

# Global Chemicals Outlook II – From Legacies to Innovative Solutions

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Symposium on Sound Management of Chemicals, Tokyo, 4 February 2021

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# Overview of the Global Chemicals Outlook II

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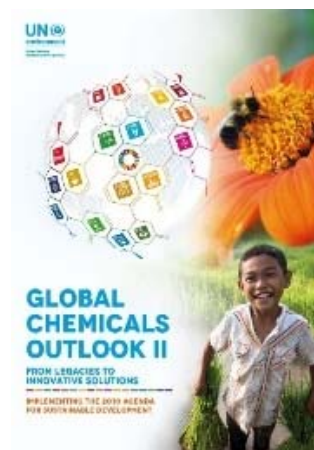
# The Global Chemicals Outlook II (GCO-II)

- First GCO published in 2013, highlighting chemical intensification
- GCO-II launched in 2019 at various meetings and conferences
- Informs UNEA and intersessional process considering the Strategic Approach and the sound management of chemicals and waste beyond 2020

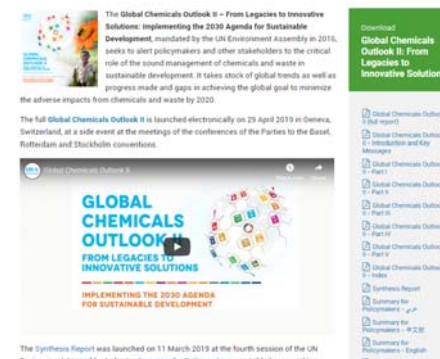
## Available products:

- *Full GCO-II*
- *Synthesis report*
- *Summary for policymakers*

<https://www.unenvironment.org/resources/report/global-chemicals-outlook-ii-legacies-innovative-solutions>



## Global Chemicals Outlook II: From Legacies to Innovative Solutions



# Mandate for the GCO-II

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Governing Council Decision 27/12 (2013) and UNEA Resolution 2/7 (2016) requested GCO-II to address the following:

- areas with lacking or inadequate data
- assessing progress towards the 2020 goal
- development of non-chemical alternatives
- linkages between chemicals and waste
- providing scientific input and options for implementation of actions to reach relevant SDGs and targets up to and beyond 2020
- emerging policy issues as well as other issues where emerging evidence indicates a risk to human health and the environment



**Johannesburg Plan of Implementation, para 23: “... aiming to achieve, by 2020, that chemicals are used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment ...”**

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# Governance and methodology

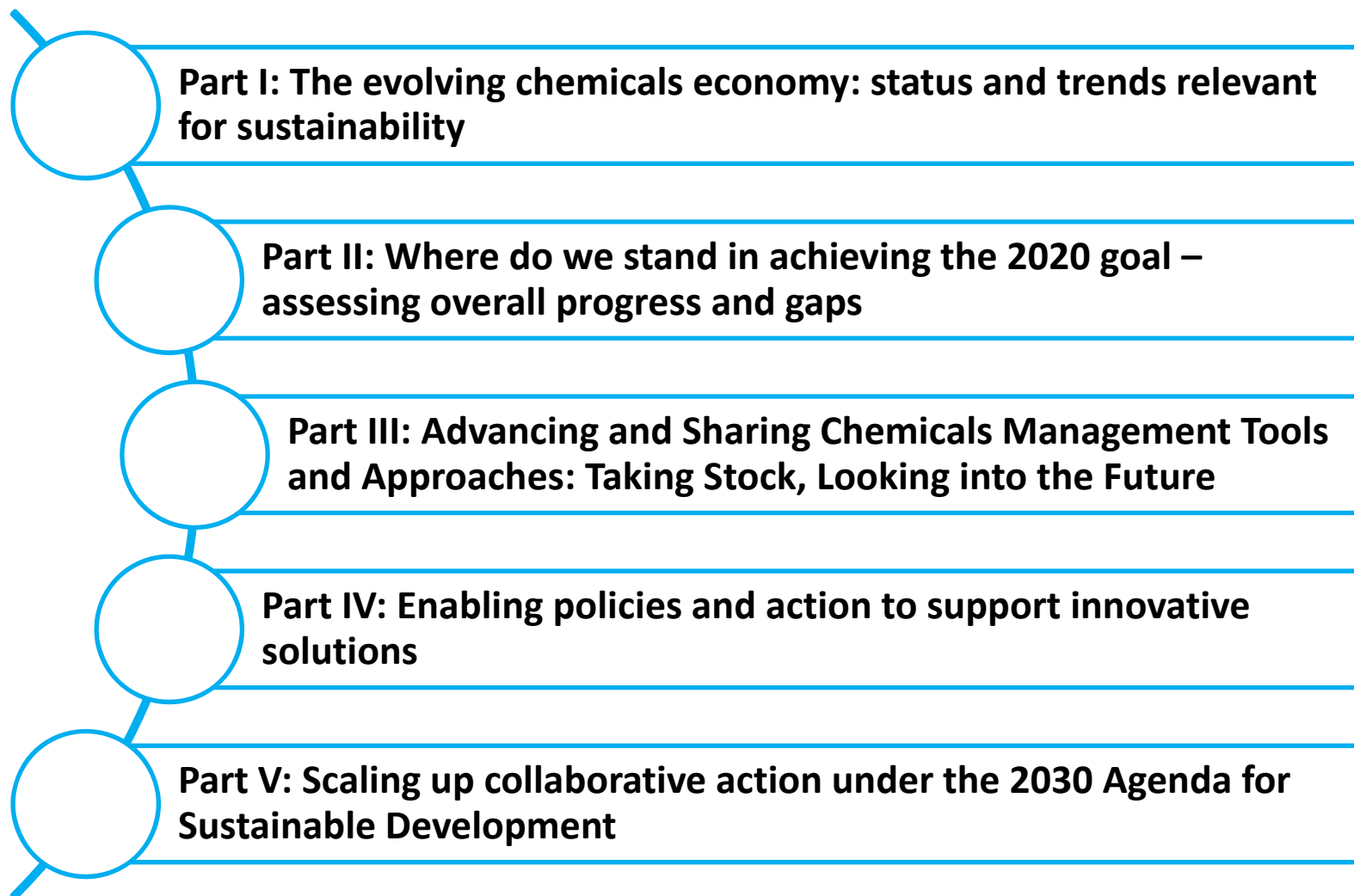
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- Steering Committee with inclusive membership
- Priority topics identified through back-casting methodology
- Approximately 50 lead and contributing authors
- Policy insights and options drawn from analysis
- Stakeholder input through global and regional workshops
- Peer reviewed by independently appointed experts



# Structure of the GCO-II

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# Overall message of the GCO-II

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- While many chemicals are important for sustainable development, trends are a cause for major concerns.
- The global goal to minimize adverse impacts of chemicals and waste will not be achieved by 2020
- Solutions exist, but more ambitious worldwide action by all stakeholders is urgently required
- Business-as-usual is not an option



