



BEYOND PLASTICS

The Environment Effects of Plastic Pollution

Testimony before the
Vermont House Committee on Environment & Energy

January 19, 2023

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BEYOND PLASTICS

Nearly 10 billion tons of plastic have been produced since 1950

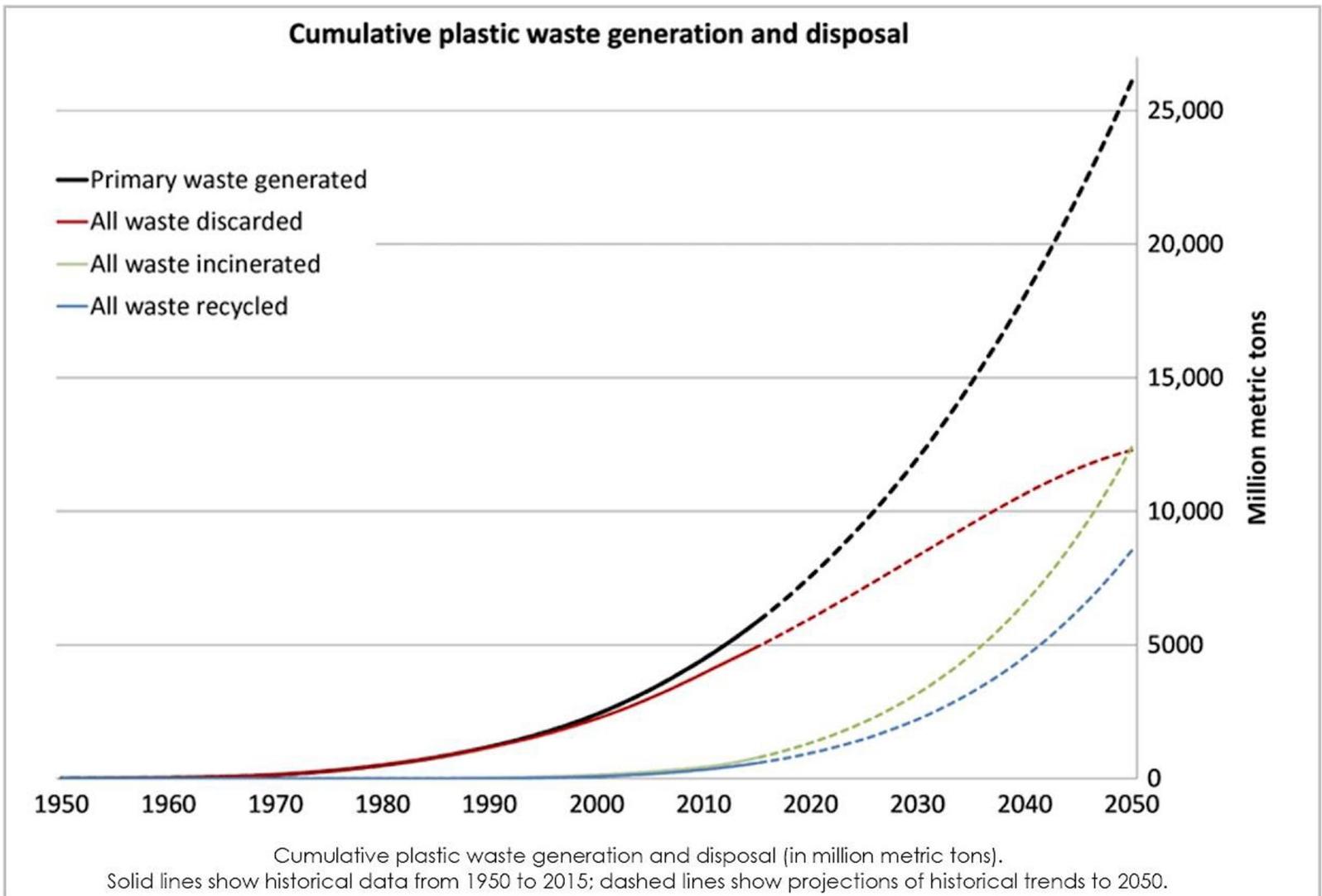


“Production, Use and Fate of all Plastics Ever Made”

