

# THE PLASTICS PARADOX

**Dr. Chris DeArmitt FIMMM FRSC CChem**  
**President - Phantom Plastics**



Realização  
Instituto  
**SustenPlást**





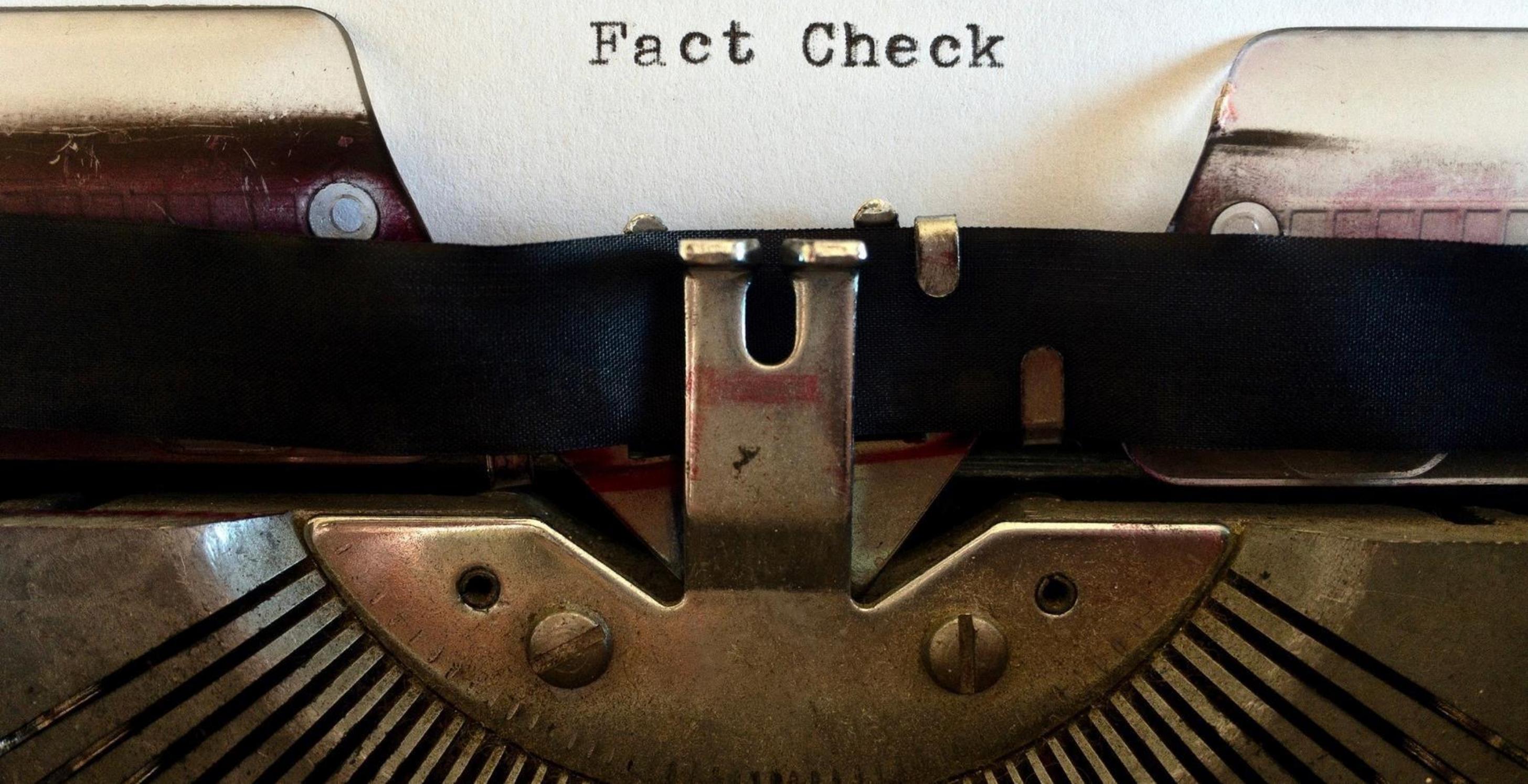




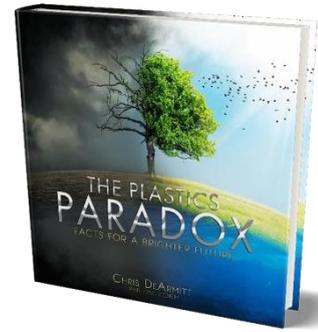




Fact Check







## CHRIS DEARMITT PHD FRSC FIMMM CChem

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Chris is considered one of the top plastic materials experts and problem-solvers in the world, which is why companies like HP, Apple, P&G, iRobot, Eaton, Total, and Disney come to him for help.

A deep understanding of materials combined with high creativity allows Chris to quickly solve even the toughest challenges. As one example, he solved a serious production issue that had plagued BASF for 30 years and cost them millions.

He has also received six open innovation cash prizes, placing him among the top 0.01% of innovators. In 2016, he published the book *Innovation Abyss* which reveals the true reasons for innovation failure and the proven path to success.

In 2018, Chris was featured on CBS's 60 Minutes with Scott Pelley as an expert witness in a class-action lawsuit related to Marlex mesh plastic implants. He helped thousands of women get settlements. Later television appearances include Sky News and the BBC as well as assorted radio and internet media interviews.

In 2020, Dr. DeArmitt published *The Plastics Paradox*, the first comprehensive, scientific overview of plastics materials and the environment covering all topics including waste, litter, microplastics, degradation, ocean plastics and more.

Chris has a multitude of granted patents as well as numerous articles, book chapters, encyclopedia chapters, and conference presentations to his name. He is an award-winning keynote speaker educating global audiences on plastic materials science and the environmental effects of plastics.

# LIFE CYCLE ANALYSIS

- FACILITY
- FUNCTION
- REPAIRS
- RECYCLING
- RAW MATERIALS
- MANUFACTURING PROCESS
- TRANSPORTATION & PACKAGING



- Carbon Dioxide
- Energy Used
- Water Used
- Acid Rain
- Toxicity
- Eutrophication
- Waste

LCA is the only proven way to know what is green

# LIFE CYCLE ANALYSIS

“Among applications for which non-plastic alternatives are used at scale, the plastics examined in this paper offer a lower total GHG contribution compared with alternatives in 13 of 14 cases.”

Grocery bags, wet pet food containers, fresh-meat packaging, hand soap bottles, **industrial drums**, municipal sewer pipes, residential water pipes, furniture, automotive fuel tanks, automotive electric-vehicle battery, pack top enclosures, t-shirts, carpet, water cups.

“GHG savings range from 10 to 90 percent, considering both product life cycle and impact of use.”

- Plastic weighs less
- Plastic takes less energy to produce

## PLASTICS ARE GREENEST IN >90% OF CASES

Climate Impact of Plastics Report (v2), McKinsey & Company, 2022 - Key: **Plastic causes least impact** **Alternative causes least impact**

McKinsey  
& Company

# Climate impact of plastics



July 2022

# LIFE CYCLE ANALYSIS



“Several studies have shown many materials used as alternatives to plastic in packaging, such as cotton, glass, metal or bioplastics, to have significantly higher CO<sub>2</sub> impact or water usage compared to plastic packaging. On average over current food packaging, replacing plastic packaging with alternatives, would increase the weight of the packaging by 3.6 times, the energy use by 2.2 times, and the carbon dioxide emissions by 2.7 times”

N. Voulvoulis et al., Examining Material Evidence - The Carbon Footprint, Centre for Environmental Policy, Imperial College London & Vedia UK, ACC, 2019

# LIFE CYCLE ANALYSIS

## Plastic greener than other materials

Materials and the Environment: Eco-Informed Material Choice 3<sup>rd</sup> Edition, Michael F. Ashby, Butterworth-Heinemann / Elsevier, Oxford, page 232, UK, 2021

Container Type & Material	Container Mass (grams)	Carbon Footprint Container (kg/kg)	Carbon Footprint per Fluid (g/L)	Recycling Rate (Percent)
500ml Cardboard + PE + Al + PP	22	3.55	78	0
1L HDPE Bottle	30	2.8	84	8
500ml PET Bottle	25	2.7	135	21
440ml Steel Can	45	2.3	235	42
750ml Glass Bottle	325	0.76	247	24
440ml Aluminium Can	20	12	545	43

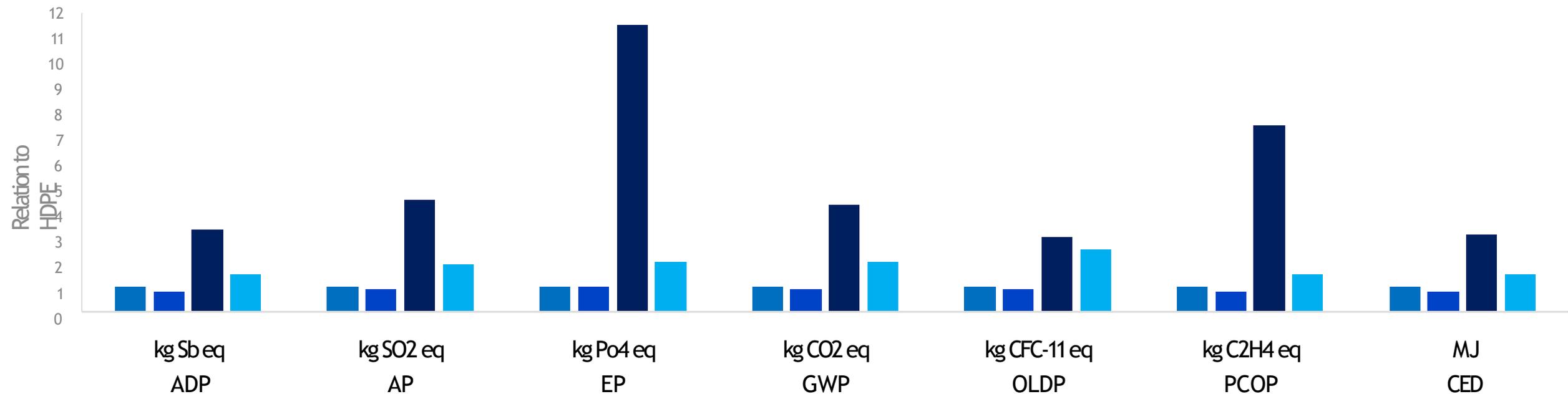
# DRINKING WATER PIPE LCA

## Plastic pipes are greenest

D. Sanjuan-Delmás et al., Environmental assessment of different pipelines for drinking water transport and distribution network in small to medium cities: a case from Betanzos, Spain, Journal of Cleaner Production, 66, pp 588-598, 2014

Comparison of the environmental impact of HDPE, PVC, DI and GFRP  
200 mm diameter constructive solutions