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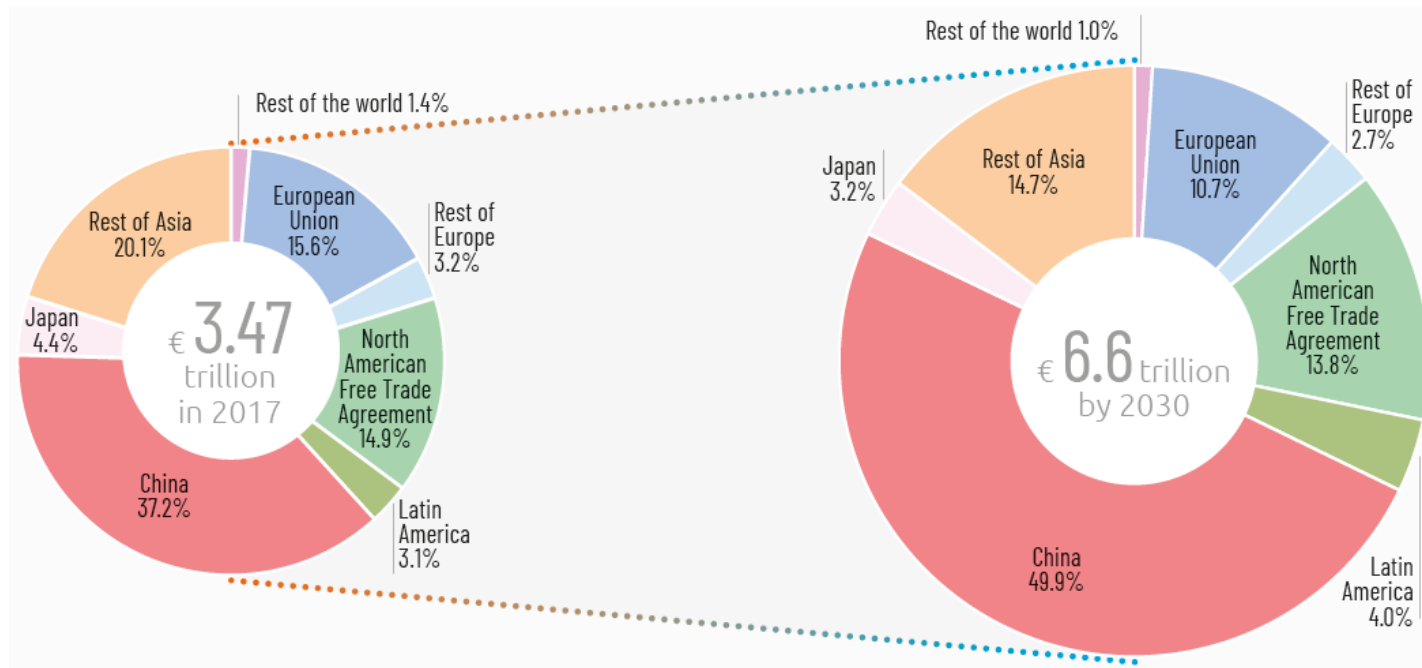
## Key insights from Part I

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# Chemicals production and consumption

- More than USD 5 trillion industry in 2017 (including pharmaceuticals)
- Sales projected to double by 2030
- Production and consumption shifting to emerging economies

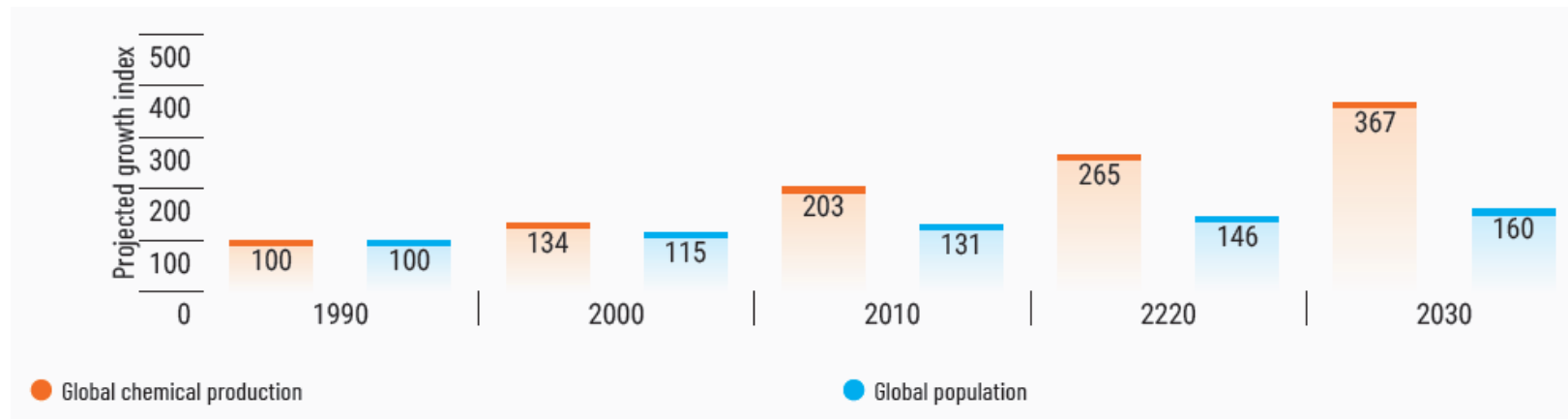


Projected growth in world chemical sales (excl. pharmaceuticals) (CEFIC)

# Megatrends, the chemical industry and chemical-intensive sectors

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- Megatrends create risks and opportunities across sectors
- Rising income and growing middle classes drive demand
- Growth in chemical production outpaces population growth
- Growth in sectors drives growth in respective chemicals markets

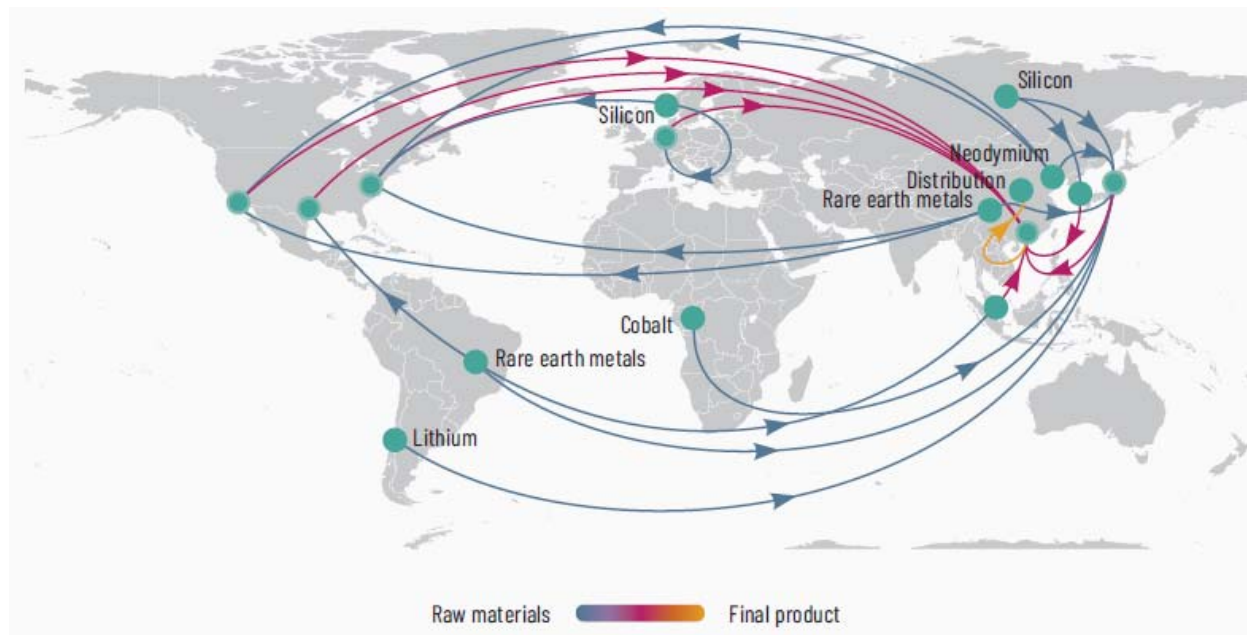


*Growth of basic chemical production capacity vs. population growth (based on UN DESA 2018 and Cayuela and Hagan 2019)*

