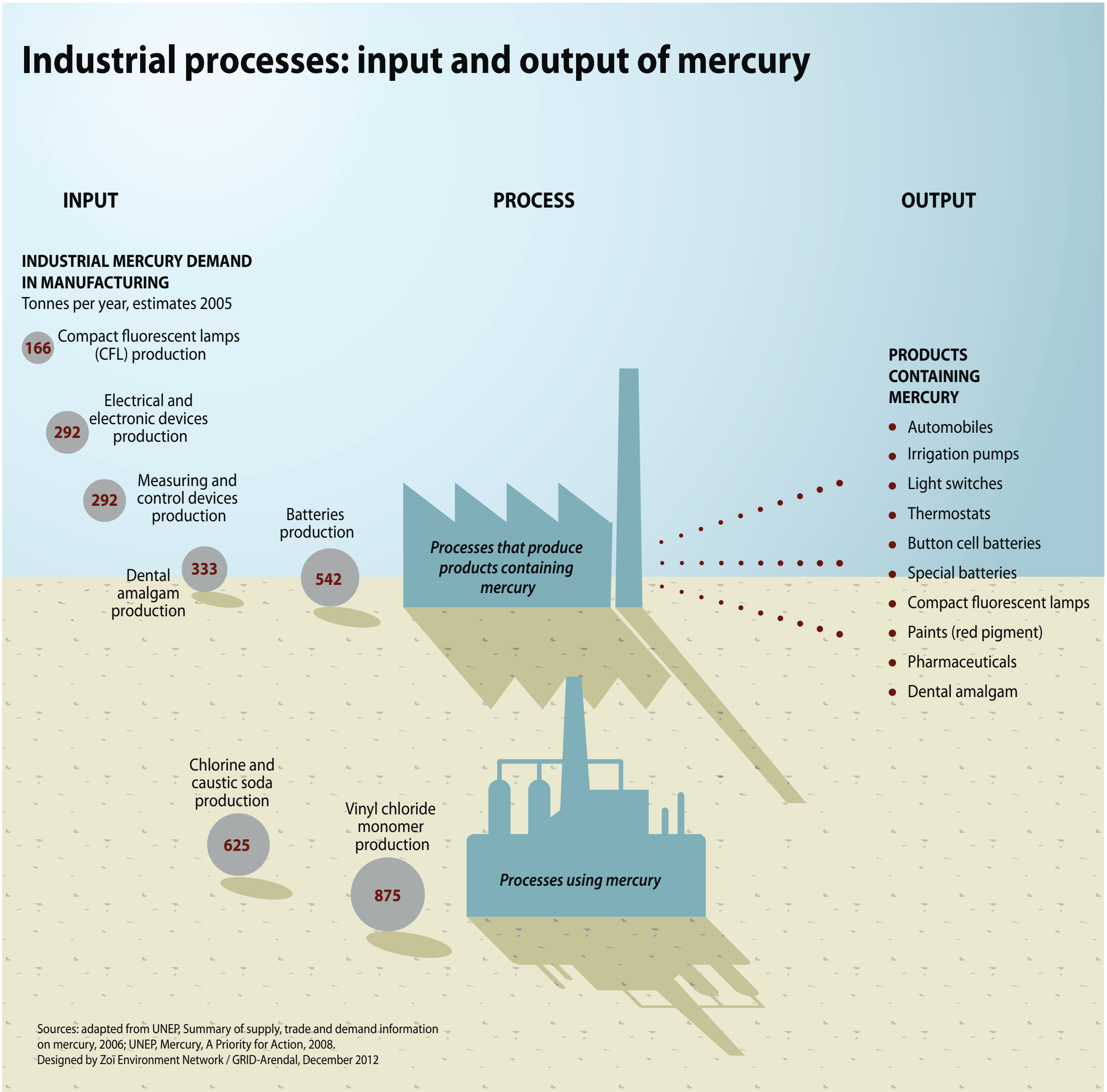
Mercury use in ASGM was estimated by Mercury Watch at 1,400 tonnes in 2011.



ASGM is the largest sector of demand for mercury, using it to separate the metal from the ore. At least 10–15 million miners are involved worldwide, mainly in Africa, Asia and South America. An estimated three million of them are women and children (UNEP, 2012). Mercury use in ASGM was estimated by Mercury Watch at 1,400 tonnes in 2011, and rising gold prices are likely to increase that use (UNEP, 2012). The practice threatens the health of the workers and their families, and the people downstream who eat mercury-contaminated fish or drink the water. It can also cause environmental damage that may persist for decades after the mining has stopped. Low-mercury and mercury-free methods are available, but socio-economic conditions are often barriers to the adoption of better practices (UNEP, 2012). Persuading miners to change the way they work because mercury is a threat to them and their families can be difficult, but some good examples exist. The Sustainable Artisanal Mining project in Mongolia, supported by the Swiss Development Cooperation, is one such initiative, involving the Mongolian Government in working with miners to develop policies and technical solutions to


Industrial processes: input and output of mercury
INPUT
PROCESS
OUTPUT
INDUSTRIAL MERCURY DEMAND IN MANUFACTURING
Tonnes per year, estimates 2005
166 Compact fluorescent lamps (CFL) production
292 Electrical and electronic devices production
292 Measuring and control devices production
333 Dental amalgam production
542 Batteries production
625 Chlorine and caustic soda production
875 Vinyl chloride monomer production
Processes that produce products containing mercury
Processes using mercury
PRODUCTS CONTAINING MERCURY
Automobiles
Irrigation pumps
Light switches
Thermostats
Button cell batteries
Special batteries
Compact fluorescent lamps
Paints (red pigment)
Pharmaceuticals
Dental amalgam
Sources: adapted from UNEP, Summary of supply, trade and demand information on mercury, 2006; UNEP, Mercury, A Priority for Action, 2008.
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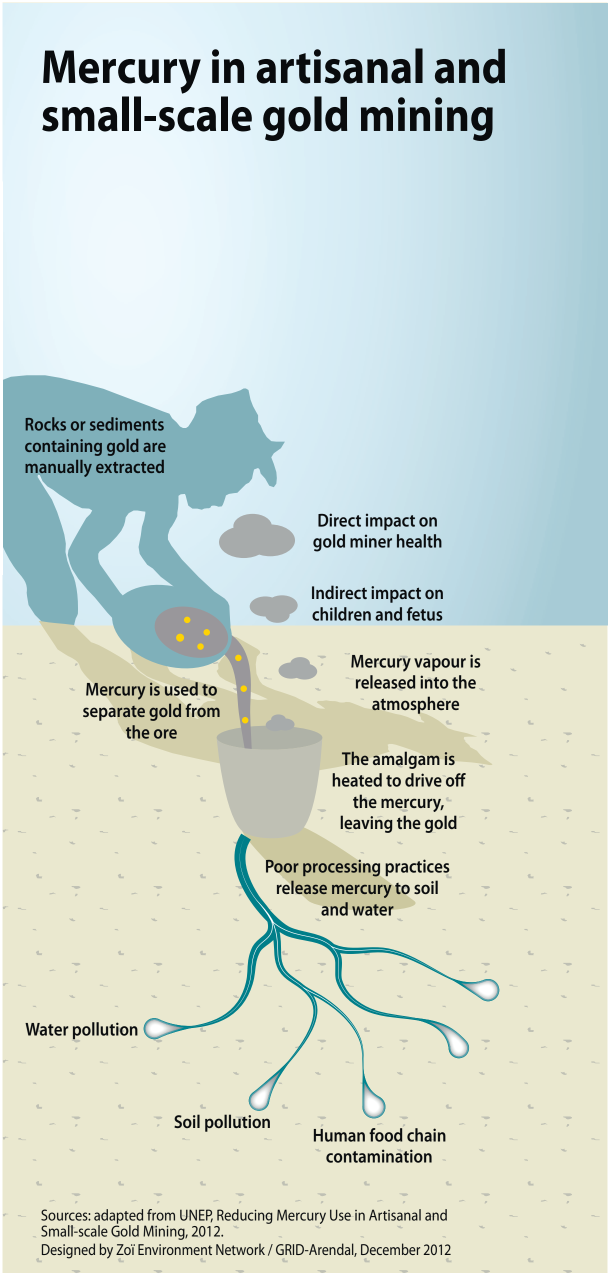
Global mercury demand is expected to decline in response to the treaty.

eliminate mercury use. The Global Mercury Partnership promotes the establishment of national action plans and reduction targets, encourages collaboration and the sharing of best practices to reduce mercury use, and helps the take-up of innovative market-based approaches.

The VCM industry, the basis for the large global production of polyvinyl chloride (PVC), used in plastics, is the second largest user of mercury, which is used as a catalyst in the production process. Most of this production occurs in China. About 800 tonnes of mercury are thought to have been used by this industry in China in 2012. Used mercury catalyst is recycled and reused by enterprises that hold permits for hazadous waste management in China. The amounts that may be emitted or released are not known (UNEP, 2013).

