



# Plastic & Health

THE HIDDEN COSTS  
OF A PLASTIC PLANET

## CHEMICALS IN PLASTICS

Health impacts throughout the  
lifecycle of plastics

<https://www.ciel.org/plasticandhealth/>

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Collaborative on health and the environment Webinar  
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#break  
free  
from  
plastic





# The life cycle approach



➤ Extraction



➤ Refining and manufacturing



➤ Consumer use



➤ Waste management



➤ Plastics in the environment

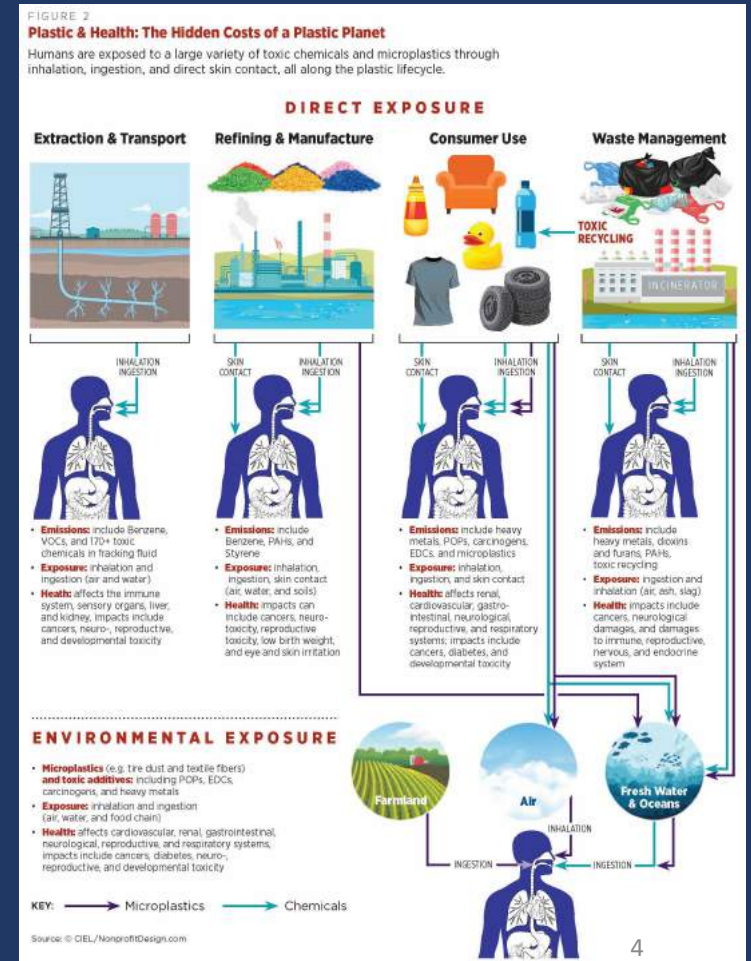
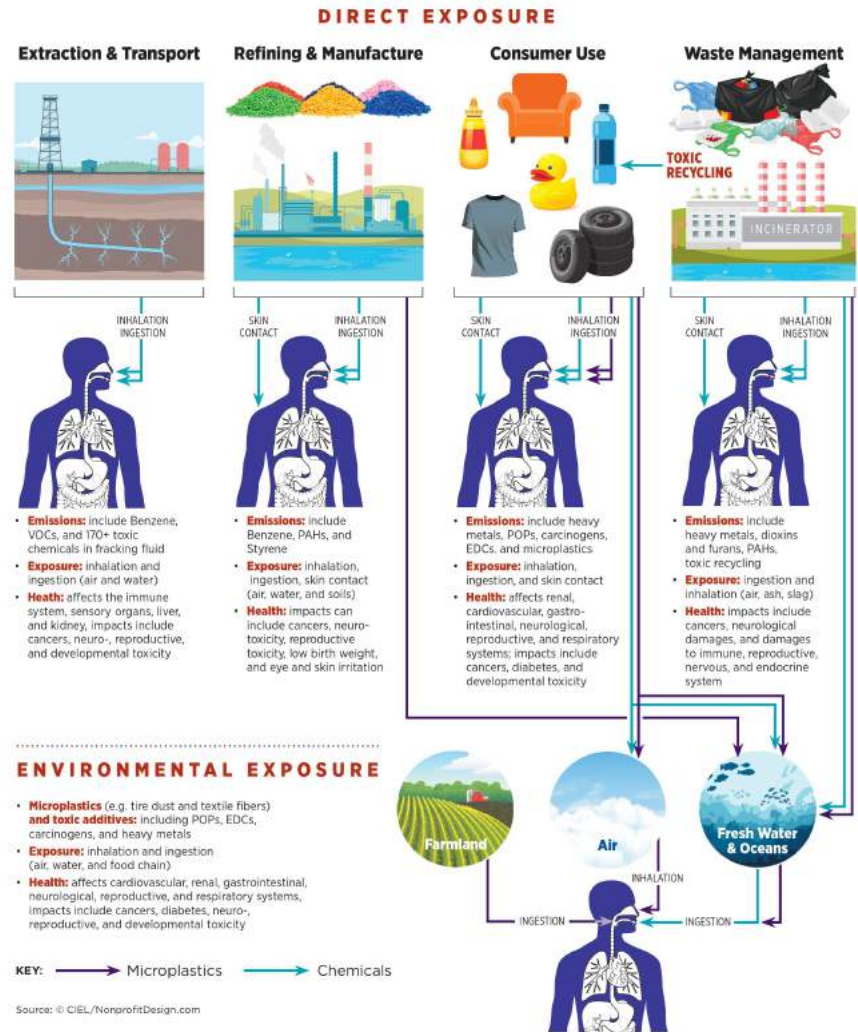