# Chemicals in products, global supply chains and trade

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- Industrial chemicals in commerce estimated at 40,000 - 60,000
- Global account of (hazardous) chemicals on the market is lacking
- Increasing complexity of supply chains, trade and presence of hazardous chemicals in secondary raw materials pose challenges for chemicals management, recycling and circularity



*Illustration of the complexity of global supply chains: the case of an electronic product (adapted from Sourcemap 2012)*

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# Chemical pollution

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- Large amounts of chemicals continue to be released to air, water, soil
- Releases indoors from consumer products and building materials
- Chemical releases triggered by increasing frequency of natural disasters
- Progress in reducing releases of some chemicals (e.g. certain POPs)



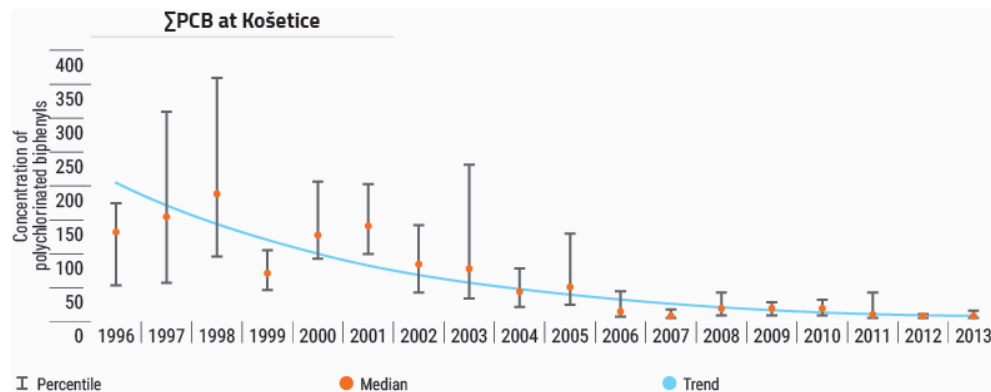
Global releases of plastic and microplastic waste to oceans (tonnes per year) (adapted from Boucher and Friot 2017, p. 11)

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# Concentrations of chemicals

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- Chemical pollutants ubiquitous in environment and humans
- Legacy chemicals present in remotest regions of the world
- Concentrations vary by substance, region and environmental media
- Limited data indicate positive trends in reducing concentrations of regulated chemicals; concentrations of some others increasing
- Chemicals of concern concentrate in building and jeopardise air quality

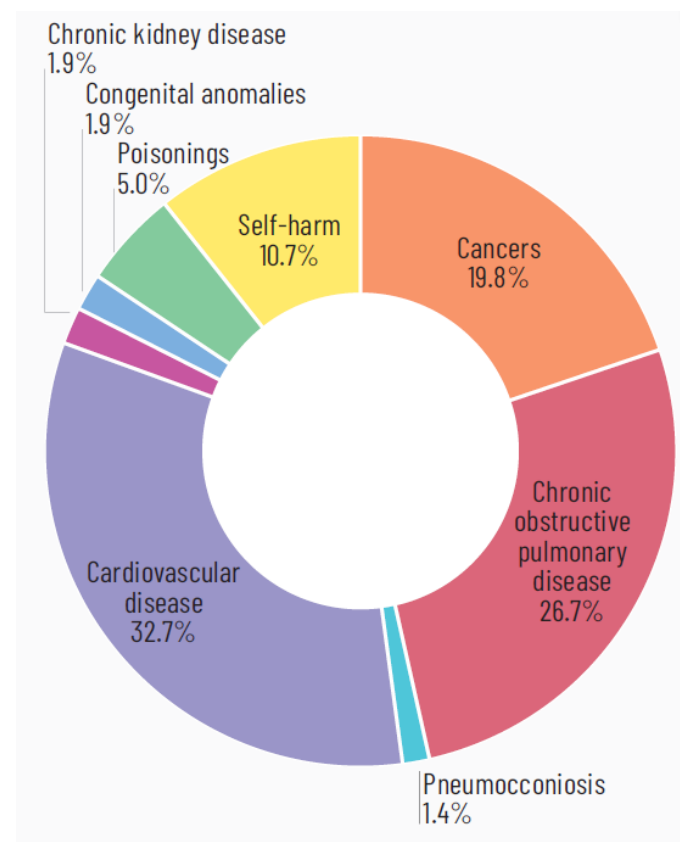


*Trends in concentrations of PCBs in Košetice, Czech Republic, 1996-2013  
(adapted from Šebková et al. 2014, p. 61)*



# Effects of chemicals

- WHO estimated the burden of disease from selected chemicals at 1.6 million lives in 2016
- Foetuses, infants, children, pregnant women, elderly and poor among the most vulnerable
- Chemical pollution threatens ecosystem services
- Costs of inaction and benefits of action estimated to be significant



Deaths (total: 1.6 million) attributed to selected chemicals in 2016 (WHO 2018)

# Effects of chemicals

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Hazardous chemicals weakening or putting stress on ecosystems and life support functions as well as critical ecosystem services, e.g.:

- Impact of some pesticides on non-target insects and pollinators
- Excess use of fertilizers contributing to ocean dead zones
- Chemicals putting pressure on health of coral reef ecosystems
- Environmental releases contributing to antimicrobial resistance



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## **Key insights from Part II**

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# How do we measure progress?

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- Reporting and measuring progress spread across various treaties, voluntary instruments, 2030 Agenda etc.
- Range of different indicators and reporting schemes developed

