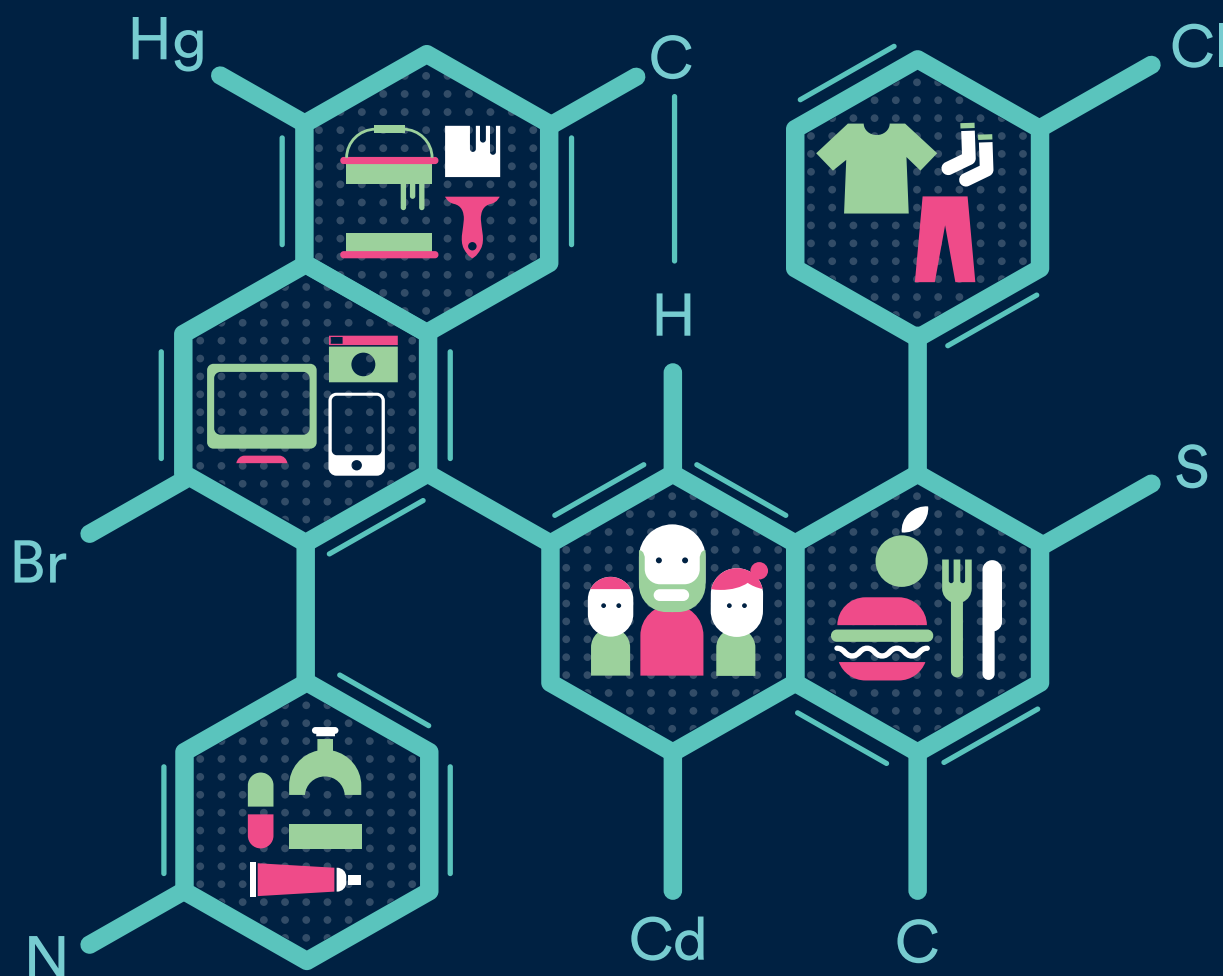


OurPlanet

United Nations Environment Programme

September 2015



Making Our Future Chemical-Safe



Jining Chen
Slow and Steady

Yoshio Mochizuki
Shining a Light on
Mercury Waste

Sharan Burrow
Help Wanted for
Industrial Transformation

Li Yong
Pivotal Potential



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For past issues visit:
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ISSN:
1013-7394

OurPlanet,
the magazine of the
United Nations Environment Programme
(UNEP)

Director of Publication: *Naysán Sahba*
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Design and Layout:
Hybrid Design (San Francisco)
William Orlale and Agnes Rube
Produced by:
United Nations Environment Programme

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TIME FOR
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FOR PEOPLE AND PLANET

*Printing: UNON, Publishing Services Section, Nairobi, ISO 14001:2004-certified
D1 No : 15-02683/1500 copies/Sept/JW*

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Chemicals are used in almost every area of the world economy. The future of sustainable development is therefore inseparable from the way chemicals are managed from their design to production, use and disposal.

In this issue of Our Planet, distinguished policy makers and experts highlight how addressing sound management of chemicals and waste is at the core of addressing the sustainable development issues of today. They urge all stakeholders to commit to a chemical-safe future for health, environment and economic growth.



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Achim Steiner

*United Nations Under-Secretary-General and
UNEP Executive Director*

The role of chemicals in our daily lives is simultaneously obvious and imperceptible. Around 100,000 different chemical substances find their way into everyday products. Some are familiar, like the household sprays and fluids that keep our counters free of germs and pests. Others are more obscure.

Most consumers are unlikely to give a passing thought to the industrial chemicals that permit mass production, unless they spill or explode onto the front pages. But rare is the industry or economic sector where chemical substances do not play an important role. In 2013, worldwide chemicals sales were valued at 3.2 trillion euros.

These important substances are vital to our modern lives and our economies, but they can also be dangerous.

Beyond headlines of catastrophe, the same chemicals that we exploit to assist agricultural production, develop medicines and produce consumer goods can be hazardous to human health over the long term, accumulating in our bodies through environmental exposure. The consequences are dreadful: some 1 million

people die from occupational poisoning every year. The economic cost is no less staggering. According to estimates by the U.S. National Research Council, the economic toll of health costs associated with air pollution in the United States alone is US\$120 billion per year.

Chemical mismanagement also results in environmental problems. Local species and ecosystems are vulnerable to chemical pollutants. Ozone-depleting substances and greenhouse gases, meanwhile, are of concern on a global scale.

Despite the omnipresence of chemicals in our lives—and the health, economic and environmental pitfalls they present—they often play second fiddle in the orchestra of issues our world faces. Chemicals and hazardous waste rarely rate a mention on the political agendas that address issues like health, development and climate change. They feature even less prominently in financial pledges to solve these problems.

This is a narrow view of things. The human health effects are obvious, while development



strategies will have to address chemicals management. By 2020, developing countries will produce and use 31 per cent and 33 per cent of global chemicals respectively. All the while, chemical waste exacerbates climate change.

At the Rio+20 Summit in 2012, governments reaffirmed their commitment to achieving the sound management of chemicals and hazardous waste by 2020, a goal in line with the Strategic Approach to International Chemicals Management (SAICM) policy framework.

This was an encouraging signal. The Sustainable Development Goals (SDGs) are about integrating the social, economic and environmental dimensions of development issues.

Companies will be the leaders in technology innovation, and play a critical role in promoting sustainable patterns of production and consumption.

Sound chemicals management will be critical to achieve these goals.

As with all of the SDGs, we must put the magnifying glass down and regard the wider, integrated view. Sound chemicals management is not a challenge to be solved in isolation. Rather, it is necessary to reconcile chemicals and hazardous waste strategies with economic and social policies. In this way, we can take a holistic account of the drivers of chemicals production, their use, and their ultimate impact on the environment and human health.

Industry no doubt plays a key role in the identification and promotion of safer alternatives to current standards. Companies will be the leaders in technology innovation, and play a critical role in promoting sustainable patterns of production and consumption.

Programmes like Responsible Care and Global Product Strategy, initiatives of the International Council of Chemical Associations, are important to ensure continuous improvement in all aspects of health, safety and environmental performance in the chemical industry.

Governments have a critical function as well. Policy direction at the national level should be driven by integration and innovation.

Here, the goals should be to generate behavioural changes within civil society and industry at large, and build cross-cutting capacity. Strengthening the chemicals management capacities of national institutions and businesses requires preventive policies that link national agencies responsible for chemicals management into an integrated system.

Broad international cooperation by all sectors and stakeholders is also key. The success of the

Montreal Protocol in phasing out production of ozone-depleting substances exemplifies the potential of cooperative action on chemicals management. This fall, the 4th International Conference on Chemicals Management (ICCM4) will assess the progress and recommend concrete steps towards achieving sound chemicals management by 2020.

The UN Environment Programme, for its part, is providing support to policymakers to strengthen legislation and boost institutional capacity to deal with the challenges of chemicals management. We are also working with partners to develop and share resources, tools and knowledge.

UNEP's *Global Chemicals Outlook* (GCO) can help in this regard. The GCO is compiled by UNEP in cooperation with international experts and is designed to inform governments and industry on trends in chemicals production, use and disposal. It also offers policy advice to help meet the Rio+20 goal.

Additionally, the Guidance on Development of Legislation, Administrative Infrastructures and Recovery of Administrative Costs (LIRA guidance) is UNEP-driven policy support to help governments achieve sound management of chemicals. The LIRA guidance has been successfully tested in Uruguay, Nigeria, Belize and Cambodia.

But sound chemicals management is not only good policy. It is critical to economic development. The business case is there. Over the past three decades, some \$ 40 billion has been spent on addressing the damages from industrial accidents. Above the cost savings of these clean-ups, sustainable investments and sound chemicals management policies maximize the contribution of the chemicals sector to economic development. This in turn paves the way for thriving and prosperous green economies.

Industrial development is likely to continue apace, but we have the capacity to avoid the mistakes of past industrial revolutions. Where those technological advancements produced prosperity and pollutants in equal measure, we now have the potential to achieve wealth without the waste. ▲

Jining Chen

Slow and Steady

China's journey towards the international target for sound management of chemicals is an uphill climb



Jining Chen

*Minister of
Environmental
Protection, People's
Republic of China*

Chemicals are an integral part of modern daily life and industrial production. It is estimated there are more than 101 million organic and inorganic chemical substances in the world. Among them, more than 100,000 chemicals are commercially available, and over 1,000 new chemicals enter the market every year. Chemicals are major contributors to economic growth and social development. However, their adverse impacts on the environment and human health, mostly from commercially or unintentionally produced ones, are unknown and increasingly arouse global concerns.

The concept of sound management of chemicals was first applied worldwide in Agenda 21 in 1992. Ten years later, at the Johannesburg World Summit on Sustainable Development, UN Member States set a target that chemicals should be produced and used in ways that minimize significant adverse effects on human health and the environment by 2020. For that, the Strategic Approach to International Chemicals Management (SAICM) was adopted in 2006 with more than 140 countries' participation.

China attaches great importance to chemicals management, and considerable efforts have been taken to prevent and control their harmful impacts on human health and the ecological environment. In 2002, for example, China promulgated *the Regulations on Safety Management of Hazardous Chemicals*. This outlines a safety management framework for hazardous chemicals with clarified responsibilities of different administration departments, as well as enterprises and institutions.

A registration system was also set up for new chemicals, toxic substances and pesticides. Registration is a prerequisite for new chemicals and pesticides entering the Chinese market, and a special permit is required for import and export of toxic chemicals and pesticides.

In recent years, chemicals management has been further enhanced in China. A national initiative, *The Twelfth Five-Year Plan on Environmental Risks Control of Chemicals (2010-2015)*, aims at sound chemicals management based upon risk control; prevention strategies, including adjustment of chemical industrial sectors and cleaner production; and capacity building for monitoring and supervision.