FIGURE 2

**Plastic & Health: The Hidden Costs of a Plastic Planet**

Humans are exposed to a large variety of toxic chemicals and microplastics through inhalation, ingestion, and direct skin contact, all along the plastic lifecycle.





- Benzene
- 1,3-Butadiene
- 2-Butanone
- n-Butyl Alcohol
- Carbon Disulfide
- Carbon Monoxide
- Carbonyl Sulfide
- Chlorobenzene
- Chloromethane
- Cis-1,2-dichloroethane
- Cyclohexane
- Cumene
- Dichlorodifluoromethane
- 1,2-Dichloroethane
- Diethyl Benzene
- Ethane
- Ethyl Benzene
- Ethylene
- Ethylene Oxide
- Formaldehyde
- n-Heptane
- n-Hexane
- Methane
- Methylene Disulfide
- Nitrogen Oxide
- Propane
- Propylene
- Sulfur Dioxide
- Tetrachloroethane
- 1,1,2-Trichloroethane
- Trichloroethylene
- Trifluoroethane
- 1,2,4-Trimethyl Benzene
- Toluene
- m,p-Xylene
- o-Xylene

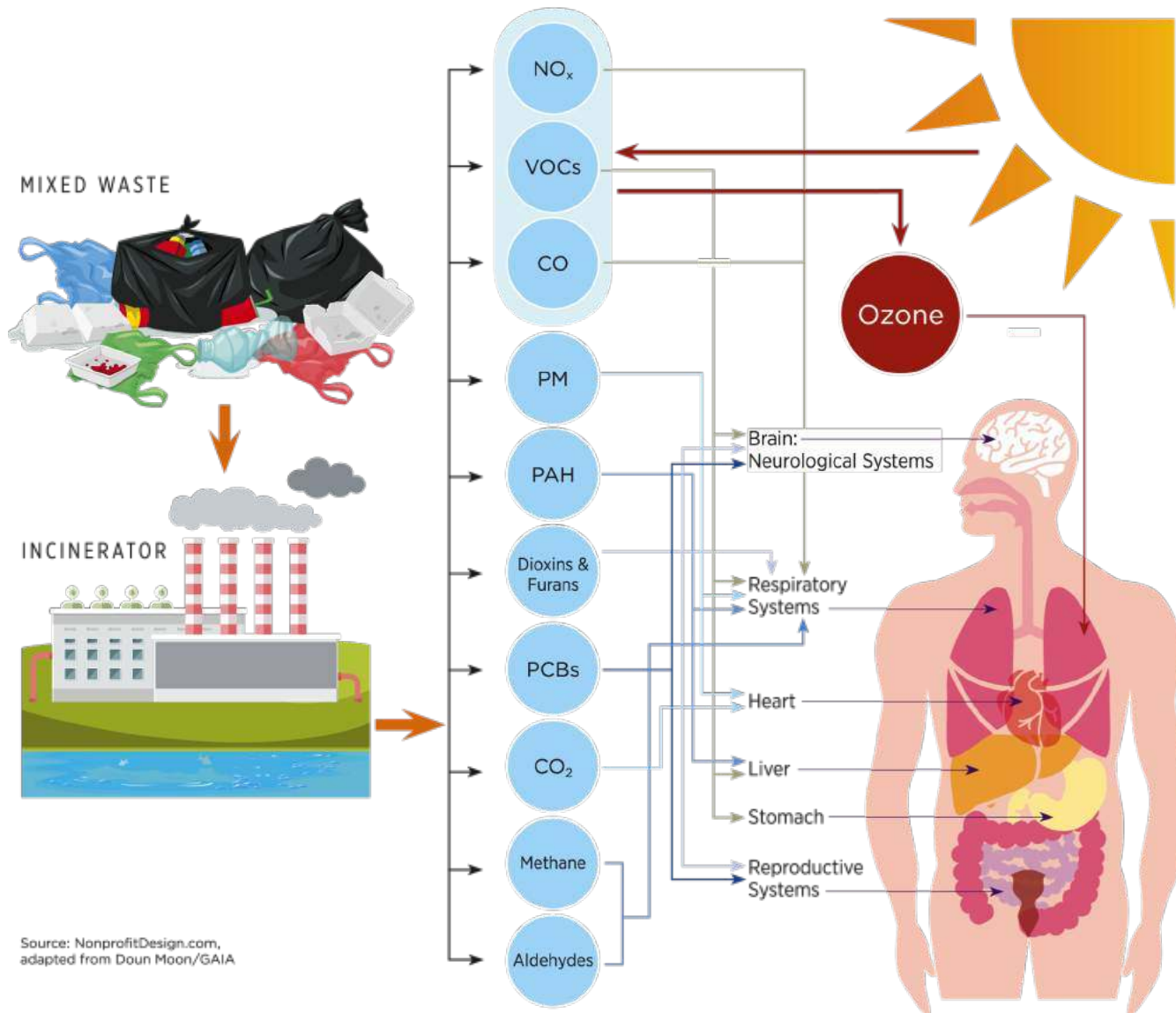
### Ranking of Some Plastic Polymer Types Based on Hazard Classification of Constituent Monomers

Polymer	Monomer(s)/additives	Relative hazard score	Recycling code	Constituents measured in NHANES?
<b>Polymers with the highest relative hazard scores</b>				
Polyurethane PUR as a flexible foam	Propylene oxide	13,844	6	