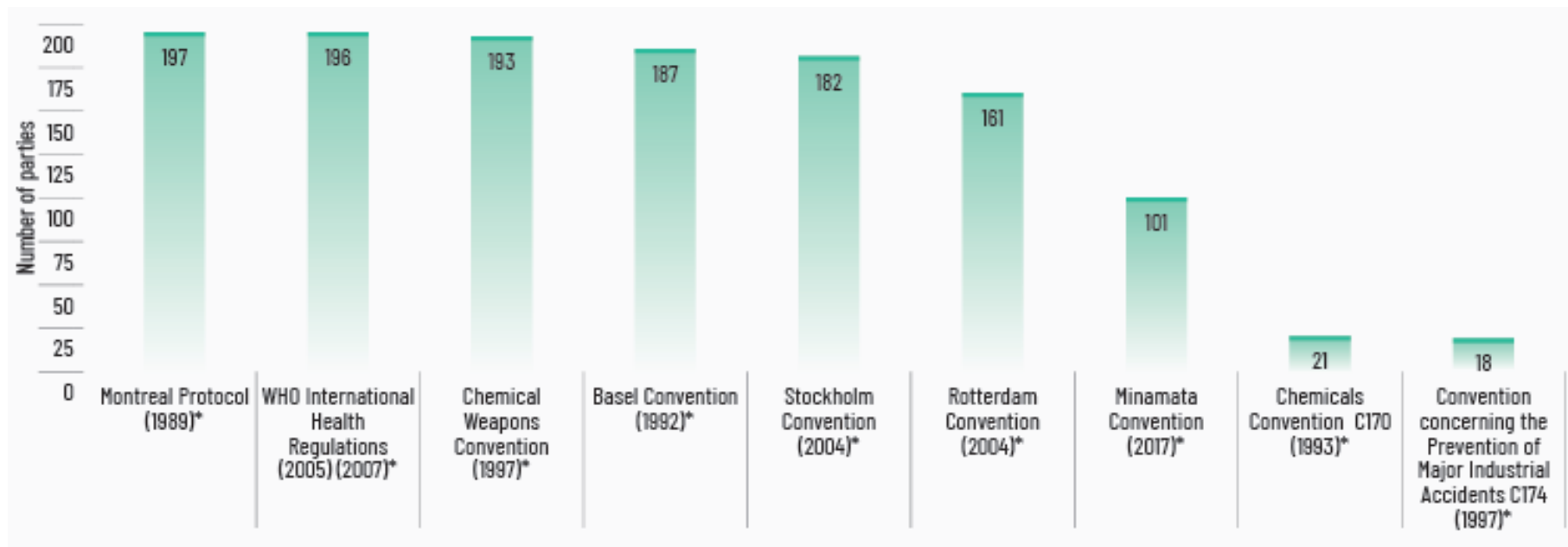
## Challenges:

- Fragmented indicators framework
- Most indicators are activity-, output- or instrument-based
- Low reporting rates



# Multilateral treaties and SAICM

- Concerted action taken on specific hazardous chemicals and issues of global concern, but implementation gaps remain
- SAICM provides a unique voluntary policy framework, but weaknesses have been identified

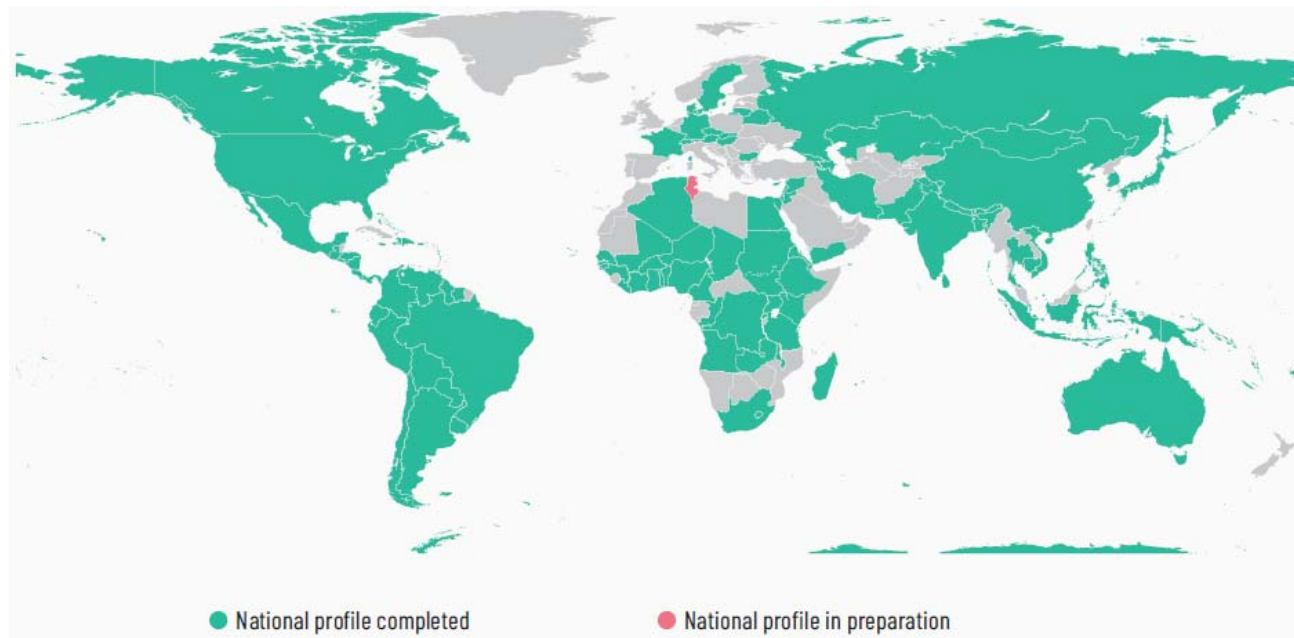


*Number of Parties to relevant multilateral legally binding treaties (as of 14 January 2019)*

# Governance

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- Many countries strengthened their legal and institutional capacities, but significant gaps remain, in particular in developing countries
- Countries save resources by aligning and harmonizing their policies
- Many developed national chemicals management profiles and plans



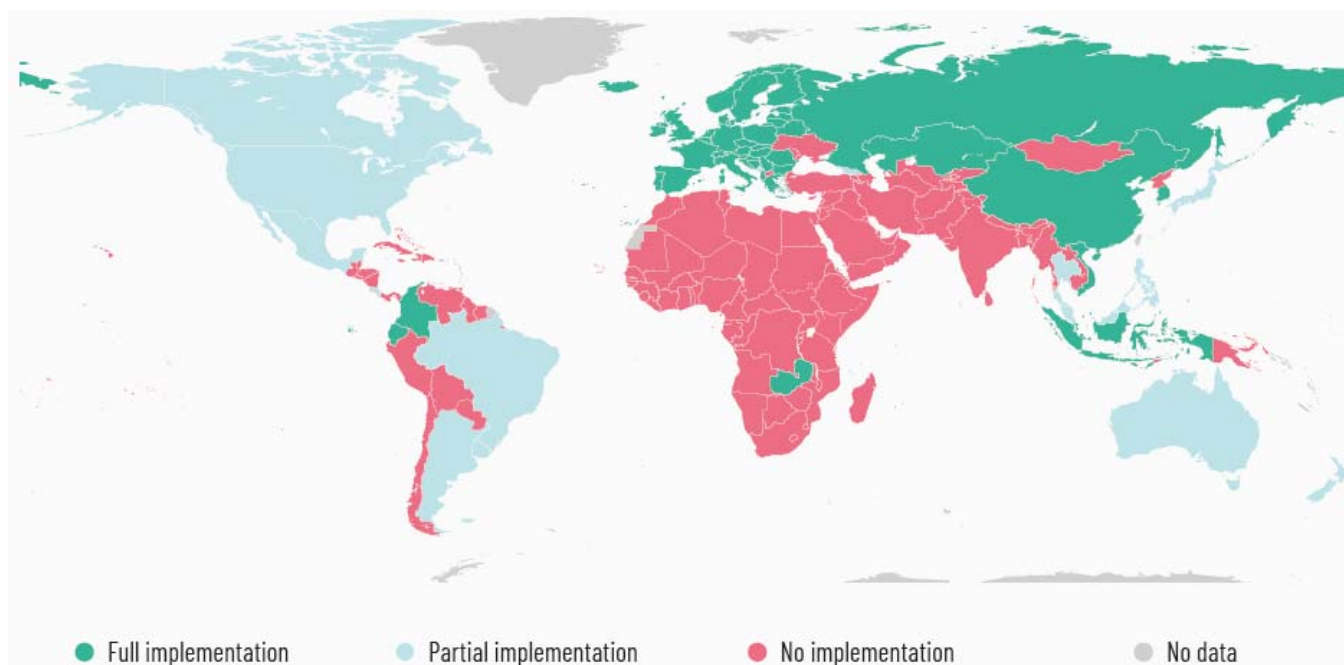
*National profiles to assess the chemicals and management infrastructure*