In addition, pollution and risk control of chemicals is mostly achieved through integration with the country's other pollution control programmes. For instance, in *The Action Plan for Prevention and Control of Water Pollution*, an ambitious nationwide programme implemented this year, it is required that the risk assessment of existing chemicals be conducted, the priority catalogue of controlled chemicals be identified and strict control actions be exercised for environmental hormone chemicals.

Pollutant discharge standards are key to chemicals management. In China, there are now 161 such standards, including for 124 types of water pollutants and 120 types of air pollutants. Cleaner production standards have also been formulated for more than 60 industrial sectors, including the chemical industry. In China, nearly 500 hazardous chemicals or their products are now listed in the product catalogue of "high pollution, high environmental risk". Among them, 84 are defined as the first group for priority control, so as to further restrict their production and use, and will be eventually phased out. In addition, six harmful chemicals, including lead and cadmium, are strictly restricted in electronic and



Photo: © David Lomax/Robert Harding Picture Library

*China has around **25,000 chemical enterprises** producing and using **over 50,000 kinds of chemicals**, and its production or consumption of over 20 of them ranks among the greatest in the world.*

information technology products. Agricultural maximum residues are regulated for 2,293 pesticides of 322 kinds. Over 30 kinds of highly toxic pesticides, such as methamidophos, have been effectively banned.

The capacity for sound chemicals management has been fostered in China from national to local levels. Thirty-one independent institutions have been established in provincial governments for chemical and/or waste management. A scientific supporting network, consisting of thousands of research institutes and laboratories nationwide, has also been formed to test, monitor and assess the toxicity of chemicals, and develop substitutes.

Besides national efforts, China conscientiously fulfils its commitment under international conventions on chemicals and wastes. China is among the first countries to deliver its National Implementation Plan on persistent organic

pollutants (POPs). Up to now, China has already phased out 17 POPs, and cleaned up 20,000 tons of waste and polluted soil containing pesticide POPs, as well as 13,000 tons of waste and polluted soil containing polychlorinated biphenyls (PCBs).

The emission intensity of dioxin in waste incineration, steel sintering and non-ferrous metal smelting industries has been reduced by more than 10 per cent. China promotes environmentally sound management of hazardous waste through 1,763 hazardous waste operation facilities, with licences showing capacity of 36.26 million tons per year. China signed the Minamata Convention on Mercury and is now in the process of ratification. Concrete actions have also been taken to implement SAICM. The “*Thirteenth Five-Year Plan on Environmental Protection (2015-2020)*”, which is now in formulation, will integrate the contents of SAICM into the national plan.

In spite of the progress noted above, China is still facing a more daunting challenge than other countries over sound chemicals management. As the largest developing country, China has around 25,000 chemical enterprises producing and using over 50,000 kinds of chemicals, and its production or consumption of over 20 of them ranks among the greatest in the world. Given that 90 per cent of the enterprises are small and medium-sized with backward technology and processes, there is a great need to enhance supervision for better and sound chemicals management. Yet at present, chemicals management is rather fragmented across nation and departments, which may call for an institutional reform.

In short, we are keenly aware that it is an uphill journey ahead to realize the 2020 target. In this journey, China is willing to collaborate with the world, learn advanced management concepts and technologies, share our experiences, fulfill international commitments and contribute to the global 2020 goal towards a green future for our planet. ▲

China is willing to collaborate with the world, learn advanced management concepts and technologies, share our experiences, fulfill international commitments and contribute to the global 2020 goal towards a green future for our planet.

Yoshio Mochizuki

Shining a Light on Mercury Waste

Japan is committed to environmentally sound management of mercury waste at home and abroad



Yoshio Mochizuki

*Minister of the
Environment, Japan*

The Minamata Convention on Mercury was unanimously adopted in October 2013 at a diplomatic conference held in Kumamoto and Minamata, Japan. Recognizing the substantial lessons of Minamata disease, the convention reflects the determination of the international community that the kind of human health and environmental damage that happened in Minamata must not be repeated anywhere in the world.

Japan is committed to making every effort for the early entry into force and the effective implementation of the convention. It promulgated a new act (the Act on Preventing Environmental Pollution of Mercury) and amended the existing Air Pollution Control Act in June 2015 to promote implementation of comprehensive mercury management. These actions not only reflected the objectives of the convention, but also included our own additional measures. Together with other existing laws, regulations and their amendments, Japan will impose rules and regulations beyond those required by the convention—and implement the most advanced mercury management policy in the world.

The convention aims to protect human health and the environment from anthropogenic emissions and releases of mercury and its compounds, and calls for comprehensive regulations covering the whole life cycle of the toxic metal, including its mining, use, atmospheric emissions and disposal. It requires parties to manage mercury waste in an environmentally sound manner.

In Japan, mercury waste has been managed in just this way, based on existing waste-related laws. Recycling mercury contained in products has been advanced by such efforts as collaboration

between the government, the business community and individuals to develop a system-wide approach for used batteries and fluorescent lamps from households.

Going forward, we will further strengthen the regulation of mercury waste in anticipation of the convention's enforcement. We will take the world's most advanced action to ensure the environmentally sound management of waste by defining metallic mercury waste as a designated waste requiring special management, and by mandating it be stabilized as mercury



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Countries should mitigate the underlying causes of ecosystem degradation, while simultaneously improving human health, capacity building, dissemination of knowledge and good practices.



Photo: © Lucas Vallejos / Robert Harding Picture Library

Japan contributed \$ 750,000 to the UNEP International Environmental Technology Centre (IETC) in 2014 and 2015 to support developing countries in the environmentally sound management of mercury waste.

sulfide before being solidified for final disposal. We will also ensure the environmentally sound disposal of mercury-added products, such as used mercury sphygmomanometers stored in homes and medical institutions, by collecting them within a short period of time through cooperation with municipal governments and medical associations. We will continue to manage mercury waste in an environmentally sound manner with new measures.

In addition to domestic measures, we will extend our contribution to the Minamata Convention by helping developing countries implement it. As mercury changes to various chemical forms and circulates globally due to its persistence and long-range mobility, global measures are required. Under the MOYAI Initiative for Networking, Assessment and Strengthening, which was proposed at the opening ceremony of the 2013 Diplomatic Conference, we launched a programme called MINAS to support the efforts of developing countries around this issue.

Japan's National Institute for Minamata Disease is the world's first institute dedicated to comprehensive research on mercury. It has already accumulated a significant volume of information, analytical technologies and research results. We will use such knowledge for research and surveys on mercury exposure assessments and impact prevention in countries having serious mercury pollution. In the field of mercury waste, we take the

lead in the waste management area of the UNEP Global Mercury Partnership. With this responsibility, we led the establishment and update of guidelines on the environmentally sound management of mercury waste developed under the Basel Convention. The guidelines, which were required to be taken into account in the Minamata Convention, were updated at COP-12 of the Basel Convention held in May 2015.

We contributed \$ 750,000 to the UNEP International Environmental Technology Centre (IETC) in 2014 and 2015 to support developing countries in the environmentally sound management of mercury waste based on the guidelines. In addition, a Practical Sourcebook on Mercury Waste Storage and Disposal is scheduled to be released to promote the guidelines, under the Global Mercury Partnership; this mechanism plays an important role in implementing the Minamata Convention through voluntary contribution, thus encouraging more stakeholders participate in these activities as partners.

In order to treat mercury throughout its life cycle, it is also vitally important to manage mercury waste in an environmentally sound manner at disposal.

Japan is determined to continue contributing to the environmentally sound management of mercury waste around the world through efforts both at home and abroad. ▲

UNEP at Work

Handle With (Better) Care

The CiP programme is helping interested parties share knowledge and take action on chemicals in products

Photo: © Mark Edwards / Enlightened Images Photography

Every day, we make myriad products out of chemicals—from buildings and clothing to machines and electronics. When handled properly, most of these chemicals are relatively safe. Some products, however, contain chemicals that can present significant risks to human health and/or the environment.

Both businesses and the general public are increasingly aware that proper diligence is needed with respect to chemicals in products. But the capacity to manage chemicals in products safely, and to use chemical information effectively, is still a work in progress.

Often, information on the chemicals in products is absent or incomplete.

At the request of Third session of the International Conference on Chemicals Management (ICCM3), UNEP developed the Chemicals in Products (CiP) programme via a multi-stakeholder consultation process.

The CiP programme is a voluntary initiative aimed at businesses, organizations and others seeking effective ways to exchange information on chemicals in products throughout product life cycles.



Photo: Peter Essick/Robert Harding Picture Library



The CiP programme is a voluntary initiative aimed at businesses, organizations and others seeking effective ways to exchange information on chemicals in products throughout product life cycles.

Through the CiP programme, stakeholders are able to gain access to information that enables them to make decisions and take appropriate actions on chemical hazards, exposure, risks and management.

Not only does this help protect human health and the environment, it can also create market opportunities for businesses and help them serve their clients more effectively.

CiP Programme: The programme is built around three objectives:

1. Within supply chains, **Know and Exchange** information on chemicals in products, associated hazards and sound management practices.

2. **Disclose** information of relevance to stakeholders **outside** the supply chain to enable informed decision-making and actions on chemicals in products.

3. **Ensure** that, through due diligence, information is accurate, current and accessible.

When handled properly, most chemicals are relatively safe. Some products, however, contain chemicals that can present significant risks to human health and/or the environment.

Advantages to manufacturers / brands

Major cost savings in the supply chain: the sector-wide approach leads to a broad harmonization of individual customer (and supplier) requirements for CiP information, and greater efficiency throughout the supply chain.

Access to essential information: when a chemical or substance is subject to a legislative restriction somewhere in the world, the sector can react quickly with necessary countermeasures.

Opportunities for innovation and green chemistry: CiP information enables substitution to safer chemistry and improved, more sustainable use of materials.

Public relations: when customers ask questions about chemicals, manufacturers can provide reliable answers.

Advantages to other stakeholders

Product designers can access tools and information and avoid materials that contain chemicals of concern.

The waste management sector can more easily segregate wastes at product end-of-life, and ensure appropriate recycling of materials. **Governments** can improve opportunities for public procurement and stimulating sustainable products.

NGOs can enhance promotion of safe chemicals and sound chemicals management.

Consumers can become more knowledgeable about chemicals in products they purchase and use, making informed choices.

See more at: <http://bit.ly/1gbAuDM>

Sharan Burrow

Help Wanted for Industrial Transformation

*Chemical pollution and workplace
risk must be exposed and eliminated,
and unions can help*



Sharan Burrow

*General Secretary,
International Trade
Union Confederation,
and President,
Sustainlabour*

Chemical pollution provokes irreparable damage to our ecosystems and communities, causing dramatic effects on the health of the most vulnerable—especially children, the poor and indigenous peoples. Although some progress has been made on chemical safety, impacts on the health of workers remain enormous. Every minute, a person dies from exposure to toxic substances at work. Out of the 160 million occupational illnesses per year, the bulk are caused by chemical agents.

High-risk industries include mining, chemicals, construction and textiles. However, workers in such sectors as transport and fishing are also facing unrecognized risks. New industries like microelectronics and nanotechnology have proven and potential risks. And exposure in services—cleaning or hairdressing, for example—can be as lethal as in manufacturing or mining. Almost no sector is exempt.

Hundreds of thousands of substances are available on global markets, yet in many cases we have no idea of their effects, not to speak of how they interact with each other. Meanwhile, citizens and workers live in ignorance, while substances available on the market, or to be used in the workplace, are presumed to be safe. The majority are used without proper tests being carried out on effects on health and the environment. Thousands are carcinogenic, mutagenic and toxic to reproduction. Workers trust that companies and governments will not expose them to risk. But they do.

Despite the size of the challenge, there is no international governance to address this global threat comprehensively. The power of the chemical industry—and of governments responding



Photo: © Stewart Cohen/Robert Harding Picture Library



We are facing a toxic cocktail of denial and deceit that means more people than at any other time in history will have tumours caused by their job.

