ANATOMY OF PLASTICS

WHAT'S IN MY PLASTICS?

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1. **MONOMERS AND POLYMERS**
constitute main building blocks of plastic material

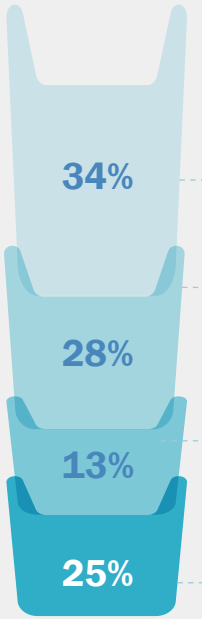
2. **ADDITIVES**
bring desired functionality to the plastic material

3. **OTHER INTENTIONALLY ADDED SUBSTANCES**
such as starting materials and catalysts

4. **NON-INTENTIONALLY ADDED SUBSTANCES**
such as solvents, cleaning agents, or impurities from manufacturing or recycling

BREAKDOWN
most widely produced plastic additivies*

*Source: Geyer et al. 2017



Plasticizers
to make plastic softer and flexible
e.g. phthalates, chlorinated parafins

Fillers
that occupy space without changing functional properties
e.g. mica, talc or clay

Flame retardants
to reduce flammability and prevent spread of fire - e.g. brominated and chlorinated flame retardants

Other
including colorants, antioxidants, heat and light stabilizers, lubricants, biocides or antistatic agents

Source: United Nations Environment Programme and Secretariat of the Basel, Rotterdam and Stockholm Conventions (2023). **Chemicals in plastics: a technical report.** Geneva.

CHEMICALS IN PLASTICS
PRIORITY USE SECTORS

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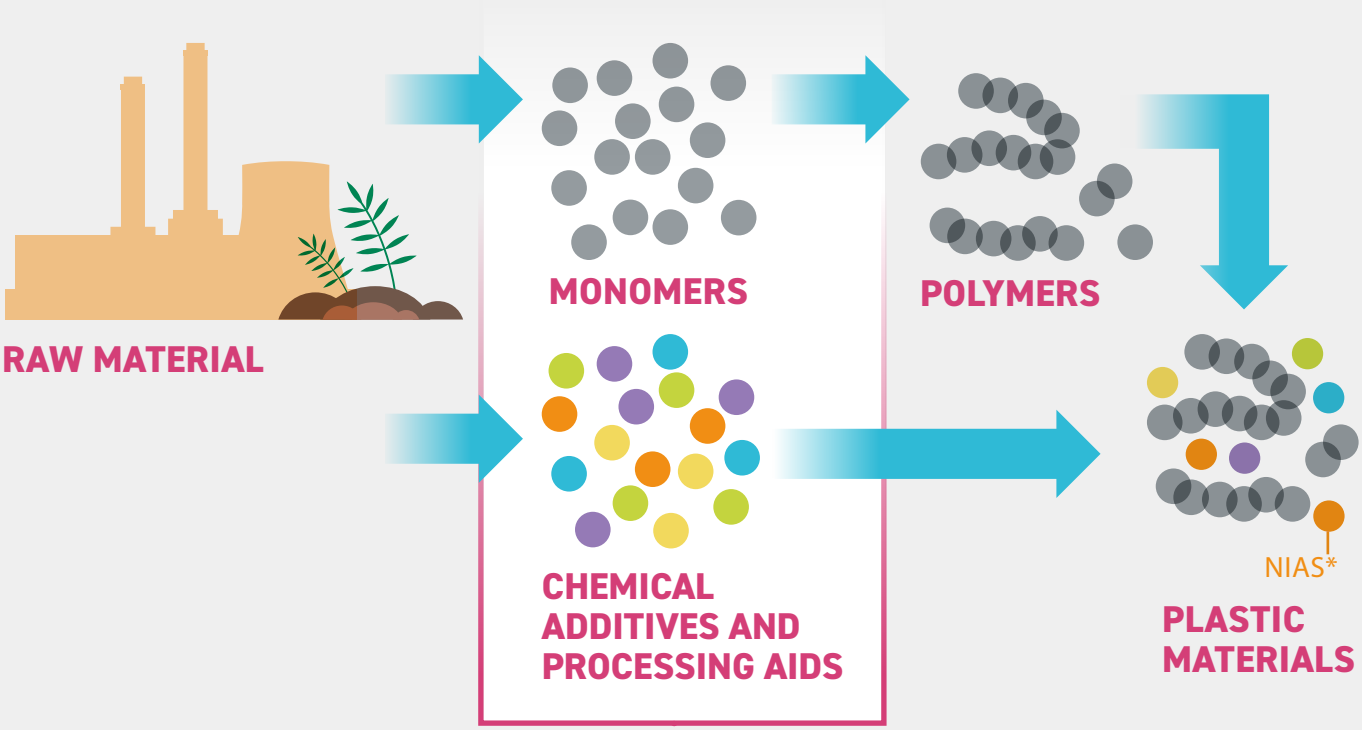
Source: United Nations Environment Programme and Secretariat of the Basel, Rotterdam and Stockholm Conventions (2023). **Chemicals in plastics: a technical report.** Geneva.