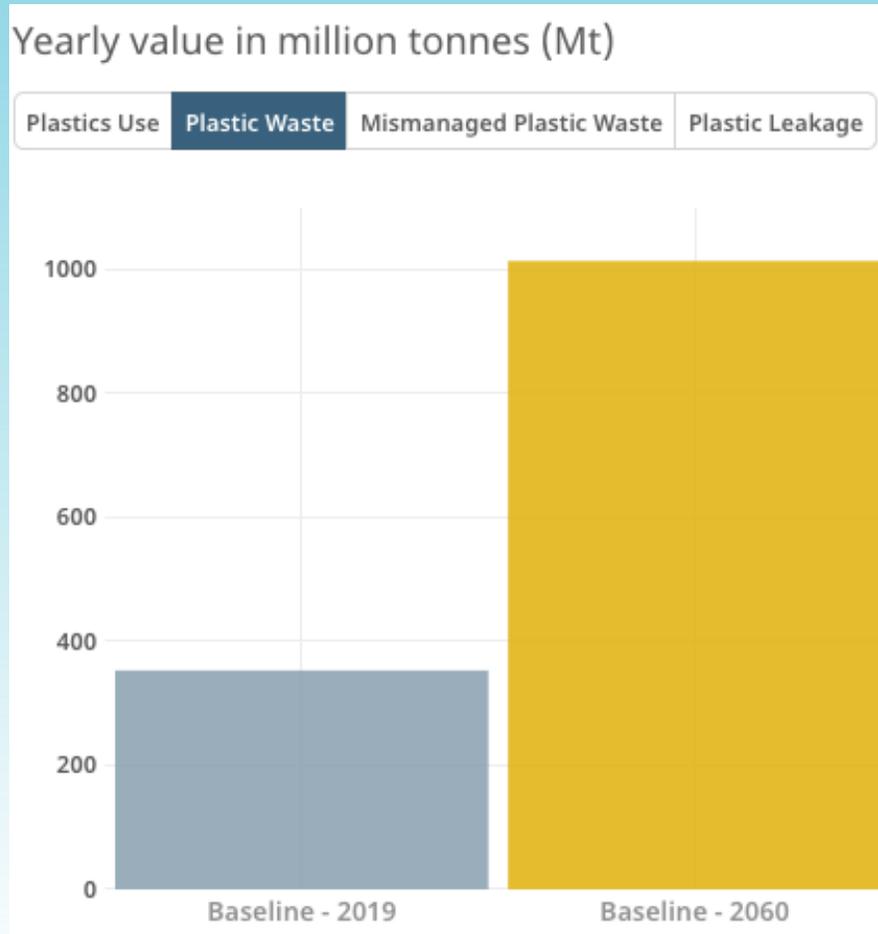
Science Advances

July 19, 2017

Written by Roland Geyer of the University of California at Santa Barbara, Jenna Jambeck of the University of Georgia and Kara Lavender Law of the Sea Education Association in Woods Hole, Mass.

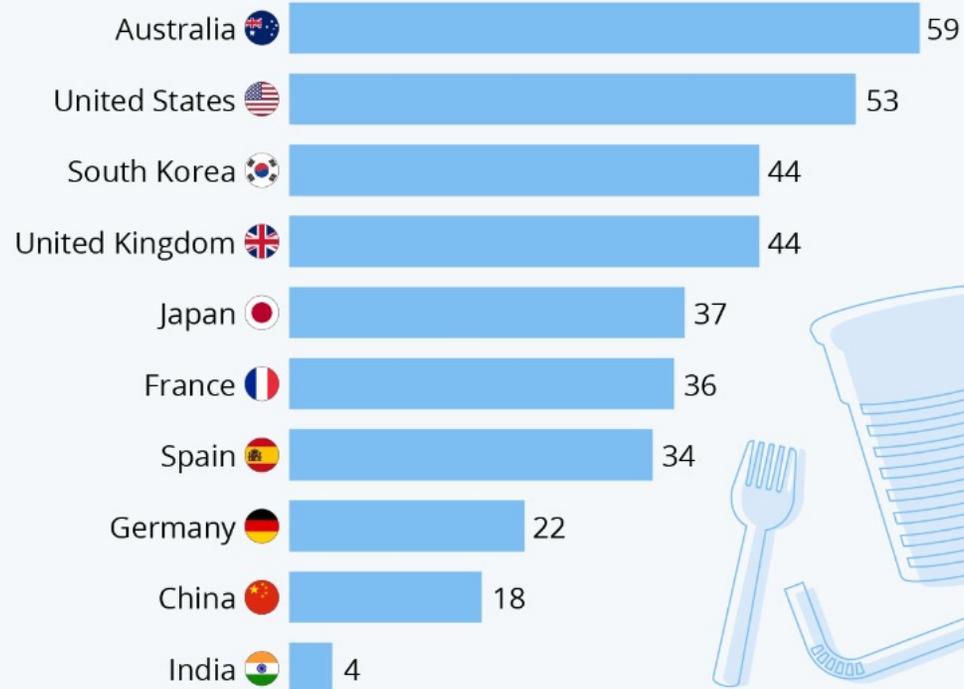


Plastic waste expected to triple by 2060



How Much Single-Use Plastic Waste Do Countries Generate?