■ HDPE ■ PVC ■ DI ■ GFRP

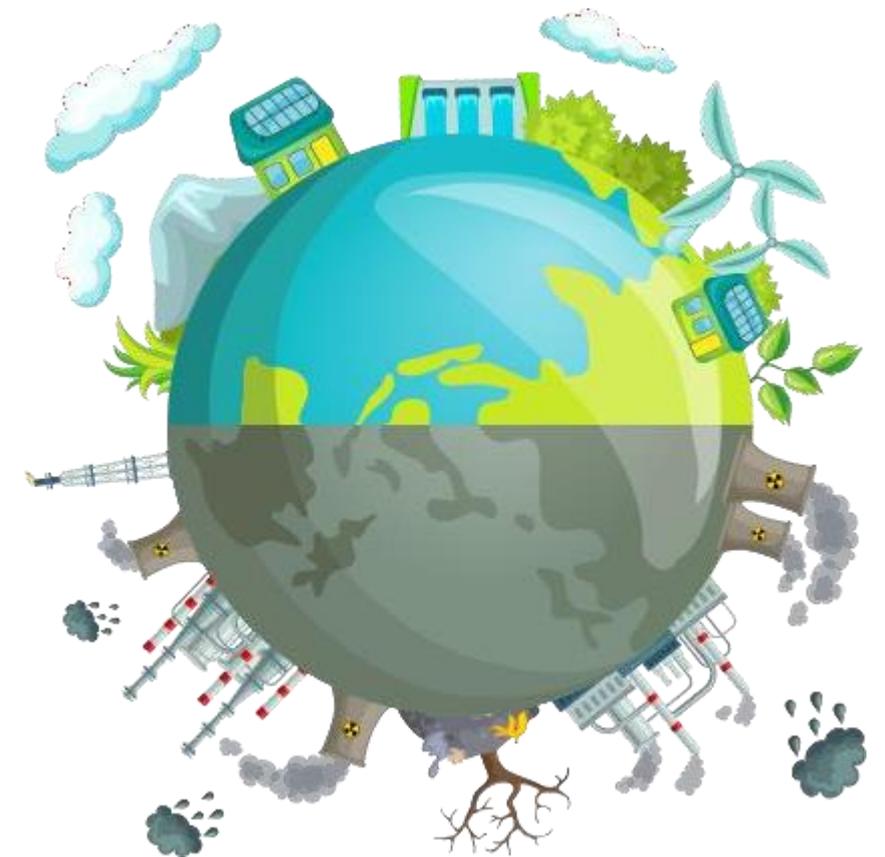


# LIFE CYCLE ANALYSIS

## Replacing plastic packaging increases harm

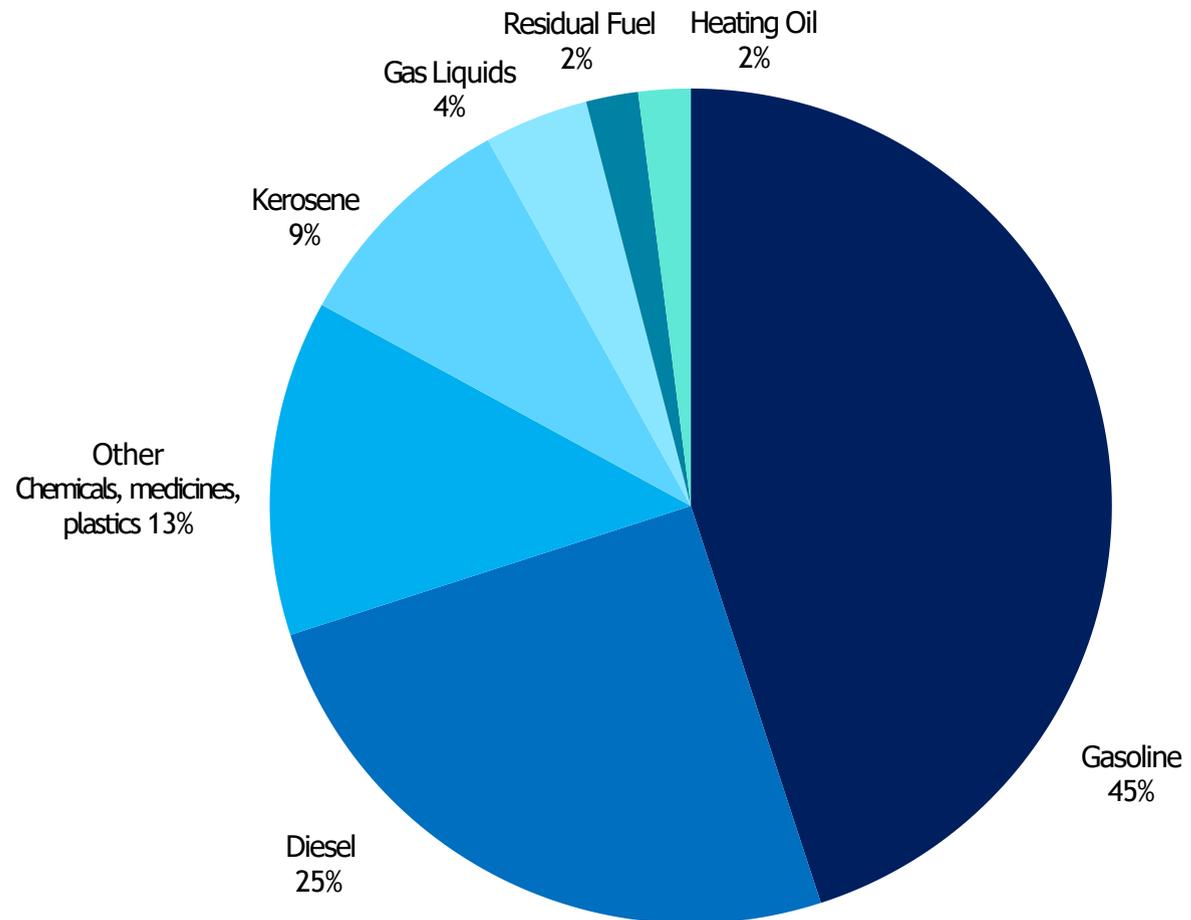
Product	Relative Impact
Bags x 28	Plastic (PE, PP) Paper Cotton Bioplastic
Packaging x 6	Plastic Paper Glass Metal
Straws x 2	Plastic Paper Glass Metal
Pipes x 13	Plastic (PE, PP, PVC) Copper Iron
Bank notes x 2	Plastic (PP) Cotton-paper
Textiles x 2	Plastic (PET) Cotton
Containers x 5	Plastic (PE, PET) Aluminium Glass Paper

Least impact Higher impact



# Oil Use

Plastics save more oil than they use



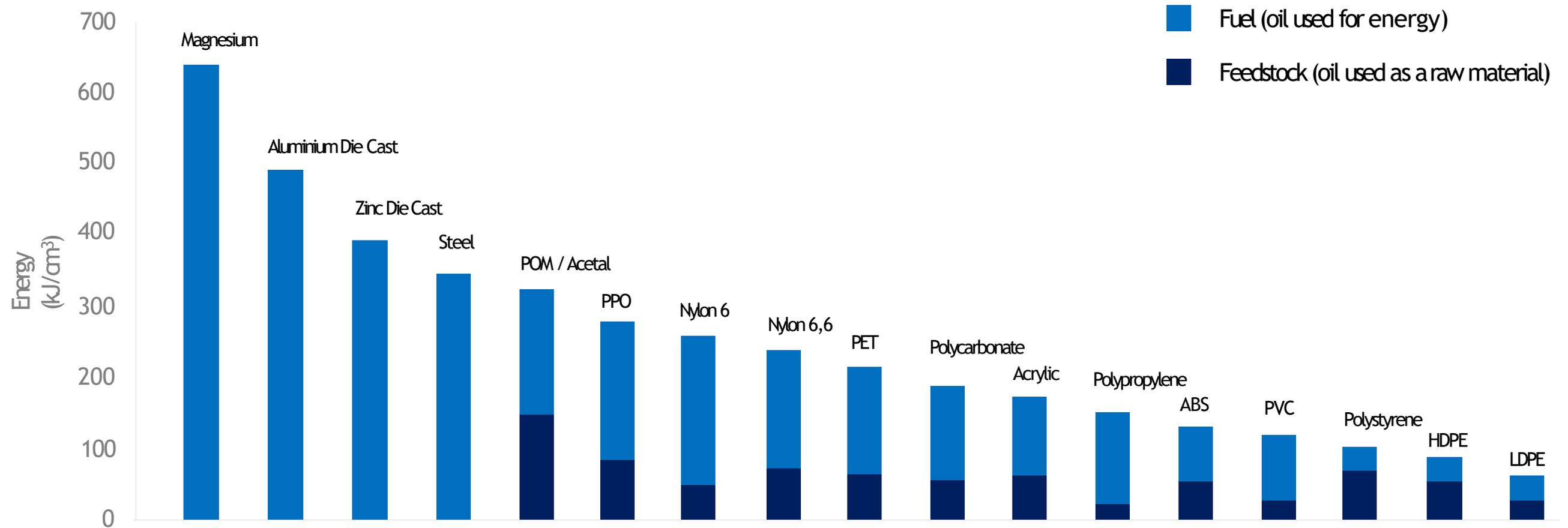
<https://www.breakthroughfuel.com/blog/crude-oil-barrel>

<https://elements.visualcapitalist.com/visualizing-the-products-and-fuels-made-from-crude-oil/>

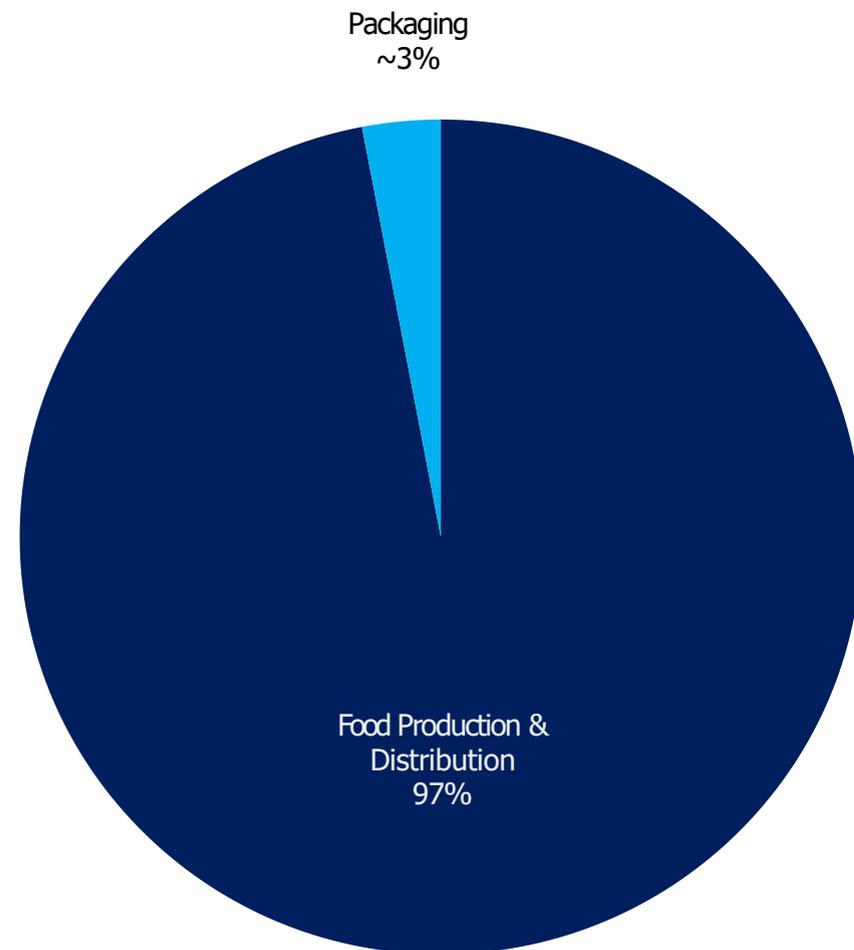


## Plastic production requires less total oil than other materials

N. G. McCrum, C. P. Buckley & C. B. Bucknall, Principles of Polymer Engineering, Oxford University Press, UK, 1988



# PACKAGING IMPACT



Food Packaging Sustainability - A guide for packaging manufacturers, food processors, retailers, political institutions & NGOs denkstatt, 2020

## Share of packaging in total carbon footprint

Butter	0.4%
Roast beef	0.5%
Beef cuts	0.6%
Ham	2-4%
Cheese	1-3%
Cucumber	2%
Eggs	2.5%
Bread	3%
Milk	4%
Beer	4%

# GREENHOUSE GAS

## Plastics reduce GHG

“In 2007 the estimated use benefits were 5-9 times higher than the emissions from the production and recovery phases.”

