



“Is there any such thing as a
circular economy for
plastics?”

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School of People Environment and Planning

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Circular economy: Two key pillars

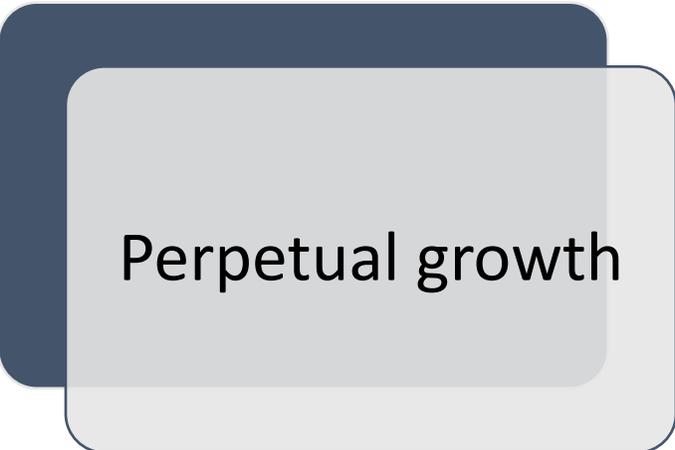
The protection of
natural capital

The elimination of negative
externalities

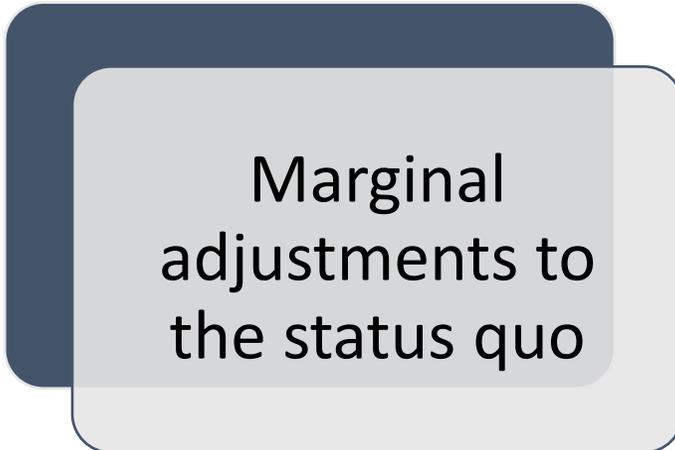




Widely varying definitions of circular economy today



Perpetual growth



Marginal
adjustments to
the status quo



Unjustified
reliance on
recycling
technologies

Life cycle

“the series of changes that the members of a species undergo as they pass from the beginning of a given developmental stage to the inception of that same developmental stage in a subsequent generation.”



Plastic pollution is a significant part of the full life cycle of plastics

Table 1. Current working definitions of plastics pollution having a full life cycle perspective.

| | | |
|---|---|---|
| <p>2020 United Nations Conference on Trade and Development (UNCTAD) Communication on Trade in Plastics JOB/TE/63</p> | <p>2022 OECD Global Plastics Outlook³</p> | <p>2022 Appendix I UNEP Plastics Science UNEP/PP/INC.1/7</p> |
| <p>“Plastic pollution” is considered one of the most pressing global environmental challenges alongside climate change and biodiversity loss. This is mainly due to the polluting effects of plastics production and disposal processes on the air, water and ecosystems, as well as on human and animal health. Plastic production, disposal and waste management are responsible for significant greenhouse gas emissions, including through open-air incineration and energy intensive recycling and incineration facilities.</p> | <p>“Plastic pollution” Broadly, all emissions and risks resulting from plastics production, use, waste management and leakage.</p> | <p>“Plastic pollution” is defined broadly as the negative effects and emissions resulting from the production and consumption of plastic materials and products across their entire life cycle. This definition includes plastic waste that is mismanaged (e.g., open-burned and dumped in uncontrolled dumpsites) and leakage and accumulation of plastic objects and particles that can adversely affect humans and the living and non-living environment.</p> |

