

Webinar 2: Plastics INC

Science informing decision-making

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Science: the essential ingredient to strong Policy - WHY

- Global plastic production to double by 2050
- 8 -11 million tonnes of it ending up in the oceans
- 53.6 million tonnes (Mt) e-waste & growing
- Municipal solid waste 2.1 billion tonnes of which 33% not managed appropriately
- Impacts of microplastics, chemical additives – human and ecological exposure and impacts
- Marine debris affecting wildlife, ingestion, entanglement
- Energy implications, GHGs

Science: the essential ingredient to strong Policy - WHAT

Global plastics production and **consumption**, 1910-2018

(https://www.grida.no/resources/14862)

1920

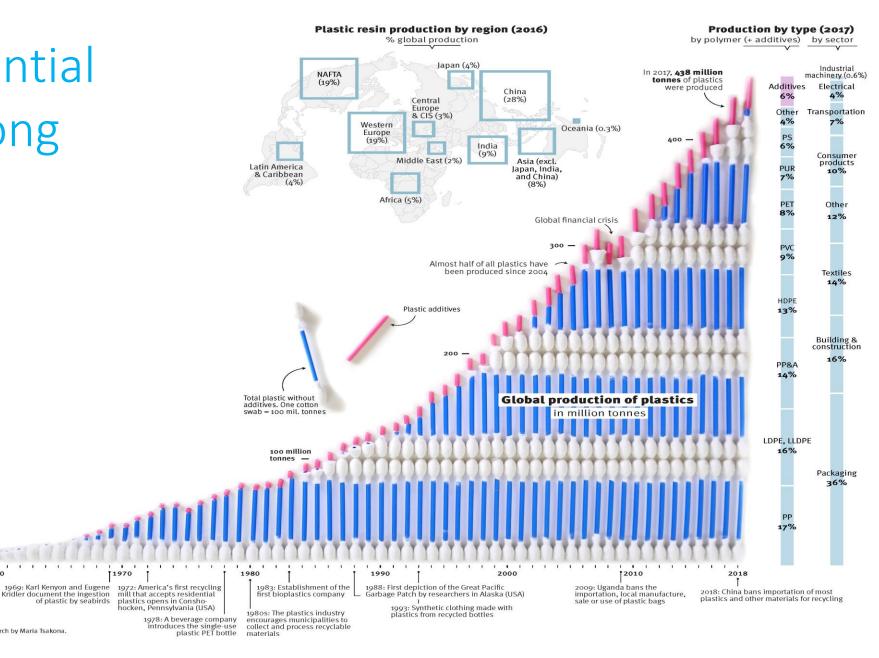
1907: Leo Baekeland invents Bakelite, the

first fully synthetic plastic

1920: Hermann Staudinger

demonstrates the existence of polymer

1930



Sources: Geyer et al. (2017), Geyer (2020), Ryberg et al. (2019). Illustration by Levi Westerveld / GRID-Arendal (2020). Research by Maria Tsakona UNEP (2021). Drowning in plastics - Marine Litter and Plastic Waste Vital Graphics.

1950

1950s: Beginning of the boom

1969: Karl Kenyon and Eugene

of plastic by seabirds

Science: the essential ingredient to strong Policy - WHAT

Five types of plastic additives



Functional

Include for example stabilizers, antistatic agents, flame retardants, plasticizers, lubricants, slip agents, curing agents, etc.



Colorants

Substances such as dyes or pigments added to give color to plastic. Some of them are added to give a bright transparent color.



Fillers

Added to change and improve physical properties of plastics. They can be minerals, metals, ceramics, bio-based, gases, liquids, or even other polymers.



Reinforcement

Used to reinforce or improve tensile strength, flexural strength and stiffness of the material. For example: glass fibres, carbon fibres, etc.



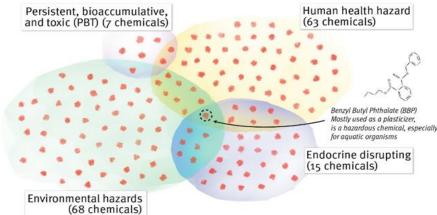
NIAS

Non-Intentionally Added Substances. Chemicals that arrive in products from processes such as reaction by-products or break down products.

Source: Hansen et al. (2013). Illustration by GRID-Arendal (2020).

Hazardous chemicals in plastics

A 2018 study found that over 4000 chemicals are *potentially* present in plastic packaging. 906 chemicals were found to be associated with plastic packaging. 148 of these chemicals have been identified as hazardous (Groh et al. 2018).



Sources: Groh et al. (2018). Illustration by GRID-Arendal (2020).

https://www.unep.org/resources/report/drowning-plastics-marine-litter-and-plastic-waste-vital-graphics

UNEP Unpublished 2023

- > 13,000 chemicals associated with plastics and plastic production
- ➤ 3,200 monomers, additives, processing aids and nonintentionally added substanceshazardous.
- Effects of hazardous additives include: carcinogenicity, reproductive toxicity, endocrine disruption, ecotoxicity, bioaccumulation potential, environmental persistence and mobility.