Once a globally-binding treaty is in place, there is hope that global mercury demand will decline sharply as industries that use mercury in products and processes or release it to the environment will be required to meet the obligations set out in the instrument.



Impacts on human health and ecosystems

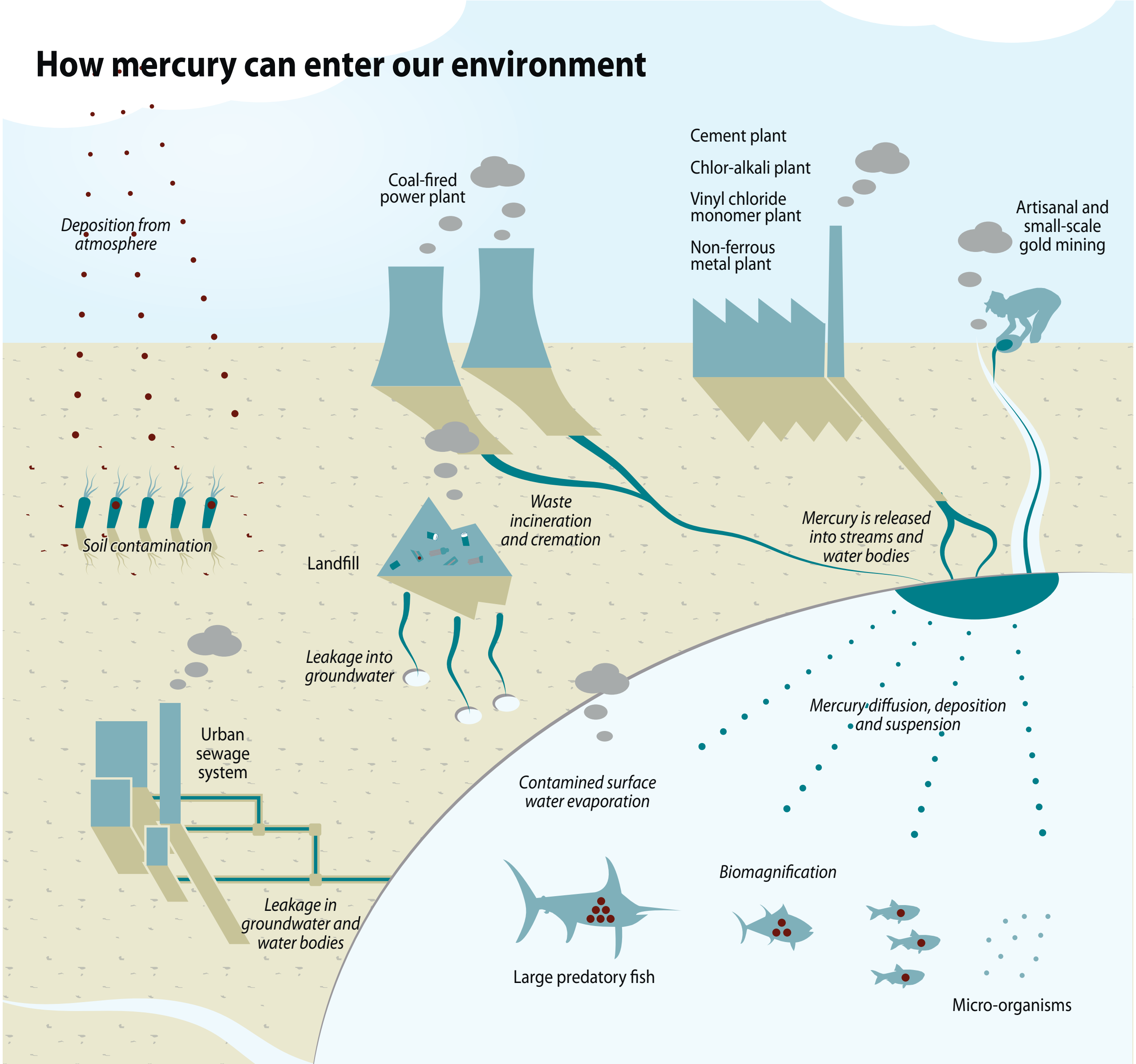
While some pollutants are restricted in their range and in the size and number of the populations they affect, mercury is not one of them. Wherever it is mined, used or discarded, it is liable – in the absence of effective disposal methods – to finish up thousands of kilometers away because of its propensity to travel through air and water. Beyond that, it reaches the environment more often after being unintentionally emitted than through negligence in its disposal. The prime example of this is the role played by the burning of fossil fuels and biomass in adding to mercury emissions.

Once released, mercury can travel long distances, and persists in environments where it circulates between air, water, sediments, soil, and living organisms. Mercury is concentrated as it rises up the food chain, reaching its highest level in predator fish such as swordfish and shark that may be consumed by humans. There can also be serious impacts on ecosystems, including reproductive effects on birds and predatory mammals. High exposure to mercury is a serious risk to human health and to the environment.

Air emissions of mercury are highly mobile globally, while aquatic releases of mercury are more localised. Mercury in water becomes more biologically dangerous and eventually some mercury evaporates into the atmosphere. Once deposited in soils and sediments, the mercury changes its chemical form, largely through metabolism by bacteria or other microbes, and becomes methylmercury, the most dangerous form for human health and the environment. Methylmercury normally accounts for at least 90 per cent of the mercury in fish.

Mercury can enter the food chain either from agricultural products or from seafood. It was widely used in agriculture, and at least 459 people are known to have died in Iraq after grain treated with a fungicide containing mercury was imported in 1971 and used to make flour (Greenwood, 1985). Those who showed the greatest effects were the children of women who had eaten contaminated bread during pregnancy. Though many of these acute cases are now in the past, agricultural products may still contain mercury. The Institute for Agriculture and Trade Policy in USA recently found that high fructose corn syrup (used in sodas, ketchup and bread) could also contain elevated mercury levels (Dufault *et al*., 2009). Another study suggested that in an area marked by intensive mercury mining and smelting and heavy coal-powered industry, rice crops could be contaminated (Zhang *et al*., 2010).

How mercury can enter our environment



Sources: adapted from UNEP, Mercury Awareness Raising Package, accessed on line in September 2012 (http://www.unep.org/hazardoussubstances); Institute for Agriculture and Trade Policy, High fructose corn syrup's not-so-sweet surprise: mercury!, 2009.
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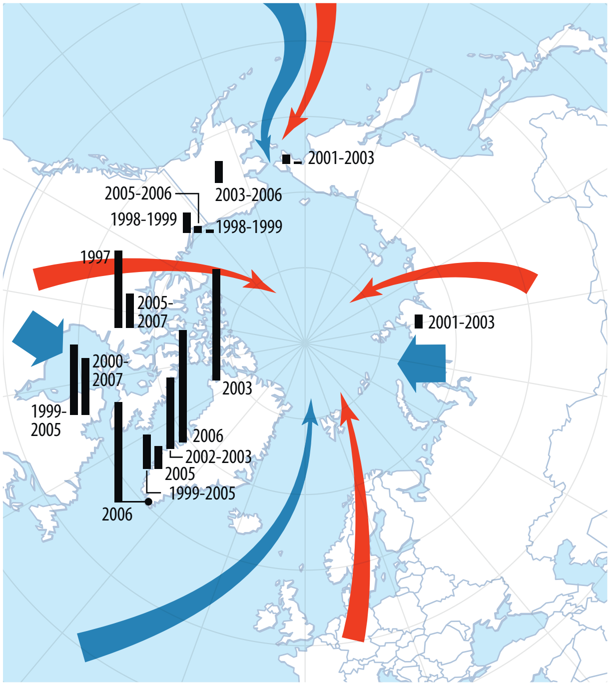
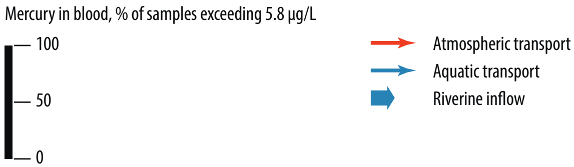
Human groups at risk include the millions of ASGM miners across the world, where mercury compounds are used in production. However, a far greater number of people whose main source of protein is fish or other marine creatures may be exposed to contamination (UNEP-WHO, 2008). The Food and Agriculture Organization says: *"Just over 100 million tonnes of fish are eaten world-wide each year, providing two and a half billion people with at least 20 per cent of their average per capita animal protein intake. This contribution is even more important in developing countries, especially small island states and in coastal regions, where frequently over 50 per cent of people's animal protein comes from fish. In some of the most food-insecure places – many parts of Asia and Africa, for instance – fish protein is absolutely essential, accounting for a large share of an already low level of animal protein consumption"* (FAO, 2010).

The once pristine Arctic region is a special case. About 200 tonnes of mercury are deposited in the Arctic annually, generally far from where it originated. A 2011 report by the Arctic Monitoring and Assessment Programme (AMAP) reported that mercury levels are continuing to rise in some Arctic species, despite reductions over the past 30 years in emissions from human activities in some parts of the world. It reports



Mercury in the Arctic

Exceedance of blood guideline values (5.8 µg/L) for (total) mercury in mothers and women of child-bearing age in different populations around the Arctic (comparable data not available from Norway, Sweden and Finland).