	Ethylene oxide			
	Toluene-diisocyanate			
Polyacrylamide PAN with co-monomers	Acrylonitrile	12,379	7	Acrylamide
	Acrylamide			
	Vinyl acetate			
Polyvinylchloride PVC, plasticised	With plasticizer	10,551	3	Benzyl butyl phthalate (BBP)
	<b>Benzyl butyl phthalate (BBP)</b> at 50 wt%			
Polyvinylchloride, PVC, unplasticised		10,001	3	
Polyurethane, PUR as a rigid foam	Propylene oxide	7,384	6	
	4,4'-methylenediphenyl diisocyanate (MDI)			
	Cyclopentane			
Epoxy resins DGEBCA	<b>Bisphenol A</b>	7,139	7	Bisphenol A
	Epichlorohydrin			
	4,4'-methylenedianiline			
Modacrylic	Acrylonitrile	6,957		
	Vinylidene chloride			
Acrylonitrile-butadiene-styrene ABS	Styrene	6,552	7	Styrene
	Acrylonitrile			
	1,3 butadiene			
Styrene-acrylonitrile SAN	<b>Styrene</b>	2,788	7	Styrene
	Acrylonitrile			
High impact polystyrene HIPS	<b>Styrene</b>	1,628		Styrene
<b>Polymers with the lowest relative hazard scores</b>				
Low density polyethylene LDPE	Ethylene	11	4	
High density polyethylene HDPE	Ethylene	11	2	
Polyethylene terephthalate PET	Terephthalic acid	4	1	
Polyvinyl acetate PVA	Vinyl acetate	1		
Polypropylene PP	Propylene	1	5	