Science: the essential ingredient to strong Policy - WHAT

Select Activities

- Production of chemicals to make plastics
- Plastics manufacture
- Plastics products manufacture and use in other manufacturing processes
- The products, use and disposal
- Recycling, Recovery, Incineration
- Disposal both controlled and uncontrolled
- Innovative solutions/ alternatives / substitutes

Science: the essential ingredient to strong Policy - HOW

What are we seeking to achieve? What is the aim of a Policy?

• **No or reduced** plastics in the environment or people (if you prevent exposure, prevent impacts)

• No or reduced direct or indirect impacts from manufacturing, use and disposing of plastics

No or reduced open burning of plastics

No or reduced GHG emissions and actions to mitigate climate change

Reduced economic costs

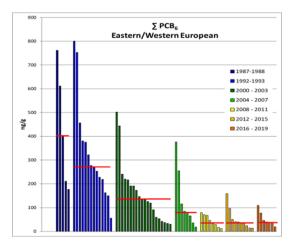
Incentivizing New materials, plastics and/or products

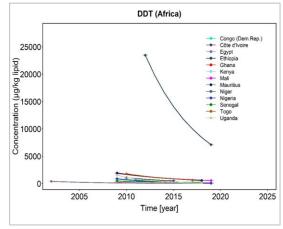
• Others or all the above?

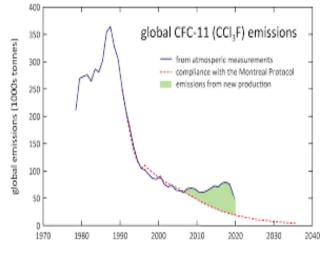


Science: the essential ingredient to strong Policy - HOW

What measures help us achieve objectives and what science do we have?







Overall declining global trend of POPs, indicating the effectiveness of the Stockholm Convention: Examples of DDT and Africa and PCB in Europe (UNEP/GEF POPs GMP)

Decrease in CFCs phased out across sectors, control measures such as handling and collection, training, bans

Regulatory Measures Work!!! But - no regrettable substitutions and no perverse outcomes

Options Paper: Possible Core Obligations, 1, 2, 3, 4
Considerations: definitions and focus

Science: the essential ingredient to strong Policy - HOW

Pollution challenges through the plastic lifecycle Emissions material recovery 🥠 🚰 Fragmentation plastic products disposal of plastics plastic waste collection landfill open burning

Sources: Andaluri et al. (2018), CIEL (2019), Hahladakis et al. (2017). Illustration by GRID-Arendal (2020).

Options Paper - Possible Core Obligations

- 5. Strengthening Waste Management
 Reprocessing, recycling, treatment, materials
 recovery, collection, disposal, landfill
- 9. Eliminating the release and emissions to land, air and water

Regulatory controls in processing and manufacturing, reprocessing, materials recovery, waste to energy, collection, disposal, landfill, open burning

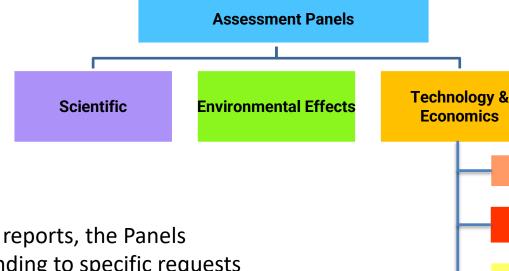
Consumer product laws?

Would require: Guidelines/benchmarks/ standards etc.

Science: the essential ingredient to strong Policy - Implementation

The Montreal Protocol Assessment Panels

 Article 6 of the Montreal Protocol requires that assessment of the latest information on scientific, environmental, technological, and economic aspects are carried out periodically (at least every 4 yrs) by the 3 Assessment Panels.



Foams

Halons

Medical and Chemicals

Methyl Bromide

Refrigeration

- In addition to the quadrennial assessments and synthesis reports, the Panels
 prepare annual progress reports and other reports responding to specific requests
 by the parties
- TEAP has 5 Technical Options Committees that deal with specific industry sectors that use ODS and HFC

