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# Chemicals of concern in Plastics

Understanding the Issues and Pathways to Solutions

Author: Maro Luisa Schulte, adelphi Consult GmbH

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# Context and Purpose

- United Nations Environment Assembly's resolution in 2022.
- Intergovernmental negotiation committee (INC) working towards a legally binding instrument.
- Ahead of the final INC meeting in Busan in December 2024: mandate for intersessional work in two **ad hoc intersessional open-ended expert groups**.

Expert Group 1: develop an analysis of **potential sources**, and **means that could be mobilized**, for implementation of the objectives of the instrument, including options for the establishment of a **financial mechanism, alignment of financial flows**, and **catalysing finance**, for the consideration by the Committee at its fifth session (INC-5).

Expert Group 2: identify and analyse **criteria and non-criteria based approaches** with regard to **plastic products** and **chemicals of concern in plastic products**, and **product design focusing on recyclability and reusability of plastic products**, considering their uses and applications, for the consideration by the Committee at its fifth session.

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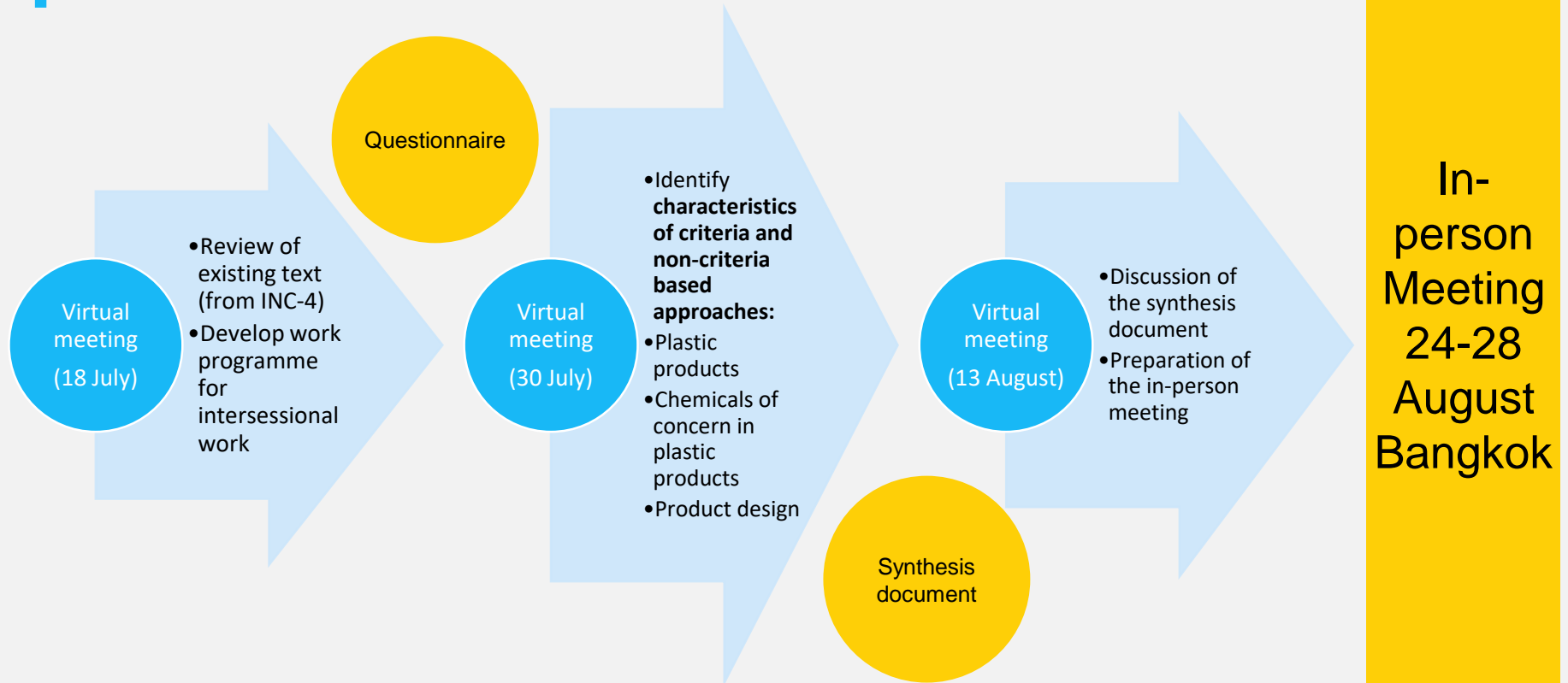
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## Criteria and non-criteria based approaches:

1. **Plastic products** (incl. problematic and avoidable)
2. **Chemicals of concern in plastic products**
3. **Product design focusing on recyclability and reusability of plastic products**
  - a) **level of intervention** (national, international etc.)
  - b) **level of obligation** (voluntary, mandatory, etc.)