Source: Adapted from Arctic Monitoring and Assessment Programme (AMAP), Arctic Pollution 2011 (> www.amap.no)
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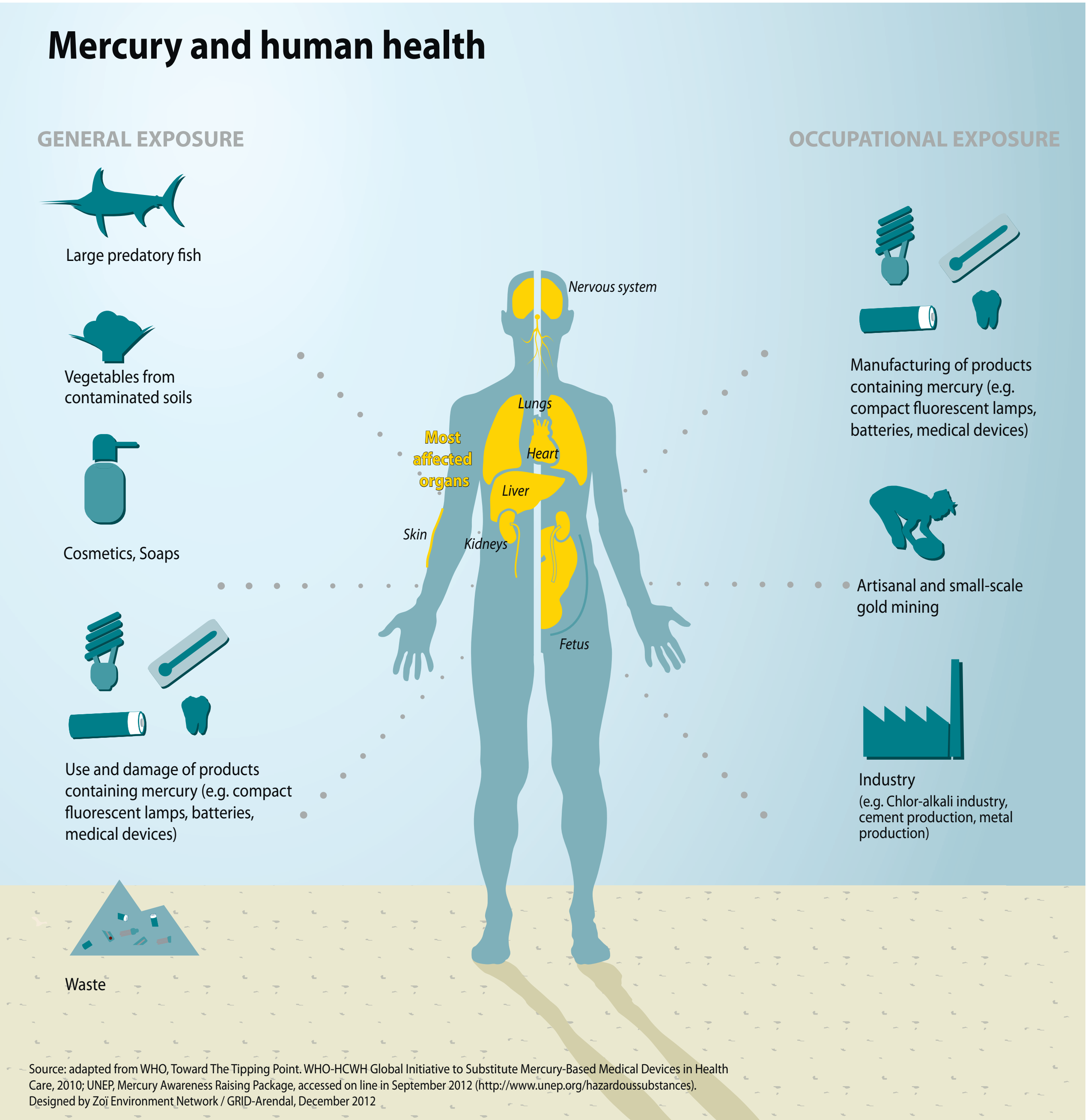
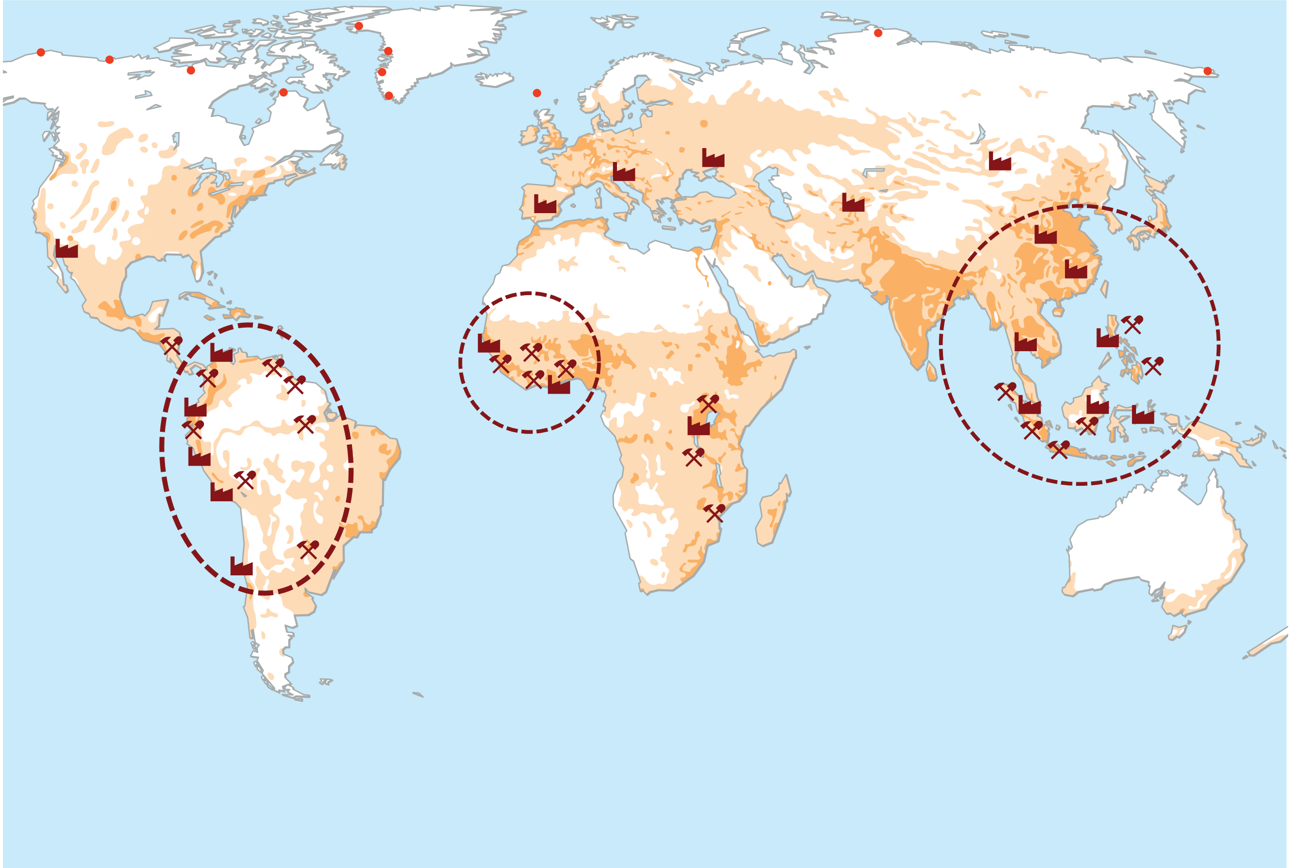
> ***Mercury can seriously harm human health.***

a ten-fold increase in the last 150 years in levels in belugas, ringed seals, polar bears and birds of prey. Over 90 per cent of the mercury in these animals, and possibly in some Arctic human populations, is therefore believed to have originated from human sources. The average rate of increase in wildlife over the past 150 years is one to four per cent annually. The report is clear about the implications for human health: *"The fact that trends are increasing in some marine species in Canada and West Greenland despite reductions in North American emissions is a particular cause for concern, as these include species used for food"* (AMAP, 2011). A recent study of the preschool children in three regions of the Arctic showed that almost 59% of children exceeded the provisional tolerable weekly intake (PTWI) level for children (Tian *et al*., 2011; WHO, 1998).

Mercury can seriously harm human health, and is a particular threat to the development of fetuses and young children. It affects humans in several ways. As vapour it is rapidly absorbed into the blood stream when inhaled. It damages the central nervous system, thyroid, kidneys, lungs, immune system, eyes, gums and skin. Neurological and behavioural disorders may be signs of mercury contamination, with symptoms including tremors, insomnia, memory loss, neuromuscular effects, headaches, and cognitive and motor dysfunction. Recent studies have also shown mercury to have cardiovascular effects (McKelvey and Oken, 2012). In the young it can cause neurological damage resulting in symptoms such as mental retardation, seizures, vision and hearing loss, delayed development, language disorders and memory loss. The Inuit population of Quebec has among the highest levels of exposure to mercury of any population in the world. Scientists recently concluded that children with higher levels of contamination are more likely to be diagnosed with attention deficit hyperactivity disorder (Boucher *et al*., 2012).