### Common Toxic Chemical Additives to Plastic

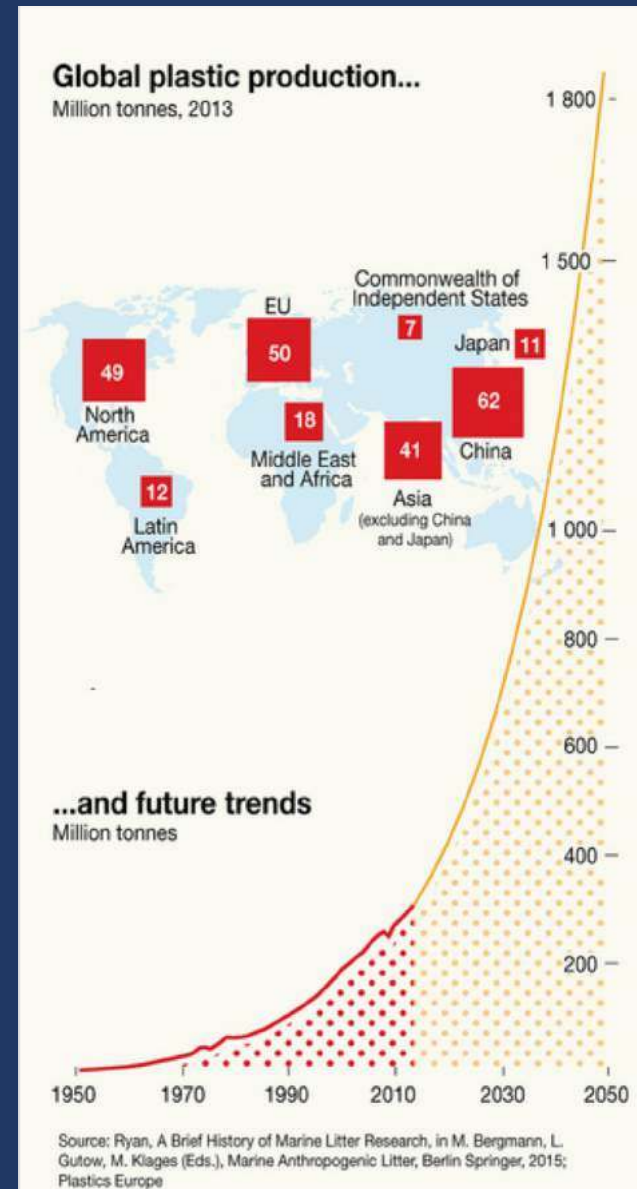
Toxic Chemical Additive	Products in Which They Can Be Found	Health Impact
<b>Acrylonitrile</b>	Drinking cups, acrylic carpet and other textiles, plastic furniture, 3-D printing, automotive parts, and appliances.	Carcinogen
<b>Bisphenol A</b>	Polycarbonate plastics, plastic tableware, dental fillings, and lenses for glasses. BPA is also used to make epoxy resins that are used as coatings in lids of glass containers and in the linings of aluminum cans. BPA is also used to coat some thermal papers.	BPA is an endocrine disrupting chemical. Breast cancer, prostate cancer, endometriosis, heart disease, obesity, diabetes, altered immune system, and effects on reproduction have all been tied to BPA's ability to disrupt the normal functioning of endocrine systems. In young children, BPA exposures before and after birth are linked to changes in brain development and behavior.
<b>Cadmium</b>	Used as a colorant and stabilizer in plastic.	Lung cancer, endometrium, and bladder and breast cancer have been associated with cadmium. Cadmium can also damage the body's cardiovascular, renal, gastrointestinal, neurological, reproductive, and respiratory systems.
<b>Flame retardants</b>	Plastic-based home furnishings (foam, upholstery, curtains and blinds) and electronics (computers, laptops, phones, televisions, and household appliances).	Some flame retardants are endocrine disrupting chemicals. Studies have also linked flame retardants to thyroid disruption, impacts on fertility and the functioning of the immune system, and harm to the development of babies' brain and nervous systems both before and after birth. Several flame retardants are banned from production or use under the Stockholm Convention because they pose an unmanageable threat to human health and the environment.