“In 2020 the estimated use-benefits could be 9-15 times higher than the forecast emissions.”

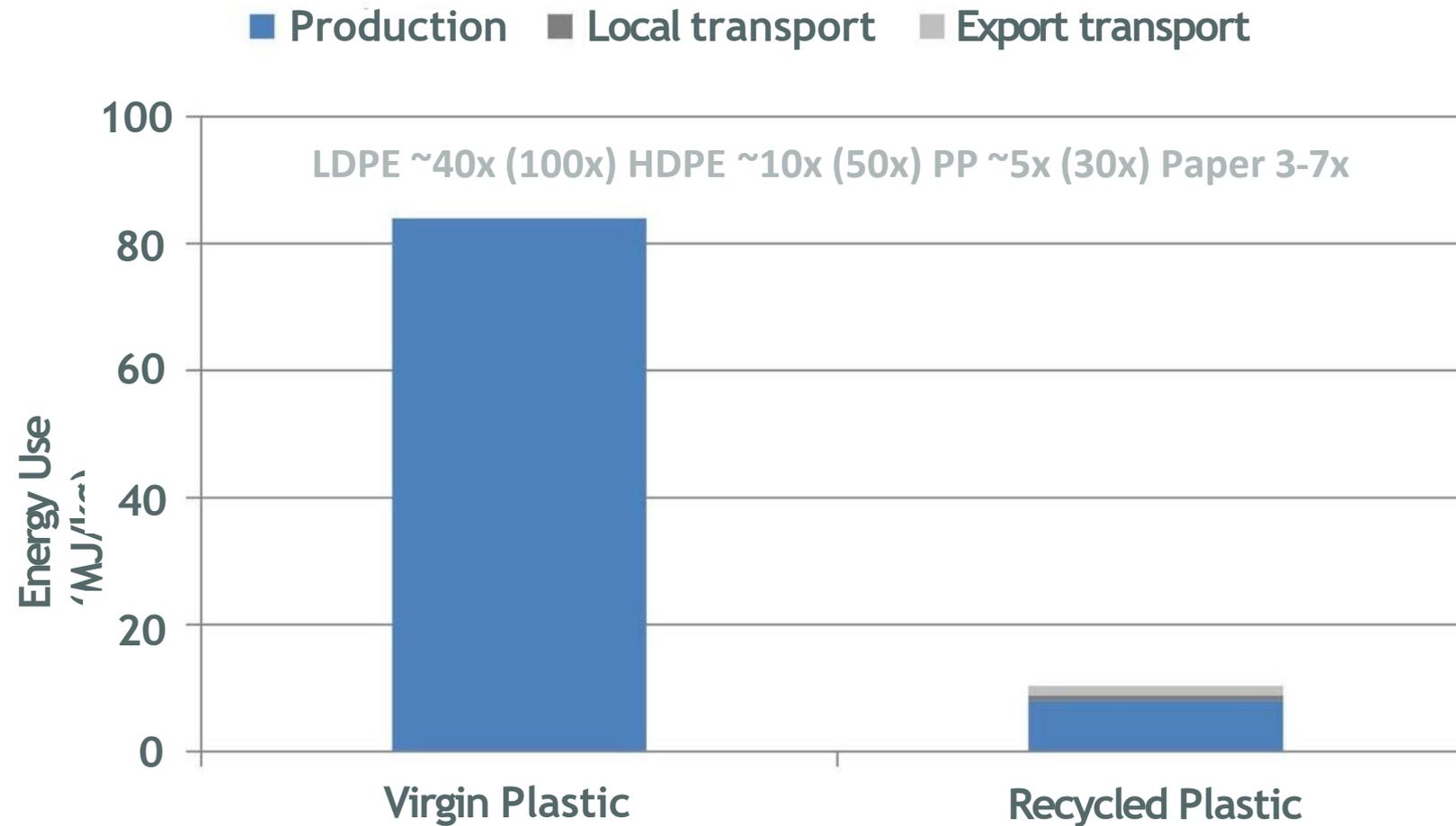
“Substitution of plastic products by other materials will in most cases increase the consumption of energy and the emission of greenhouse gases.”

The impact of plastics on life cycle energy consumption and greenhouse gas emissions in Europe, denkstatt GmbH, 2010



# Is RECYCLING GREEN?

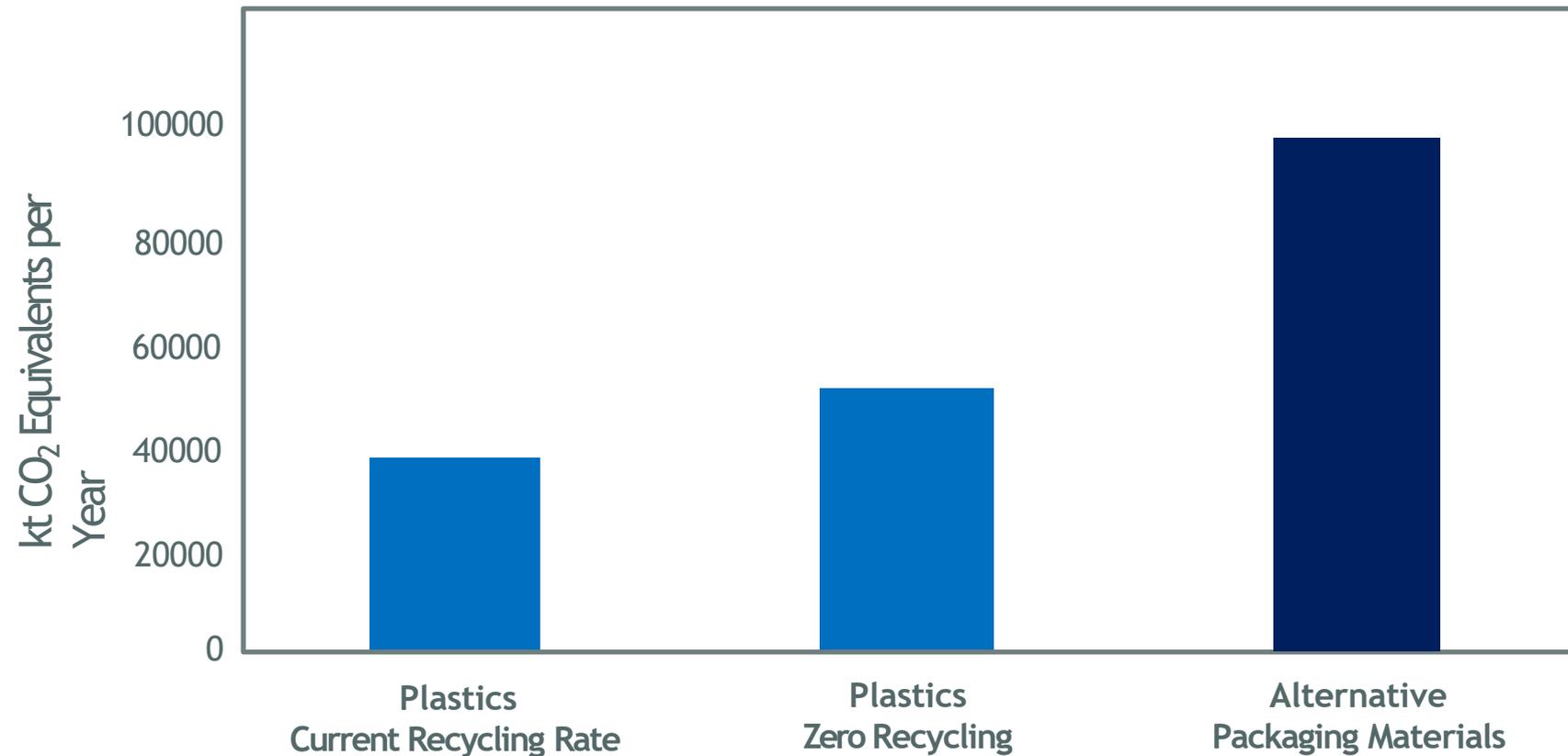
## Mechanical Recycling Makes Plastics Even Greener



Life Cycle Impacts of Plastic Packaging Compared to Substitutes in the United States and Canada, Franklin Associates for ThePlastics Division of the American Chemistry Council, 2018 C. Wong, A Study of Plastic Recycling Supply Chain, University of Hull, 2010

# PLASTIC PACKAGING REPLACEMENTS

Replacing plastic packaging increases harm



Denkstatt The impact of plastic packaging on life cycle energy consumption and greenhouse gas emissions in Europe, Executive Summary July, 2011