In cases of severe mercury poisoning, as occurred in the Minamata case in Japan, symptoms can include numbness in the hands and feet, general muscle weakness, narrowing of the field of vision, and damage to hearing and speech (EINAP). In extreme cases, insanity, paralysis, coma and death have been known to ensue rapidly. People may be at risk of inhaling mercury vapour from their work (in industry or ASGM), or in spills, and may be at risk through direct contact of mercury with the skin. The most common form of direct exposure for humans, however, is through consuming fish and sea food contaminated with methylmercury. Once ingested, 95 per cent of the chemical is absorbed in the body.


Mercury and human health
GENERAL EXPOSURE
Large predatory fish
Vegetables from contaminated soils
Cosmetics, Soaps
Use and damage of products containing mercury (e.g. compact fluorescent lamps, batteries, medical devices)
Waste
OCCUPATIONAL EXPOSURE
Manufacturing of products containing mercury (e.g. compact fluorescent lamps, batteries, medical devices)
Artisanal and small-scale gold mining
Industry
(e.g. Chlor-alkali industry, cement production, metal production)
Nervous system
Lungs
Heart
Most affected organs
Liver
Skin
Kidneys
Fetus
Source: adapted from WHO, Toward The Tipping Point. WHO-HCWH Global Initiative to Substitute Mercury-Based Medical Devices in Health Care, 2010; UNEP, Mercury Awareness Raising Package, accessed on line in September 2012 (http://www.unep.org/hazardoussubstances).
Designed by Zoï Environment Network / GRID-Arendal, December 2012



Population at risk from mercury contamination

- Mercury pollution from mining and ore processing
- Mercury contamination from artisanal and small-scale gold mining
- Key regions of affected people by mercury pollution
- Health risk by consumption of contaminated marine mammals in arctic communities
- Densely populated area
- Populated area
- Sparsely populated area

Source: Adapted from Blacksmith Institute (> www.worstpolluted.org); Arctic Monitoring and Assessment Programme (AMAP) (> www.amap.no)
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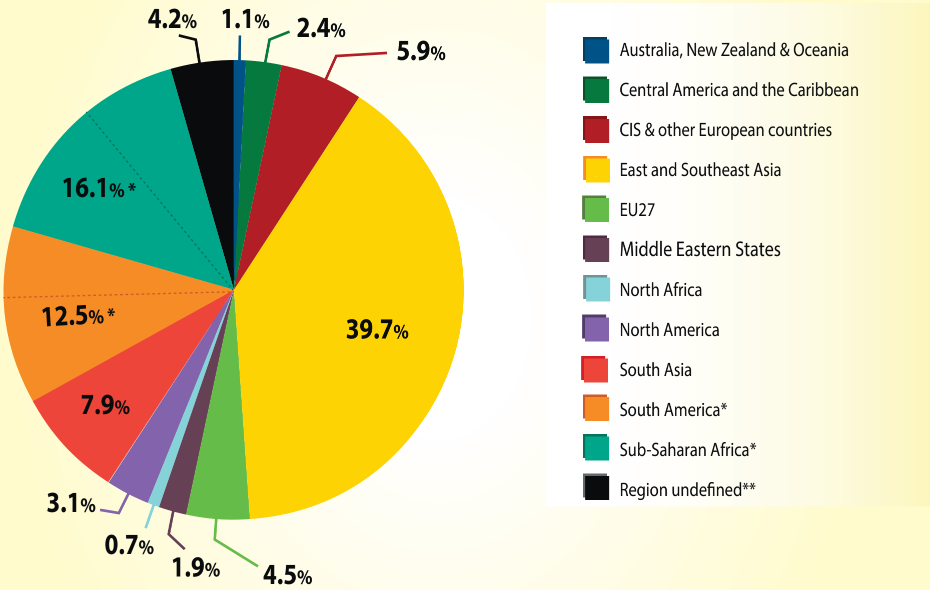
Emissions and releases

Regional mercury emissions in 2010



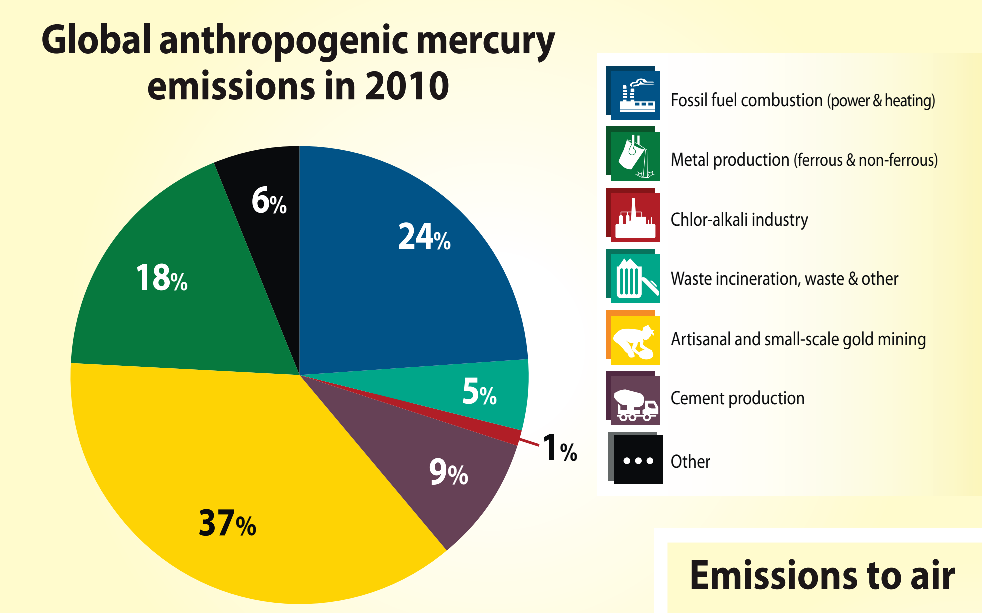
* Artisanal and small-scale gold mining is by far the major contributor to mercury emissions in South America and Sub-Saharan Africa

** Emissions from contaminated sites.

Source: Adapted from UNEP, Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport, 2013.
Designed by Zoï Environment Network / GRID-Arendal, December 2012.

Global emissions of mercury to the air in 2010 from human activities were estimated at 1,960 tonnes. Although it is difficult to compare emissions estimates for individual years, total anthropogenic emissions of mercury to the atmosphere appear to have been relatively stable from 1990 to 2010 (UNEP, 2013). There has been a large shift in regional patterns, however. Economic growth has driven an increase in anthropogenic emissions in Southern and Eastern Asia, which now account for about half of global emissions. Emissions in Sub-Saharan Africa and in South America are slowly rising (together accounting for about 30 per cent of global emissions), while emissions are declining in North America and Europe (about eight per cent of global emissions altogether) (UNEP, 2013).

The largest anthropogenic sources are associated with artisanal and small-scale gold mining (ASGM) and coal burning,

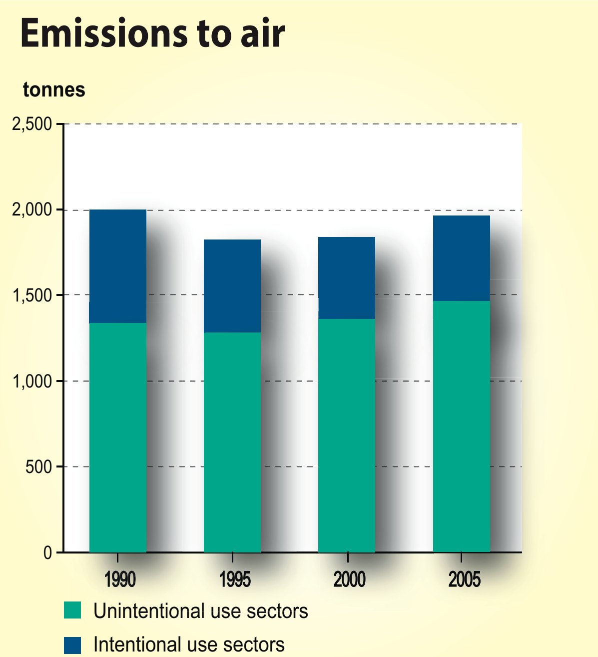


Source: Adapted from UNEP, Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport, 2013.
Designed by Zoï Environment Network / GRID-Arendal, December 2012.

which together contribute about 61 per cent of total annual anthropogenic emissions to the air (UNEP, 2013). Other major contributors include ferrous and non-ferrous metal production and cement production, together responsible for 27 per cent (UNEP, 2013).

Emissions of mercury from ASGM reported for 2010 are more than twice those reported for 2005. While the higher price of gold and increased rural poverty may indeed have caused more activity in this sector, the increased emissions estimates are thought to explained mainly by better data (UNEP, 2013).