Plastics as a novel entity/chemical pollution is exceeding planetary boundaries

Until now the planetary boundary for chemical pollution had not been quantified

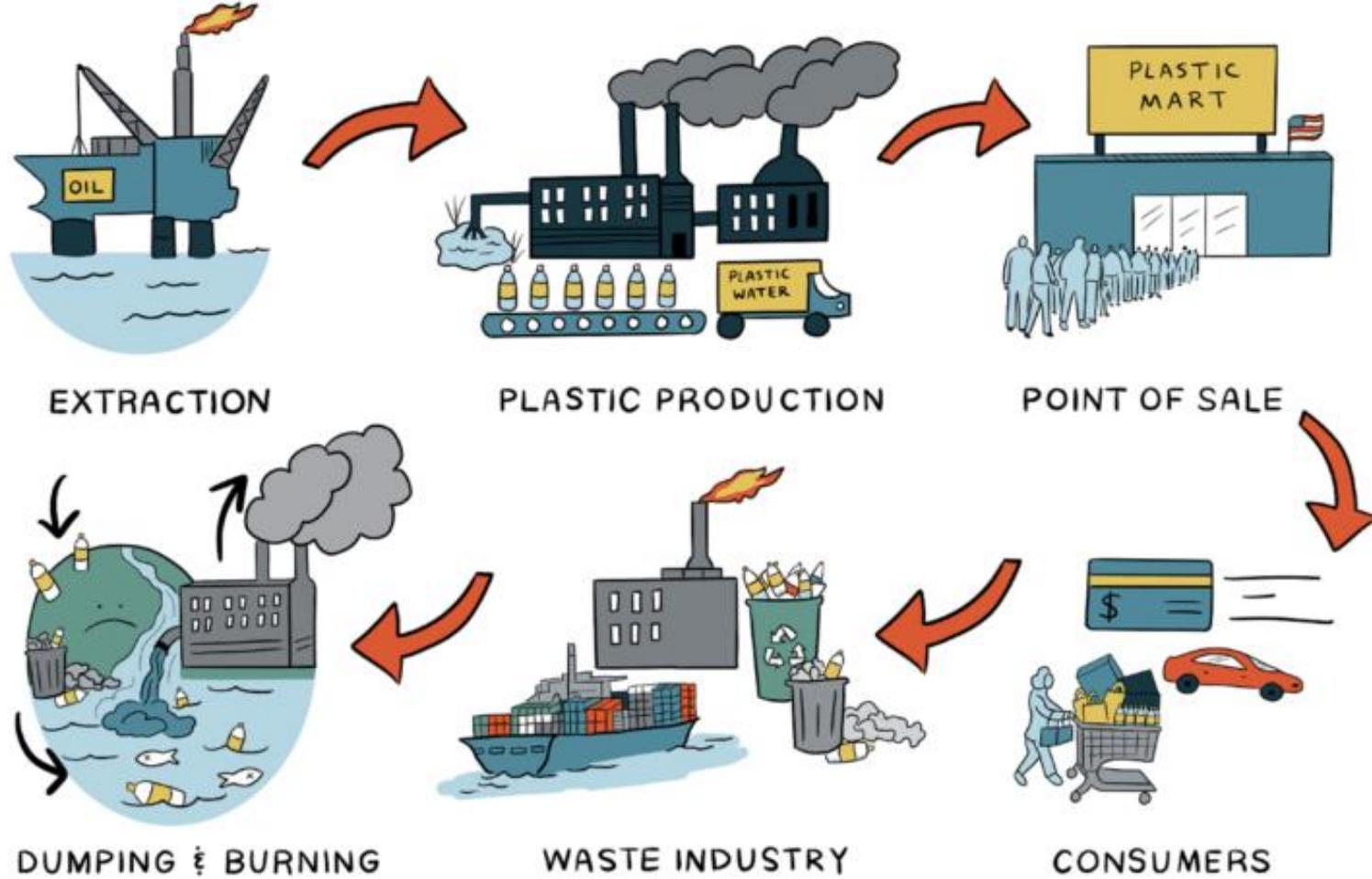


Now it has been – and the news is devastating



The updated Planetary Boundaries framework (2022) showing 11 boundaries transgressed, now including "novel entities." Credit: Stockholm Resilience Centre/Auste

PLASTIC POLLUTION LIFECYCLE





**UNEA-5.2: Resolution
“End Plastic Pollution:
Towards an International
Legally Binding
Instrument”**

An **intergovernmental negotiating committee (INC)** to develop an international legally binding instrument:

- **plastic pollution in all environments**, including **microplastics**
- **comprehensive approach** addressing the **full lifecycle of plastics**, including provisions on:
 - **sustainable production and consumption of plastics**
 - **product design**
 - **environmentally sound waste management**
 - **national action plans**
 - **reporting**
 - **technical and financial assistance**

368 million metric tons of virgin plastics are produced annually, with production expected to double by 2040

Only 9% of all plastics ever produced have been recycled, and 12% have been incinerated

79% of all plastics produced have accumulated in landfills or the environment

Global plastic production...

Million tonnes, 2013



...and future trends

Million tonnes



Source: Ryan, A Brief History of Marine Litter Research, in M. Bergmann, L. Gutow, M. Klages (Eds.), Marine Anthropogenic Litter, Berlin Springer, 2015; Plastics Europe



Why a global plastics
treaty?

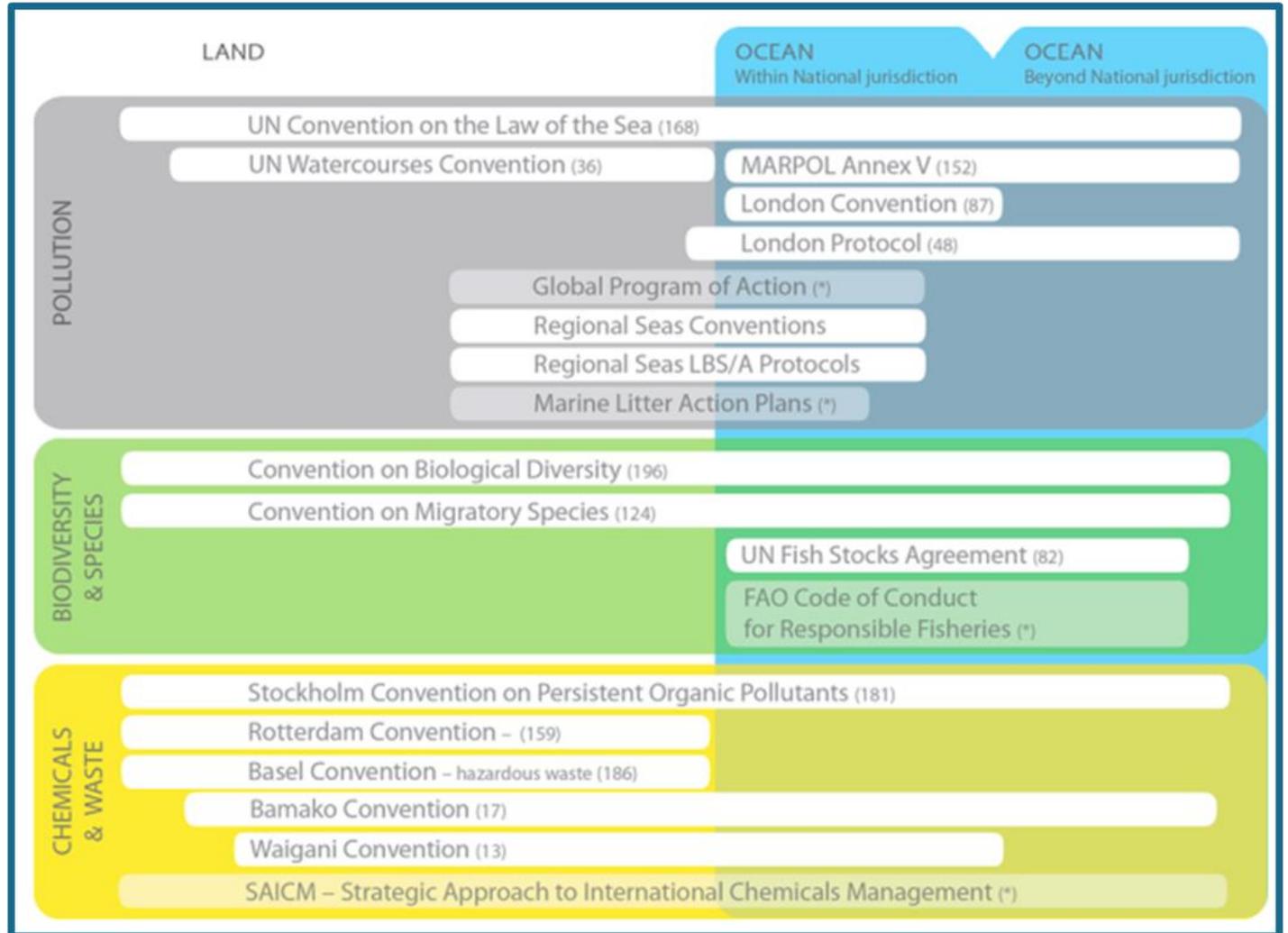
A large cargo ship is shown at sea, heavily laden with colorful shipping containers. The ship is viewed from an elevated perspective, showing its deck and the stacks of containers. The water is a deep blue-green, and the sky is a pale, overcast grey. The text "Gaps in current global governance" is overlaid in white, sans-serif font, centered on the image. A thin white horizontal line is positioned below the text.