# CARBON FOOTPRINT & COST

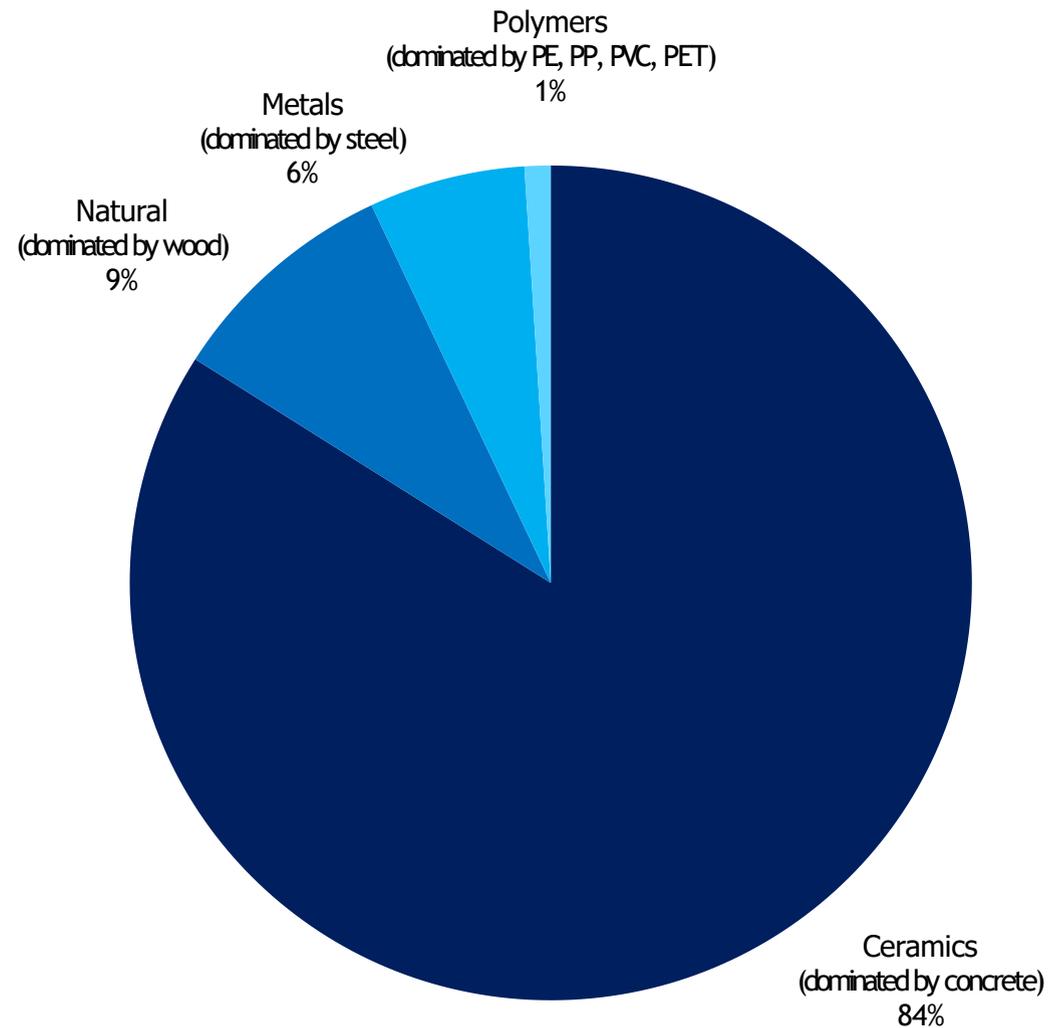
Material	Footprint kg/kg	Price \$/ton
Gold	27,000	67,000,000
Platinum	15,000	30,000,000
Silver	100	800,000
Aluminium	11	2300
Plastic	2-3	1000-2000
Paper	0.7	1000-2000
Wood	0.5	700
Concrete	0.12	60
Limestone	0.02	35

Materials and the Environment: Eco-Informed Material Choice 3<sup>rd</sup> Edition, Michael F. Ashby, Butterworth-Heinemann / Elsevier, Oxford, page 232, UK, 2021

GREENER MATERIALS TEND TO BE  
CHEAPER AND THEREFORE  
LITTERED MORE & LESS  
ECONOMICALLY ATTRACTIVE TO  
COLLECT AND RECYCLE



# MATERIAL USE



Materials and the Environment: Eco-Informed Material Choice, Michael F. Ashby, Butterworth-Heinemann / Elsevier, Oxford, page 18, UK, 2009

Global consumption of materials is 90 Billion metric tons per year

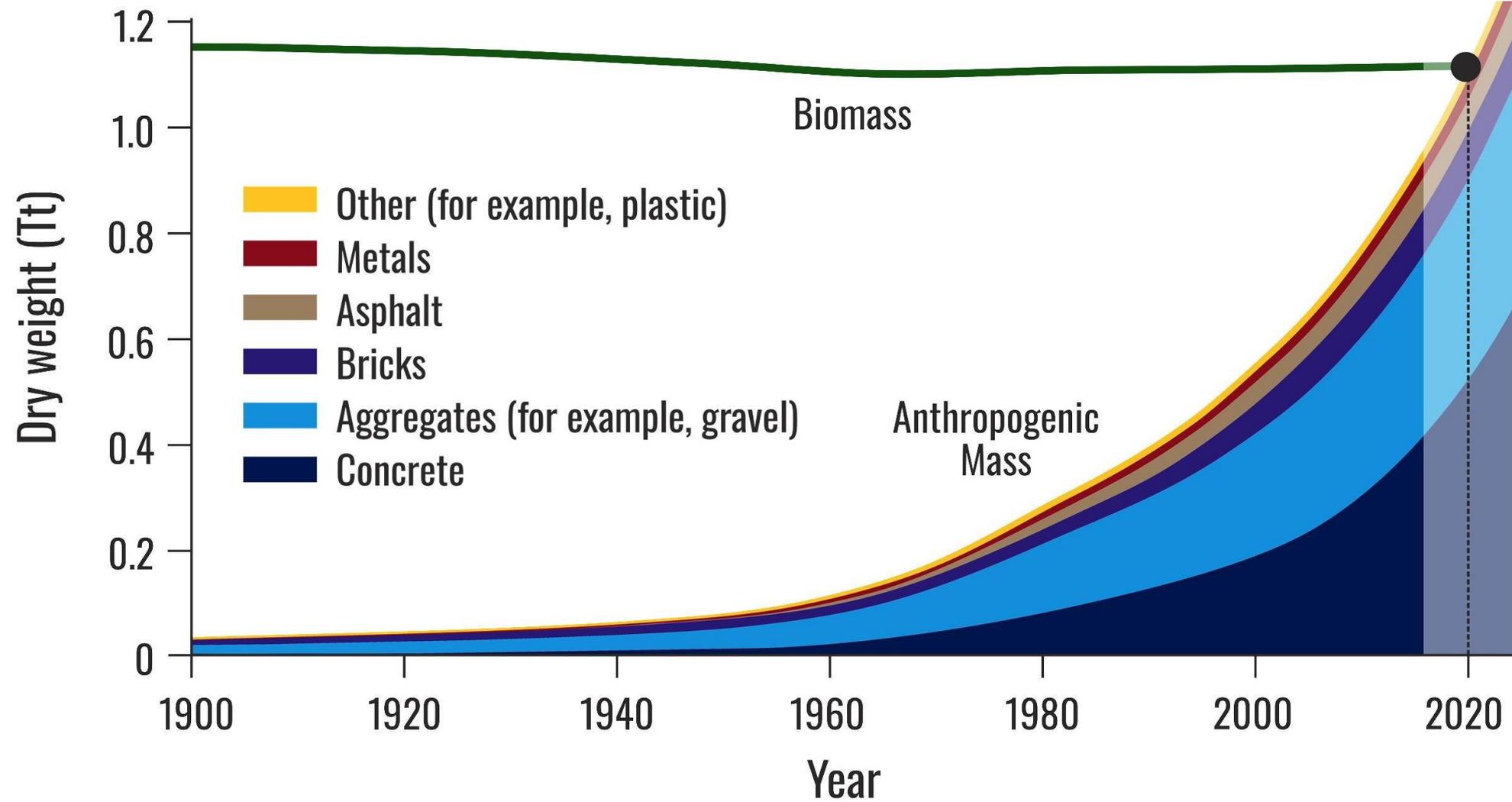
Global plastics consumption is 370 Million metric tons per year

Assessing Global Resource Use: A systems approach to resource efficiency and pollution reduction, Stefan Bringezu et al., UNEP, 2017

Global plastic production 1950-2019, Published by M. Garside, Statista, Dec 11, 2020

PLASTICS REPRESENT JUST ~0.4% BY WEIGHT AND <1% BY VOLUME OF THE MATERIALS WE USE

# MATERIALS USE & GROWTH



E. Elhacham et al., Global human-made mass exceeds all living biomass, Nature, Vol 588, p442, December 2020

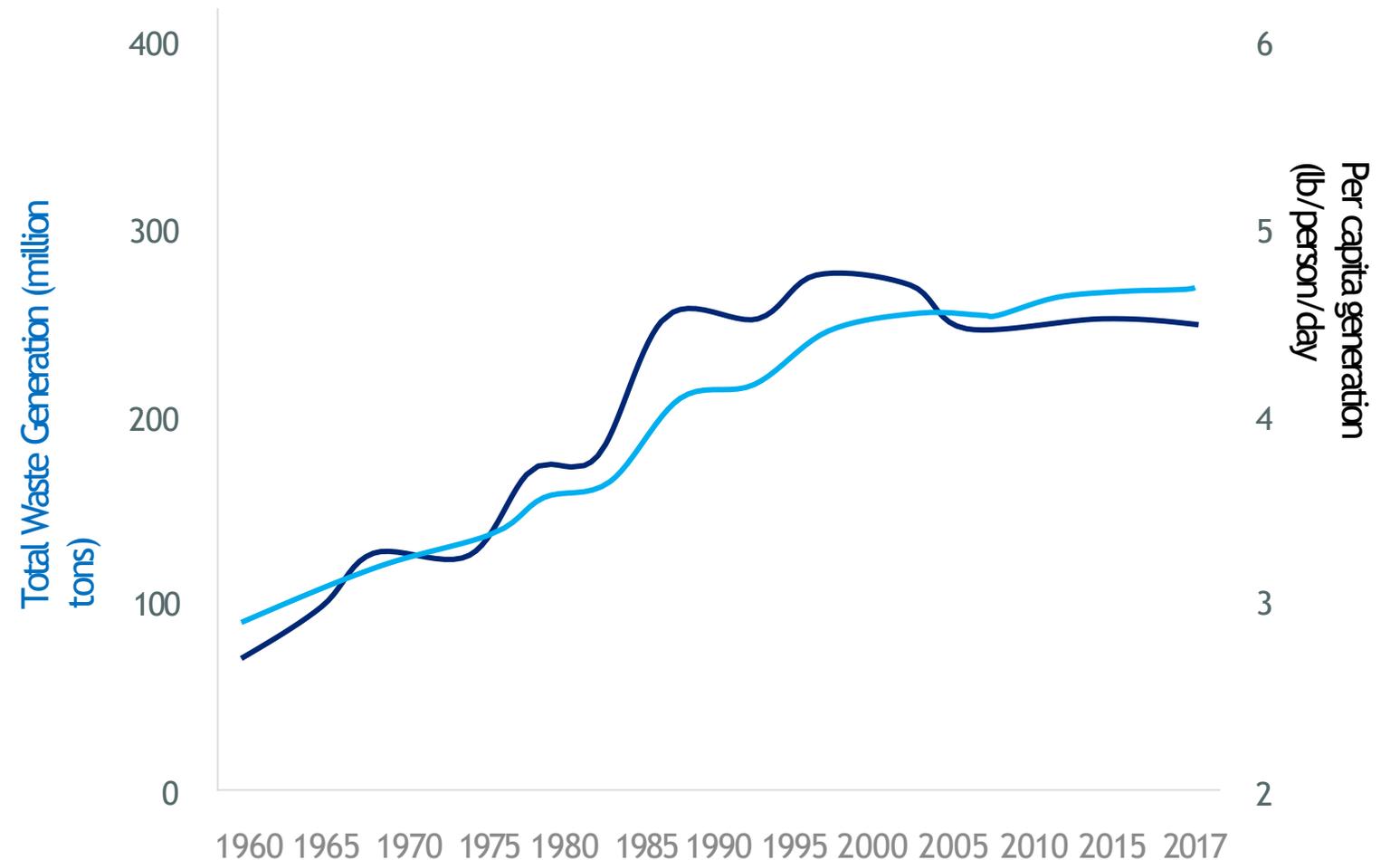
# SOLID MUNICIPAL WASTE



...plastics increased by nearly 84 times from 1960 to 2013 while total MSW increased only 2.9 times. The increase in plastic waste generation coincides with a decrease in glass and metal...”\*