# Work Plan Group 2



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## Problematic plastics:

- hard to recycle
- hazardous substances
- easily leak into the environment.

## Avoidable plastics

- replaced with sustainable alternatives or
- eliminated through better design and consumption practices.

Both types of plastics will need to be ultimately reduced:

- avoidable plastics: phased out or substituted
- Essential problematic plastics: re-design, minimize harm, improve collection.

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What are design criteria (and non-criteria based approaches) for products, in order to ensure their reusability and/or recyclability?

- Recyclable and durable materials, modular design for easy disassembly to facilitate recycling and repair
- Longevity and maintenance (durable, repairable, timeless, user-friendly)
- Recycling instructions and take-back programs

# Deep Dive

## Criteria and non-criteria based approaches:

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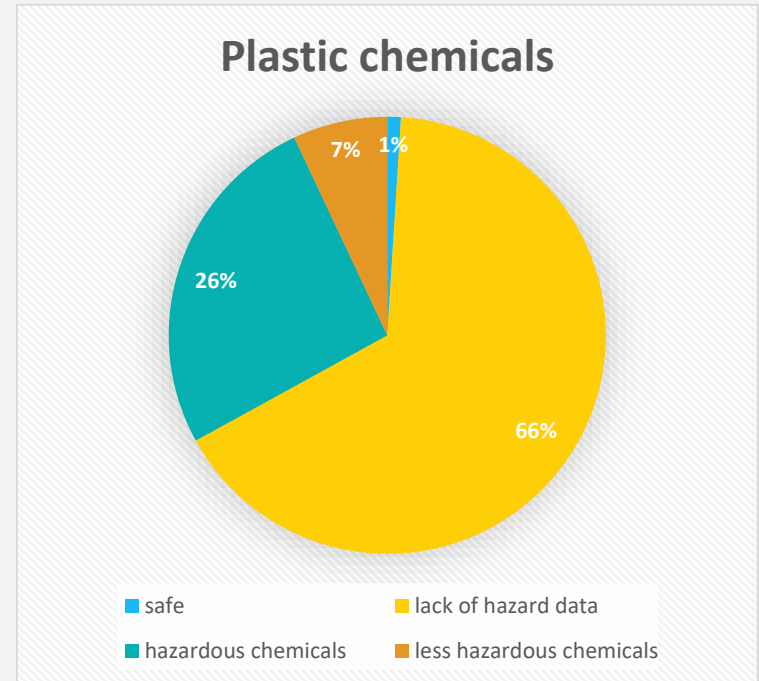
Highly contested issue: some countries do not want the Treaty to cover this issue at all!

**Focus of this session!**

# The Problem with Chemicals and Polymers in Plastics

## Polymers and Additives

- Plastics made from polymers and various additives.
- Over **16,000 chemicals** potentially used in plastics.
- **10,560 chemicals** lacking hazard data.
- **4,200 chemicals** are hazardous: persistent, bioaccumulative, mobile, and toxic.



Source: data from (Wagner et al. 2024)



# Most commonly used hazardous plastic chemicals

| Chemical                                   | Application / impacts   |
|--|---|
| Bisphenols (e.g., BPA)                     | <ul style="list-style-type: none"> <li>• Water bottles, food storage containers, and the linings of food cans.</li> <li>• Adversely effects reproductive capacities of women.</li> </ul>  |
| Phthalates                                 | <ul style="list-style-type: none"> <li>• Vinyl flooring, shower curtains, and children's toys.</li> <li>• reproductive disorders, endocrine disruptors, asthma in children, cardiovascular diseases, obesity in women.</li> </ul>   |
| Polybrominated diphenyl ethers (PBDEs)     | <ul style="list-style-type: none"> <li>• Flame retardants in electronics, furniture, and building materials.</li> <li>• persistent organic pollutant (POP) under the Stockholm Convention: persistence and toxicity</li> <li>• endocrine disruption, problems caused in the development of the nervous system, and of the reproductive system.</li> </ul> |
| Per- and polyfluoroalkyl substances (PFAS) | <ul style="list-style-type: none"> <li>• Non-stick cookware, water-repellent sports gear, stain-resistant carpets, and some firefighting foams.</li> <li>• accumulate in specific organs such as the liver, kidney, or brain, causing cancer, deaths of new-born children, and endocrine disruptions, delaying physical developments.</li> </ul>          |
| Polycyclic aromatic hydrocarbons (PAHs)    | <ul style="list-style-type: none"> <li>• Released from the degradation of certain plastics and found in coal tar, crude oil, and some pesticides.</li> <li>• cause cancer, mutations in genes, toxic for reproduction.</li> </ul>   |
| Heavy metals such as Lead and Cadmium      | <ul style="list-style-type: none"> <li>• heavy metals used as stabilizers or colorants in plastics, particularly in PVC products.</li> <li>• negatively impact the brain and the nervous system, along with several other organs. also toxic for the aquatic environment.</li> </ul>  |
| Chlorinated paraffins (SCCPs/MCCPs/LCCPs)  | <ul style="list-style-type: none"> <li>• Secondary plasticizers and flame retardants in PVC formulations. Found in products like PVC cables and flooring. SCCPs are also listed as POPs under the Stockholm Convention.</li> </ul>  |