*Every minute, a person dies from exposure to toxic substances at work. Out of the **160 million** occupational illnesses per year, the bulk are caused by chemical agents.*

to their interests—has prevented the United Nations from creating a coherent and binding structure. For workers around the world, the pace of progress in regulating chemicals is too slow, while the poor record of prosecution of those who sell and use dangerous products means that many continue to do so with impunity.

Governments, though, have an international agreement to honour. At the Johannesburg Summit in 2002, they endorsed a goal that is vital for workers everywhere: by 2020, all chemicals must be produced and used in ways that minimize significant adverse impacts on human health and the environment.

This objective must be enforced and governments must not be allowed to ignore it. For the remaining five years, the International Trade Union Confederation will remind them of this commitment and offer them help to make it happen. We have started already, this 28 April, launching a global campaign

on toxics to raise awareness among our members both about their impacts and about prevention policies.

For the sake of workers, sustainable management of chemicals has to be an essential part of a UN sustainable development agenda, and a central piece of an international environmental regime.

Cancer and other illnesses cannot continue to be a part of workers' pay packages. More than 660,000 workers a year get occupational cancer. In the face of growing evidence and more complete surveys, and instead of advancing prevention, we are facing a toxic cocktail of denial and deceit that means more people than at any other time in history will have tumours caused by their job.

The emergence of a huge electronics industry is transforming not only the world, but also the way we work and the way we communicate. However, it is also creating jobs where workers are exposed to carcinogens in production, where consumers are potentially exposed in usage and where recyclers face intolerable effects at the end of the chain.

Workers are still used as guinea pigs for chemical products. New industries have to learn from the mistakes of the past. Yet the precautionary principle does not apply to manufacturers, old or new, because they face no significant costs when penalties either do not exist or are too low to drive change.

The year 2020 is our deadline, which is enough time to meet some feasible goals. By 2020, the world must be free of



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asbestos in all forms, while highly hazardous pesticides—such as paraquat, endosulfan or glyphosate—must be eliminated, ensuring workers do not die when trying to produce food to feed the world. By these actions alone, governments will save

millions of workers' lives and will get much closer to the target they have promised to meet.

Honouring the Johannesburg goal demands coherent national occupational health regulations in every country accompanied by policies and practices that incorporate preventive approaches and full worker participation. Occupational health and safety regulations must also be brought into force to ensure workplaces are safe from hazardous substances, such as carcinogens and endocrine disruptors, and to protect from new risks such as nanomaterials. There are ILO standards to guide these preventative policies—155, 170, 139—and governments have five years to ratify and implement them.

For those governments committed to progress, unions are on your side. We are important allies in workplaces in achieving sustainable use of chemicals. Studies show that unionized workplaces are safer and that deaths and diseases can be prevented when union representatives are included on joint committees, when they are allowed to participate and when

Trade unions are not afraid that progress on regulation will happen at the expense of jobs. On the contrary, they support an industrial transformation agenda to create the jobs of the future.



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Photo: © Jim West/Robert Harding Picture Library



they are given the means, training and information they need. The results are better when they are part of the equation.

Most importantly, trade unions are not afraid that progress on regulation will happen at the expense of jobs. On the contrary, they support an industrial transformation agenda to create the jobs of the future. We need innovative industries and innovative industrial policies, which design their production around protecting workers' health, respecting the environment, establishing safer processes, and researching and developing clean technologies. As this must happen holistically during the whole life-product cycle and along the entire supply chain, we are convinced of the global job creation potential of such a transformation. ▲



Formula for Success

More holistic approaches are raising the bar for green chemistry

“This is a very exciting time for green chemistry,” says Philip Jessop, the Canada Research Chair of Green Chemistry at Queen’s University in Kingston, Ontario. “The concept has been around since about 1990, but it’s maturing. Not just in terms of the technology, but also in terms of our expectations. Good enough is no longer good enough.”

In their landmark *Green Chemistry: Theory and Practice*, published in 1998, Paul Anastas and John Warner outlined 12 principles for green chemistry. They include preventing rather than treating or cleaning up waste, designing chemical products to break down at the end of their function, using renewable feedstocks or raw material whenever possible and minimizing energy requirements of chemical processes.

“These principles are still very useful,” says Jessop. “No one has criticized them because they are actually well written. Not only do they stand up, they have inspired similar lists for engineering and others as well.”

But if the foundation of green chemistry remains solid, the practice itself is rapidly evolving. “It used to be enough to come up with a new technology that made one or two improvements, like being less flammable, without checking to see if the new technology was actually worse in other ways, like being toxic to fish,” he says. “That kind of thinking is dying out. Now we want a more holistic assessment before we call something ‘green.’”

Life-cycle analysis, which assesses environmental impact throughout all stages of a product’s life, is becoming the new standard. “Rather than judging against a few basic criteria, it looks at a whole range of factors – from whether the chemical is toxic to fish, plants or insects to whether it causes smog or depletes water resources.”

This kind of analysis, however, is complex. “I collaborate with an expert, but most chemists don’t have this kind of access,” says Jessop. “They are developing a chemical which they claim or hope is green, but they don’t actually know. They fall back on the idea that it’s better than existing technology based upon only a single criterion, like not being flammable.”

Rising expectations about life-cycle analysis are also transforming how green chemists work. “We’re piling so many new criteria on our research that success is much more elusive,” he says. “No chemist is



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smart enough to design a molecule that meets all those criteria using intellect alone.”

In response, green chemists are starting to plug all the desired variables for a molecule into a computer until it churns out a handful of possibilities. “Once I’ve done the computational screening, there’s a good chance the chemical will perform, and also be reasonably green,” he says.

In 2010, Jessop’s team invented a solvent that can “switch” its properties, becoming soluble or insoluble in water, as needed, with the addition or removal of CO₂. Some potential applications include extracting soybean oil from soybeans without hexane or desalinating water without the excessive energy and cost of reverse osmosis. Two companies have been formed to further develop and market the technologies.

Jessop believes academics must take the lead in revolutionizing green chemistry because they have the freedom to take high-risk, long-term research. Industry plays a critical role in tweaking these innovations for the real world. Most importantly, companies can influence the research agenda so that academics spend their time on relevant problems.

“There are a lot of young chemists with a drive to do green chemistry, but they don’t have industry contacts,” says Jessop. “They may think they’ve identified a need, but industry may already know how to solve that problem. So they spend time and effort solving a need that doesn’t exist.”

“I would like to see industries giving academics more information about problems causing environmental damage,” he says. “They’re reluctant to do this because they fear getting slammed by activists or divulging too much to a competitor. One solution is for industry to work collectively with academics, and maintain anonymity.”

In North America, the American Chemical Society’s Green Chemistry Institute has created a roundtable with 13 formulated products companies – an industry that uses hundreds of chemicals to make cleaning and personal care products. Working with roundtable members, Jessop published a research paper in 2015 that outlined industry needs for green replacements in ten areas without associating any company with a particular issue.

Many formulators, for example, are looking for greener alternatives to commonly used solvents that are sourced from renewable raw materials that avoid, where possible, petroleum feedstocks; have non-sensitizing, non-irritating qualities with low toxicity to humans; and minimal odour and colour, among other characteristics. They want life-cycle assessments, or at least a map of the entire manufacturing process to identify obvious problems.

As government and intergovernmental agencies converge for the Fourth Session of the International Conference on Chemicals Management (ICCM4) held in Geneva, the field of green chemistry remains a fast moving target for industry and academics. For consumers, it’s moving much more slowly with competing claims of so-called green products difficult to sort out. “What we need is a labeling program,” says Jessop. “It’s complex, but sooner or later we’ll standardize a green chemistry guide for consumers. I’m looking forward to that day.”



See more at: <http://bit.ly/1AHsgGr>

Li Yong

Pivotal Potential

Small- and medium-sized enterprises can help forge a more sustainable model of industrial development through sound chemicals management



Li Yong

*Director General,
United Nations
Industrial
Development
Organization
(UNIDO)*

Global chemicals production today is subject to a number of dramatic shifts of scale and geographic concentration. Since 1970, the global chemicals industry has grown in value from \$ 171 billion to \$4 trillion. It accounts for over 7 per cent of global income and 9 per cent of international trade.

Europe, Asia and the North American Free Trade Area account for nearly 93 per cent of world chemical sales. Until 2009, the United States was the largest national producer of chemicals. From 2000-10, US chemicals production increased 54 per cent. Yet, during that same period, chemicals production increased by nearly 300 per cent in China, which is now the largest chemicals-producing nation, selling approximately EUR 950 billion worth in 2012.

Within this changing landscape, small- and medium-sized enterprises (SMEs) play a pivotal role in both economic and environmental terms. In Europe, 96 per cent of all chemical companies are SMEs, providing 37 per cent of jobs in the industry and generating 30 per cent of sales. In total, some 23 million SMEs in Europe account for 75 million jobs and make up 99 per cent of all European enterprises. Indeed, SMEs account for approximately 64 per cent of industrial pollution in Europe.

On a global scale, SMEs represent 90 per cent of businesses and provide over 60 per cent of employment, adding up

to around 50 per cent of global gross domestic product. Estimates posit their cumulative environmental impact at 60 to 70 per cent of all industrial pollution.

SMEs are clearly essential for global economic development, even as they generate negative impacts on the environment. As a result, there is tremendous potential for them to help forge a more sustainable model of industrial development through sound chemicals management. This potential is realized by moving SMEs consistently and holistically to pursue two objectives: use reduction and pollution prevention.

Reducing the volume of environmentally-hazardous chemicals used by industrial SMEs can be achieved through introducing and adopting alternative substances and related technologies. For over 25 years, the United Nations Industrial Development Organization (UNIDO) has been assisting SMEs to take up low- to no-cost alternatives to harmful chemical compounds such as ozone-depleting substances and persistent organic pollutants.

Within the recycling chain of e-waste, SMEs play a major role in manually pre-processing the waste for the isolation of toxic compounds and precious metals.



Photo: Nigel Dickinson/Robert Harding Picture Library

For over 25 years, UNIDO has been assisting SMEs to take up low- to no-cost alternatives to harmful chemical compounds such as ozone-depleting substances and persistent organic pollutants.

Phasing out and eliminating toxic chemicals—often through global environmental compliance regimes—offers a reliable means by which SMEs can further contribute to sound chemicals management by preventing pollution. UNIDO is working to support the Minamata Convention on Mercury, which covers artisanal and small-scale gold mining, among other activities.

SMEs, critical for local economic growth, cause about 40 per cent of global mercury emissions associated with gold mining. With upgraded capacities through awareness, training and equipment, SMEs engaged in such mining activities are reducing anthropogenic emissions of mercury into water, soil and air. In so doing, they are helping to reduce the incidence of substantial environmental and human health effects.

Pollution prevention by SMEs can also take the form of economically gainful activities, such as developing recycling industries. UNIDO works together with SMEs around the world to develop sustainable e-waste management strategies from collection to end-processing. Within the recycling chain of e-waste, SMEs play a major role in manually pre-processing the waste for the isolation of toxic compounds and precious metals. This leads to higher recycling rates at the end of the treatment chain and closing the materials loop. Ultimately, this allows UNIDO to connect SMEs to international recycling companies and downstream markets for further treatment of the waste fractions and hazardous chemicals.