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# Knowledge and information

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- Various initiatives generated data and improved our understanding of the hazards and risks of chemicals of concern
- Major gaps remain in GHS implementation and establishment of PRTRs



Global GHS implementation status (adapted and updated based on Persson et al 2018)

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# Risk reduction

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- Progress in the development of pesticide legislation based on the International Code of Conduct
- Gaps remain, e.g. less than half of countries have a poisons centre

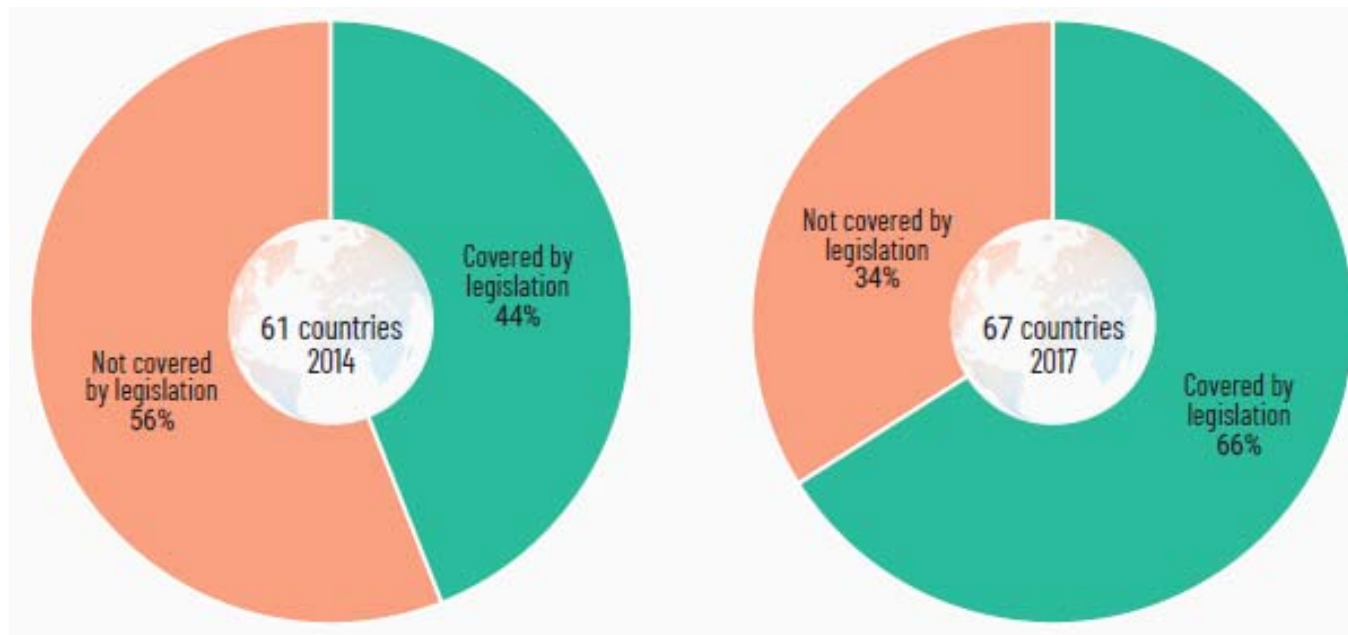


Existence and distribution of poisons centres (adapted from WHO 2017)

# Emerging Policy Issues (EPIs) and other issues of concern

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- Identification of, and actions taken on the EPIs a major strength and uniqueness of SAICM.
- However, slow, modest and uneven progress has been made in implementing actions to address the EPIs (exception: lead in paint)
- GCO-II presents a range of measures to further address the EPIs



% of world population and number of countries covered by e-waste legislation (adapted from Baldé et al. 2017, p. 6)

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# Other issues with emerging evidence of risk

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- UNEA requested that the GCO-II address other issues where emerging evidence indicates a risk to human health and the environment.

Criteria-based approach resulted in the identification of:

- **Arsenic**
- **Bisphenol A (BPA)**
- **Glyphosate**
- **Cadmium**
- **Lead**
- **Microbeads**

- **Neonicotinoids**
- **Organotins**
- **Polycyclic aromatic hydrocarbons (PAHs)**
- **Phthalates**
- **Triclosan**

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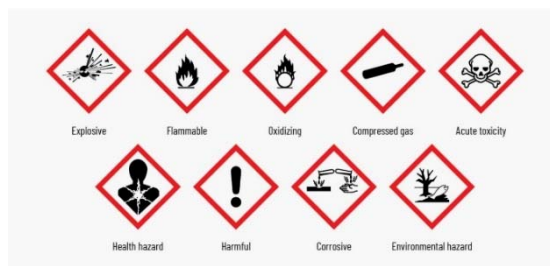
## Key insights from Part III

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# Hazard assessment

- Efficiencies can be gained via harmonized methodologies for mutual acceptance of hazard test data and accepting test results, as well as a global list of hazard classifications



Hazard pictograms according to GHS

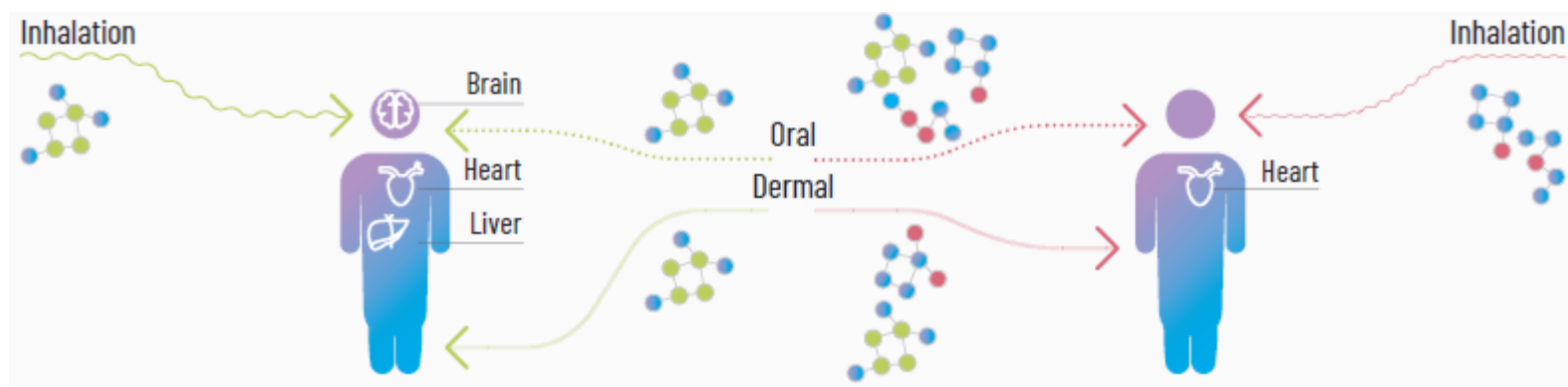
The OECD e-ChemPortal

International Chemical Safety Cards

# Exposure assessment

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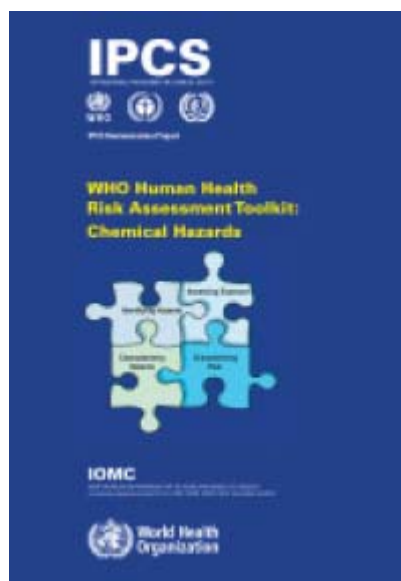
- Wider awareness of generic exposure assessment methods and models can provide insights on local chemical exposure
- Further work ongoing regarding aggregate exposures, cumulative exposures, and exposure from products