# Exposure and effects on circularity

## Exposure Across the Lifecycle

- Exposure occurs at all stages:
  - **Production:** risks to workers and nearby communities.
  - **Use:** chemicals leach into food, air, and through skin contact.
  - **End-of-life:** chemicals leach from waste, contaminating the environment.

## Chemicals of Concern Influence Circularity

- Complicate recycling processes and damage infrastructure.
- Accumulate in recycled materials, making them unsafe.
- **Crucial to address these chemicals to ensure the transition towards a sustainable plastics economy.**

# Exposure across sectors

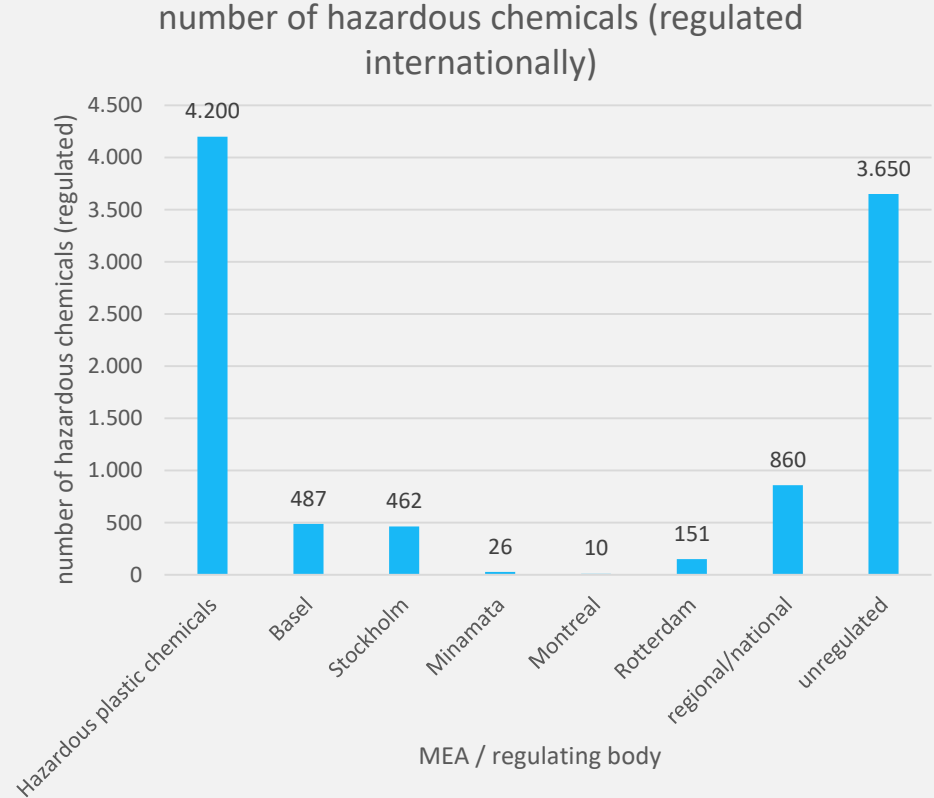
| Sector  | Chemicals  |
|---|--|
| Toys and Children's Products                  | <ul style="list-style-type: none"> <li>Hazardous substances like BPA, heavy metals, and phthalates.</li> <li>Higher vulnerability in children due to ingestion and low body weight.</li> <li>Developing countries often lack regulatory capacities.</li> </ul> |
| Furniture                                     | <ul style="list-style-type: none"> <li>Contains flame retardants, many of which are persistent organic pollutants (POPs).</li> <li>Increased exposure during fires.</li> <li>Efforts to regulate and limit use of hazardous flame retardants</li> </ul>        |
| Packaging (Including Food-Contact Materials): | <ul style="list-style-type: none"> <li>Over 1,000 chemicals, including 325 hazardous ones.</li> <li>Chemicals can migrate into food and human bodies.</li> <li>Major contributor to environmental pollution and microplastics.</li> </ul>                      |
| Electrical and Electronic Equipment (EEE):    | <ul style="list-style-type: none"> <li>Contaminated with legacy additives, including POPs.</li> <li>Difficult to recycle; hazardous chemicals enter consumer products.</li> <li>Bans on harmful substances in some regions, but not widespread.</li> </ul>     |