There are thus a wide variety of ways in which SMEs can and must be involved in the sound management of chemicals. As the driving force behind economic growth and the linchpin of industrial activity all around the world, they occupy a central role in creating and implementing a more inclusive and sustainable industrial development model. Indeed, sound management of chemicals is only one way in which SMEs can help countries achieve both economic and environmental gains, while pursuing a brighter future for coming generations. ▲

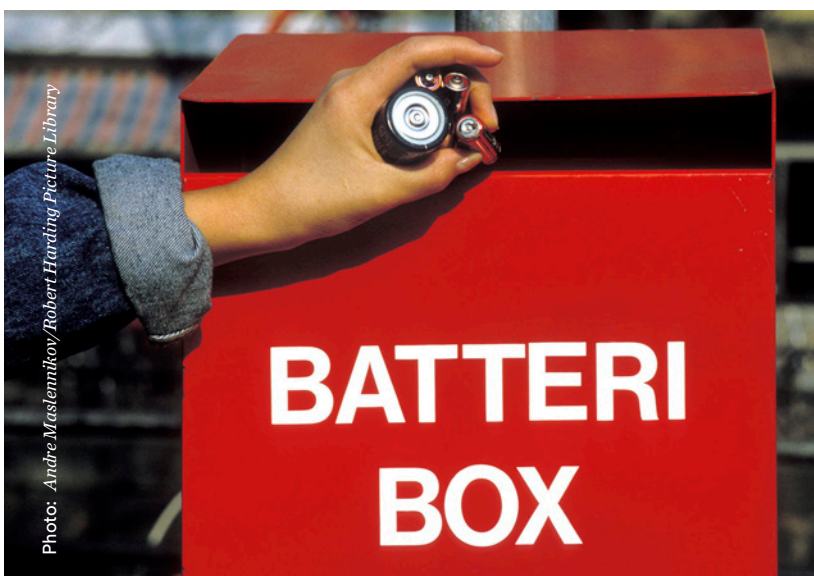


Photo: Andre Maslennikov/Robert Harding Picture Library

*From 2000 to 2010, chemicals production increased by nearly **300 per cent** in China, which is now the largest chemicals-producing nation.*

Use reduction can also be achieved through simple, low-tech efficiency measures, easily implemented by SMEs. Merely by switching from spray gun to powder coating, for example, an SME could increase transfer efficiency from 35-65 per cent, with corresponding use reductions.

Adopting innovative business models has also proven to be a viable path to help SMEs reduce their use of toxic chemicals. UNIDO and partner governments have pioneered chemical leasing to decouple the purchase of chemicals from sales volumes. By paying for the performance of a chemical instead of its volume, both buyer and supplier are economically incentivized to reduce use. Chemical alternatives, efficiency gains and new business models bring an inherent cost savings potential, and SMEs can further monetize such new approaches. Additional economic opportunities are created by the global green chemistry market, which is predicted to grow from \$ 2.8 billion in 2011 to \$ 98.5 billion in 2020.

Vance Bell

Designing the Future

How producing chemically-safe, environmentally-sustainable products makes for product innovation, good business and financial success



Vance Bell

*Chairman and CEO,
Shaw Industries*

Shaw creates flooring for residential and commercial properties throughout the world. As the world's largest carpet manufacturer and a leading manufacturer and provider of hardwood, resilient and other flooring types, we understand the vast number of lives we touch with our products—and flooring's ability to create safe, beautiful, comfortable spaces to meet a wide variety of needs.

Our sustainable business strategy is focused on driving innovation into the business; protecting and making efficient use of resources; engaging our associates, customers, stakeholders and communities; and focusing on long-term financial success.

Advances in chemistry and technology have allowed us and other flooring manufacturers to create more durable products that stand up to today's hectic households and the high-performance needs of commercial properties. Simultaneously, we've looked for ingredient materials that provide a way to achieve those important attributes with environmental and human health in mind.

The lessons we've learned along the way can be applied to almost any manufacturer.

Design with the end in mind. Guided by cradle to cradle design philosophy, we take a holistic approach to sustainability that includes a focus on the health and reuse of material, energy efficiency and use of renewable sources, water stewardship and social responsibility.

By designing with the end in mind, manufacturers have the opportunity to ensure that products are not only safe for use,

but take into consideration what happens at the end of their useful life. How can a product be deconstructed to be more easily recycled or repurposed? How do inputs into a product in the manufacturing process impact its ability to be recycled or reused? Imposing such design constraints not only leads to safe products and material chemistry advancements, it is often a driving force of product innovation.

Our investment in safe chemicals for carpet backing brought substantial benefits—for our customers and for our company. By replacing our polyvinyl chloride (PVC) carpet tile (24-inch squares) backing with an alternative, we reduced its weight by 40 per cent; lowered levels of volatile organic compounds on installation; and created a product that could be recycled back into carpet once it had reached the end of its life on the floors of offices, schools, hospital waiting rooms, government buildings and other commercial properties. This product quickly captured market attention. Production capacity tripled in one year.

The development of EcoWorx was a multi-year quest for a better alternative to PVC-backed carpet tiles. We had unsuccessful attempts along the way, took risks and learned from them. The team also began to think about all aspects of the product and its installation and how to apply the material health thinking that comes with the cradle to cradle approach to the entire product portfolio. We extended our EcoWorx product line to include broadloom carpet (12-foot wide); LokDots, an adhesive installation system; and a more traditional installation adhesive, which we developed in partnership with a key supplier. This entire product line is Cradle to Cradle Certified Silver.

Long known for our efforts in carpet (what the industry refers to as soft surface), we entered the hard surface flooring category in 2011. Hard surface has grown in popularity in recent years in residential and commercial markets, and we recognized that we had the opportunity to elevate it. We couldn't advance the sector if we didn't participate in it.



By designing with the end in mind, manufacturers have the opportunity to ensure that products are not only safe for use, but take into consideration what happens at the end of their useful life.

*EcoWorx Resilient is one of the first cradle to cradle certified-resilient flooring products. **Free of phthalate and PVC,** it offers guaranteed reclamation and recycling at end of life.*

We are now opening a world-class manufacturing facility, while continuing to work with our manufacturing partners to provide a broad portfolio of innovative products to our customers. Now EcoWorx Resilient, introduced this year, has the opportunity to influence the resilient flooring category, in the same way as EcoWorx shaped the commercial carpet industry.

EcoWorx Resilient is one of the first cradle to cradle certified-resilient flooring products. Free of phthalate and PVC, it offers guaranteed reclamation and recycling at end of life. Engineered to withstand the demands of intense-use environments, our product development not only focused on material health, but also durability.

Be transparent, verify and validate. The notion of a nutrition-label approach to other products is gaining in popularity. In commercial buildings, it has led to the rise of standard, self-reporting tools such as health product declarations (HPDs) and environmental product declarations (EPDs). We've also heard from architects, facility managers and homeowners who say: "I'm not a toxicologist. A list of ingredients isn't enough for me. I need impartial experts to evaluate what materials have a significant impact and whether the way they are used in a particular product is safe for people."

We believe the combination of HPDs, EPDs and cradle to cradle certification work well together to provide both the assurance

and transparency the market expects. Indeed, 66 per cent of the products we manufacture are cradle to cradle certified.

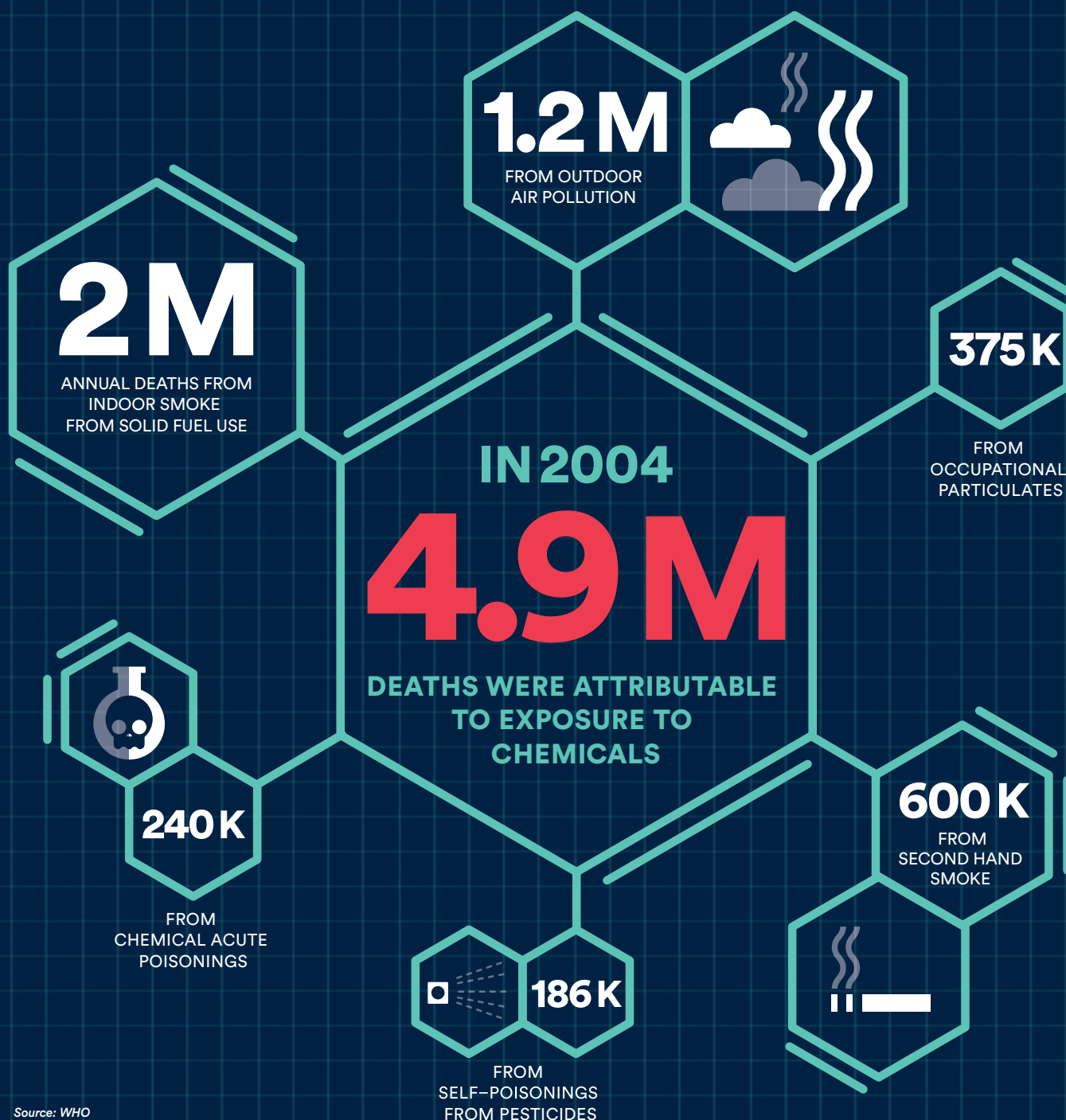
We manufacture many of our own products and ingredient materials. We source others from strategic partners in the United States and around the world to offer a broad portfolio to meet diverse customer preferences. In doing so, we set high standards for ourselves and our suppliers. We take numerous steps to verify that our products— regardless of where or by whom they are manufactured—meet our customers' high expectations, and the attributes specified for each one.

Innovate for the future. Propelling a company's sustainability efforts forward requires a focus on strategic innovation and continuous improvement. Change is inevitable. Technology advances. Processes and protocols evolve. New research emerges. Market expectations shift. It's impossible to predict the future, but if we are to continue moving in the right direction, we must innovate and seek continuous improvement.

At Shaw, our corporate vision is to create a better future. That requires designing for it—with every material, every process, every action. It's an aspiration that drives innovation into the business and ensures long-term viability for our customers, our associates, our company, and the communities in which we live and work. ▲

How harmful are chemicals?

KEY	Unit
(K)	THOUSAND
(M)	MILLION
(B)	BILLION
(T)	TRILLION

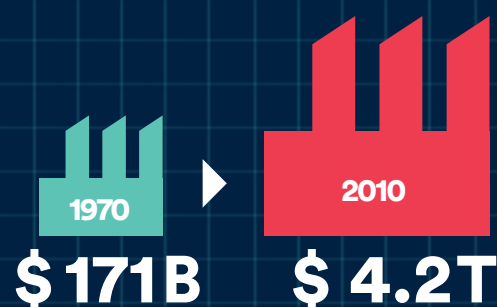


Source: WHO

The burden of increase in use of chemicals globally falls on developing countries.