<b>Lead</b>	Lead is used as plastic stabilizers and has been found in plastic jewelry, <sup>1</sup> vinyl raingear, <sup>2</sup> lunchboxes, <sup>3</sup> and vinyl window blinds.	In children, lead can cause reduced growth both before and after birth, decreased IQ and increased attention deficit and problem behaviors. In adults, lead exposures are linked to decreased kidney function and increased risk of hypertension, nerve disorders, and memory problems. <sup>4</sup> There is no safe level of exposure to lead.
<b>Perfluorinated Substances (PFAs)</b>	Grease and stain repellent in plastic-based fabrics used for raingear, upholstery, and carpeting, and as a plastic coating on cookware.	PFOA and PFOS are linked to human diseases including pregnancy complications, low birth weight, testicular and kidney cancer, and thyroid problems. The Stockholm Convention POPRC recommended not using any of the fluorinated alternatives to PFOA and PFOS, "due to their persistency and mobility as well as potential negative environmental, health, and socioeconomic impacts."
<b>Phthalates</b>	Plasticizer used to make plastic soft and pliable.	Phthalates are endocrine disruptors. They harm the reproductive and nervous systems, especially in children before and after birth. Deformities of the penis and learning and behavior problems are all associated with phthalates exposure. <sup>5</sup> Studies have also shown that the higher the levels of phthalates are in a home, the more likely children in that home are to have asthma or other respiratory conditions. <sup>6</sup>
<b>Styrene</b> (also known as Vinyl Benzene)	Polystyrene plastics and expanded polystyrene.	Carcinogen
<b>Vinyl Chloride</b>	PVC: plastic furniture, carpet backing, packaging or wall covering.	Liver cancer
<b>SCCP</b>	Plastic consumer product, children's products.	SCCPs adversely affect the kidney, liver, and thyroid, disrupt endocrine function, and are believed to be human carcinogens. <sup>7</sup>