Coal burning for electric power generation and for industrial purposes continues to increase, especially in Asia (UNEP, 2013). Coal does not normally contain high concentrations of mercury, but the combination of the large volume burned and the fact that a significant portion of the mercury present



Source: Adapted from UNEP Study on mercury sources and emissions, and analysis of cost and effectiveness of control measures, 2010.
Designed by Zoï Environment Network / GRID-Arendal, December 2012.

is emitted to the atmosphere results in large overall emissions from this sector. The mercury content of coal varies widely, making emissions estimates highly uncertain (UNEP, 2013).

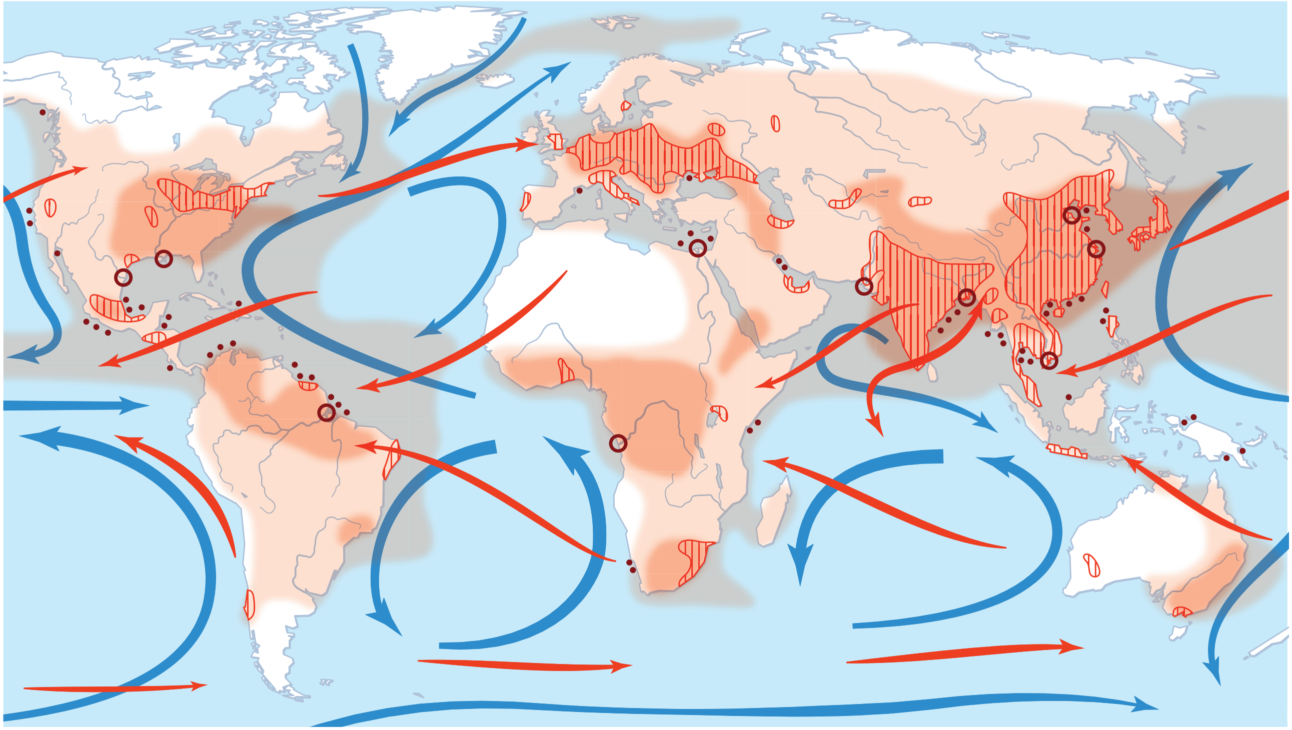
Much of the mercury released into aquatic environments comes from ASGM. However, the latest findings suggest that even deforestation can be a source of mercury emissions through extensive erosion, which releases mercury previously held in soils. Using 2010 figures for global deforestation rates, it is estimated that around 260 tonnes of mercury may have been released into rivers that year (UNEP, 2013).

Assessing the global spread and fate of mercury is a challenging task, as there are few studies available about net deposition of different forms of mercury in air, water and land. For example, when mercury moves from air to water and land it is generally in an oxidized gaseous or particle form, whereas when it is re-emitted to air it has been converted back to gaseous elemental mercury. These complicated mechanisms make final calculations a challenging task.

Much of the mercury in the Arctic has been carried over long distances from human sources at lower latitudes. The main way mercury is transported to the Arctic is by the atmosphere, which contributes slightly less than half. Oceanic transport, mainly from the Atlantic, makes up around 23 per cent, with a similar amount coming from coastal erosion. The remainder comes from rivers. Mercury reaches the Arctic on air currents within days, while on ocean currents it may take decades. The form in which mercury is released and the processes that change it from one chemical form to another are the key to determining its spread and fate. The aquatic environment is of critical importance to mercury pathways to humans and wildlife, because inorganic mercury in water is transformed into highly toxic methylmercury.

About 100 tonnes are estimated to reach the Arctic Ocean by air annually, with about the same amount from the Atlantic and Pacific Oceans, rivers and erosion combined. Recent calculations suggest that the water in the Arctic Ocean accumulates about 25 tonnes of mercury a year (AMAP, 2011). Less is known about mercury dynamics and pathways in the ocean than in the atmosphere, but about 75-90 tonnes annually are thought to leave the Arctic in ocean outflow, with about 110 tonnes deposited in Arctic Ocean shelf and deep ocean sediments (AMAP, 2011).

Even deforestation can be a source of mercury emissions through extensive erosion and forest burning.



Long-range mercury transport

Major emission areas

Mercury deposition > 20 g/km²/year

Mercury deposition > 12 g/km²/year

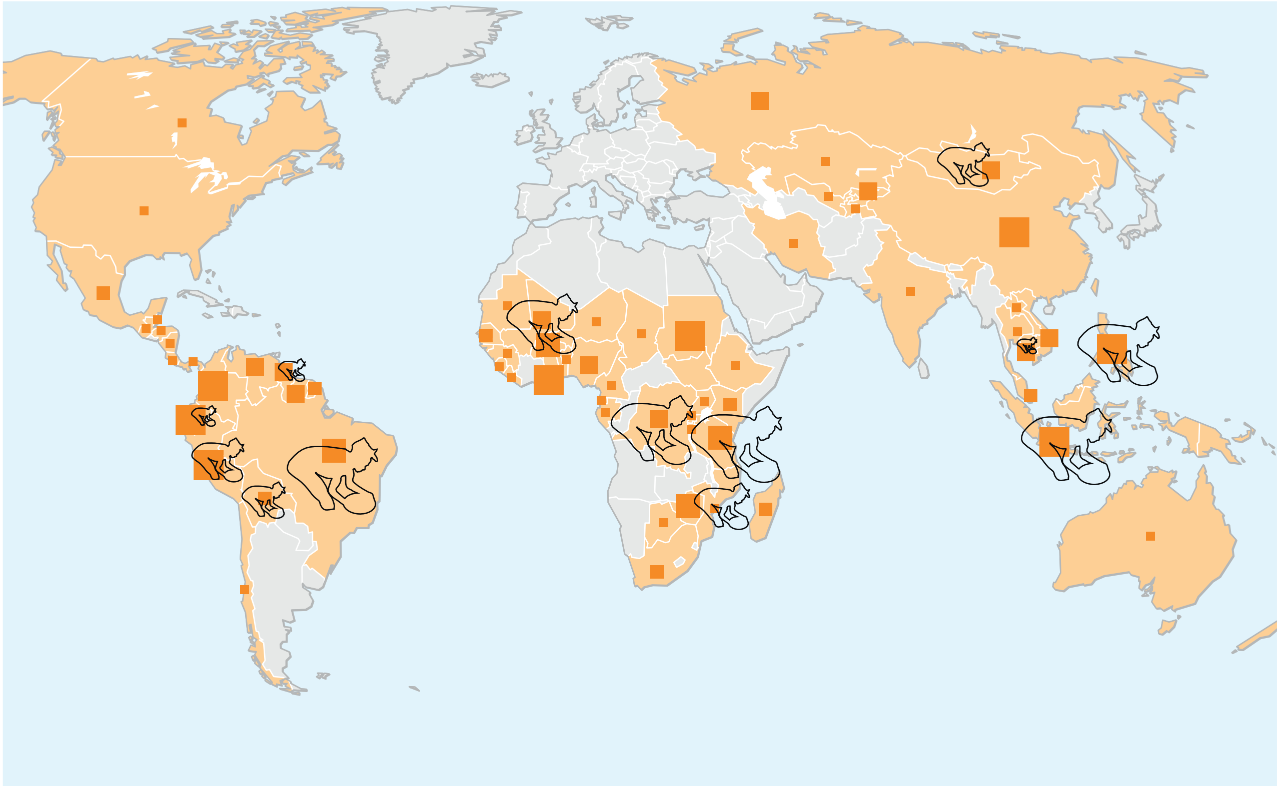
High annual mercury fluxes to oceans

High annual mercury fluxes in major river mouths

Major winds

Major ocean currents

Source: Adapted from AMAP/UNEP 2008, Technical Background Report to the Global Atmospheric Mercury Assessment; UNEP, Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport, 2013
Designed by Zoï Environment Network / GRID-Arendal, December 2012



Artisanal and small-scale gold mining (ASGM)

Estimated mercury releases from ASGM in tonnes per year

- 0-5
- 5-10
- 10-25
- 25-50
- 50-500

Estimated numbers of miners

- 10,000
- 100,000
- 500,000

Reported countries with ASGM

No estimate

Source: Adapted from Mercury Watch database (> www.mercurywatch.org); UNEP Global Forum on Artisanal and Small-scale gold mining Manila, 8th December 2010
Designed by Zoï Environment Network / GRID-Arendal, December 2012

Artisanal and small-scale gold mining and coal burning are the largest anthropogenic sources of emissions.