<https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials>

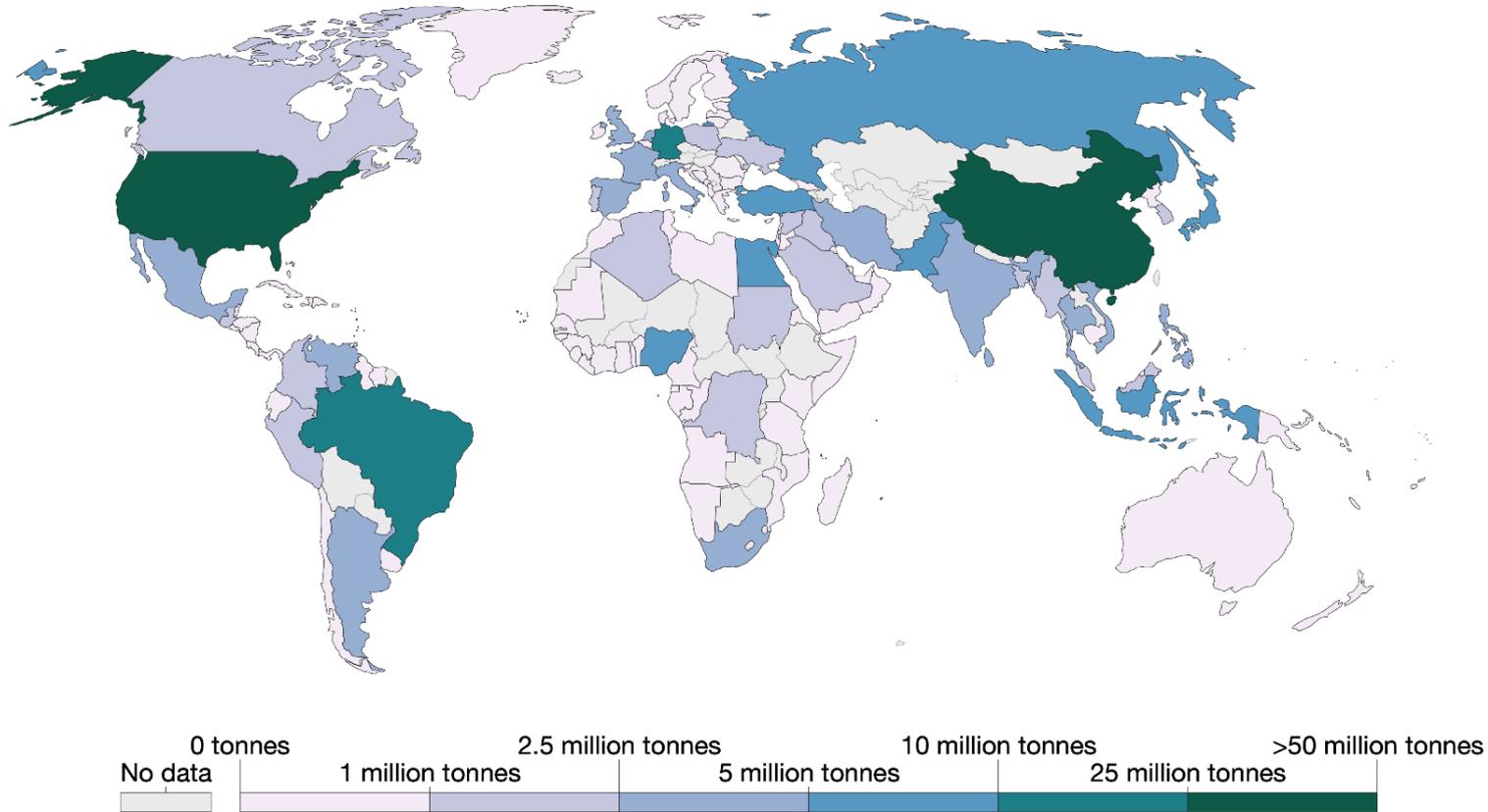
\*D. A. Tsiamis, M. Torres, M. J. Castaldi, Role of plastics in decoupling municipal solid waste and economic growth in the U.S., Waste Management, 77, 147-155, 2018



# Plastic waste generation, 2010



Total plastic waste generation by country, measured in tonnes per year. This measures total plastic waste generation prior to management and therefore does not represent the quantity of plastic at risk of polluting waterways, rivers and the ocean environment. High-income countries typically have well-managed waste streams and therefore low levels of plastic pollution to external environments.



Source: OWID based on Jambeck et al. (2015) & World Bank

CC BY

Hannah Ritchie and Max Roser (2019) - "Plastic Pollution" - Published online at OurWorldInData.org Retrieved from: 'https://ourworldindata.org/plastic-pollution'





# ACCESSIBLE BEACH



# REMOTE BEACH



# BEACH LITTER

“Beach users have been shown to be main contributors to debris along coastal and estuarine shores. The ease of access to a beach is a main factor to the number of beach visitors.”

“Our results also suggest that most debris released into the marine environment is deposited locally, which may be the answer to where all the missing plastic is in the ocean. Furthermore, local interventions are likely to be most effective in reducing land-based inputs into the ocean.”

## PEOPLE, NOT MATERIALS, CAUSE LITTER

K. Willis et al., Differentiating littering, urban runoff and marine transport as sources of marine debris in coastal & estuarine environments, *Nature Scientific Reports*, 7, 44479, 2017

M. C. B. Araújo et al., Anthropogenic Litter on Beaches With Different Levels of Development and Use: A Snapshot of a Coast in Pernambuco (Brazil), *Frontiers in Marine Science*, 5 (233), 2008



# LITTER

## Blaming materials is unjust

P. W. Schultz et al., Littering in Context: Personal and Environmental Predictors of Littering Behavior, *Environment and Behavior*, 45(1), pp 35-59, 2011

“

Of the 1,962 coded disposals, the most frequent were cigarettes (N = 340), mixed trash (N = 337), and paper (N = 272).”

“When combined, an estimated 81% of observed littering occurred with intent.”



CAUSE



EFFECT



# MISPLACED BLAME

- 8 Billion printed every year for decades...
- How many have you seen on the beach?
- How many on the roadside?
- How many on the street?

LITTER IS CAUSED BY AND SOLVED THROUGH  
HUMAN BEHAVIOUR



# DEGRADABLE LITTER

“As was expected, the PET bottles were littered less than the Cartocans. Of the PET bottles, 2.6% was littered, while 5.8% of the Cartocans was littered..”

“In addition to this, 16 of the peel-off closures of the Cartocan were found littered, while none of the caps of the PET bottle were found separately.”

## PAPER LITTERED 2X MORE THAN PLASTIC

R. Wever et al., Influence of Packaging Design on Littering and Waste Behaviour, Packaging Technology and Science, 23, pp239 -252, 2010





# OCEAN LITTER

“The environmental problem of litter, particularly regarding plastics, is in one sense a local problem that stems from discard behaviors...”

“Correspondingly, we argue that an effective way to reduce the impacts of plastics and other types of litter on aquatic systems is to identify management strategies that can be employed on local scales to reduce inputs.”

PEOPLE CAUSE LITTER, NOT MATERIALS

E. Carpenter & S. Wolverson, Plastic litter in streams: The behavioral archaeology of a pervasive environmental problem, Applied Geography, 84, pp 93-101, 2017



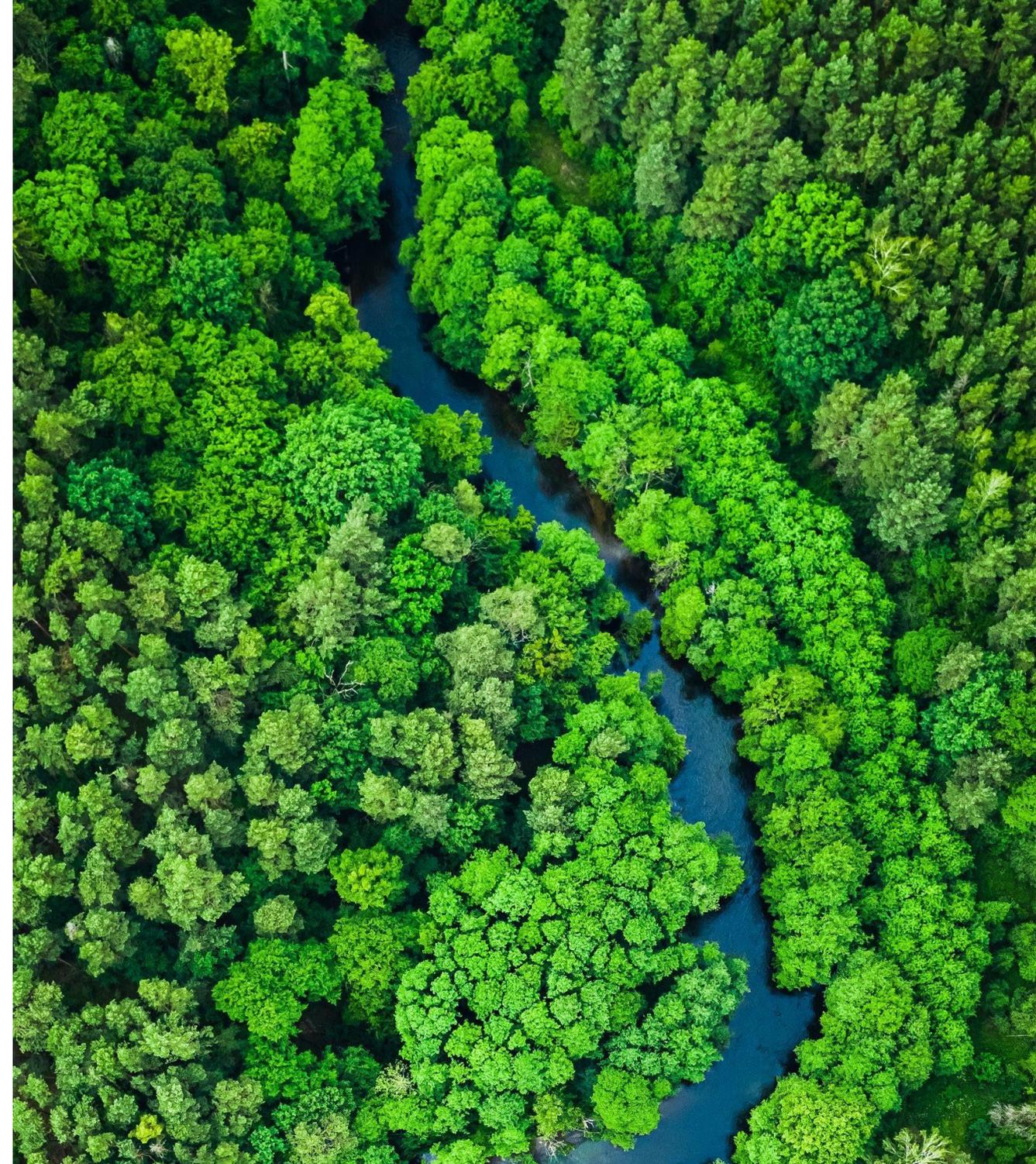
# RIVERS & OCEAN PLASTIC

“Leakage from waste generation and inadequate disposal on land—i.e., mismanaged plastic waste (MPW)—was initially identified as the main driver for plastic discharge to the ocean, with a potential annual transfer of 4.8 to 12.7 million metric tons (Mt). Rivers are recognized as the principal conveyors in this transfer.”