The global chemicals industry has grown steadily over the past several decades. Chemical industry data indicate that global chemical industry output was valued at \$ 171 billion in 1970. In 2010, industry sources valued global output at \$ 4.12 trillion.

Source: OECD Environmental Outlook for the Chemicals Industry

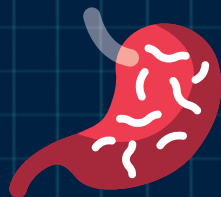


Comparison of deaths attributable to chemicals with other major causes:



1 DEATHS ATTRIBUTABLE
TO EXPOSURE TO
CHEMICALS

4.9 M



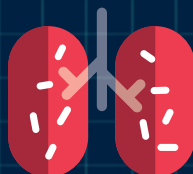
2 DEATHS ATTRIBUTABLE
TO DIARRHOEAL
DISEASES

2.16 M



3 DEATHS ATTRIBUTABLE
TO HIV/ AIDS

2.04 M



4 DEATHS ATTRIBUTABLE
TO TUBERCULOSIS

1.5 M



5 DEATHS ATTRIBUTABLE
TO ROAD TRAFFIC
ACCIDENTS

1.27 M



6 DEATHS ATTRIBUTABLE
TO MALARIA

0.9 M

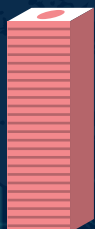
Source: The top ten leading causes of death in 2004 reported by the WHO

Estimated total lost economic productivity due to lead poisoning:

LATIN AMERICA

\$ 28 B

OF ECONOMIC LOSS
(2.04% OF GDP)



AFRICA:

\$ 12 B

OF ECONOMIC LOSS
(4.03% OF GDP)



SOUTHEAST ASIA:

\$ 68 B

OF ECONOMIC LOSS
(1.88% OF GDP)



Source: UNEP's Costs of Inaction Initiative Baseline Assessment Report

UNEP at Work

Chemical Interactions

A new project will increase global cooperation to protect humans and wildlife from endocrine-disrupting chemicals

Photo: © Simone Brandt/Robert Harding Picture Library

UNEP is scaling up its action to combat the harmful impact of endocrine-disrupting chemicals (EDCs).

The endocrine system refers to an organism's collection of glands that produce hormones that regulate metabolism, growth and development, and tissue function reproduction, among others. A chemical that can mimic a hormone—known as an endocrine disruptor—can alter the system, and lead to adverse health effects either in the organism or its offspring. Increasing evidence points to the role of the harmful effects of EDCs in both humans and wildlife.

Some endocrine disorders such as those in the reproductive, metabolic and thyroid organ systems have been linked to chemical exposure. Tributyltin, an anti-fouling chemical for shipping, has been connected to imposex in female aquatic snails; natural and/or synthetic estrogen is associated with feminization of

UNEP has launched a new project to increase intersectoral and intergovernmental cooperation on EDCs, as well as awareness, especially in developing and transition countries.

fish; and exposure to PCB has been linked to serious reproductive problems such as spontaneous abortion and uterine tumors in the Baltic seals. Furthermore, thyroid disorders in birds and marine mammals have been detected in those exposed to chemicals such as PCBs, DDT, dioxins and PBDEs. Meanwhile, DDT and its metabolite DDE have been linked to declines in population of birds of prey.

In 2012, UNEP and WHO published a report entitled *State of the Science of Endocrine*

Disrupting Chemicals – 2012 (SOS of EDCs), together with a summary for decision makers. These documents, launched during the twenty-seventh session of the UNEP Governing Council in February 2013, provide, respectively, a detailed report on the current scientific information on endocrine-disrupting chemicals, and highlights of the scientific material to help decision makers determine key areas of concern.

The International Conference on Chemicals Management (ICCM) at its third session in



Photo: © Peter Essick/Robert Harding Picture Library

September 2012 agreed that EDCs met the criteria as an emerging policy issue. It adopted a resolution that calls for cooperative action to provide up-to-date information and scientific expert advice to relevant stakeholders, raise awareness and facilitate science-based information exchange, provide international support for activities and facilitate mutual support in research and translation of research results into control actions.

In response to the call of ICCM3, UNEP, WHO and the OECD—three participants of the Inter-Organization Programme for the Sound Management of Chemicals (IOMC)—developed their respective workplans. For its part, UNEP convened awareness-raising workshops on EDCs back-to-back with the regional meetings of the Strategic Approach to International Chemicals Management (SAICM) in the Latin America and Caribbean, Central and Eastern European, African and Asia-Pacific regions.

The workshops, which were well received in the regions, recognized the need for increased awareness on the issue, including more information on levels of endocrine-disrupting chemicals in the environment. In addition, UNEP established an advisory group on environmental exposure and impact that provides strategic and policy advice to UNEP on its work on EDCs.

A chemical that can mimic a hormone—known as an endocrine disruptor—can alter the system, and lead to adverse health effects either in the organism or its offspring



Photo: © Frans Lanting/Robert Harding Picture Library

Several interventions are needed to protect humans and wildlife from the effects of EDCs: strengthened knowledge, improved testing, and better control and regulation to reduce exposure and thereby vulnerability to disease. To this end, UNEP has launched a new project to increase intersectoral and intergovernmental cooperation on EDCs, as well as awareness, especially in developing and transition countries.

Project outputs include a set of overview reports that focus on existing knowledge on environmental exposure, legislation, measures and gaps regarding EDCs and selected potential EDCs; situation and gap analysis reports of the state-of-the-art methodologies and tools for environmental hazard and risk assessment, as well as environmental exposure assessment of EDCs; information exchange on EDC policy and science; and a set of awareness-raising materials and region-specific awareness-raising campaigns.

See more at: <http://bit.ly/1EQ3wor>

Rolph Payet

Laying the Bedrock

Sound management of chemicals and waste is essential for successful implementation of the Sustainable Development Goals



Rolph Payet

*Executive Secretary,
Basel, Rotterdam and
Stockholm Conventions*

Imagine a farmer unable to feed his family due to insect resistance to traditional pesticides; imagine a fisherman without a mobile phone to access the market; imagine a child crippled for life due to lack of access to medicine. Imagine a world without chemicals!

For centuries, chemicals have been increasingly woven into the fabric of our daily lives, finding their way into everything, including health, energy, transport, agriculture, construction and textiles. Regrettably, the widespread use of chemicals is also responsible for poisoning our planet. Some are so toxic that they persist for decades and accumulate in the food chain, while others contaminate basic foods like rice, wheat and meat.

Often the impacts are neither visible nor quantifiable due to difficulties in attributing the substances' source and fate. Sometimes lack of cost-effective and safer alternatives to toxic chemicals severely hampers efforts at phasing out or eliminating them. Contributions from household wastes and the constantly growing mountain of electronic wastes pose yet another challenge for local communities. Sound management of chemicals and wastes, therefore, calls for an integrated approach spanning environment, health, economic and social dimensions.

The World Health Organization (WHO) calculates that exposure to polluted soil, water and air in 2012 resulted in an estimated 8.9 million deaths worldwide, largely in developing

countries. The 1.3 billion people living in poverty—most of whom live in slums and areas close to contaminated land, landfills and hazardous waste dumping sites—are most likely to be exposed to hazardous chemicals and wastes through contaminated water, food and even shelter.

Long-term health and environmental risks still dominate vibrant industries with low-cost labour, such as intensive agriculture, textile and leather industries, mines and recycling. In China, for example, pesticide use in rice systems has been estimated to cost \$ 1.4 billion per year in health expenses and effects on biodiversity. In Burkina Faso, the total cost of unsustainable chemical use and management was estimated at \$ 24.2 million/year in artisanal mining and \$ 9.3 million/year in the cotton sector: the overall cost of environmental degradation amounted to 18-22 per cent of annual gross domestic product, equivalent to \$ 1.7 billion.

Effectively implementing the Sustainable Development Goals (SDGs) on chemicals and wastes—as relating to poverty, pollution, health and development—means moving beyond eliminating toxic chemicals and stockpiles. We need a circular and life-cycle approach for sustainable consumption and production, and a proactive framework to address related environment and health issues. We need greener product cycles minimizing exposure to toxics that ensure that people in abject poverty have dignified working conditions and do not “die working”. So we need to ensure the global framework for sound management of chemicals is inclusive, stimulating greater involvement and substantive action by the global industry.

In considering chemicals and wastes as an integral part of the SDGs, the international community is giving a clear



Photo: © Martin Moxter/Robert Harding Picture Library

We can swerve the global development trajectory to a paradigm shift towards green economies, through sound chemicals and waste management, and decent jobs.

*The World Health Organization calculates that exposure to polluted soil, water and air in 2012 resulted in an estimated **8.9 million deaths** worldwide, largely in developing countries.*



Photo: © Martin Moxter/Robert Harding Picture Library

signal that we need to address their sound management from a development perspective. It calls for prioritizing hazardous chemicals and wastes in the sustainable development agenda, which further strengthens the fundamental role of multilateral environmental agreements for sound management in achieving global targets.

Part of this process involves international and local engagement through synergies and better cooperation among concerned international organizations. The Strategic Approach to International Sound Management of Chemicals, under the leadership of the United Nations Environment Programme, remains a significant overarching global policy framework whose strength lies in its multi-stakeholder approach.

It needs to evolve and be further enhanced to implement SDGs and increase the effectiveness of the Basel, Rotterdam and Stockholm (BRS) Conventions. Indeed, earlier this



Photo: © Mattheus/Master/Robert Harding Picture Library

We need a circular and life-cycle approach for sustainable consumption and production, and a proactive framework to address related environment and health issues.



Photo: © Jorgen Schytte/Robert Harding Library

year, parties to the BRS Conventions endorsed the central role played by those three conventions in implementing the SDGs with regards to sustainable consumption, environment and health.

The Fourth International Conference on Chemicals Management (ICCM4) and the seventh session of the

Minamata Intergovernmental Negotiating Committee are expected to underscore the strategic opportunity further to implement sound management of chemicals and wastes within the SDGs framework.

At the national level, governments should invest in better governance mechanisms and more robust institutions for mainstreaming management of chemicals and waste into national sustainable development policies, with the support of international agencies. Regional centres of excellence supported by the BRS Conventions, working with other regional agencies, can provide excellent opportunities for scaling up action and extending knowledge.

Significant financial resources mobilized through the Global Environment Facility and other sources remain critical to meeting the 2030 SDG targets and important milestones, such as ridding the planet of PCBs by 2028. However, political commitment can catalyze international support through complementary efforts. Uruguay, for example, increased national efforts by six-fold—from \$ 350,000 in 2010 to \$ 2.15 million in 2014—to integrate environment and poverty through, for example, better



waste management. Such efforts will be essential for implementing key SDGs such as ending hunger (Goal 2), healthy lives (Goal 3), managing water and sanitation (Goal 6), sustainable economic growth (Goal 8) and sustainable consumption and production (Goal 12).

The year 2015 is momentous not just for chemicals and waste policymaking, but also for the broader environmental and sustainable development agenda. There is a once-in-a-generation opportunity to get it right with a set of robust, measurable and integrated SDGs. In so doing, we can swerve the global development trajectory to a paradigm shift towards green economies, through sound chemicals and waste management, and decent jobs. Appropriate and

measurable indicators, which are not burdensome to countries with modest capacities, are crucial for assessing where we are, and what needs to be done, to achieve the targets we have set. Without doubt, the success of the SDGs depends upon the great strides made in the past two decades in fostering collaborative approaches, effective partnerships, win-win solutions and clear decisions by the parties to the BRS Conventions to move towards a synergistic approach and to strengthen implementation at the local level.

If we are to indeed take the road to dignity by 2030 by ending poverty, transforming all lives and protecting the planet, sound management of chemicals and waste must form the bedrock of the post-2015 development strategy. ▲

UNEP at Work

Get The Lead Out!