Gaps in current global governance

Transboundary



No current agreement individually nor collectively deals with the full life cycle of plastics.



A large pile of plastic waste, including bottles, bags, and other debris, is shown under a clear blue sky. The waste is piled high, and the sky is a solid, bright blue. The overall scene is one of environmental pollution.

TUESDAY, JUNE 29, 2021

8:00 AM PST / 11:00AM EST / 6:00PM EAT

WASTE COLONIALISM

LEARN ABOUT THE GLOBAL CAMPAIGN
AGAINST WASTE EXPORTS WITH BREAK FREE FROM
PLASTIC MEMBERS IN KENYA AND THE UNITED STATES.

#breakfreefromplastic

Requires regulation at 'top of pipe':

- Extraction
- Petrochemical production
- Plastic product manufacture



FROM POLLUTION TO SOLUTION

A GLOBAL ASSESSMENT OF MARINE LITTER
AND PLASTIC POLLUTION



“Dire consequences for health, economy, biodiversity, and climate”

“Threat multiplier”

Recommends: A drastic reduction in unnecessary, avoidable and problematic plastics, and proposes an accelerated transition from fossil fuels to renewable energies, the removal of fossil fuel subsidies, and **a shift towards genuine circularity.**

Plastics in the Environment

There are many sources of plastics in the environment, including:

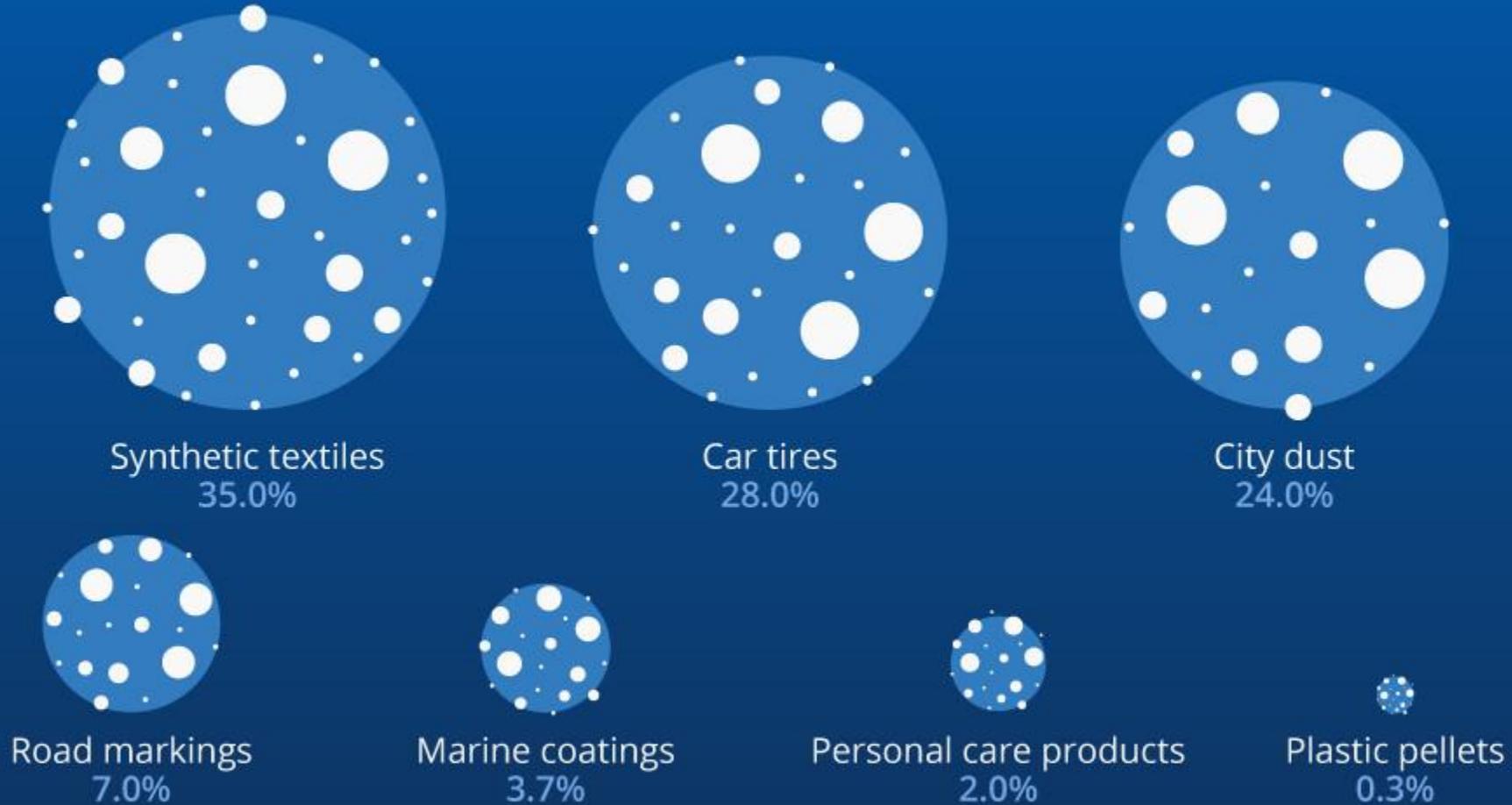


Plastics spread to the environment through, for example:



Where Do the Oceans' Microplastics Come From?