Mercury residues from mining and industrial processing, as well as mercury in waste, have resulted in a large number of contaminated sites all over the world. Polluted soil can contain as much as 400 grammes of mercury per hectare, as measured at a Venezuelan gold mining site (Garcia-Sanchez *et al*., 2006). Most mercury contamination sites are concentrated in the industrial areas of North America, Europe and Asia; and in sub-Saharan Africa and South America. In contrast to Europe and North America, the number and extent of mercury-contaminated sites in other parts of the world is increasing because of the rising use of mercury (Kocman *et al*., 2011). Safe storage of mercury-containing waste and rehabilitation of various hotspots is needed.

Air pollution control technologies in industrial facilities remove mercury that would otherwise be emitted to the air, but there is little information about the ultimate fate of the mercury captured in this way or about how the mercury-containing wastes are subsequently disposed of. However, it is likely that these control technologies will reduce the amount of mercury that is transported globally by air. But the mercury captured by filters will be disposed of in the area where it originated. While the atmosphere responds relatively quickly to changes in mercury emissions, the large reservoirs of mercury in soils and oceans mean that there will be a long time lag (in the order of tens of decades) before reductions in mercury inputs are reflected in depleted concentrations in these media and in the wildlife taking up mercury from them.

Mercury action

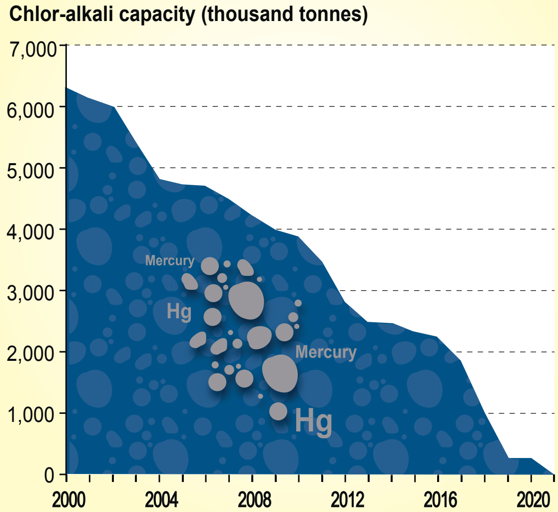
Efforts to confront the threat posed by mercury to human health and the environment have grown over the last decades. There are a number of initiatives aiming, for example, to reduce the use of mercury in products, to remediate sites and to clean up historic pollution. Some countries have introduced far-reaching regulations. Global action, however, has been rather limited.

In 2008, United States of America (USA) introduced its Mercury Export Ban Act, which bans the export of mercury from the USA from 1 January 2013. It also includes provisions on long-term mercury management and storage. Because the USA is one of the world's top mercury exporters, implementation of the act will remove a significant amount from the global market (US EPA, 2012).

The European Union (EU) banned mercury exports in 2011. Under EU law, mercury that is no longer used by the chlor-alkali industry or that is produced in certain other industrial operations must be put into safe storage. Although the EU stopped all forms of mercury mining in 2001, as recently as 2008 it was the world's biggest exporter, responsible for up to a quarter of the global supply.

The industry's self-commitment to phase-out mercury use in the chlor-alkali industry

Western Europe

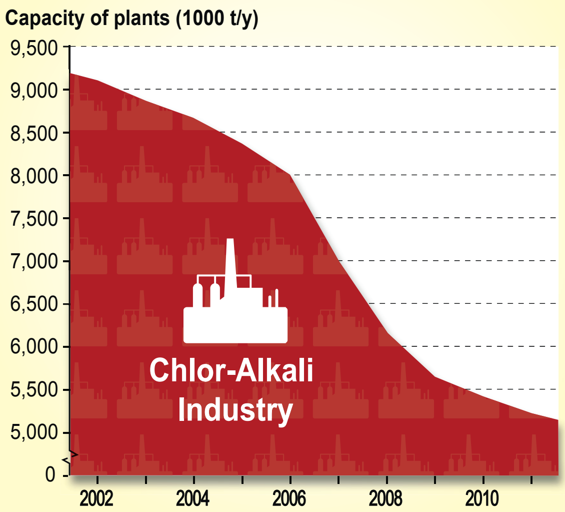


Source: Adapted from European Commission, Directorate General for Environment, 2004, Brussels. Designed by Zoï Environment Network / GRID-Arendal, December 2012.

Only a few countries such as Canada and the USA have taken steps to set national standards specifically for mercury emissions from coal-fired plants. Relatively strict mercury control requirements in Canada demand significant investment in some plants. The USA has recently finalized the Mercury and Air Toxics Standard which aims to reduce mercury emissions by 20 tonnes by 2016, a total of 70 per cent reduction in emissions from the power sector (Sloss, 2012). In the EU, further mercury

Mercury use in the chlor-alkali industry

Capacity of mercury electrolysis units in USA / Canada / Mexico, EU, Russia, India and Brazil / Agentina / Uruguay



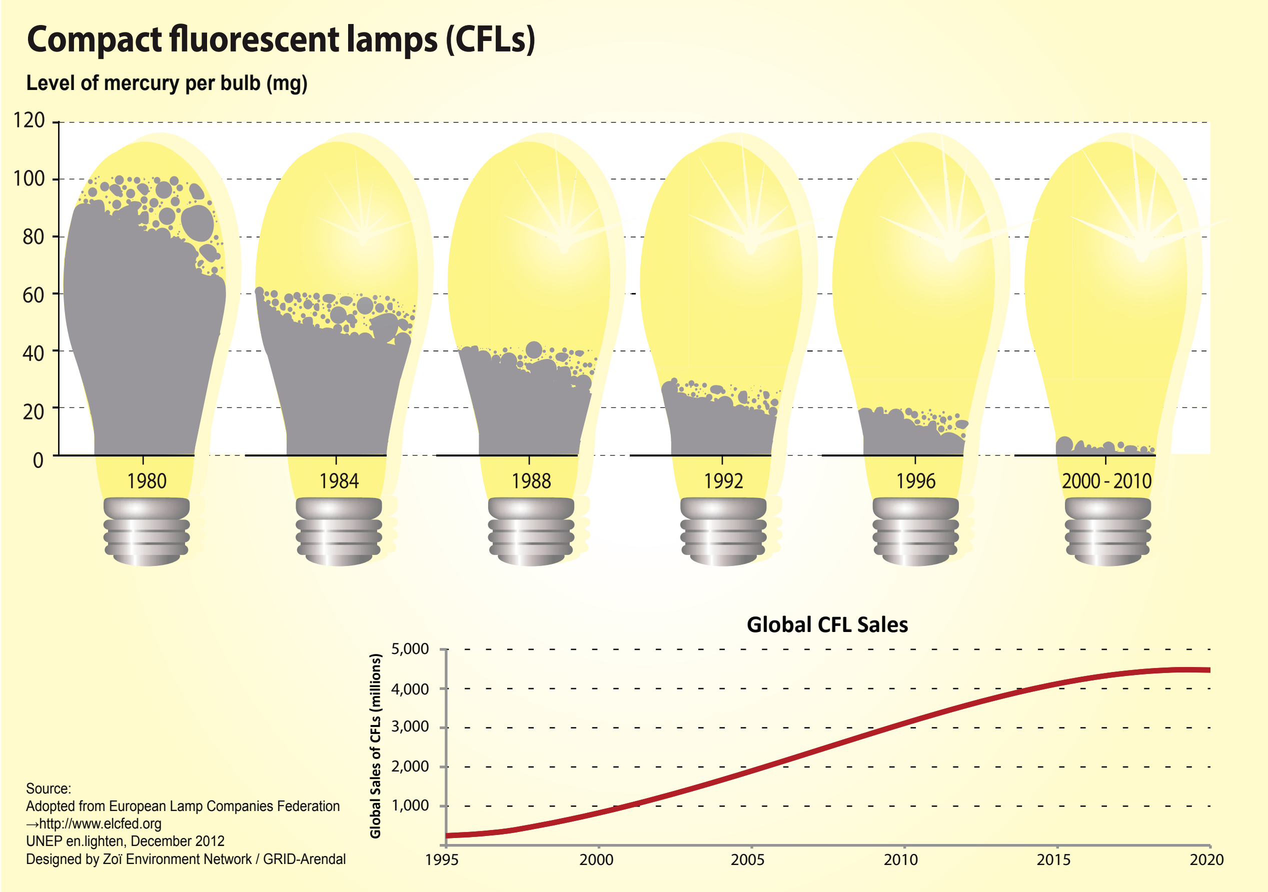
Source: Adapted from WCC Hg reporting to the Chlor-Alkali Partnership, 2012.
Designed by Zoï Environment Network / GRID-Arendal, December 2012.

reduction will be achieved through the new Industrial Emissions Directive adopted in 2010, however, specific reduction or control requirements of mercury may still be required.