With support from UNEP, stakeholders are scaling up efforts to phase out lead from paint

Photo: © Javier Larrea/Robert Harding Picture Library



The Global Alliance to Eliminate Lead Paint, a coalition initiated by UNEP and the World Health Organization (WHO), is harnessing the power of the Strategic Approach stakeholder network to free paint of a deadly chemical.

Lead is toxic, especially to children. Every year, an estimated 600,000 new cases of children with intellectual disabilities caused by childhood lead exposure are identified. Lead exposure also accounts for some 0.6 per cent of the global burden of disease, with the highest burden occurring in developing countries. A recent study estimates that reduced cognitive potentials (loss of IQ points) due to preventable childhood lead exposure equates to 98.2 million points in Africa, 283.6 million

in Asia and 24.4 million in Latin America and the Caribbean, which translate into economic losses of \$ 134.7, \$699.9 and \$ 142.3 billion, respectively.

Since the first part of the 20th century, a number of countries have restricted the use of lead in paints. Despite these efforts, paints with high levels of lead are still widely available

and used in many countries for decorating the interiors and exteriors of homes. Lead can also be found in paint in public buildings such as schools and hospitals, as well as on toys, toy jewellery, glazes, furniture and playground equipment.

At the 2002 World Summit on Sustainable Development (WSSD), nations agreed to phase

Every year, health authorities identify an estimated 600,000 new cases of children with intellectual disabilities caused by childhood lead exposure.



Paints with high levels of lead are still widely available and used in many countries for decorating the interiors and exteriors of homes.



Photo: © UNEP



Photo: © Yoko Aziz/Robert Harding Picture Library



Photo: © Walter G. Allgower/Robert Harding Picture Library

out lead in lead-based paints. More recently, through the Global Alliance to Eliminate Lead Paint (Lead Paint Alliance), UNEP and WHO have taken the lead in efforts to phase out the use of lead in paints.

See more at: www.unep.org/transport

Srinath K. Reddy Bhargav Krishna Tackling the Hidden Assassin

Exposure to a range of toxic chemicals continues to grow in India as a risk factor for ill health



Srinath K. Reddy
President, Public Health Foundation of India



Bhargav Krishna
Research Fellow and Executive Aide to the President, Public Health Foundation of India

Environmental pollution has now become the single largest risk factor for death and disability in the developing world. This is especially true in India, where the ubiquity of sources and the manifold pathways to exposure ensure the impact of pollution is felt by all. The rapid economic growth of the last 25 years has left the country with a growing cloud of pollution, be it exposure from indoor cooking or vehicular exhaust, overuse of pesticides, heavy metals released from power plants and factories contaminating food and water supplies, or chemical wastes discharged into vital river systems.

Exposure to a range of toxic chemicals has been a long-standing issue in India, and continues to grow as a risk factor for ill health. The shadow of inadequacy in chemical management goes all the way back to the Bhopal Gas tragedy—one of the worst industrial disasters in history, resulting in thousands of deaths—and continues today, with several dozen critically polluted industrial clusters in the country. The issue recently came to the forefront with the proliferation of mercury pollution in southern India as a result of inadequate remediation by a multinational consumer goods company at a former production facility. And the clean-up of legacy sites continues to be a major problem, with one study estimating there to be hundreds of such toxically polluted sites in India.

Toxic chemicals in food chains were recently highlighted by publicity over high levels of lead in popular processed foods. These foods were taken off the market, but the issue of why

these levels occurred was never really discussed. Nor was the debate broadened to encompass the real problem—that around 20 per cent of random samples tested by India's Food Safety and Standards Authority do not conform to national standards. Recycling used lead acid batteries is a primary pathway to lead pollution, but legislative frameworks are poorly enforced, resulting in over half of it occurring in the informal marketplace. These informal recyclers rarely have adequate safety protocols, exposing workers, and often their families, to toxic lead dust. The pollutant also often seeps into the soil and the water supply.

The health impacts of exposure to toxic chemicals, including lead, range from mild poisoning and respiratory illness, to impacts on the cardiovascular system, endocrine disruption, cancers, and neuropsychiatric and developmental disorders. Exposure to lead and mercury has also been shown to be associated with congenital anomalies, such as perinatal conditions as low birth weight and musculoskeletal diseases. A 2010 study estimated that close to 1.6 million disability-adjusted life years were lost through exposure to toxic chemicals at 373 sites in just three countries (India, Indonesia and the Philippines), with lead and chromium the key responsible pollutants.

The distribution of impacts is iniquitous, with the heaviest burden often impacting the poorest and most vulnerable. This is especially so for children: a multitude of studies reveal the developing brain as particularly susceptible to chemical exposures, with neurotoxicity resulting in IQ impairment, autism, attention deficit hyperactivity disorder, dyslexia and other cognitive impairments. Increasingly, the evidence also shows there is no safe level of exposure for such toxic chemicals as lead.

The pervasive exposure to toxic chemicals also has serious implications for economic growth. More often than not, the developmental dialogue in emerging economies is focused on growth at all costs, tending to ignore the impacts across sectors, especially on health. Traditionally regarded as an

Developed nations are dumping their e-waste in India and other developing countries where legislative and enforcement mechanisms are often found wanting.

right direction. There is, however, lack of clarity on how to define targets to track progress, especially over exposure to hazardous chemicals. Most countries, if not all, have no designated statistical tool or other mechanism to collect data on chemical exposure. Building capacity on this issue will be challenging; however, the task will be made more straightforward by leveraging global expertise through multilateral forums such as the International Conference on Chemicals Management and its Strategic Approach.

Immediate steps to address the growing exposure to toxic chemicals and to mitigate health impacts include:

- developing an effective surveillance system to track the proliferation of toxically polluted sites
- initiating a comprehensive programme to clean up legacy sites similar to the US Environmental Protection Agency's Superfund programme
- funding the study of health impacts in greater detail since many believe the burden attributable to toxic pollution may be underestimated due to the paucity of studies in the developing world
- creating a comprehensive legislative framework, aided by an adequately staffed, effectively trained and appropriately empowered enforcement body
- training health professionals to diagnose exposures accurately and provide the necessary care
- establishing a framework to embed health in all policies.

Chemical pollution is the “hidden assassin” in transitional societies with the poor and the young bearing a disproportionately high burden. Industrial and agricultural pollutants contaminate air, water and food. Ubiquitous exposures, while poorly measured, have undeniably high adverse health effects and economic costs. Transnational chemical waste transfers compound the problem.

An integrated national response must combine effective surveillance systems (identifying sources, exposure levels and health effects), robust regulatory frameworks, responsive legal systems, multisectoral actions for mitigation and health system readiness for early detection and treatment. A global response must ensure non-polluting transnational trade and investment policies and technical cooperation to strengthen national capacities to reduce and respond to the threat of chemical pollution, with particular attention on the goal of minimizing its impact on health. We must move towards a world where chemicals no longer harm well-being. ▲



Photo: © Robert Harding Picture Library

*Around **20 per cent** of random samples tested by India's Food Safety and Standards Authority do not conform to national standards.*

“externalized cost”, exposure to pollutants—including toxic chemicals—has a direct impact on economic growth through increased health costs related to treatment, lost productivity due to illness and decreased IQ. Another unmeasured cost is the impact on the health of veterinary populations, including livestock.

There is a case to be made for stronger and more effective regulation, for both existing and emerging issues. Over the last few decades, the developing world has been the preferred destination for relocating toxic polluting industries from the western world: more recently it has also become final destination for much of the world's electronic waste. In May 2015, an Indian parliamentary committee noted that—under the garb of exporting “used goods” and to avoid the high costs of recycling in their own countries—developed nations are dumping their e-waste in India and other developing countries where legislative and enforcement mechanisms are often found wanting.

Rising global awareness of the impacts of pollution is heartening. Including a target to “substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination” in the Sustainable Development Goals is a move in the



Taking Stock

Pilot projects in Argentina and the Philippines help hospitals identify risks from toxic chemicals

A UNEP-funded project has begun to change the shape of chemical use in hospitals in the Philippines and Argentina. According to the World Health Organization, more than 25 per cent of the global burden of human disease can be traced back to preventable environmental factors, including exposure to chemicals. Indeed, a recent WHO review estimated that unsound management of chemicals resulted in 4.9 million deaths in 2004. Ironically, the health-care sector is often a major source of exposure to toxic chemicals through use of disinfectants, pesticides and cleaning agents.

Common chemicals in hospitals range from glutaraldehyde in disinfectants and mercury in medical devices like IVs to formaldehyde in laboratories and dioxins in waste dumps. Patients and health-care workers are the most vulnerable since they are exposed to these substances every day. Workers who manufacture and dispose of the products are also at risk.

With support from UNEP's Strategic Approach for International Chemical Management's (SAICM) Quick Start Program, Health Care Without Harm (HCWH)—an international coalition seeking to transform the health-care sector worldwide—embarked on a project to improve management of chemicals and promote safer alternatives in four pilot hospitals in Argentina and the Philippines. The project, which ran between 2012-13, was part of the coalition's Global Green and Healthy Hospitals Network, which seeks to reduce the ecological footprint of health-care operations.

Among its outcomes, the project produced a tool kit to help phase out hazardous chemicals; a laboratory protocol to test alternatives for chemicals used in hospitals; and a training module on chemical safety and management. In Argentina, for example, one hospital has reduced ethylene oxide use for sterilization, while the other has found substitutes for glutaraldehyde. In the Philippines, both pilot hospitals have adopted laboratory testing protocols, and 24 partner hospitals have committed to identifying chemicals for substitution and management.

"Most hospitals in the Philippines don't have proper chemical guidelines," says Faye Ferrer, who co-led the project in South East





Asia. “Apart from how they use chemicals, hospitals also have to be knowledgeable about how to dispose of them properly. For us, the most important outcome was development of the laboratory testing protocols, especially since we had input and validation from the National Reference Laboratory. This is an agency of the Philippine Department of Health so it’s a big step towards adoption of national policies and procedures for substituting hazardous chemicals in health care.”

As a first step in the project, newly formed Chemicals Management Teams took a one-day “walk through” with HCWH to identify the extent of chemical use in the two pilot hospitals. Both hospitals

often used disinfectants that contain hazardous chemicals, including sodium hypochlorite (which irritates the skin and breathing through release of chlorine gas) and glutaraldehyde (a skin irritant and carcinogen).

“The widespread use of sodium hypochlorite was an eye-opener for them,” says Ferrer. “They were not just using it to clean medical supplies, but also to wash surfaces and floors in the reception area and offices.”

But even the HCWH team was taken aback by the rampant use of glutaraldehyde. After using it to sterilize medical instruments, one hospital also used it to clean floors in the operating and emergency rooms, exposing vulnerable patients and health-care workers to the fumes. “It was a question of efficiency for them,” says Ferrer. “The chemical costs a lot, and they wanted to get as much value from it as possible.”

The project held focus groups with health-care workers to develop the training modules. “They don’t realize the extent of the risk of sodium hypochlorite because they use it every day,” she says. “Their eyes burn and their sense of smell is affected, but they did not connect it to the chemical.”

Both hospitals have expressed willingness to find less toxic alternatives for these two chemicals. The economic reality of health care in developing countries, however, means more work needs to be done.

“We can safely say the administrations have taken to heart the results of the project,” says Ferrer. “We have tested several possible alternatives to the chemicals, but availability and cost are obstacles. With more demand, the cost should come down.”

See more at: <https://noharm-asia.org>

Mark S. Rossi

Get Active

Moving from a passive to an active strategy in managing for chemicals in products makes good business sense



Mark S. Rossi

*Interim Executive
Director, Clean
Production Action*

Companies increasingly need to know more about the chemicals in their products and supply chains, thanks to such drivers as regulatory requirements, market demands, media attention, advocacy from nongovernmental organizations (NGOs), product recalls and market opportunities. Otherwise, they are blind to the hidden liabilities of chemicals of concern to human health and the environment in their products. This can be a significant barrier to generating value as transparency becomes increasingly essential to informed decisions, supplier reliability and clear communication to customers.