Distribution of sources of microplastics in the world's oceans



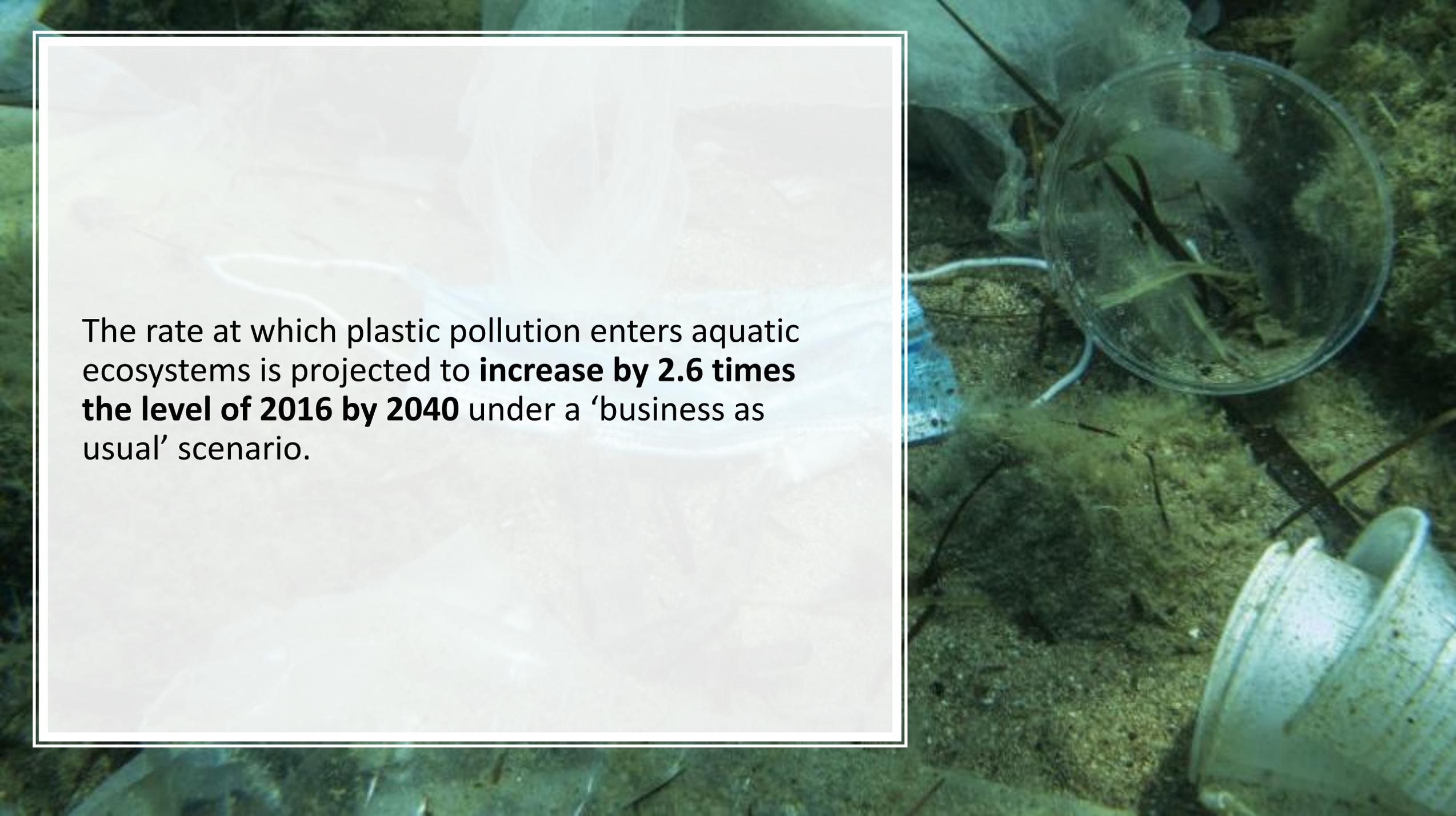
@StatistaCharts

Source: International Union for Conservation of Nature

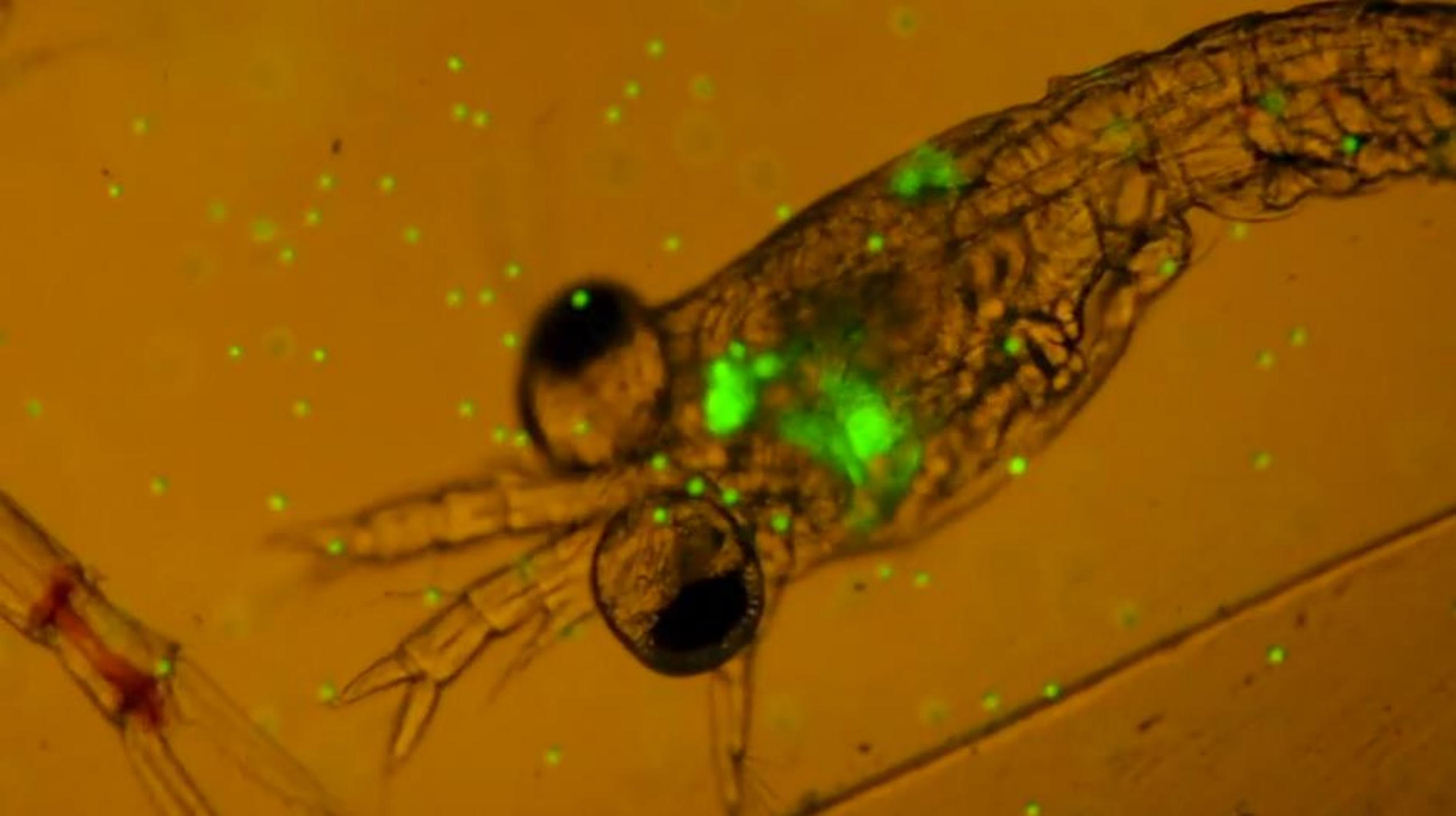
Microplastics

Found pretty much everywhere



An underwater photograph showing significant plastic pollution. A large, crumpled white plastic bag is the central focus, partially obscuring the view. To the right, a clear glass jar is overturned on the seabed, containing some green seaweed. In the lower right corner, a white plastic bucket is also overturned. The seabed is covered in dark, greenish-brown sediment and some sparse vegetation. The overall scene illustrates the impact of plastic waste on marine ecosystems.

The rate at which plastic pollution enters aquatic ecosystems is projected to **increase by 2.6 times the level of 2016 by 2040** under a 'business as usual' scenario.