| Sector                                  | Chemicals   |
|---|---|
| Transport                               | <ul style="list-style-type: none"> <li>Increased plastic content in cars; VOC emissions degrade air quality.</li> <li>Significant pollutants include BFRs, OPFRs, and phthalates.</li> <li>Environmental contamination from tires and end-of-life plastic waste.</li> </ul>           |
| Personal Care and Household Products    | <ul style="list-style-type: none"> <li>Exposure through skin contact, inhalation, and ingestion.</li> <li>Contains additives like microbeads and silicone-based resins.</li> <li>Regulations in place in some regions to control exposure.</li> </ul>                                 |
| Medical Devices                         | <ul style="list-style-type: none"> <li>Single-use plastics like PVC with DEHP, toxic to reproduction.</li> <li>High exposure risks, especially to infants.</li> <li>Harmful chemicals released when incinerated improperly.</li> </ul>  |
| Building Materials                      | <ul style="list-style-type: none"> <li>Hazardous chemicals in sealants and paints.</li> <li>Legacy chemicals in older constructions pose exposure risks.</li> <li>Degrade indoor air quality and complicate waste management.</li> </ul>  |
| Synthetic Textiles                      | <ul style="list-style-type: none"> <li>Made from polyester, nylon, acrylic; require flame retardants.</li> <li>Contain POPs, not labelled, complicating recycling and safety.</li> <li>Used in vehicles, public spaces, and protective clothing.</li> </ul>                           |
| Agriculture, Aquaculture, and Fisheries | <ul style="list-style-type: none"> <li>Extensive use of plastics for enhancing crop yields and food security.</li> <li>Difficult to collect and recycle, leading to soil contamination.</li> <li>Harmful chemicals released through open burning and pesticide containers.</li> </ul> |

# The Global Dimension

## Existing Multilateral Environmental Agreements (MEAs)

- Current MEAs cover only a fraction of hazardous chemicals in plastics.
- Basel, Rotterdam, Stockholm, and Minamata Conventions.
- Approximately 4,200 hazardous chemicals identified.
- Only about 6% regulated under these agreements.
- Need for comprehensive global regulations.



Source: data from (Wagner et al. 2024)

# Current State of INC Negotiations

The [Zero Draft](#) outlined three options on how chemicals and polymers of concern could be regulated under the Global Plastics Treaty:

1. **Each Party** must take steps to **prohibit and eliminate** the use of certain chemicals in the production of plastics by **specified dates**, as outlined in **an annex** of the Treaty with exceptions noted in that annex. Additionally, each Party must also prohibit and **eliminate** the **production, sale, distribution, import, or export of plastics containing these chemicals** by the same dates, again with specified exceptions.
2. **Parties** must take steps to **minimize** and, **if possible, eliminate** harmful chemicals in plastics that could negatively impact human health or the environment, or hinder safe management of plastics throughout their life cycle. Additionally, **each Party** must **regulate or prohibit** the use of **specific chemicals listed in an annex** and include these measures in their **national plans**.
3. **Each Party** must take steps to **prohibit or regulate** the use of harmful chemicals in plastics that could affect human health or the environment, or hinder their safe management, **according to criteria in an annex of the Treaty**. These measures must be included in the **national plan** as outlined in the part of the Treaty regarding national plans.