CHEMICALS IN PLASTICS
OVERVIEW

Source: United Nations Environment Programme and Secretariat of the Basel, Rotterdam and Stockholm Conventions (2023). **Chemicals in plastics: a technical report.** Geneva.



>13,000 so far identified or detected in plastics as monomers, additives and processing aids

>7,000 analyzed for their hazardous properties

>3,200 of potential concern

*NIAS = non-intentionally added substances, including (1) break-down products of polymers, additives and other chemicals in plastics, (2) impurities, (3) contaminants from processing such as production and recycling, and (4) reaction byproducts.

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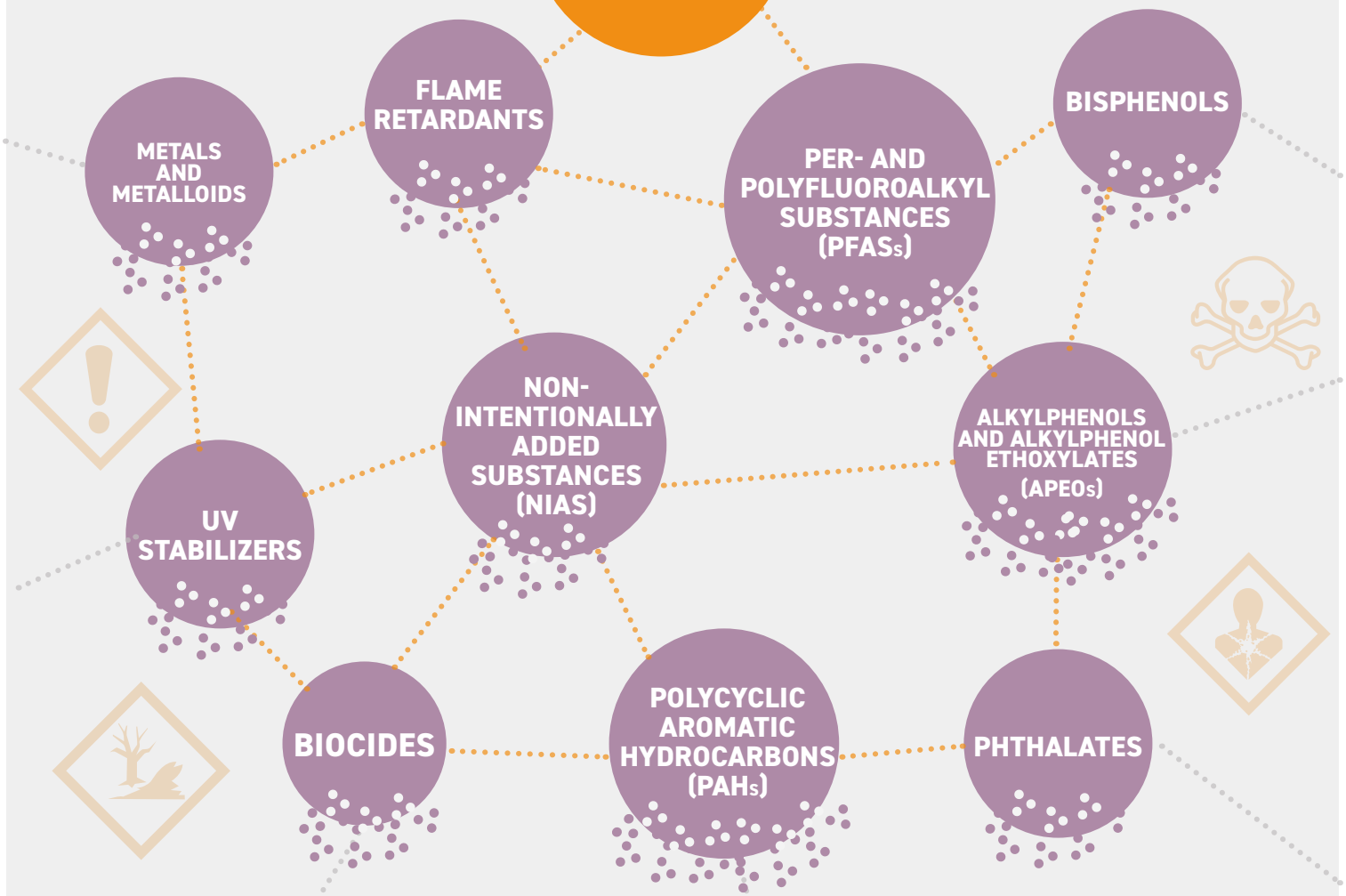
CHEMICALS OF CONCERN
IN YOUR PLASTICS