The UNEP Global Mercury Partnership estimates that some 100 facilities in 43 nations today use mercury in the chlor-alkali industry. The European chlor-alkali industry, producing chlorine and caustic soda from salt, has committed to the closure or conversion of its mercury-based plants by 2020. While agreeing to phase out mercury by 2020, the European chlor-alkali producers are actively engaged in the application of best practices when handling mercury during normal operation and during conversion to other technologies. In 2010, emissions for all mercury cells across Western Europe reached an all-time low of 0.88 grammes per tonne of chlorine capacity.

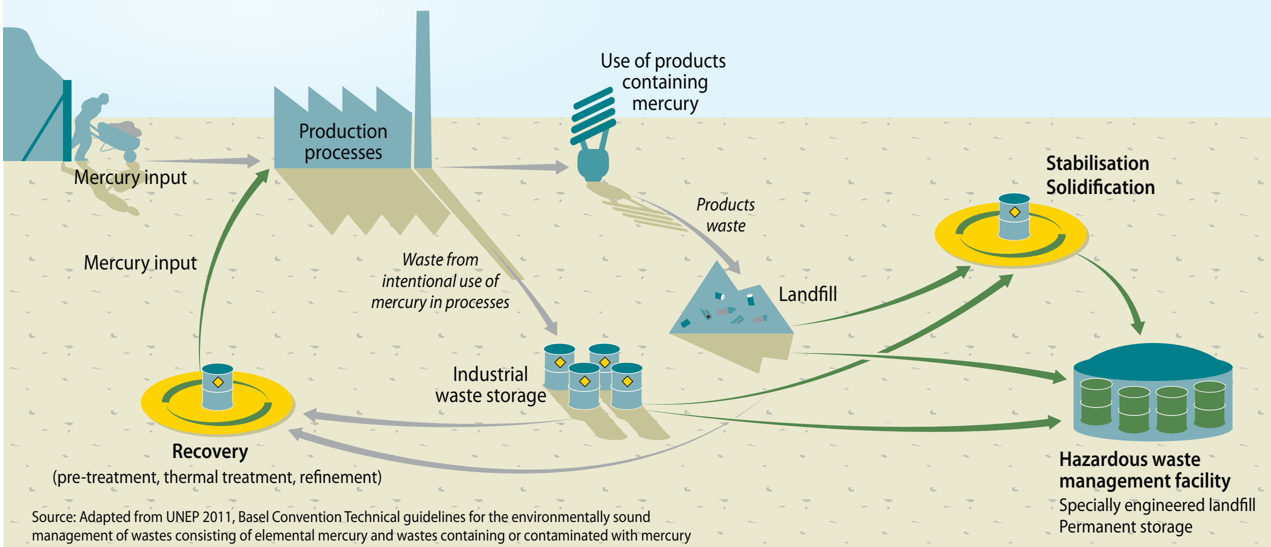
Forty-two mercury-based chlorine plants remain to be voluntarily phased out or converted to non-mercury technology by 2020 at a cost of more than € 3,000 million. These plants account for an ever-decreasing part (31.8% in 2010) of European chlor-alkali capacity (Euro Chlor website).

The EU Regulation on the Export Ban and Safe Storage of Metallic Mercury makes it legal to permanently store liquid mercury in underground salt mines or hard rock formations. An investigation into the safety of permanent storage of liquid mercury is under way in Germany, but it may be several years before it reaches a conclusion. The industry is therefore continuing to look into other permanent disposal solutions, including stabilized mercury.



Managing surplus mercury involves collection, stabilization and safe disposal to isolate it from the biosphere. Stabilizing mercury offers several benefits: technology is available on an industrial scale, there is no risk of liquid spillage, vapour pressure is below occupational safety limits, and mercury concentrations in leachates are below the threshold for disposal. Beyond that, the lower commercial value of the stabilized mercury reduces the risk of theft, and disposal after stabilization by binding with sulphur is possible. Several stabilization technologies exist: chemical transformation into a more stable, less mobile chemical compound; micro-encapsulation, the embedding of particles in an impermeable matrix such as cement; and macro-encapsulation, the covering of waste material with an impermeable material, for example polyethylene. The fact that stabilized mercury is non-toxic significantly helps the search for suitable storage sites. Unlike liquid mercury, the stabilized form is suitable for storage in landfills and underground.

Mercury management options



Source: Adapted from UNEP 2011, Basel Convention Technical guidelines for the environmentally sound management of wastes consisting of elemental mercury and wastes containing or contaminated with mercury
Designed by Zoï Environment Network / GRID-Arendal, December 2012

Mercury storage and disposal is a growing problem. The global trend towards phasing out products which contain mercury and processes which use it will soon generate an excess of mercury if supplies remain at their current level. Environmentally sound management of mercury waste will be a critical issue for most countries. There are some good examples. But in the Latin American and Caribbean region, mercury supply may exceed demand by 2013. In 2012, UNEP helped Argentina and Uruguay to find environmentally sound solutions for the storage and disposal of excess mercury, including identifying existing hazardous waste facilities that could serve as temporary storage and identifying relevant regulatory frameworks. Both countries developed National Action Plans for the environmentally sound management of mercury and mercury wastes.

Mercury is widely used in compact fluorescent lamps (CFLs) and the demand for them is increasing in the quest for energy efficiency. According to the EU Directive 2002/95/EC on the restriction of hazardous substances in electrical and electronic equipment (RoHS Directive), mercury content in CFLs not exceeding 5 mg per lamp is allowed. These lamps reduce electricity consumption so that in countries that generate electricity largely from coal, there could be less electricity required for lighting, thereby saving about 10 per cent of emissions into the environment (EU, 2010). However, despite continuing industry efforts to reduce the mercury content of each CFL and proven recycling techniques allowing effective recovery of mercury at the end of a lamp's life cycle, the high global demand for CFLs might present a challenge to achieving the goal of effective reduction of mercury use.

Acting now …

Substitutes for mercury in products and mercury processes are available, cost-effective and safe. Waste management and stabilization processes can make mercury storage safe and effective. Control technologies can capture emissions.

Society has the ability to make significant reductions in anthropogenic emissions and releases of mercury without compromising development and people's livelihoods. The reduction and eventual elimination of mercury as a commodity is not only desirable but possible.

Actions we need

Once emitted or released, mercury persists in the environment where it circulates between air, water, sediments, soil and living creatures. It can travel long distances to areas far from any production or use. Therefore actions need to be taken at the source whenever possible.

Reduce supply

Stop primary mining as soon as possible and satisfy remaining demand by recycling. The demand for mercury for use in products and processes in the transition towards mercury free products and processes should be met preferentially from mercury reuse and recycling.

Reduce demand

Viable, safe and commercial alternatives are available for almost all uses of mercury. Take actions that promote the transition to mercury-free alternatives in product and processes. If it is not yet possible, reduce content of mercury in products. Move to non-mercury technologies in the chlor-alkali and vinyl chloride monomer (VCM) sectors.

Manage continuing use

While mercury-added products remain in production and use, those products must be managed to avoid mercury releases.

Dispose properly

Mercury not needed for remaining uses needs to be disposed of by environmentally sound means. Products containing or contaminated by mercury should also be managed in an environmentally sound way as they are turned into waste.

Reduce unintentional emissions and releases

Mercury occurs as a trace contaminant in fossil fuel, metal ores and limestones used by industry. Therefore, industrial processes need to be optimized to reduce or eliminate mercury emissions and releases. Raw material selection and processing combined with existing air pollution control devices may provide cost-effective reductions of mercury emissions. Mercury captured by control technologies and mercury containing waste streams need to be managed in an environmentally sound manner.

Take holistic approach for artisanal and small-scale gold mining (ASGM)

Significant reductions in mercury releases from ASGM can be obtained by introducing mercury-free techniques and low-cost mercury capturing devices that allow a high rate of recycling. Take-up of such techniques will depend on training miners that will need to take account of the wider socio-economic and development contexts of the sector.

Who needs to act?

Governments: Ensure regulatory frameworks that promote the transition to mercury-free products, and investment in best available techniques by industries continuing to use or release mercury.

Industries: Invest in cleaner and more effective techniques that do not require mercury, resulting in improved control of releases of mercury and other pollutants. Invest in and commercialize alternatives to mercury-added products.