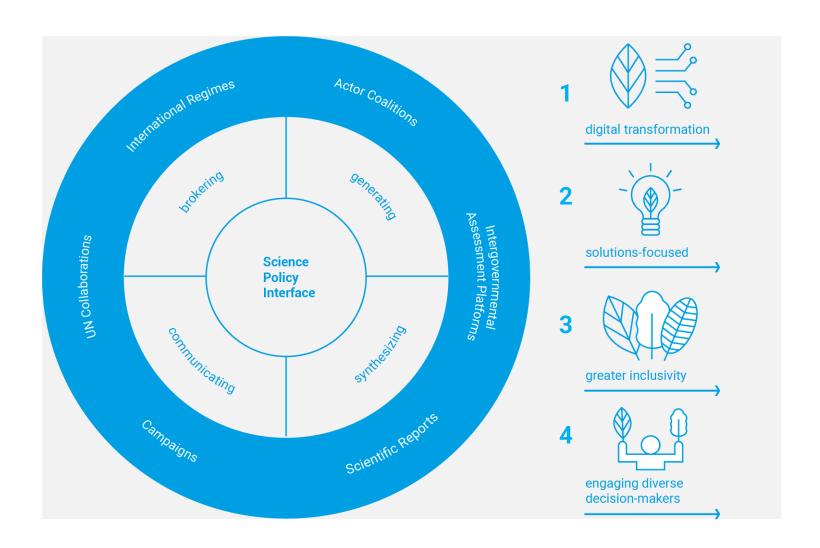
Independent, authoritative, consensus assessment by the world's top scientists and experts



Science: the essential ingredient to strong Policy - Implementation

- Objectives need to be clear
- The science of solutions and innovations needs to consider the objectives i.e., 'do no harm'?
- The benefits of what we know about how to manage the plethora of issues around plastics but also what we don't know
- A strong credible Monitoring and Evaluation framework
 - Environmental Forensics/ Isotope analysis
 - Analytical approaches
 - Mapping source to sea
 - Citizen science approaches
 - Biological monitoring

Strengthening the Science Policy Interface: UNEP@50 Report



Enabling open accessible and transparent data, information and knowledge

Placing significantly more emphasis on solutions, rather than challenges and barriers

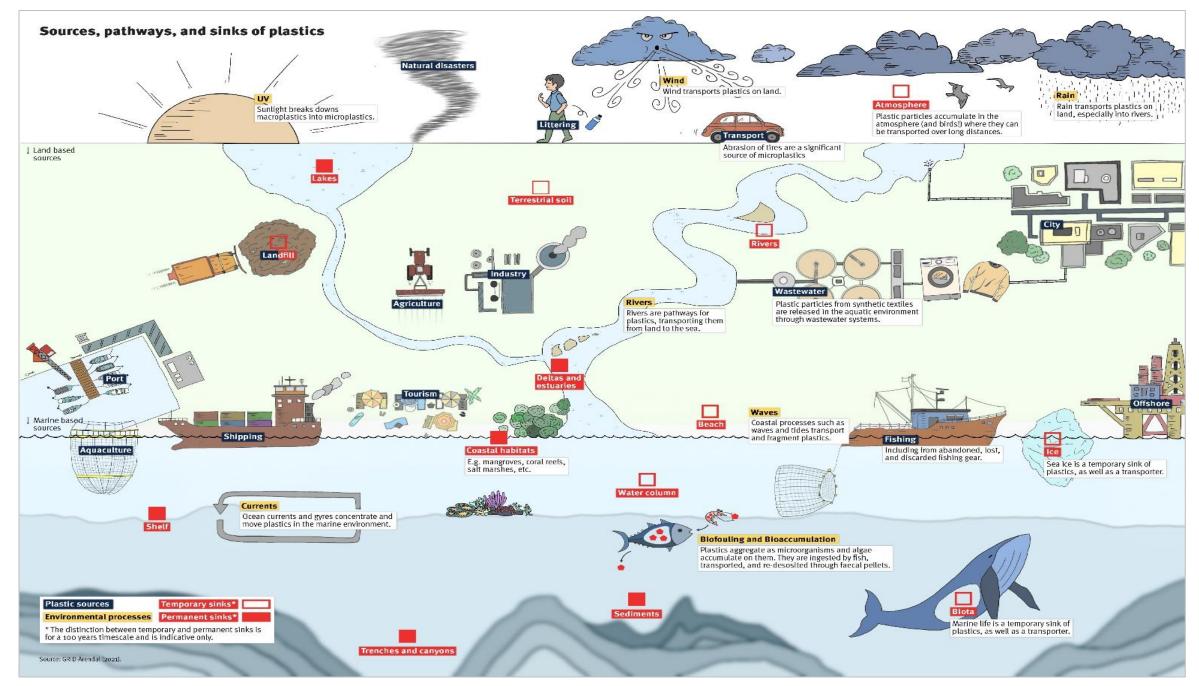
Embracing a more diverse range of stakeholders, partners and

Engaging with a variety of decision-makers and influencers

Concluding Remarks

- Science is fundamental to good Policy and implementation
- Data, information and knowledge across the lifecycle needs to be available, open, accessible and transparent
- The Science Policy Interface can be strengthened by enhanced stakeholder engagement with more diverse voices and focusing on solutions
- Focus on actionable outcomes that are practical to implement
- Monitor and evaluate success, need clear measures (metrics) some of which are yet to be determined.





https://www.unep.org/resources/report/drowning-plastics-marine-litter-and-plastic-waste-vital-graphics