Companies and purchasers downstream from chemical manufacturing—which use chemicals by virtue of the products they buy—mainly use the “passive strategy,” for chemical management, complying with such government regulations as upper limits to certain substances in products. They do not look pre-emptively for chemical risks; rather, they save short-term costs by not investing in systems, staff or third parties for chemicals management beyond meeting regulatory requirements.

Such a strategy, however, has serious flaws. It leaves companies vulnerable to hidden liabilities and unprepared for swiftly changing market demands and regulations. It also makes them vulnerable to crises that incur significant costs—to sales, to brand reputation and to stock value—by failing to invest in due-diligence chemicals management.

Alternatively, the “active strategy” seeks to stay ahead of regulatory and market demands. Companies integrate chemicals management into product design, material selection and supplier engagement: chemicals become another element to be considered in products along with costs, performance and other sustainability attributes. Such companies make upfront investments ahead of regulatory and market demands

and invest in systems for knowing chemicals in products and supply chains. This creates long-term value for them and their shareholders by enhancing brand reputation, increasing sales, creating innovative products, increasing supply chain reliability and avoiding the high costs of chemical crises (such as reformulating products under pressure).

If hidden liabilities in chemicals become revealed to regulators or customers, the costs can be high in terms of fines, lost market share and value, and tarnished brand reputation. Consider, for example, the fines levied by American regulators on retailers for failing to appropriately manage products that become hazardous waste when they break or are returned: over three years, Walmart, Target, Walgreen Co., CVS Pharmacy and Costco Warehouse were fined a total of \$ 138 million.

Retailers need to know the chemicals of concern in their products and which ones trigger hazardous waste regulations, while establishing chemical management systems in their stores. The costs of product recalls—where an unknown chemical of concern in products causes brands to incur significant costs for non-compliance, legal counsel, supply chain communication, product takeback, and/or product reformulation—can stretch into hundreds of millions of dollars.

In 2011, Sony’s recall of its PlayStation cost the company \$ 150 million in lost sales and product reformulation. And in 2007, Mattel’s recall of more than 9 million toys cost \$ 110 million and pushed its stock price down 18 per cent. Meanwhile, RC2 Corporation’s recall of toy trains cost \$ 48 million in expenses and legal fees, and halved its stock price. Compared with such costs, the benefits of the passive strategy—delayed investments—are quite modest. And with regulation of chemicals increasing globally, market forces are moving faster and more aggressively to demand chemical ingredient transparency and safer substitutes. The market costs of failing to address consumer demands for safer chemicals in products can be high.

In 2009, Johnson & Johnson lost significant sales in China when American NGOs found formaldehyde and 1,4-Dioxan in some of its baby products (including shampoo). The company knew the chemicals were in their products, but opted not to remove them. However, consumers—when informed of the chemicals’ presence—chose to avoid the brand. Tens of thousands of Chinese stopped buying its products, thousands of stores dropped them and its market share for baby products declined by almost 10 per cent. Four years later, the company responded to market demands and reformulated its baby

In 2011, Sony's recall of its PlayStation cost the company **\$ 150 million** in lost sales and product reformulation.

products to eliminate the two substances. Similarly, retailers and consumers reacted swiftly when water bottle manufacturer, Sigg, failed to disclose Bisphenol A (BPA) in products. Sigg USA had to file for bankruptcy in 2011 with \$ 13 million in liabilities. All these examples illustrate the corporate risks of chemicals of concern in products. Such risks are often hidden from the companies themselves, only coming to light through government enforcements or NGO campaigns. The passive strategy clearly creates vulnerabilities for companies, including tarnished brand reputation, lost shareholder value and the high monetary costs of responding to revelations under crisis conditions.

By contrast, proactive businesses do not wait for government regulations, product recalls and market demands to emerge before finding out about the chemicals in their products and supply chains, and reducing the use of hazardous ones. Instead, they integrate knowledge of them into their management systems and create value for their organizations.

Seagate Technology PLC (manufacturer of data storage devices), Coastwide Laboratories (manufacturer of cleaning products and division of Staples, Inc.) and Shaw Industries (manufacturer of flooring products, including carpets) provide three examples of companies implementing such an active strategy.



Passive approaches to chemicals management leaves companies vulnerable to hidden liabilities and unprepared for swiftly changing market demands and regulations.

Seagate realized many benefits from knowing chemicals in products, including:

- **Reduced costs:** every time a new chemical of concern emerges due to regulations or market forces, Seagate staff search for it in their chemicals management database, thus enabling a quick response to new substance restrictions with current resources. As more and more chemicals of concern emerge, its data collection costs remain relatively stable instead of varying widely up and down.

- **Increased supplier reliability:** an unintended benefit is a much more thorough understanding of suppliers and the quality of their products. By knowing in detail the chemistry of its suppliers' products, Seagate can quickly identify when changes are being made to the materials in its components.

Coastwide Laboratories realized significant benefits when it invested in a new product line based on safer chemicals. Its Sustainable Earth brand became the primary driver behind the company's rapid growth during the early 2000s: net operating income averaged double to triple the industry norm, sales rose 8 per cent, market share grew to about 16 per cent of the regional market and new customers increased by 35 per cent.

Meanwhile, Shaw Industries' investment in safer chemicals for carpet backings quickly captured market attention. For example, it replaced polyvinyl chloride (PVC) plastic and its phthalate plasticizer with safer alternatives, and reduced the weight of carpet backing by 40 per cent. Production capacity tripled by 2000 and, within two years, sales of its new EcoWorx products exceeded those of PVC-backed carpets.

The demand for increased chemical transparency up and down the supply chain grows daily. Awareness of hazardous chemicals in products and supply chains is driving companies to disclose their chemical ingredients and select inherently safer substances. Such companies are leaving behind crisis-driven change and creating long-term value for themselves, their shareholders, the public and the planet. ▲



UNEP at Work

World Environment Day 2015

Diverse grassroots activities unleash a torrent of passion to protect our planet



Photo: © UNEP

World Environment Day (WED), celebrated annually on 5 June since 1972, took on a more popular flavour in 2015. While official preparations got off to a slow start, grassroots actions from people across the world gave the campaign a vitality not seen in years.

In Saudi Arabia, 15 women crocheted a mural from 2,000 plastic bags in support of this year's theme—*Seven Billion Dreams. One Planet. Consume with Care*. As members of a collective, Kees Chic, the women focused on countering the negative impact of export-driven growth that does not benefit local

people or the planet because of increased carbon emissions from transport.

“There is no good in a nation that neither eats what they grow nor wears what they have made

themselves,” they said. With their activities, they aim to reduce plastic waste, increase employment for women and improve local handmade productions. In Islamic Republic of Iran, with the cooperation of Kurdistan’s

On YouTube, over 500 new videos were uploaded in celebration of World Environment Day 2015. Meanwhile, the media generated more than 18,000 news articles in 35 languages on WED across the world.



Photo: © UNEP

In Saudi Arabia, 15 women crocheted a mural from 2,000 plastic bags in support of this year's theme—Seven Billion Dreams. One Planet. Consume with Care.

Department of Environment, Ashti Cultural Cycling Club demonstrated the impacts of waste to villagers in Asr Abad through a neighbourhood clean-up activity. With the help of local children, they displayed banners and posters, and handed out brochures during the bike ride and clean-up event.

Other grassroots activities included a sailing expedition from Panama to Port Douglas, launched by the Edmondson family on WED. Steve, Katrina and their two children sailed out with the hope their actions will increase awareness and appreciation of our natural and fragile environment.

Cote d'Ivoire focused on consumption patterns that are making our world unsustainable. The government sent out a mobile truck to market WED that travelled through three cities, as well as smaller communities, in a bid to spread the word far and wide. Panel discussions on the theme were also broadcast on television.

Of course, official events also took place across the globe involving high-level politicians. President Sergio Mattarella gave a speech on WED in Italy, the official host country for WED 2015. Indian Prime Minister, Narendra Modi, got his hands dirty and dug in to plant a tree. Meanwhile, Brazilian authorities hosted an entire week of celebrations for WED.

Celebrities like Nadya Hutangalung, Leonardo DiCaprio and Richard Branson, and religious leader Sri Sri Ravi Shankar also lent their support. In addition, UNEP Goodwill ambassadors Yaya Touré, Jack Johnson, Gisele Bündchen, Ian Somerhalder, Li Bingbing and Suzanna Owiyo were engaged in many hands-on and online activities.

Apart from grassroots and official activities, WED was also celebrated via various types of technology. In Paris, more than 173 electronic billboards around the city announced WED over three days. Beijing Airport Authority displayed



Photo: © UNEP



Photo: © UNEP

80 large billboards, 400 television screens and 64 LED screens with WED messaging.

Meanwhile, on Twitter, WED trended globally in over 20 countries on the day. Businesses, NGOs, politicians, celebrities and individuals all posted tweets with WED messaging. On YouTube, over 500 new videos (news clips, documentaries, event footage, music videos and animations) were uploaded in celebration. The media were not to be left out, generating more than 18,000 news articles in 35 languages on WED across the world.

This year's theme for WED clearly resonated with the audience. People were able to personalize how they saw environmental issues touching their own lives, and respond through appropriate positive actions. With over 1 million people registered on the WED website as participants, World Environment Day 2015 has unleashed a torrent of passion for the planet through diverse and creative activities.

Yixiu Wu

Detox My Fashion

A global campaign is motivating clothing brands to clean up textiles



Yixiu Wu

Greenpeace East Asia

Earlier this year, I revisited one of the many textile mills in China's eastern province, Zhejiang. This region represents roughly half of China's dyeing capacity, notable in a country that—according to UNEP's *2012 World Chemical Outlook*—consumes 42 per cent of the world's textile chemicals.

I came to this heartland of the world's textile industry to tour the latest wastewater treatment plant. The facility's owner was eager to show me that the waste he received could be purified, claiming the end product was even safe to drink.

This was no small undertaking and showed terrific foresight, although it was not completely altruistic. The owner had spent millions of dollars upgrading the treatment plant in anticipation of upcoming regulations from both the government and the fashion brands. He aimed to be ahead of the curve, he said, to gain a competitive advantage by quickly attracting more orders from leading brands.

The change I witnessed in this Zhejiang plant speaks to real transformation brought about by a global campaign to expel toxic chemicals from the textile industry. For decades, the use and discharge of such chemicals from textile manufacturers were hidden behind a fashionable façade of beautiful advertising and catwalk glamour. In the shadows loomed up to 3,500 chemical substances used to turn raw materials into textiles, about 10 per cent of which are hazardous to human health or the environment. Many of those chemicals are persistent organic pollutants or hormone disruptors, including

nonylphenol, PFCs and phthalates. Some of them have been flagged in international regulations and frameworks, such as the Stockholm Convention and UNEP's Strategic Approach to International Chemicals Management (SAICM) as notorious endocrine-disrupting chemicals.

Over the past four years, Detox My Fashion, a global campaign backed by Greenpeace, has researched and investigated the presence of chemicals in textile products and discharged wastewater, spotlighting the issue and shaking the industry to make radical change.

Since the campaign's launch, 31 global textile, retail, and fabric and button companies have joined this movement, moving towards eliminating toxic chemicals and publishing their pollution data for global scrutiny. In the process, they are affecting hundreds of their suppliers.

These brands, including Zara, H&M, Adidas, Valentino and Burberry, as well as retailers such as Aldi and Lidl, have



Photo: © Sarah Peters/Robert Harding Picture Library

A global movement is growing within the industry, creating new norms in new territories, and millions of consumers are inspiring brands to change their minds and their deeds.