*Aggregate (left) and cumulative (right) exposure (adapted from US EPA 2017d)*

# Risk assessment

- Further steps can be taken to facilitate the use of risk assessment methods in developing countries, and develop harmonize and simplify methods for risk assessment



*The WHO Human Health Risk Assessment Toolkit (WHO 2010)*



*The OECD Environmental Risk Assessment Toolkit (OECD 2016)*

# Risk management decision-making

- Safety data sheets and labelling provide the foundation for risk management
- Complementing government initiatives, frontrunner private governance can drive risk management beyond compliance



Ø ZDHC  
ZERO  
DISCHARGE OF  
HAZARDOUS  
CHEMICALS



# Assessment of chemical and non-chemical alternatives

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- Regulatory action, public pressure and voluntary initiatives drive safer alternatives in products and processes
- Conventional approaches focus on drop-in replacements
- Informed substitution to avoid regrettable substitutions.





# Risk management in facilities and during production

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- Facilitating a paradigm shift from managing to preventing disasters
- Better integrating chemical accidents in broader emergency planning
- SMEs face particular challenges
- Awareness-raising and promotion of good practices key



# Approaches to sustainability assessment

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- Value in further development and use of wider sustainability assessment methods, including life-cycle assessment tools
- Avoiding burden shifting across impacts, locations, life cycle stages and time



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## Key insights from Part IV

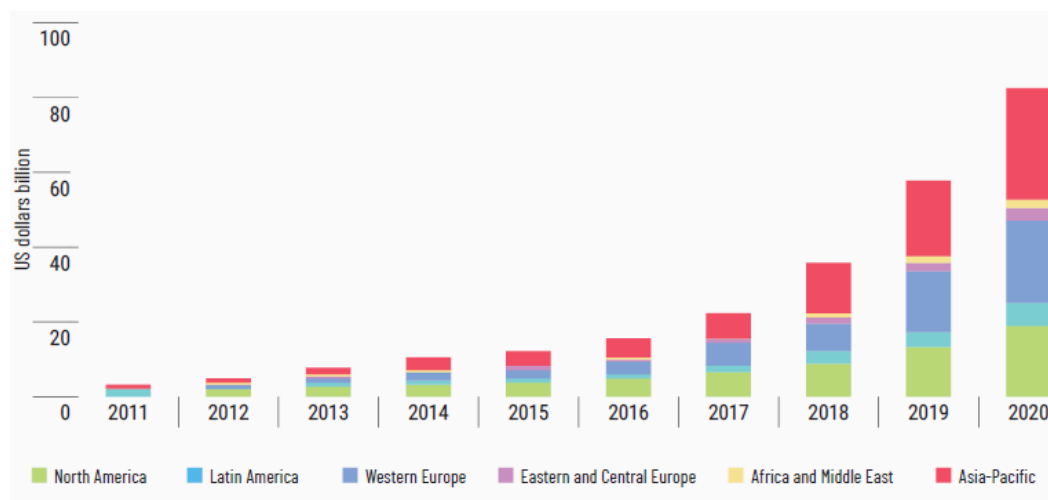
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# The future of chemistry

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- Chemistry's potential to advance sustainable development
- Enhancing understanding of green and sustainable chemistry
- Sustainable chemistry is an evolving concept that may serve as a reference for chemistry innovation

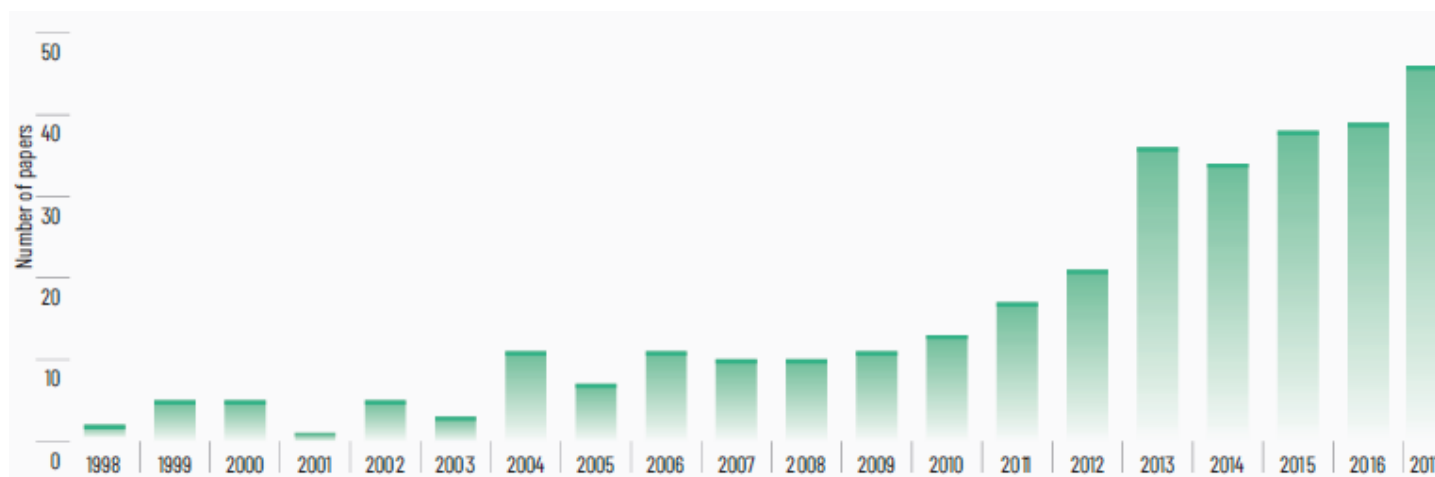


*Global green chemicals market by region, 2011-2020 (Pike Research 2011, p. 432)*

# Green and sustainable chemistry education

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- Opportunities exist to mainstream green and sustainable chemistry education into curricula and teaching, in particular in developing countries



*Number of papers published concerning green chemistry education or sustainable chemistry education, 1998-July 2017 (adapted from Clarivate 2018)*

# Sustainable chemistry technology innovation and financing

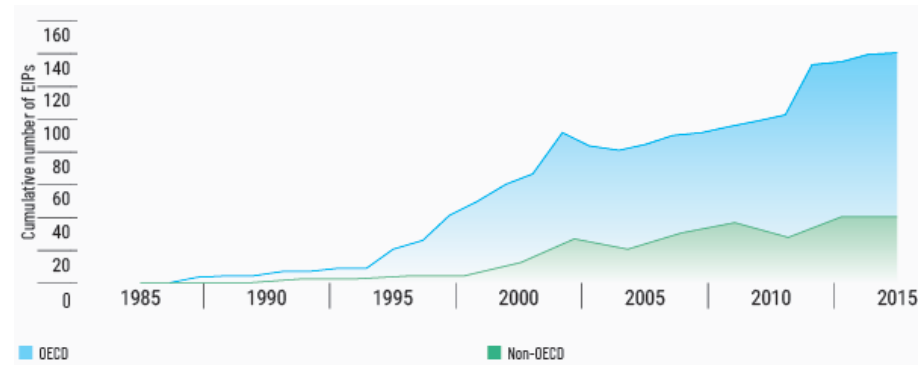
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- Accelerating research and innovation through collaborative and enabling action so chemistry helps to achieve the 2030 Agenda
- Innovative measures to scale up private sector funding (e.g. green bonds) could be further developed.