FIGURE 7  
**Toxic Exposure from Incineration**



Source: NonprofitDesign.com,  
 adapted from Doun Moon/GAIA

By 2025, production capacity projected to grow by 1/3<sup>rd</sup> for both ethylene and propylene.



- This new capacity would lock in a massive expansion of cheap plastic production for decades.



cc:ipegy/Pixabay

- If the boom is not addressed, it could largely undermine efforts to reduce plastics use and pollution.

# Solutions and ways forward

**Complex life cycle and variety of actors will require variety of solutions and options**

- Put human health and human rights at the core of any future approaches
- Make the invisible visible – Transparency is key
- Avoid false solutions
- Think globally, act everywhere.

# Triple COP, UNEA and beyond

Stockholm : Recycling exemptions and Low POPs waste

Basel: Norwegian amendment

UNEA: Process towards a new multilateral instrument on Plastic pollution

Learn more at <https://www.ciel.org/reports/unea-progress-on-plastics/>

Progress on Plastics Update  
Issue 11: BRS COPs 2019

## PLASTICS AT THE BRS COP

Many countries are taking steps to mitigate plastic pollution, recognizing it as a serious and rapidly growing issue of concern worldwide that needs an urgent global response. The Basel and Stockholm Conventions have a direct impact on the plastic waste trade, on standards for the management of plastic waste, and on the toxic exposure inherent in the plastic pollution crisis for large and microscopic plastics on the land and in the marine environment. The UN Environment Assembly (UNEA) had invited the Basel Convention "to increase their action to prevent and reduce marine litter and microplastics and their harmful effects," and the Basel, Rotterdam, and Stockholm Convention (BRS) Secretariat has participated in and presented at UNEA's Ad Hoc Open-Ended Expert Group on Marine Litter and Microplastics. In 2018, Norway proposed amendments to the Basel Convention annexes to bring the global trade in dirty, hard-to-recycle, or unrecyclable plastics under the scope of the Convention.

Several members and partners of the #breakfreefromplastic movement issued [positions](#), [statements](#), and [letters of support](#) for the proposed changes and attended the concurrent meetings of the Conferences of the Parties to the BRS Conventions (BRS COP). The BFFP member and partner engagement at these meetings is in concert with the ongoing work to support development of [an international legally binding agreement on plastics and plastic pollution](#) to address the entire life cycle of plastics, including: binding global reduction targets; caps on production and consumption of plastics; and requirements for loss prevention, collection, and recycling of all plastics.

Past and Current Issues of [Progress on Plastics](#)

In this issue:

- Success!
  - Basel Restricts Waste Exports
  - Stockholm Bans PFOA
  - Rotterdam Votes
- Plastics & the Conventions
- Recycling: Toxics In, Toxics Out
- Side Events
- What does Plastic Pollution look like?



## 29 APR - 10 MAY: CONVENTIONS TAKE MAJOR STEPS

In addition to our detailed updates below from the BRS COP, you can find press coverage of the significant decisions here: [The Guardian](#), [National Geographic](#), and [The Hindu Times](#) (via AFP wire).

The joint press release of the *Progress on Plastics* partners can be [found here](#).

*Basel Convention Restricts Waste Exports, Allows for More Ambitious Action on Toxic Chemicals in Plastic Waste*

187 countries took a major step forward in curbing the plastic waste crisis by adding plastic to the Basel Convention, a treaty that controls the movement of hazardous waste from one country to another. The

#breakfreefromplastic

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# The global plastic waste trade: Changes in international rules



# The Basel Convention amendment

➤ Basel Convention 1.01: Green, Yellow and red list

## Before the amendment

All plastic waste = Green list

(except hazardous as defined in annex 1 & 3)



Learn more @ <https://wastetradestories.org/>

## After the Amendment

### **All plastic waste = yellow list except:**

- Plastic waste almost exclusively consisting of ONE non halogenated polymer (PE, PP, PS, PP, ABS..)
- Mixtures of plastic wastes, consisting of polyethylene (PE), polypropylene (PP) or polyethylene terephthalate (PET), provided they are destined for separate recycling of each material and in an environmentally sound manner, and almost free from contamination and other types of wastes.
- Plastic waste almost exclusively consisting of ONE cured resin or condensation products
- Plastic waste almost exclusively consisting of ONE of the listed fluorinated waste

Provided it is destined for recycling in an environmentally sound manner and almost free from contamination and other types of wastes

More details at:

[http://wiki.ban.org/images/1/10/Briefing\\_Paper\\_2\\_May\\_2017.pdf](http://wiki.ban.org/images/1/10/Briefing_Paper_2_May_2017.pdf)

<https://www.ciel.org/empowering-countries-stop-plastic-flood-basel-amendment/>

<https://www.ciel.org/wp-content/uploads/2018/06/Progress-on-Plastics-Update-Issue-11-BRS-COP-May-2019.pdf>



# Challenges ahead:

- Situation until entry into force, 1 Jan 2021
- Enforcement
- Revision of amendment (cured resins and fluorinated Polymers)
- plastic waste (co)incineration



# THANK YOU FOR YOUR ATTENTION AND QUESTIONS

<https://www.ciel.org/plasticandhealth/>



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