Health conditions linked to chemicals associated with plastics

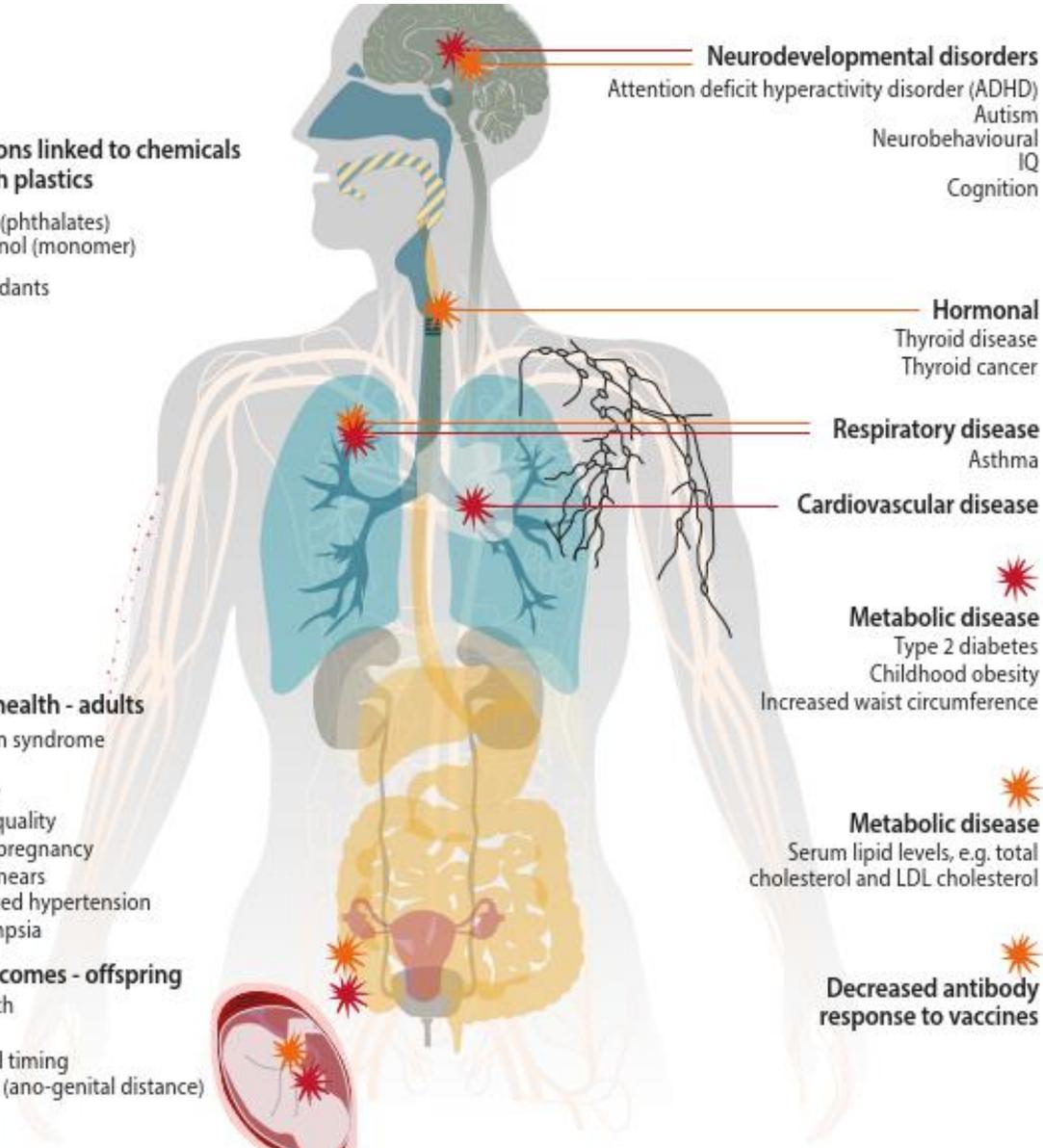
- ★ Plasticizers (phthalates) and bisphenol (monomer)
- ★ Flame retardants

Reproductive health - adults

- Polycystic ovarian syndrome
- Endometriosis
- Male sub-fertility
- Reduced sperm quality
- Delayed time to pregnancy
- Abnormal PAP smears
- Pregnancy-induced hypertension and/or pre-eclampsia