The differences among the options refer to:

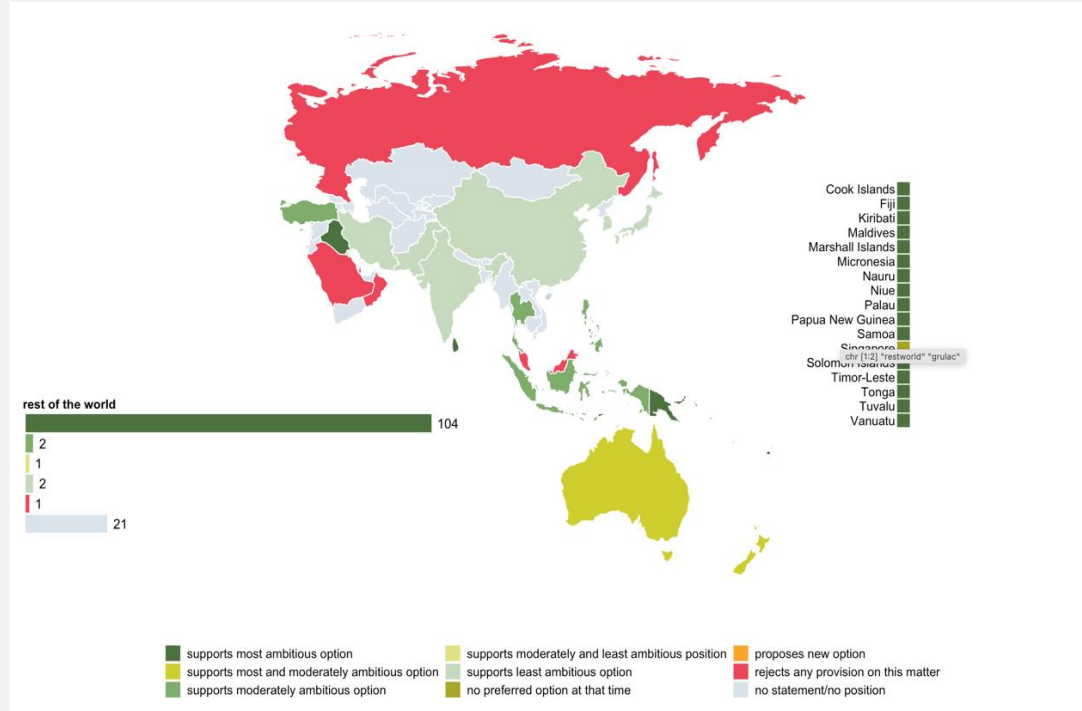
- the kind of **legal obligation**, i.e. an individual legal obligation (1, [2] and 3) or a collective legal obligation to act (2),
- the provisions laid out in the respective **annexes**; i.e. timelines (1), specific chemicals (2) or criteria (3)
- the **extent of regulation**, i.e. whether chemicals of concern in plastics should be prohibited and eliminated (1), minimized and only eliminated if possible (whereby judgement of the possibility for eliminations will lie with the states) (2), or either prohibited or merely regulated (3)
- Whether **the same global goal** is set for all countries, i.e. top-down (1) or whether countries themselves **set their own, nationally determined goals, taking into account national circumstances** in national plans, i.e. bottom-up (2 and 3)

# Treaty Formulations and levels of ambition

| Formulation  |
|--|
| [no provision]   |
| [Each Party] [Parties]   |
| [shall] [should] [is encouraged]   |
| [and polymers]   |
| [in [plastics and] plastic products]   |
| [to prohibit or] to regulate, [as appropriate]   |
| [hazardous] [that may present a demonstrated risk of concern to human health or the environment] |
| [at any stage of] [throughout] the lifecycle   |
| [and group of chemicals]   |
| [listed in part II of annex A] [based on the criteria contained in annex A]                      |

# Contesting views in the Asia-Pacific Region

- Bahrain, Russia, Saudi Arabia, Oman, Qatar, and Malaysia **rejected any provision** on chemicals and polymers of concern.
- Iraq, Sri Lanka, Papua New Guinea as well as the Pacific Small Island Developing States (SIDS), **supported the most ambitious option**.
- Iran, Pakistan, India, China, and Japan **supported the least ambitious options**
- **26 countries had not voiced any preferences prior to or during INC-3**



# Key Messages

- Chemicals in plastics are a serious and complex problem.
- Negative impact on circular economy efforts.
- Existing MEAs are insufficient.
- INC negotiations need significant progress.
- Issue highly relevant for and contested in the Asia-Pacific region.

## **In Conclusion: protect human health and the environment**

- Urge stakeholders, policymakers, and industry leaders to support ambitious measures to address hazardous chemicals in plastics.
- Need for comprehensive global regulations.
- Support transition to a circular plastics economy.



# Q&A

- Open to questions regarding issues and solutions related to chemicals and polymers of concern in plastics.