# Evolving and new business models

- New and evolving business models (e.g. chemical leasing, 3-D printing, e-commerce), chemical parks and social enterprises create opportunities but may also create risks

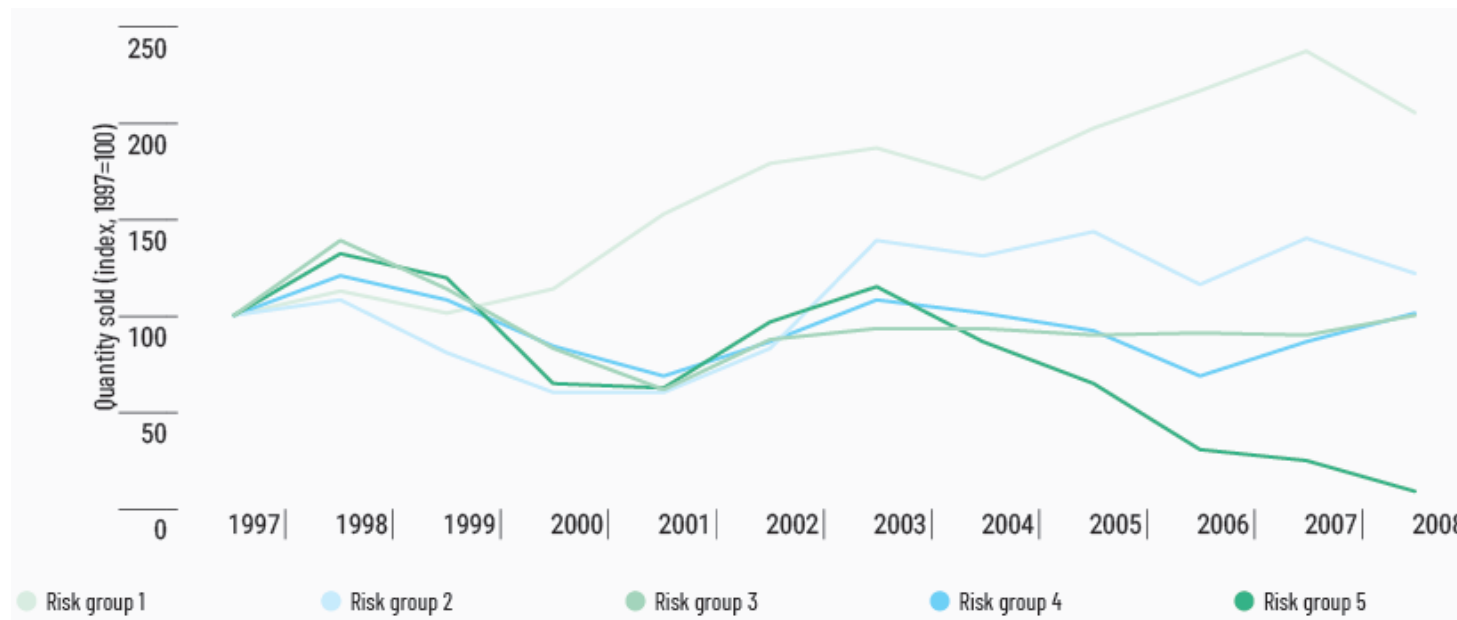


Global growth of eco-industrial parks (EIPs) (adapted from Kechichian and Jeong 2016, p. 15)

# Fiscal incentives

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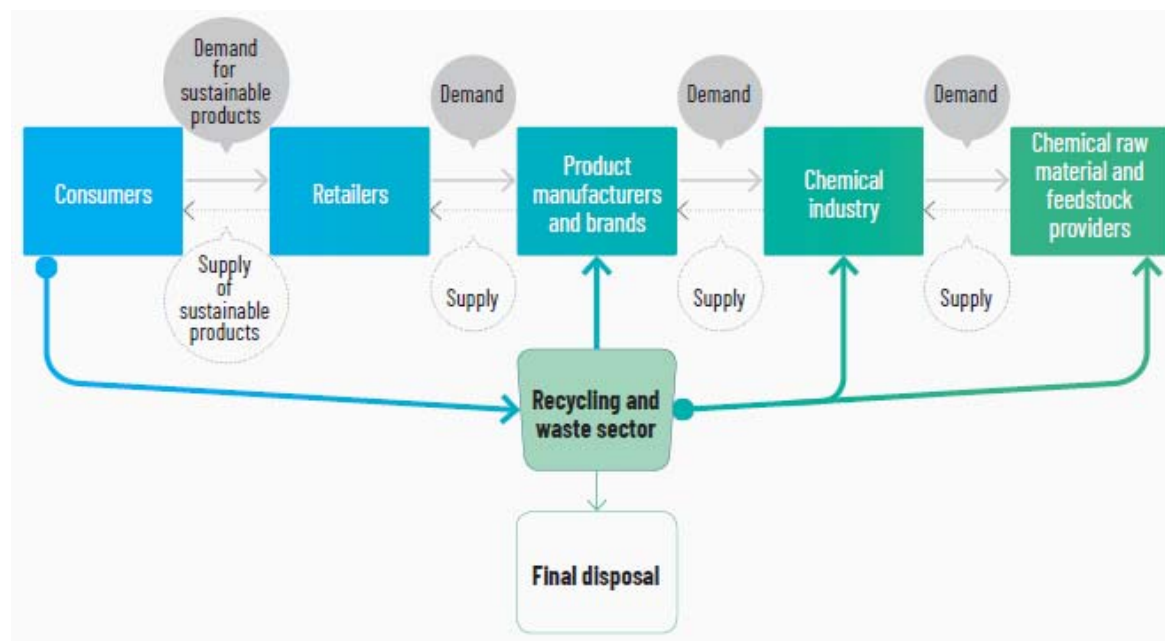
- Market based instruments is limited but increasing
- Such instruments can effectively complement command and control regulatory approaches



*Effects of differentiated taxation on quantities of pesticides sold in Norway (adapted from Kjäll 2012)*

# Sustainable supply chain management

- Ensuring procurement complies with sustainability criteria creates a driving force for upstream suppliers
- Retailers, product manufacturers, and companies in the chemical industry have taken relevant measures



*Interface of demand and supply in driving the sustainability of chemicals in the supply chain*

# Sustainability metrics and reporting

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- Private sector metrics and reporting proliferating and hold significant potential to measure progress
- Efforts needed to align approaches, ensure reporting is meaningful, increase transparency, and address the lack of a sustainable chemistry assessment framework