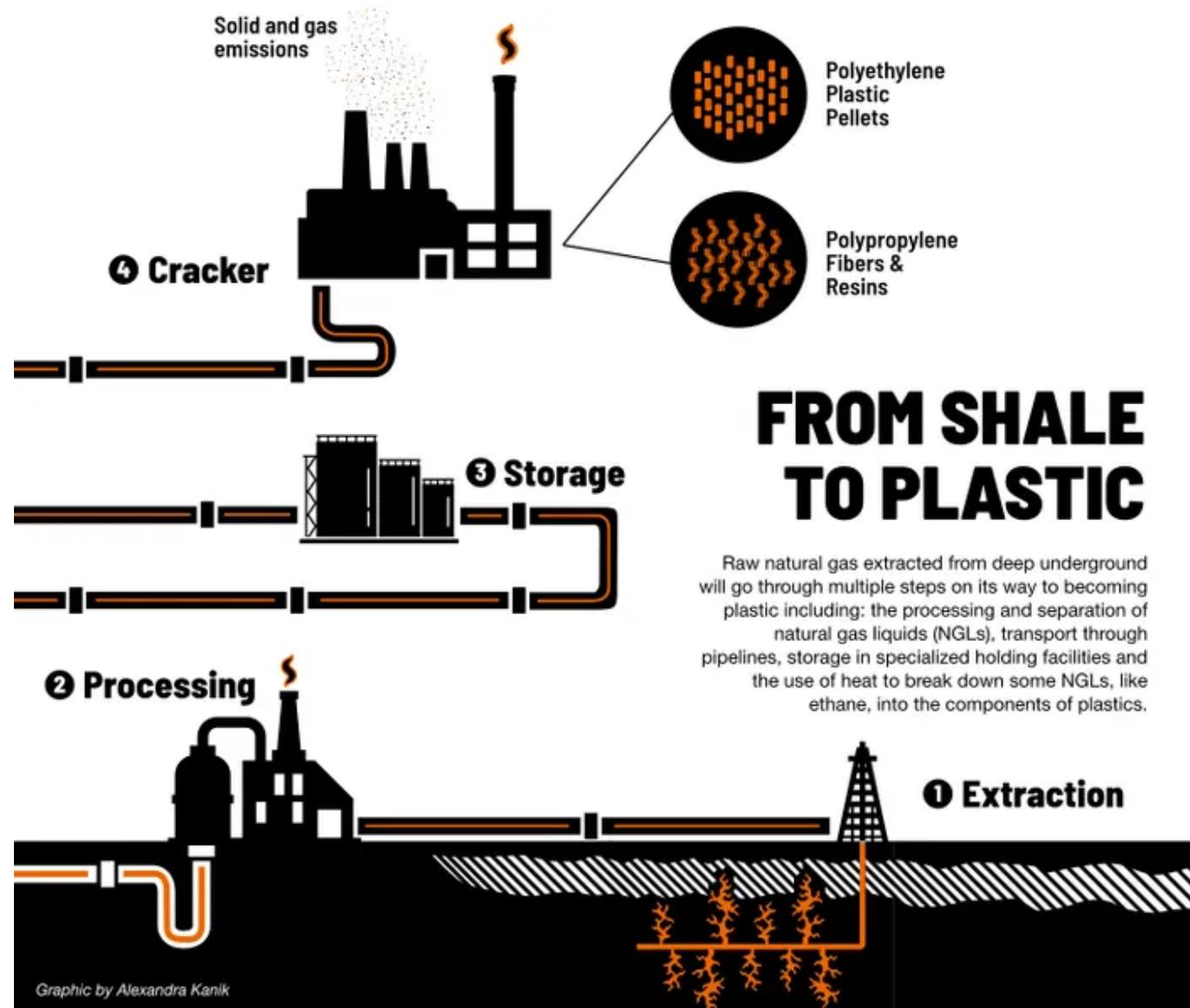
Pregnancy outcomes - offspring

- Gestational length
- Birth weight
- Delayed pubertal timing
- Genital structure (ano-genital distance)
- Pubertal onset



Human health impacts of plastics and associated chemicals

Extraction and transport



Refining and manufacture



Thermal treatment of plastics for energy production

INCINERATION

PYROLYSIS

PLASMA ARC

GASIFICATION

CHEMICAL RECYCLING

The recycling myth

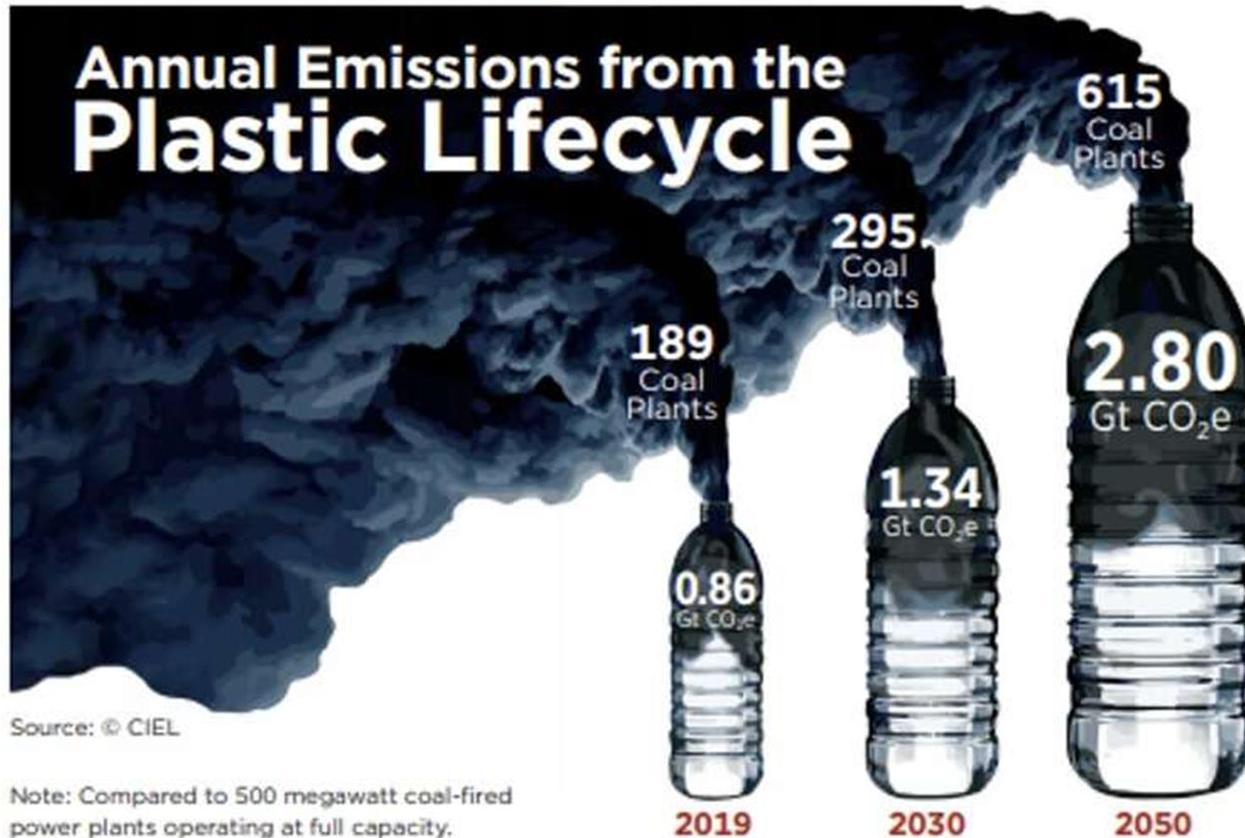
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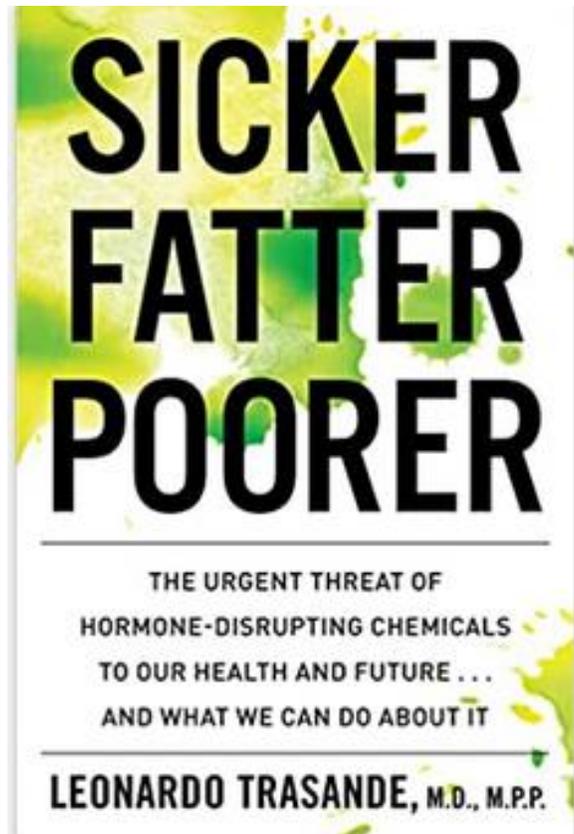
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Manufacturing and recycling do not keep fossil fuels in the ground