“On the basis of an in-depth statistical reanalysis of updated data on microplastics—a size fraction for which both ocean and river sampling rely on equal techniques—we demonstrate that current river flux assessments are overestimated by two to three orders of magnitude.”

PLASTICS FROM RIVERS TO OCEANS 100-  
1000X LESS THAN THOUGHT AT ONLY ~6000  
TONS PER YEAR

L. Weiss et al., The missing ocean plastic sink: Gone with the rivers, *Science*, 373 (6550), 107-111 2021  
J. R. Jambeck et al., Plastic waste inputs from land into the ocean, *Science* 347, 768-771, 2015



# OCEAN PLASTIC

“Our new results indicate that a significant fraction of these hard plastics may also be coming from fishing vessels. Adding to the mass of floating nets and ropes, this suggests that between 75 and 86% of the floating plastic mass (> 5 cm) in the NPGP could be considered abandoned, lost or otherwise discarded fishing gear.”

6048 items - 0 grocery bags, 1 straw, 9 drink bottles

Grocery bags, straws and bottles 0.03% of total mass

## OCEAN PLASTIC DOWN 33% IN 4 YEARS & MAINLY FISHING GEAR NOT FROM LAND

L. Lebreton et al, Industrialised fishing nations largely contribute to floating plastic pollution in the North Pacific subtropical gyre, Nature Scientific Reports, 12, 12666, 2022



28000:1

FISHING NETS & GEAR: CONSUMER PLASTIC BAGS, STRAWS AND BOTTLES

# WHALES

Study conducted from 1970 - 2009 covering 1762 mortalities

Mortality All Causes	Mortalities per Year
Entanglement in fishing gear	323
Natural causes	248
Vessel strikes	171

## PLASTICS NOT A THREAT TO WHALES

J. M. Van der Hoop et al., Assessment of Management to Mitigate Anthropogenic Effects on Large Whales, *Conservation Biology*, 27 (1), 121-133, 2012  
R. Knowlton, S. M. Kraus, Mortality and serious injury of northern right whales (*Eubalaena glacialis*) in the western North Atlantic Ocean, *J. Cetacean Res. Manage.*, 2, 193-208, 2001  
C. Kemper et al., Southern right whale (*Eubalaena australis*) mortalities and human interactions in Australia, 1950-2006, *J. Cetacean Res. Manage.*, 10 (1), 1-8, 2008  
J. J. Meager, Marine wildlife stranding and mortality database annual report 2012. II. Cetacean and Pinniped. Conservation Technical and Data Report, 2:1-38, 2013



# OCEAN PLASTIC

“We conducted an ecological risk assessment of MP in the global ocean by comparing the thresholds of biological effects with the probability of exposure to those concentrations...”

“Levels of MP from 100 to 5000  $\mu\text{m}$  span from  $< 0.0001$  to  $1.89 \text{ mg/L}$ , whereas the most conservative safe concentration is  $13.8 \text{ mg/L}$ , and probability of exposure is  $p = 0.00004$ . Therefore large MP pose negligible global risk.”

‘NEGLECTIBLE’ RISK FROM MICROPLASTICS

R. Beiras & M. Schönemann, Currently monitored microplastics pose negligible ecological risk to the global ocean, Nature Scientific Reports, 10, 22281, 2020





# DEGRADATION

- There are thousands of scientific studies over decades
- Same degradation chemistry as wood, wool, cotton
- Plastics are degraded faster than most materials
- Degradation rate can be adjusted as needed
- \$5BN a year on stabilizers to slow degradation

## PLASTICS DEGRADE

W. L. Hawkins, *Polymer Degradation & Stabilization*, Springer Berlin / Heidelberg, 1984  
Inamuddin, R. Mobin, M. I. Ahamed (Eds.), *Degradation of Plastic Materials*, Materials Research Forum, 2021  
Y. Shashoua, *Conservation of Plastics: Materials science, degradation and preservation*, Routledge, 2008  
S. Balasubramanian, *Degradation of plastics by Microbes*, Lambert Academic Publishing, 2018  
M. Srikanth et al., *Biodegradation of plastic polymers by fungi: a brief review*, *Bioresources & Bioprocessing*, 9 (42), 2022  
G. Weber, U. T. Bomscheuer, R. Wei (Eds.), *Enzymatic Plastic Degradation (Methods in Enzymology, Volume 648)*, AP, 2021



- FUNGI
- SUNLIGHT
- TEMPERATURE
- INSECTS
- WATER
- OXYGEN
- BACTERIA

# BAG DEGRADATION

“After 9 months in the open-air, all bag materials had disintegrated into fragments”

“This study shows that the real durability of olefin polymers may be much shorter than centuries, as in less than one year the mechanical properties of all samples decreased virtually to zero, as a consequence of severe oxidative degradation..”

“The ultimate products of degradation are CO<sub>2</sub>, H<sub>2</sub>O, and biomass under aerobic conditions. Anaerobic microorganisms can also degrade these polymers under anoxic conditions.”

## PE BAGs DEGRADE RAPIDLY OUTDOORS

Imogen E. Napper, Richard C. Thompson. Environmental Deterioration of Biodegradable, Oxo-biodegradable, Compostable, and Conventional Plastic Carrier Bags in the Sea, Soil, and Open-Air Over a 3-Year Period. Environmental Science & Technology, 2019  
T. Ojeda et al., Degradability of linear polyolefins under natural weathering, Polymer Degradation and Stability 96, 703 -707, 2011  
J.Arutchevi et al., Biodegradation of polyethylene and polypropylene, Indian Journal of Biotechnology, 7, pp 9-22, 2008



# DISCRIMINATION

- 500-year-old wooden ship Mary Rose, Vasa
- 2000-year-old metal coins Roman
- 2500-year-old parchment Dead Sea Scrolls
- 20,000-year-old clay vase in China

If an object is made of metal, glass, wood, cloth, clay or paper we celebrate finding it, put it in a museum and charge money to see it.

And yet we claim that plastics are despicable materials because they don't degrade - even though that's untrue.

## PLASTICS SUFFER FROM DISCRIMINATION

X. Wu et al., Early Pottery at 20,000 Years Ago in Xianrendong Cave, China, Science, Vol 336, (6089), pp. 1696-1700, 2012



# EATING MICROPLASTIC

WWF-funded study says we eat up to a credit card of plastic per week (5g)  
Newer independent study says that would actually take over 20 000 years!

“Comparing our findings with the intake of other particles, MP mass intake rates are insignificant, as they make up for only 0.001% of these particles.”

MICROPLASTICS ARE JUST 0.001% OF  
INGESTED PARTICLES AND “INSIGNIFICANT”

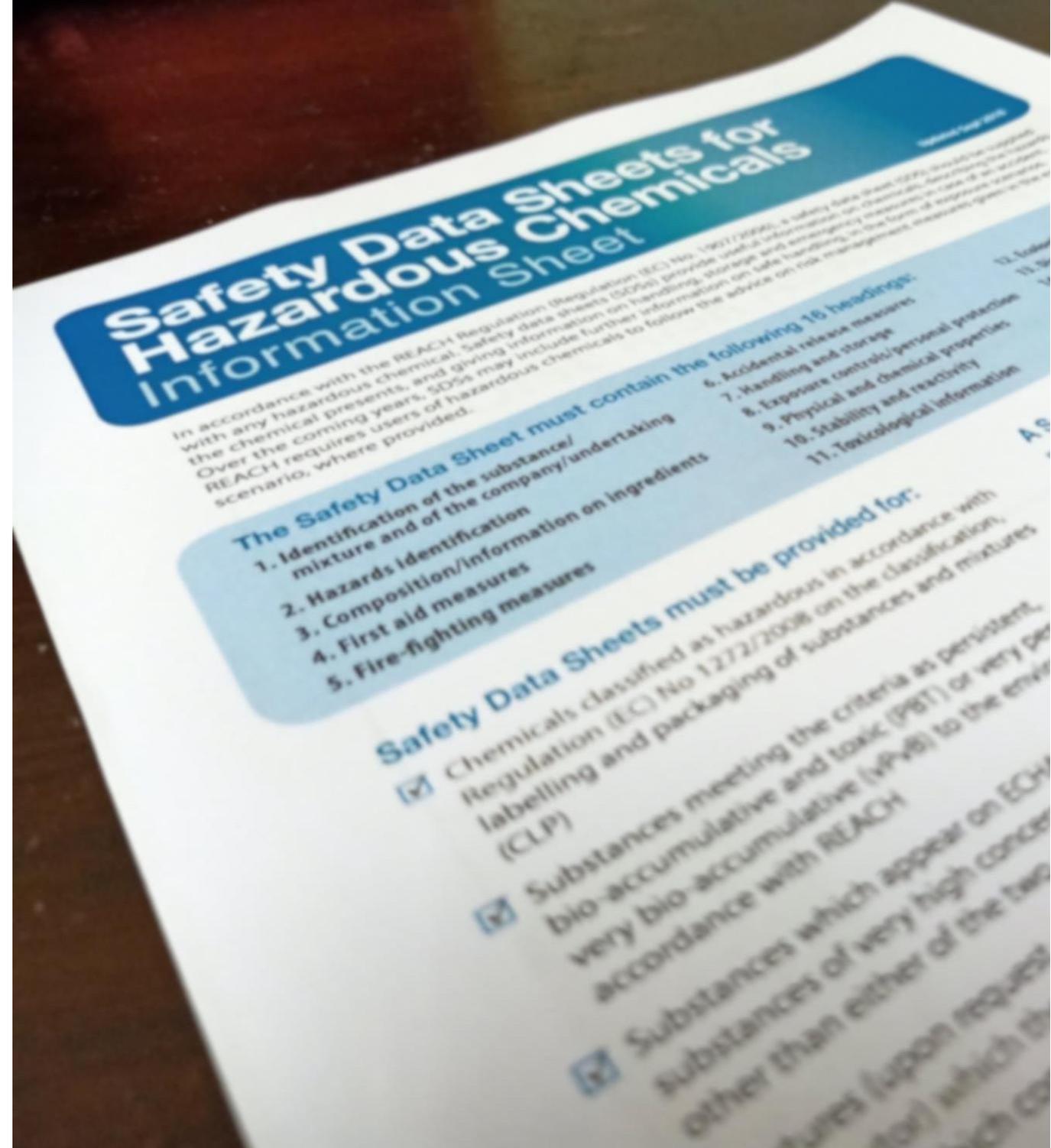
K. D. Cox et al., Human Consumption of Microplastics, *Environ. Sci. Technol.*, 53, 12, 7068-7074, 2019