# Workers, citizens and consumers

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- Citizens play a key role in shaping demand
- Access to information a requisite for the right to know and effective public participation
- Human rights law may complement other legislation





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## Key insights from Part V

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# Chemicals and waste in the 2030 Sustainable Development Agenda

- The 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs) and 169 targets
- Sound management of chemicals and waste relevant across the 2030 Agenda
- 2030 Agenda an opportunity for global collaborative action



# Scaling up collaborative action under the 2030 Agenda

- 2030 Agenda an opportunity to integrate chemicals and waste considerations in sector policies through inter-ministerial coordination

Agriculture and food		Target 2.4: sustainable food production	Integrated pest management and agro-ecological approaches
Health		Target 3.8: safe medicines and vaccines	Addressing antimicrobial resistance
Housing		Target 11.1: safe housing	Safer insulation and building materials
Energy		Target 7.a: clean energy research and technologies	Sustainable materials for decarbonizing
Education		Target 4.7: education for sustainable development	Mainstream green and sustainable chemistry into curricula
Finance		Target 17.3: financial resources from multiple sources	Use of green and sustainable chemistry metrics in investment

# Scaling up collaborative action under the 2030 Agenda:

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Incentives needed for active commitment and engagement of relevant stakeholders :

- Key economic and enabling sectors
- Companies, industry groups, associations
- Workers' organizations
- Academic and research community
- Donor, investor and financial community
- Leaders in the media













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# Options for action

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# Options for action

	1) Develop effective management systems		6) Strengthen corporate governance
	2) Mobilize resources		7) Educate and innovate
	3) Assess and communicate hazards		8) Foster transparency
	4) Assess and manage risks		9) Bring knowledge to decision-makers
	5) Use life cycle approaches		10) Enhance global commitment

# Options for action

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## 1. Develop effective management systems

Address prevailing capacity gaps across countries, strengthen national and regional legislation using a life cycle approach, and further strengthen institutions and programmes by:



- promulgating, aligning and enforcing legislation and policies, including full implementation of the GHS, promulgating legislation for industrial and consumer products, and taking measure to address illegal international traffic;
  - developing national and regional chemicals and waste management action plans and programmes, linked to globally agreed targets and priorities; and
  - integrating chemicals and waste considerations into national and sectoral policies (e.g. agriculture, housing, transport and energy) to implement specific SDG targets.
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# Options for action

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## 2. Mobilize resources

Scale up adequate resources and innovative financing for effective legislation, implementation and enforcement, particularly in developing countries and economies in transition, by:



- scaling up efforts to integrate chemicals and waste management into national and sectoral budgets;
  - facilitating adequate external technical assistance, financial support and technology transfer to address issues causing greatest harm, including through new and innovative financing (e.g. fiscal incentives, cost recovery instruments, green bonds, venture capital); and
  - strengthening the integrated approach to financing through assessing its effectiveness and renewed commitment across all three components (mainstreaming, industry involvement, and dedicated external financing).
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# Options for action

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## 3. Assess and communicate hazards

Fill global data and knowledge gaps, and enhance international collaboration to advance chemical hazard assessments, classifications and communication by:



- sharing existing hazard data and assessments globally, and increasing the mutual acceptance of testing data and hazard assessments across countries based on accepted methods and scientific criteria;
  - developing a global database of assessed and classified chemicals for information-sharing and promoting harmonization of classifications; and
  - setting targets to fill data gaps to fully understand globally the hazards of substances in commerce, and assessing progress.
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# Options for action

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## 4. Assess and manage risks

Refine and share chemical risk assessment and risk management approaches globally to promote safe and sustainable use of chemicals and address emerging issues throughout the life cycle by:



- sharing knowledge on existing risk assessment and management approaches and tools (e.g. exposure scenarios) more widely;
  - further developing and refining exposure, risk assessment and LCA methods; and
  - taking into account and benefiting from opportunities for accelerated and effective risk management, such as placing the burden of proof on producers, advancing informed and non-regrettable substitution of chemicals of high concern, and using generic risk-based approaches, when possible.
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# Options for action

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## 5. Use life cycle approaches

Advance widespread implementation of sustainable supply chain management, full material disclosure, transparency and sustainable product design by:



- promoting wide implementation of corporate sustainability and sustainable procurement policies;
  - developing harmonized approaches across sectors to share chemical information and to advance full material disclosure across supply chains, including chemical-intensive industry sectors and the recycling/waste sector;
  - strengthening collaboration by all actors in the supply chain in designing and using safer chemicals and sustainable products; and
  - promoting the integration of chemicals and waste considerations into corporate sustainability metrics and reporting.
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# Options for action

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## 6. Strengthen corporate governance

Enable and strengthen chemicals and waste management aspects of corporate sustainability policies, sustainable business models, and reporting by:



- encouraging private sector frontrunner action to further develop voluntary standards that exceed basic compliance, and reviewing their effectiveness through interested stakeholders;
- promoting sustainable business models, such as chemical leasing and eco-industrial parks; and
- enhancing systematic use by investors of corporate sustainability and chemical footprint reporting, covering chemicals and waste management performance.

# Options for action

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## 7. Educate and innovate

Integrate green and sustainable chemistry in education, research, and innovation policies and programs by:



- reforming chemistry curricula in tertiary, secondary, primary and professional education;
  - scaling up research initiatives, and technology innovation policies and programmes, that advance green and sustainable chemistry, particularly for start-up companies; and
  - facilitating a better global understanding of green and sustainable chemistry concepts.
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# Options for action

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## 8. Foster transparency

Empower workers, consumers and citizens to protect themselves and the environment by:

- disclosing robust and understandable information about hazardous chemicals in the supply chain to workers, consumers, citizens and communities;
- scaling up innovative programmes and technology applications to facilitate a better understanding by individuals of chemical and waste risks, and engaging citizens in data collection through citizen science;
- promoting and supporting meaningful and active participation by all actors of civil society, particularly women, workers and indigenous communities, in regulatory and other decision-making processes that relate to chemical safety; and
- taking action so that citizens have ready access to justice.



# Options for action

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## 9. Bring knowledge to decision-makers

Strengthen the science-policy interface and use of science in monitoring progress, priority-setting (e.g. for emerging issues), and policy-making throughout the life cycle of chemicals and waste by:



- taking steps to harmonize scientific research protocols (e.g. for biomonitoring);
  - developing science-based criteria to identify emerging issues at the international level, taking into account harm (e.g. using health impact information) and monitoring their implementation;
  - providing research funding to fill identified gaps and priorities; and developing a study on the global costs of inaction, and benefits of action, on chemicals and waste management, comparable to the Stern Review on the Economics of Climate Change; and
  - developing and improving institutional mechanisms to improve knowledge generation and management.
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# Options for action

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## 10. Enhance global commitment

Establish an ambitious and comprehensive global framework for chemicals and waste beyond 2020, scale up collaborative action, and track progress by:



- developing an aspirational, overarching and widely owned global framework that encourages engagement by all relevant stakeholders;
- developing global targets, milestones and indicators that distinguish between outputs and impacts;
- providing opportunities for sharing internationally, and for input or peer reviews, action plans and roadmaps by stakeholders under a beyond 2020 framework;
- considering how corporate sustainability metrics and reporting can play a stronger role in measuring progress in a beyond 2020 framework; and
- monitoring, tracking and reviewing collective action and progress and making adjustments in regard to ambition, as needed.





**Thank you for your attention**

**Contact:**  
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