Emissions from the Plastic Lifecycle



Toxic plastic products and packaging



Plastic recycling could be more dangerous than you think

Toxic chemicals in recycled plastics products

New study by environmental health organizations finds brominated flame retardants in children's food contact articles and other products made of recycled plastics; call against recycling of hazardous waste

Widespread chemical contamination of recycled plastic pellets globally

September 21, 2022

“It's As If They're Poisoning Us”

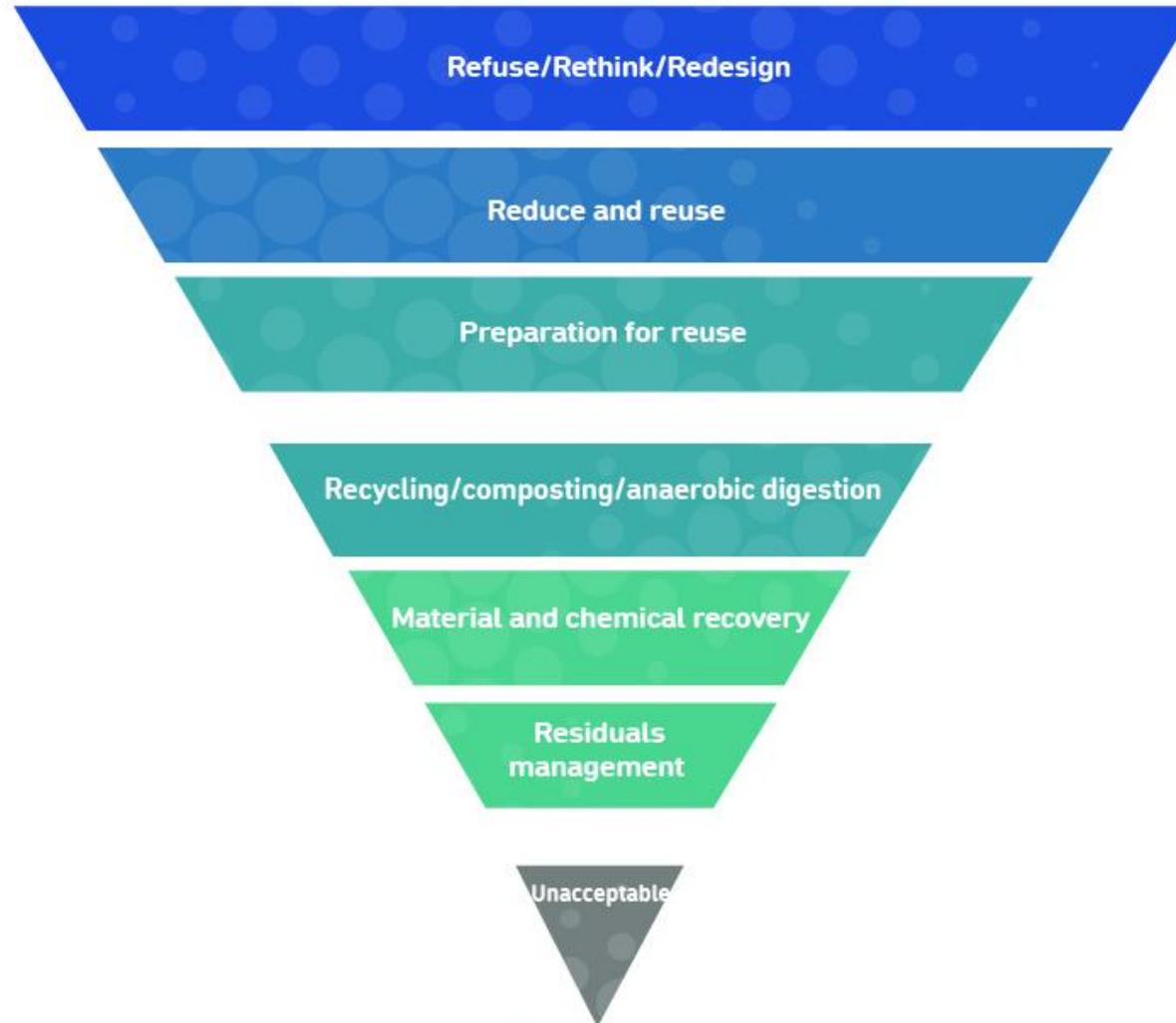
The Health Impacts of Plastic Recycling in Turkey

Recycling of plastics threatened by toxic additives, environmental and health advocates say

Plastic Recycling Schemes Generate High Volumes of Hazardous Waste

Zero Waste Hierarchy

😊 BEST USE



☹️ WORST USE

Economy

By 2040 plastic leakage into the oceans could represent a US\$ 100 billion annual financial risk for businesses .



Incompatibility of plastics in a circular economy

We need to debunk the myth that plastics 'can' be perpetually kept in use as material feedstock. They simply cannot.



Zero waste approaches and true circularity

Where everything that is produced or consumed
is returned safely to nature or society

A safe(r) circular economy for plastics in the Pacific Region

“Prevention is better than cure”