Nur Hazimah Mohamed Nor et al., Lifetime Accumulation of Microplastic in Children and Adults, *Environ. Sci. Technol.*, 55, 8, 5084-5096, 2021



Material / Substance	Acute Toxicity LD <sub>50</sub> 70kg Person	Chronic Toxicity NOAEL 70kg Person
Sugar	~2000g	60g
Alcohol (ethanol)	~500g	~12g
Polyethylene	>350g	>50g
Polypropylene	>350g	>140g
Polyethylene terephthalate	>350g	N/A
PVC (unplasticized)	>350g	N/A
Calcium Carbonate - Filler	>350g	>70g
Talc Mineral - Filler	>350g	>60g
Calcium Stearate - Lubricant	>700g	>140g
Irgaphos® 168 - Stabilizer	>350g	140g
Irganox® 1076 - Stabilizer	>350g	70g
Irganox® 1010 - Stabilizer	>350g	100-200g
Irganox® 1330 - Stabilizer	>350g	35g
Iron Powder	>350g	14g
Table Salt	~200g	4g
Caffein	14g	0.25g
Copper Metal	30g	~1g
Cu Dissolved	3.5g	0.005g
Nicotine	0.7g	0.00006g

EPA toxicity ratings: Practically Non-Toxic Slightly Toxic Moderately Toxic Highly Toxic



# INGESTION

“Among aquatic organisms, fish are particularly susceptible to ingesting microplastic particles due to their attractive coloration, buoyancy, and resemblance to food. However, in previous experimental setups, fish were usually exposed to unrealistically high concentrations of microplastics, or the microplastics were deliberately contaminated with persistent organic chemicals; also, in many experiments, the fish were exposed only during the larval stages.”

“In conclusion, the dietary exposure of *S. aurata* to 6 common types of virgin microplastics did not induce stress, alter the growth rate, cause pathology, or cause the microplastics to accumulate in the gastrointestinal tract of the fish.”

NO HARM FROM MICROPLASTICS  
(PVC, NYLON, UHMWPE, PS, MDPE)

B. Jovanović, Virgin microplastics are not causing imminent harm to fish after dietary exposure, *Marine Pollution Bulletin*, 130, 123-131, 2018



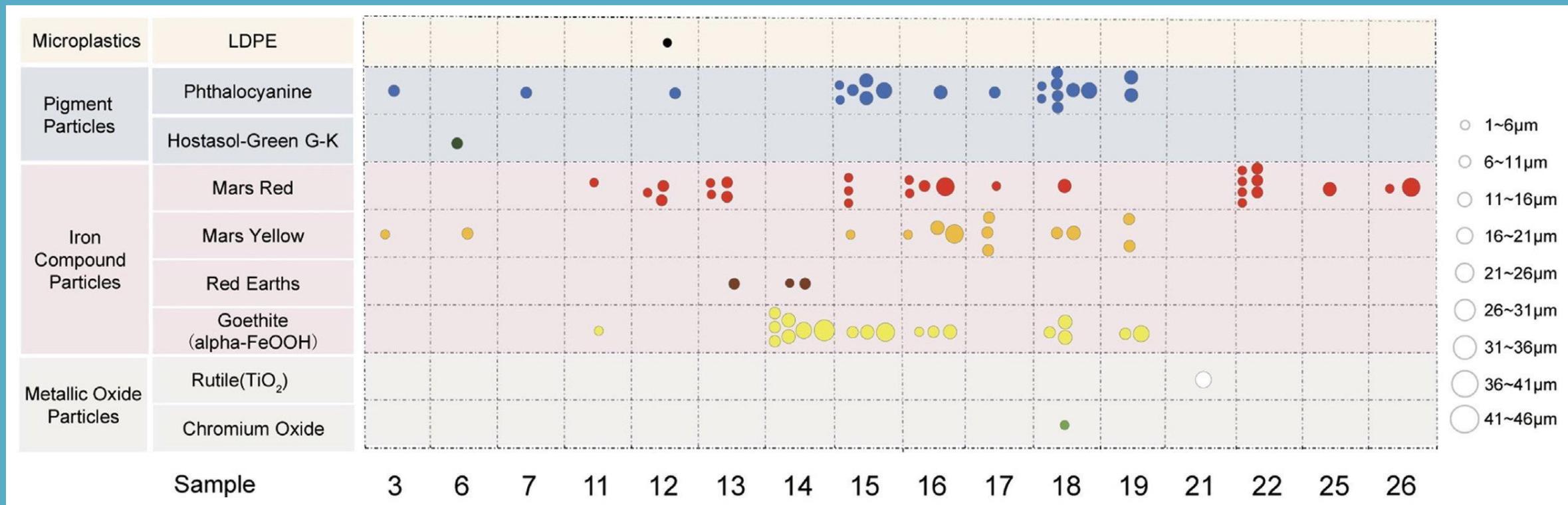
# MICROPLASTIC

“..the experimental design of most studies does not allow distinguishing plastic-specific effects from those caused by any other particles, such as clay and cellulose, which are ubiquitously present in the environment. We suggest that microplastic effects reported in recent ecotoxicological studies are similar to those induced by the natural particles.”

## PLASTIC PARTICLES AS SAFE AS NATURAL PARTICLES LIKE CLAY AND CELLULOSE

M. Ogonowska, Z. Gerdesa & E. Gorokhova, What we know and what we think we know about microplastic effects - A critical perspective, Current Opinion in Environmental Science & Health, 1, 41-46, 2018





“Among twenty-six thrombi, sixteen contained eighty-seven identified particles ranging from 2.1 to 26.0 µm in size. The number of microparticles in each thrombus ranged from one to fifteen with the median reaching five. All the particles found in thrombi were irregularly block-shaped. Totally, twenty-one phthalocyanine particles, one Hostasol-Green particle, and one low-density polyethylene microplastic, which were from synthetic materials, were identified in thrombi. The rest microparticles included iron compounds and metallic oxides.”

D. Wu et al., Pigment microparticles and microplastics found in human thrombi based on Raman spectral evidence, *Journal of Advanced Research*, 49, pp 141-150, 2023

# MICROPLASTIC REALISM

“>80% of studies are identified as not reliable”

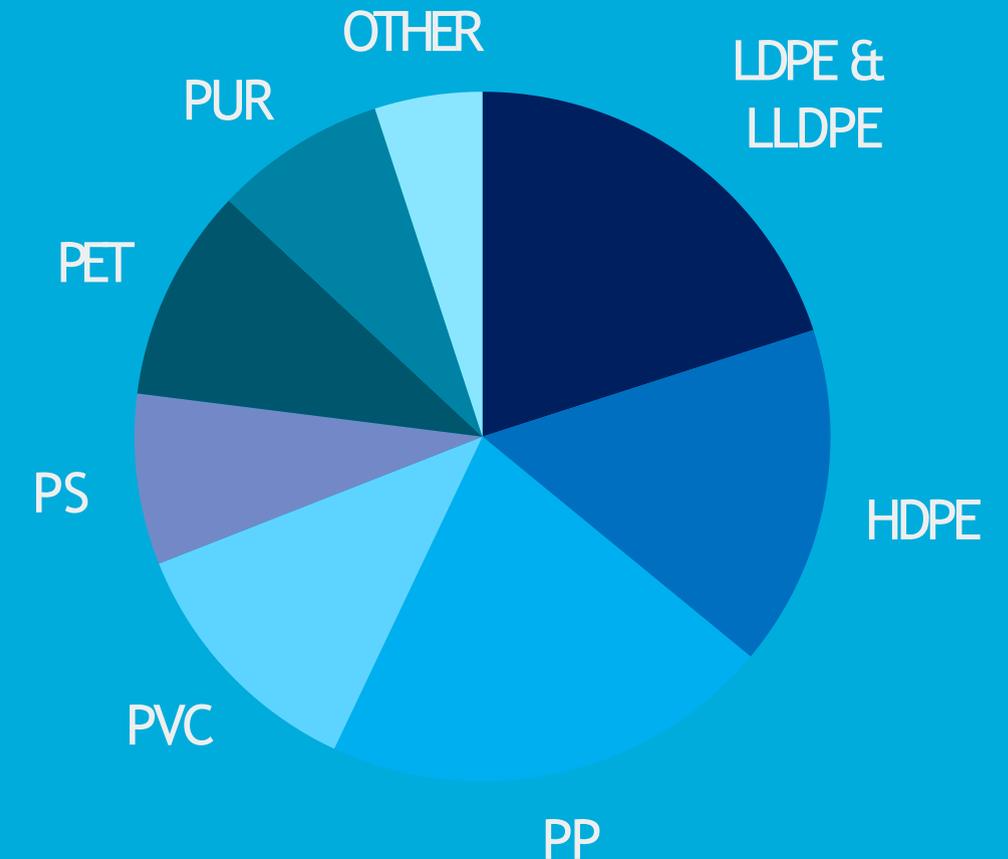
“..few studies provide information that support that the particles tested are representative of NMPs found in the environment, or that the concentrations tested are representative of environmentally relevant exposure scenarios.”

~46% on polystyrene (of a special kind that doesn't exist in the environment)

10% of studies on PE, 5% PVC, 3% PP, 3% PET

## SCIENTISTS ARE DOING INVALID STUDIES ON THE WRONG KINDS OF PARTICLE

T. Guin et al., Screening and prioritization of nano- and microplastic particle toxicity studies for evaluating human health risks - development and application of a toxicity study assessment tool, *Microplastics & Nanoplastics*, 2 (2), 2022





# BPA & PHTHALATES

Plastic Chemicals Causing Infertility, Diabetes Found 'Widespread' in Common Food Items: Report - Epoch Times January 6<sup>th</sup> 2024

- BPA and phthalates reported in most foods as ng per serving levels
- One nanogram is 0.000000001g
- BPA levels far lower than in prior studies
- Phthalates found at levels below safe limits in all cases
- BPA found at levels below safety limits in all cases

The FDA and other organizations have studied these matters for decades and found that exposure is not a threat.

## NOT A THREAT DETECTED

<https://www.theepochtimes.com/health/plastic-chemicals-causing-infertility-diabetes-found-widespread-in-common-food-items-report-5559746>

<https://www.consumerreports.org/health/food-contaminants/the-plastic-chemicals-hiding-in-your-food-a7358224781/>

<https://phantomplastics.com/bpa-from-plastics/>





# NGO SCORECARD

Topic	NGOs say problem is	Science says problem is	NGOs right or wrong?
Materials	Plastic	Concrete, wood, metals	Wrong
Waste	Plastic	Manufacturing, mining, oil, gas	Wrong
CO <sub>2</sub>	Plastic	Metals, cement, paper	Wrong
Fossil fuel	Plastic	Iron, steel, cement	Wrong
Ocean plastic	Dangerous Increasing	“Negligible” Constant	Wrong
Turtles	Plastic	Trawling, fishing, boat strikes	Wrong
Whales	Plastic	Fishing gear, vessel strikes	Wrong
Birds	Plastic	Buildings, powerlines, cats	Wrong
Particles	Plastic	Soot, inorganics (quartz, Pb, Cd)	Wrong
Toxins	Plastic	Lead, mercury, cadmium, dioxins	Wrong

SO-CALLED “ENVIRONMENTAL” GROUPS ARE HARMING THE ENVIRONMENT WITH DISASTROUS ADVICE

# MICROPLASTIC & EVEREST



ENVIRONMENT | PERPETUAL PLANET

**Microplastics found near Everest's peak, highest ever detected in the world**

Since when was "I found dust" news? Dust is everywhere.