>13,000
so far identified or detected in plastics as monomers, additives and processing aids

>7,000
analyzed for their hazardous properties

>3,200
chemicals of potential concern



Source: United Nations Environment Programme and Secretariat of the Basel, Rotterdam and Stockholm Conventions (2023). **Chemicals in plastics: a technical report.** Geneva. and Aurisano et al. 2021; Wiesinger et al. 2021

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HUMAN EXPOSURE TO CHEMICALS IN PLASTICS

SOURCES

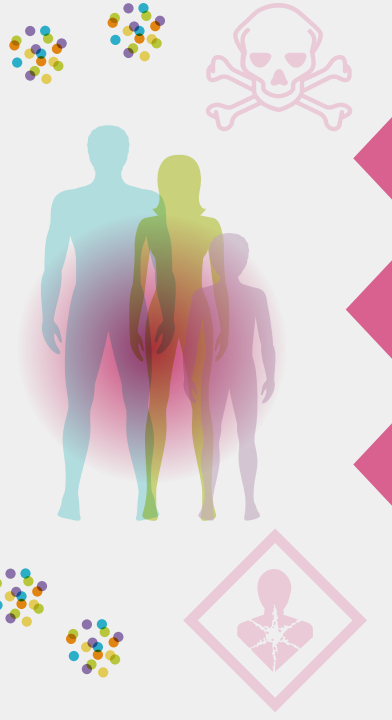
EVERYDAY PLASTIC PRODUCTS, e.g. plastic-based food contact materials, building materials, electronics, textile, clothing and personal care and household products

CHILDREN'S products e.g. toys, clothing or furniture.

OCCUPATIONAL exposure at various stages of the plastic value chain

EXPOSURE PATHWAYS examples

- inhalation of contaminated air
- ingestion of contaminated food, water and dust
- dermal contact



ADVERSE HEALTH EFFECTS examples

- abnormal hormone functions
- reduced fertility
- damaged nervous system
- hypertension/ cardiovascular disease
- lung and liver cancer

Source: United Nations Environment Programme and Secretariat of the Basel, Rotterdam and Stockholm Conventions (2023). **Chemicals in plastics: a technical report.** Geneva.

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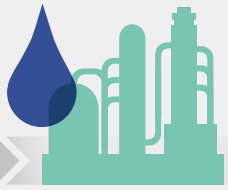
HAZARDOUS CHEMICALS
ALONG THE PLASTIC LIFE CYCLE

Source: United Nations Environment Programme and Secretariat of the Basel, Rotterdam and Stockholm Conventions (2023). **Chemicals in plastics: a technical report.** Geneva.

Hazardous chemicals can be released from plastics along the entire life cycle, finding their way to air, water and soils.

EXTRACTION
and processing of raw materials



PLASTIC PRODUCTION
Chemicals are added e.g. as additives to make material stronger, softer, colorful or fire resistant

PLASTIC PRODUCT MANUFACTURE
Chemicals are added to enhance the product properties

RECYCLING
Additives can make recycling of plastics challenging, and limit material circularity e.g. by contaminating new materials

DISPOSAL
Open-burning of plastic waste can release toxic chemicals such as dioxins and furans

USE OF PLASTIC PRODUCT
Chemicals can be released during the use of plastic products