Intergovernmental organizations and nongovernmental organizations: Support governments in their efforts through the provision of technical assistance, capacity-building and mobilization of resources.

You too, can act: Be aware that exposure to mercury occurs principally through food chain and that foetuses, infants, children, and pregnant women are the most susceptible to mercury exposure. Look for and use mercury-free products. Take care when disposing of mercury-containing products and ask your local authorities to provide facilities for proper disposal.

Many substitutes for mercury in products and mercury processes are available, cost-effective and safe.

References

AMAP (2011). Assessment 2011: Mercury in the Arctic. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway. pp xiv + 193.

ATSDR (1999). Toxicological Profile for Mercury. Agency for Toxic Substances and Disease Registry U.S. Department of Health and Human Services (Available from http://www.atsdr.cdc.gov/toxprofiles/tp46-c1.pdf).

Asia History website (Available from http://asianhistory.about.com).

Bank, M. S. (2012). Mercury in the Environment. Pattern and Process, University of California Press.

Boucher, O., Jacobson, S. W., Plusquellec, P., Dewailly, E., Ayotte, P., Forget-Dubois, N., Jacobson, J. L., Muckle, G. (2010). Prenatal methylmercury, postnatal lead exposure, and evidence of attention deficit/hyperactivity disorder among Inuit children in Arctic Québec. Environmental Health Perspectives, Vol. 120: 10, 1456–61.

Dufault, D., LeBlanc, B., Schnoll, R., Cornett, C., Schweitzer, L., Wallinga, D., Hightower, J., Patrick, L., Lukiw, W. J. (2009). Mercury from chlor-alkali plants: measured concentrations in food product sugar. Environmental Helath, 8:2.

EINAP website (Available from http://www.einap.org).

EU (2010). Opinion on Mercury in Certain Energy-saving Light Bulbs. European Commission Scientific Committee on Health and Environmental Risks. (Available http://ec.europa.eu/health/scientific_committees/environmental_risks/docs/scher_o_124.pdf).

European Commission (2004). Mercury Flows in Europe and the Worlds: the Impacts of Decommissioned Chlor-Alkali Plants. Concorde. (Available from http://ec.europa.eu/environment/chemicals/mercury/pdf/report.pdf.).

Euro Chlor website (Available from http://www.eurochlor.org).

FAO (2010). The State of World Fisheries and Aquaculture 2010. Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture department. Rome, Italy.

Garcia-Sanchez, A., Contreras, F., Adams, M., Santos, F. (2006). Atmospheric mercury emissions from polluted gold mining areas (Venezuela). Environ Geochem Health 28, 529–540.

Greenwood, M. R. (1985). Methylmercury poisoning in Iraq. An epidemiological study of the 1971–1972 outbreak. Journal of Applied Toxicology 5: 3, 148–159.

Horvat, M., Kocman, D., Pirrone, N., Cinnirella, S. (2011). Contribution of contaminated sites to the global mercury budget. Presentation at the 3rd session of the Intergovernmental Negotiating Committee on a Hg instrument Nairobi, 2nd November, 2011.

McKelvey, W., Oken, E. (2012). Mercury and Public Health: An Assessment of Human Exposure. Mercury in the Environment: Pattern and Process by Michael Bank, Chapter 13.

Tian, W., Egeland, G.M., Sobol, I., Chan, H.M. (2011). Mercury hair concentrations and dietary exposure among Inuit preschool children in Nunavut, Canada. Environment International, 37:42-48.

UNEP (2006). Summary of supply, trade and demand information on mercury. United Nations Environment Programme. UNEP´s Division of Technology, Industry and Economics (DTIE) Chemical Branch. Geneva, Switzerland.

UNEP (2010). Study on mercury sources and emissions, and analysis of cost and effectiveness of control measures "UNEP Paragraph 29 study". Division of Technology, Industry and Economics (DTIE), Chemicals Branch, Geneva, Switzerland.

UNEP (2012). A Practical Guide: Reducing Mercury Use in Artisanal and Small-Scale Gold Mining. United Nations Environment Programme, Global Mercury Partnership.

UNEP (2013). Global Mercury Assessment 2013 Sources, Emissions, Releases and Environmental Transport. United Nations Environment Programme, report in draft.

UNEP Global Mercury Partnership (Available from http://www.unep.org/hazardoussubstances/Mercury/GlobalMercuryPartnership/tabid/1253/Default.aspx).

UNEP-WHO (2008). Guidelines for Identifying Populations at Risk from Mercury Exposure. UNEP´s Division of Technology, Industry and Economics (DTIE) Chemical Branch, the World Health Organization Department of Food Safety, Zoonoses and Foodborne Diseases.

United States Environmental Protection Agency (US EPA) (Available from http://www.epa.gov/hg/regs.htm).

USGS (2012). Mineral Commodity Summary. United States Geological Service. (Available from http://minerals.usgs.gov/minerals/pubs/commodity/mercury/mcs-2012-mercu.pdf).

WHO (1998). Summary and Conclusions: Joint FAO/WHO Expert Committee on Food Additives. Presented at the 51st meeting. World Health Organization.

Zhang, H., Feng, X., Larssen, T., Qiu, G., Vogt, R. D. (2010). In inland China, rice, rather than fish, is the major pathway for methylmercury exposure. Environmental Health Perspective, 118: 9, 1183–1188.

Index

The Global Mercury Partnership

Mercury partnerships were initiated through UNEP in 2005 to take immediate actions to reduce risks to human health and the environment from the release of mercury and its compounds to the environment. The Global Mercury Partnership was formalized in 2008 through the development of the Overarching Framework that governs the UNEP Global Mercury Partnership.

The overall goal of the Global Mercury Partnership is to protect human health and the global environment from the release of mercury and its compounds by minimizing and, where feasible, ultimately eliminating global, anthropogenic mercury releases to air, water and land. The Partnership currently has eight identified 'Priorities for Actions' (or partnership areas) that reflect the major source categories and have established business plans:

- Reducing mercury in artisanal and small-scale gold mining (ASGM).
- Mercury cell chlor-alkali production.
- Mercury air transport and fate research.
- Mercury-containing products.
- Mercury releases from coal combustion.
- Mercury waste management.
- Mercury supply and storage.
- Mercury releases from cement industry.

The work in the Global Mercury Partnership has provided helpful information for decision-makers in the negotiation of the treaty and is well positioned to support implementation in the years ahead. Some key Partnership activities to date include:

- Support for the development of sectoral inventories for chlor-alkali and ASGM.

- Expanding the previous knowledge base on coal, by developing new information from China, India, South Africa and Russia – four developing and transition economy countries that are among the most significant users of coal in power generation.

- Products/emissions inventories and risk management plans in Latin America (Chile, Ecuador, Peru), Mongolia and South Africa.

- The development of the Global Mercury Observation System (GMOS) in support of the evaluation of the effectiveness of international control measures.

- Development of guidance materials, including:
  - ASGM: (i) Reducing Mercury Use in ASGM: A Practical Guide (2012). (ii) Analysis of formalization approaches in the ASGM sector based on national experiences in Ecuador, Mongolia, Peru, Tanzania and Uganda (2012). (iii) Guidance Document on developing a National Strategic Plan to reduce mercury use in ASGM.
  - Provision of assistance in the finalization of the "Basel Convention Technical Guidelines on Environmentally Sound Management of Wastes Consisting of Elemental Mercury and Wastes Containing and Contaminated with Mercury".
  - Good Practices for Management of Mercury Releases from Waste.
  - Process Optimisation Guidance (POG) prepared for mercury control at coal-fired facilities outlining how changes in plant performance and efficiency can reduce emissions of all pollutants in an effective and economic manner. An interactive calculation tool (iPOG) based on the POG has been developed, that allows users to provide coal and plant specific data to study mercury behaviour on a plant by plant basis.
  - Economics of Conversion in the chlor-alkali sector.

- Mercury Regional Storage projects undertaken in Asia-Pacific and Latin America developed assessment reports on projected excess mercury supply and studied various options which governments could use in the management of excess supply.

- Supporting the Government of the Kyrgyz Republic to transition away from primary mercury mining, as it is the last exporting primary mercury mine globally.

As of December 2012, there were 116 official partners in the Global Mercury Partnership, including 25 governments, 5 intergovernmental organizations, 46 non-government organizations, and 40 others. Some of the partners are global associations that represent industry sectors or global civil society consortia. These represent a large number of national associations that extend the reach of the Partnership. In addition, the Partnership works with a number of stakeholders that have not yet officially joined.

This report speaks directly to governments involved in development of the global treaty on mercury. It presents updates from the UNEP Global Mercury Assessment 2013 in short and punchy facts and figures backed by compelling graphics that provide governments and civil society with the rationale and the imperative to act on this notorious pollutant.

The report underlines the fact that mercury remains a major global, regional and national challenge in terms of threats to human health and the environment, especially but not uniquely to the health of pregnant woman and babies world-wide through the eating of contaminated fish for example or marine mammals in places like the Arctic.

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