**SPURIOUS NEWS IS MISLEADING US**

E. Napper et al., Reaching New Heights in Plastic Pollution—Preliminary Findings of Microplastics on Mount Everest, *One Earth*, 3 (5), pp621-630, 2020



# MEDIA LIES

“Correction 16<sup>th</sup> January 2023: The article originally included a picture of a Hawksbill Turtle swimming underwater while entangled in a plastic bag. However as this was a concept picture, and the bag was not present in the original photo, we have replaced this image.”

## NEWS

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“10 000 000 tons per day”



the senior scientists there at the Oceanographic [Institute]

The man who first discovered plastic in the ocean

<https://www.bbc.com/news/av/stories-64250382>

<https://www.shutterstock.com/image-photo/hawksbill-turtle-floating-dark-blue-clear-1323984977>

## NEWS

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“10 000 000 tons per year”



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<https://www.shutterstock.com/image-photo/underwater-concept-global-problem-plastic-rubbish-1366434269>

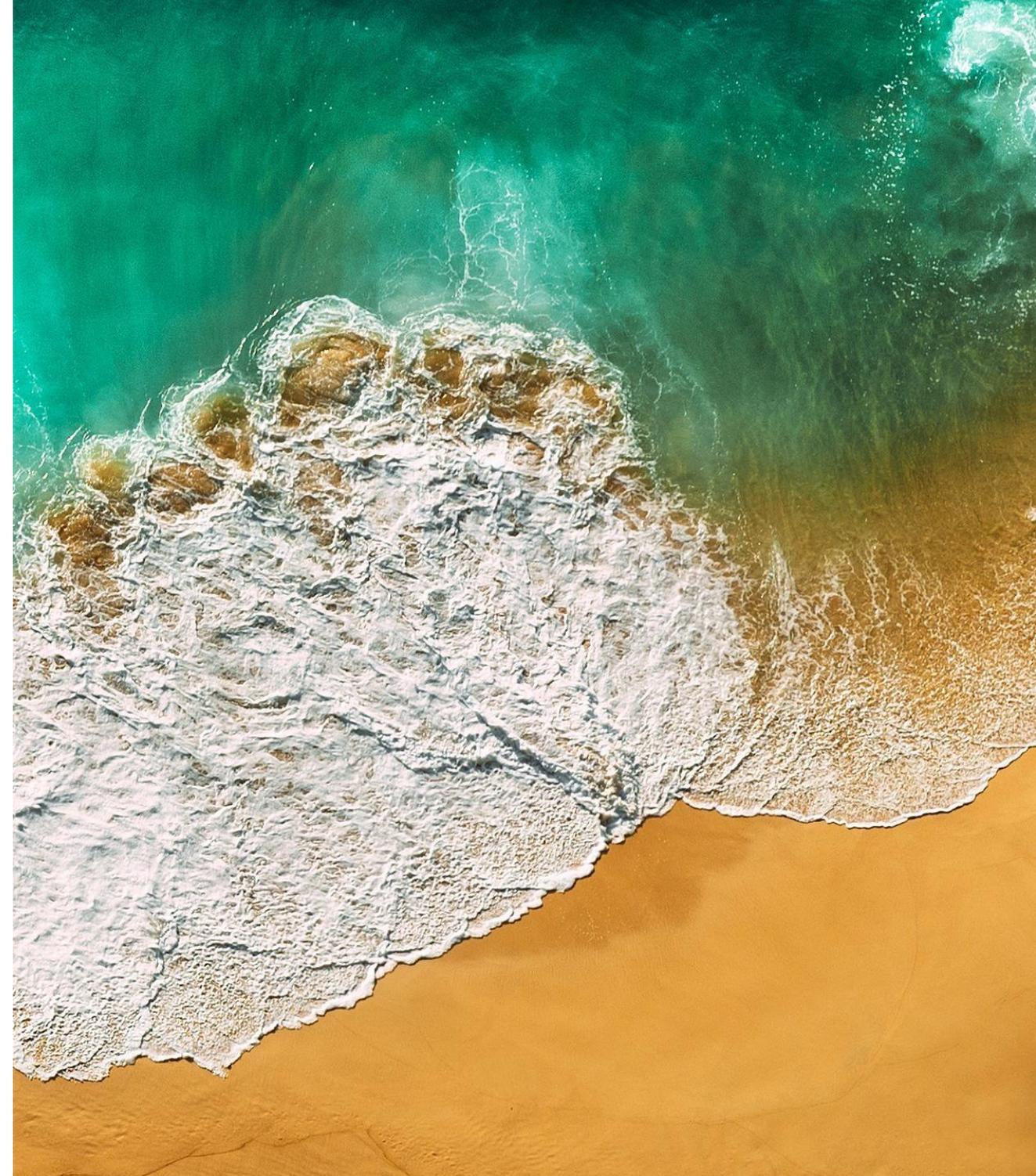
# MISLED

“Anti-plastic sentiments have been exploited by politicians and industry, where reducing consumers' plastic footprints are often confused by the seldom-challenged veil of environmental consumerism, or “greenwashing.” Plastic is integral to much of modern day life, and regularly represents the greener facilitator of society's consumption.”

“Influenced by media and political exploitation of an emotive environmental issue, public concern for the environment is dominated by plastic pollution. However, as a scientific community, it is important that the amount of time and funds devoted to addressing this popular concern are not disproportionate to less tangible anthropogenic pressures on our environment such as that of heavy metals, pharmaceuticals, and pesticides. Environmental research that does not fairly represent the problem under investigation risks undermining public and political trust in environmental science.”

## DISTRACTED FROM THE REAL ISSUES

T. Stanton et al., It's the product not the polymer: Rethinking plastic pollution, WIREs Water, 8 (1), 2021



# MISLED

“The global discourse surrounding plastics has been marked by a profound perceptual schism, also for plastic packaging in the fresh food industry. The public opinion expresses mounting concerns in terms of such plastic packaging solutions. However, in many cases the unique material properties and the well-established methodology of Life Cycle Assessment (LCA) actually demonstrate the environmental advantage of plastics for food packaging. This paper delves into the chasm between the two perspectives, leveraging empirical evidence to resolve the divide.”

## MISLED CONSUMERS INCREASE HARM BY CHOOSING ALTERNATIVES TO PLASTIC

E. Horsthuis et al., Closing the Perception-Reality Gap for Sustainable Fresh Food Plastic Packaging, *Procedia CIRP*, 122, pp 647-652, 2024



# PUBLIC PERCEPTION

“Across eight studies, we show that objectively less environmentally friendly plastic + paper packaging is systematically perceived as more environmentally friendly compared to plastic-only packaging.”

“...the effect is stronger when the proportion of paper in product packaging increases...”

“...the effect is stronger among people with stronger “paper = good, plastic = bad” beliefs.”

## PEOPLE DEMAND INCREASED HARM

T. Sokolova et al., Paper Meets Plastic: The Perceived Environmental Friendliness of Product Packaging, Journal of Consumer Research, 2023

*“Absolut Vodka has announced a new bottle made from 57% paper with a plastic lining, ...”*





News > UK > Home News

## Supermarkets bringing in even more damaging packaging in rush to ditch plastic, study finds

Race to find alternatives leads to rise in items creating more greenhouse gases

Jane Dalton | @JournoJane | Thursday 09 January 2020 07:38 | 24 comments



“Worryingly, our interviewees indicated that not all the changes made have been assessed properly for environmental impact and some decisions have been taken knowing it could actually increase some environmental burdens. One supermarket representative was frank: “We are aware that [by switching from plastic to other materials] we may, in some cases, be increasing our carbon footprint.”

L. Peake, I. Cripps, Plastic promises: What the grocery sector is really doing about packaging, The Green Alliance Trust, 2020

# BELIEF VS REALITY

## The focus on plastic bags is unjustified

Are People Clueless When It Comes to Their Carbon Footprints?, Treehugger, 2019



Here are the German results, with the beliefs compared to their actual facts about what works. The most surprising thing is the preoccupation with plastic bags. They may be made from fossil fuels, but their impact on carbon dioxide emissions is negligible.”

Belief (% of respondents)

Facts (CO<sub>2</sub> kg reduction p.a. per capita)



# GLOBAL MATERIALS IMPACT

Material	Material Usage (BN Tons)	CO <sub>2</sub> Generated (%)
Cement	10	7.2
Iron & Steel	1.8	8.7
Wood	1	---
Paper	0.41	1.4
Plastic	0.37	2*
Glass	0.2	0.36
Aluminium	0.064	0.54

<https://bellona.org/news/industry/2022-02-circularity-in-cement-and-concrete>

<https://worldsteel.org/steel-topics/statistics/world-steel-in-figures-2022/>

<https://www.statista.com/statistics/1089078/demand-paper-globally-until-2030/>

<https://www.globenewswire.com/en/news-release/2023/02/10/2606027/0/en/Global-Cement-Market-to-Reach-14-2-Billion-Tons-by-2030.html>

Nature Geoscience, 14, pp 151-155, 2021 UNEP (2011), Recycling Rates of Metals - A Status Report

# DISTRACTED

Every word...  
Every dollar...  
Every policy...  
Every minute...

Spent on plastics is wasted and  
Distracts us from real progress.

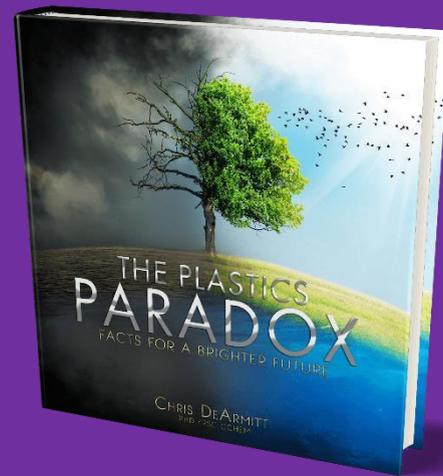
It's time to start talking about  
the other 99% of materials and waste  
before it's too late!





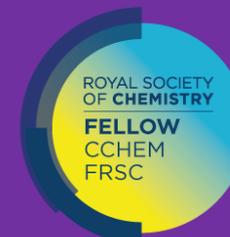
# KEYNOTE SPEAKER

Dispels Myths about Plastics & the Environment



- Microplastics
- Degradation
- Toxicity
- Ocean Plastics
- Marine Animals
- Life Cycle Analysis
- Wise Policies
- Bags, Straws & More!

As Seen on Radio & TV



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QUESTIONS

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# OBRIGADO

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