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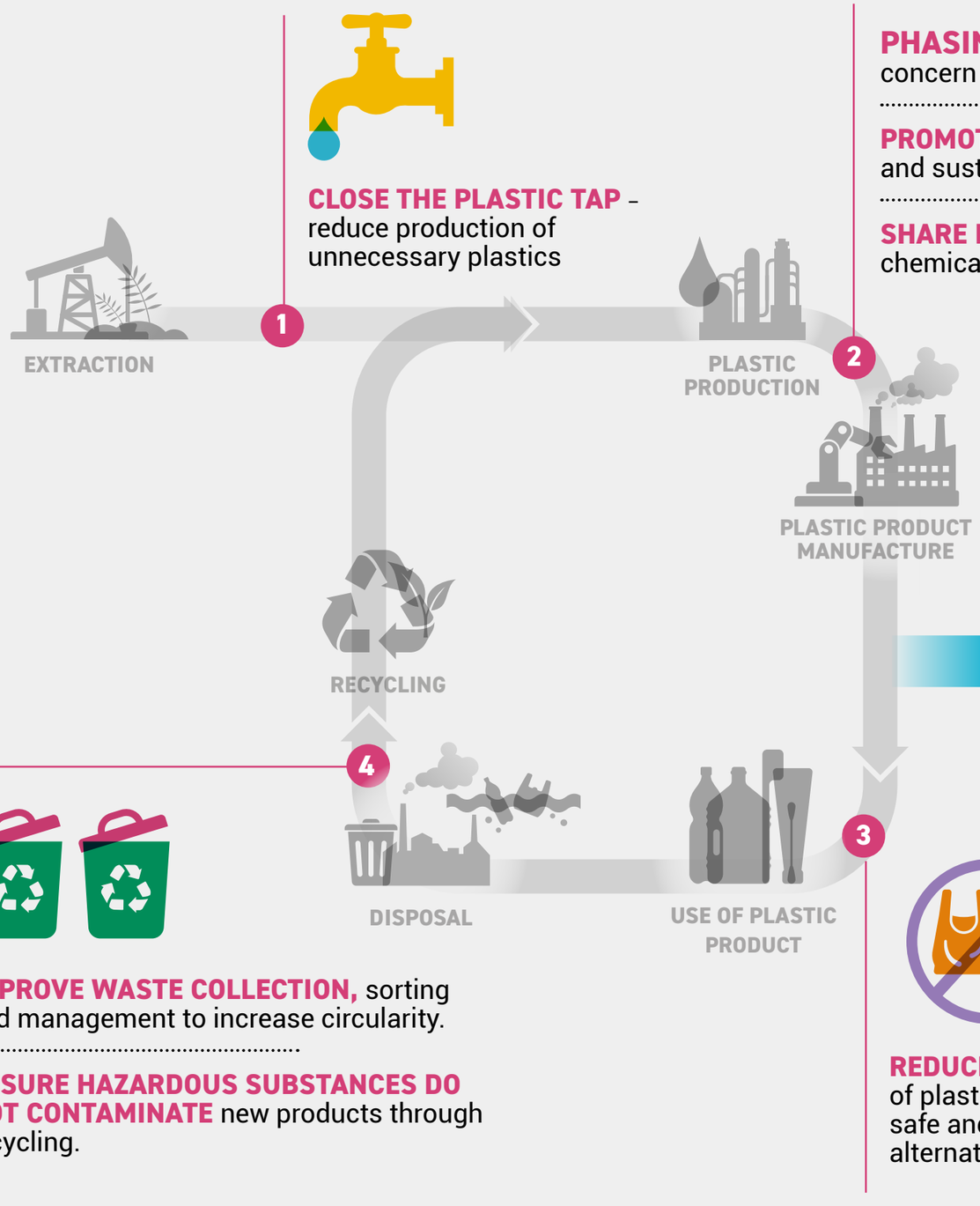
OPTIONS FOR ADDRESSING CHEMICALS ALONG THE PLASTIC LIFE CYCLE

Source: United Nations Environment Programme and Secretariat of the Basel, Rotterdam and Stockholm Conventions (2023). **Chemicals in plastics: a technical report.** Geneva.



CLOSE THE PLASTIC TAP – reduce production of unnecessary plastics

PHASING-OUT chemicals of concern

PROMOTE AND DEVELOP safe and sustainable alternatives

SHARE INFORMATION on the chemicals in plastics

IMPROVE WASTE COLLECTION, sorting and management to increase circularity.

ENSURE HAZARDOUS SUBSTANCES DO NOT CONTAMINATE new products through recycling.

REDUCE OVERALL USE of plastic products, encourage safe and sustainable alternatives.

OVERARCHING OPTIONS
along entire plastic life cycle

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REGULATIONS:

ADDRESS fragmentation and gaps in legal frameworks to cover chemicals along plastic life cycles

RESTRICT chemicals of concern in plastics globally

SCIENCE:

DEVELOP more robust methodologies to assess human and ecosystem exposure, and further research on impacts, in particular with respect to mixtures and multiple exposure pathways.

TRANSPARENCY:

IMPROVE transparency and information-sharing on chemicals along the plastic value chain

AWARENESS RAISING:

RAISE awareness on workplace safety and exposure reduction measures along the plastic value chain