Photo: © Stefan Kiefer / Robert Harding Picture Library



Photo: © Christian Handel / Robert Harding Picture Library

Hundreds of suppliers in manufacturing countries, including China, India, Morocco, Bangladesh, Italy and Turkey, are releasing their **pollution data globally** through an NGO webpage.

made a promise to worldwide consumers: by 2020, they will realize zero discharges of all hazardous chemicals from production. They've also committed to full public disclosure of discharges of toxic chemicals in their supply chain, recognizing that transparency is a necessary mechanism to achieve the zero discharge goals.

When the first brand made such a pledge four years ago, it sounded like an ambitious goal. But as the numbers grew, and more brands continue to make their pledge, the promise has become an unfolding reality. A global movement is

growing within the industry, creating new norms in new territories, and millions of consumers are inspiring brands to change their minds and their deeds.

We are learning that corporations, when determined to scrutinize their supply chain, will bring sound chemical management to the entire process up to final product control, creating new opportunities and competitive advantages.

Many brands committed to Detox My Fashion, for example, have completely eliminated the use of PFCs in their supply chain; a few others are working quickly to meet the fast approaching deadline for eliminating the substances in textiles. Impending elimination has also triggered swift adoption of PFC-free solutions and promoted exchanges and explorations within and beyond the textile industry to move alternatives from the lab to the factories.

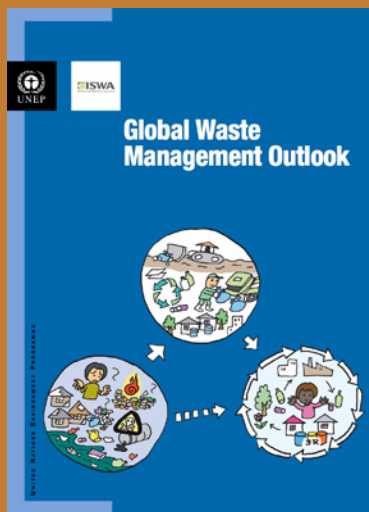
Hundreds of suppliers in manufacturing countries, including China, India, Morocco, Bangladesh, Italy and Turkey, are also releasing their pollution data globally through a webpage managed by a nongovernmental organization (NGO). More and more brands publicly list the names and addresses of their factories, previously a closely guarded secret.

These successes work in parallel with similar actions encouraged by a global chemical management framework created more than a decade ago. In 2002, world leaders, industry and NGO stakeholders gathered in Johannesburg for the World Summit on Sustainable Development. The summit's Plan of Action spelled out their vision: "By 2020, chemicals are produced and used in ways that minimize significant adverse impacts on human health and the environment".

The "Johannesburg 2020 Goal", which is the foundation of the Strategic Approach to International Chemicals Management, brings the challenge of sound chemicals management to a global level with multi-stakeholders. As delegates meet at the International Conference on Chemicals Management this September in Geneva, reaching this goal by 2020 once again calls on all stakeholders to make great strides.

The Detox campaign demonstrated some practices that pave the way to the 2020 goal. Five years remain for governments, industry and other stakeholders to stay committed and engaged so as to accelerate progress. The potential for successful breakthroughs for a sustainable future is attainable. Consumers continue to provide motivation through their demands, and stakeholders are seizing the opportunity to make impacts at a global level. ▲

UNEP Publications



Global Waste Management Outlook

The Global Waste Management Outlook, a collective effort of the United Nations Environment Programme and the International Waste Management Association, is a pioneering scientific global assessment on the state of waste management and a call for action to the international community. Prepared as a follow up to the Rio+20 Summit and as a response to UNEP Governing Council decision GC 27/12, the document establishes the rationale and the tools for taking a holistic approach towards waste management and recognizing waste and resource management as a significant contributor to sustainable development and climate change mitigation.

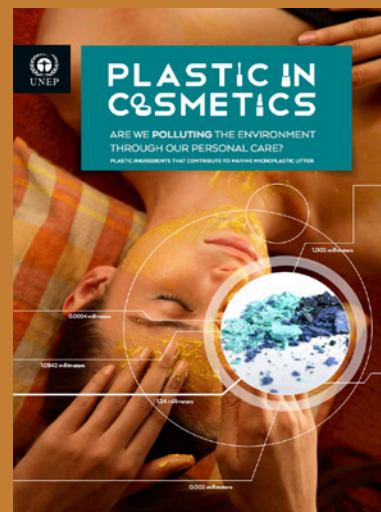
To complement the Sustainable Development Goals of the Post-2015 Development Agenda, the Outlook sets forth Global Waste Management Goals and a Global Call to Action to achieve those goals.



Policy Coherence of the Sustainable Development Goals: A Natural Resource Perspective

The Sustainable Development Goals (SDGs) aim, by 2030, to end human deprivation worldwide. They represent a coherent, collective vision of a better future for all and provide a framework by which progress towards this vision may be monitored. One of the great strengths of the SDG framework in its current formulation is its recognition of the intimate links between human well-being, economic prosperity and a healthy environment.

In its adoption, it must send out a clear message that restoring and maintaining the health of the natural resource base is a necessary condition for eradicating poverty and sustaining economic progress for all.



Plastic in cosmetics: Are we polluting the environment through our personal care?

This paper focuses on the emerging issue of plastic particles in personal care and cosmetic product (PCCP) formulations as a possible source of micro-sized plastic litter. Known as 'microbeads', when used in PCCPs, these microplastic ingredients are solid materials that fall under the definition of marine litter when emitted to the marine environment.

The concern is that plastic ingredients in products that are being used by consumers in households worldwide are contributing to the total abundance of plastic particles smaller than 5 mm in the ocean today.



Waste Crime - Waste Risks Gaps in Meeting the Global Waste Challenge: A Rapid Response Assessment

More than ever, our future depends upon how we manage the future of our waste. As an integrated part of sustainable development, effective waste management can reduce our global footprint. Ignoring or neglecting the challenges of waste, however, can lead to significant health, environmental and economic consequences.

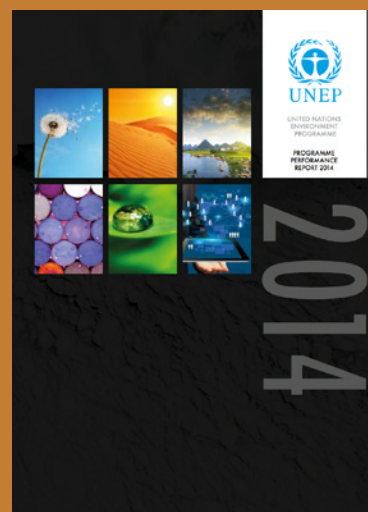
Waste covers a very wide spectrum of discarded materials ranging from municipal, electrical and electronic, industrial and agricultural, to new types including counterfeit pesticides. It also includes anything in size and scale from decommissioned ships, oil or liquid wastes, hundreds of millions of mobile phones to billions of used car tyres.



Climate Commitments of Subnational Actors and Business: A Quantitative Assessment of their Emission Reduction Impact

Initiatives which catalyse climate action are now recognised increasingly as playing an important role in mitigating greenhouse gas emissions (GHG) and bridging the global emissions gap. The number and range of these initiatives is growing rapidly.

There are several open questions about these initiatives at a global scale, including what contribution they can make to closing the emissions gap, but also what makes a successful initiative and how can this be replicated and scaled up. This paper focuses on the first of these questions.



United Nations Environment Programme: Programme Performance Report, 2014

2014 marked the evolution of UNEP's governing body from a 58-member Council to the United Nations Environment Assembly (UNEA) with universal membership (193 countries), demonstrating that the environment is a global concern.

This new political platform provided a broader overarching context for the work of UNEP in 2014, with a challenge to provide added value to a growing community of stakeholders with high expectations.



*All UNEP publications are available online at:
www.unep.org/publications*

Environmental Champion

Erin Brockovich

*Erin Brockovich is an
American legal clerk and
environmental activist*

Photo: © Makers.com



Her name is now synonymous with the fight against the contamination of drinking water with toxic chemicals but no-one, least of all herself, expected that Erin Brockovich would become world famous. Yet as the celebrated film, starring Julia Roberts, showed, the dyslexic single mother with no formal education and little apparent future ended up—through sheer persistence—winning the largest toxic tort injury settlement in US history. And she is still battling on in what, she told *Our Planet*, “should be a world priority.”

Born Erin Pattee in Lawrence, Kansas, in 1960, she says she had always had “an enormous love of water and land taught to me by my father”, an engineer. Her mother, a journalist with a sociology degree, taught her “thoroughness” and “understanding and compassion of others.” And both gave her what she calls “stick-to-it-iveness”.

It all came unexpectedly into play when, as a \$ 300 a week clerk in a Los Angeles law firm she was handed papers to file on a real estate case from the Californian town of Hinkley and was intrigued to see medical records among them.



Photo: © Courtesy



“I cannot imagine doing anything other than following my calling to pursue the injustice to our environment.”

determined to go on bringing pollution to light and has fought many cases since.

“It is extremely important to manage pollution,” she told *Our Planet*. “We cannot use our streams, rivers, oceans and aquifers as dumping grounds. I am often baffled that we disassociate ourselves from environmental pollution and think that it won’t have negative impact on our health and welfare. It can. It has. And it will continue to do so until we begin to manage our resources and find sustainable and meaningful ways to dispose of our waste.”

Individual people, she adds “can still turn and change the dial” on the issue, “through awareness, education and being proactive, speaking out and being united for a common goal that is good for everyone of us. As for the Government, don’t be in the pockets of industry, and don’t turn a blind eye to the lack of funding and neutering of agencies that doesn’t allow them to protect, enforce and preserve our environment.”

Brockovich herself feels “stronger than ever, thanks to social media, to campaign hard to help inform, educate, empower and provide tools for all individuals to appreciate, respect and care for our water. Without it, there is no us! This should be a world priority, and everyone’s issue. We must find a way to save this precious gift, our natural resources that sustain us all.”

“The water situation is worse than ever, and I cannot imagine doing anything other than following my calling to pursue the injustice to our environment.”

“It is extremely important to manage pollution. We cannot use our streams, rivers, oceans and aquifers as dumping grounds.”

She started to investigate, eventually finding contamination of drinking water and widespread illness in the town. A lawsuit ended with an out of court settlement of \$333 million, bringing a huge corporation to its knees. She herself earned a bonus of \$2 million, but “never thought of sitting back and doing nothing but enjoying the money.” She was “thrilled and humbled and thankful” to be able to buy a home for her family but was

Chemicals and waste-related targets in the Sustainable Development Goals

Pollution and sound management of chemicals are directly mentioned in the targets of four SDGs, which are expected to be adopted at the United Nations Summit held in New York in September.

GOAL 3.

Ensure healthy lives and promote well-being for all at all ages

One-third of the world's urban population live in slums and are exposed to environmental and social health risks such as indoor and outdoor air pollution. Air pollution alone is estimated to cause several million preventable deaths each year.



TARGET 2030

Substantially reduce the number of deaths and illnesses from hazardous chemicals, and air, water, and soil pollution and contamination.

GOAL 6.

Ensure availability and sustainable management of water and sanitation for all

Groundwater around the world is threatened by pollution from agricultural and urban areas, mining, manufacturing and other industrial sources. Hazardous pollutants remain for long periods and biomagnify up the food chain, with the highest concentrations found in top predators.



TARGET 2030

Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and substantially increasing recycling and safe reuse globally.

CO₂

GOAL 12.

Ensure sustainable consumption and production patterns

Unsustainable consumption and production patterns are increasing water and air pollution, land and forest degradation, waste generation and the use of harmful chemical substances.



TARGET 2020

Achieve environmentally sound management of chemicals and all wastes throughout their life cycle in accordance with agreed international frameworks and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.

H₂O

GOAL 14.

Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Mercury emitted during artisanal gold mining operations is of particular concern for marine resources and ocean conservation. Tons of mercury are lost each year due to inefficient processing techniques, such as excessive grinding of ore or adding more mercury than necessary.



TARGET 2025

Prevent and significantly reduce marine pollution of all kinds, particularly from land-based activities, including marine debris and nutrient pollution.