Single-use plastic waste generated per person in selected countries in 2019 (in kilograms)



Source: The Plastic Waste Makers Index by The Mindaroo Foundation

Plastics are made from fossil fuel-derived polymers and chemical additives

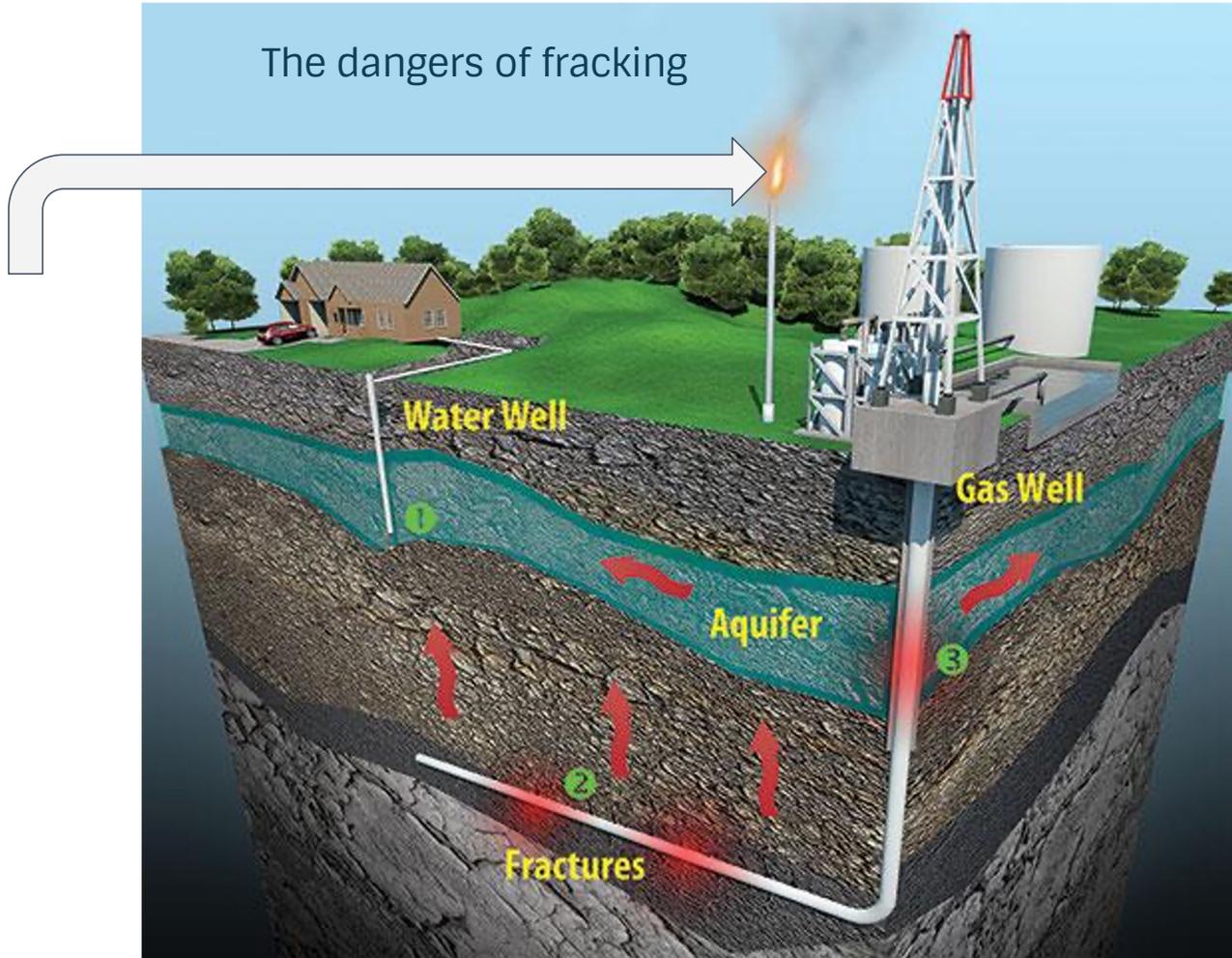


Fossil fuels are coal, oil, and natural gas.



Today, most plastics are made from a by-product of natural gas called ethane.

The dangers of fracking





ETHANE CRACKERS ARE COMING...

SHELL Chemical in Appalachia is approved to emit:

- 2.2 million tons of carbon each year
- 164 tons of PM-10 each year
- 522 tons of volatile organic compounds each year

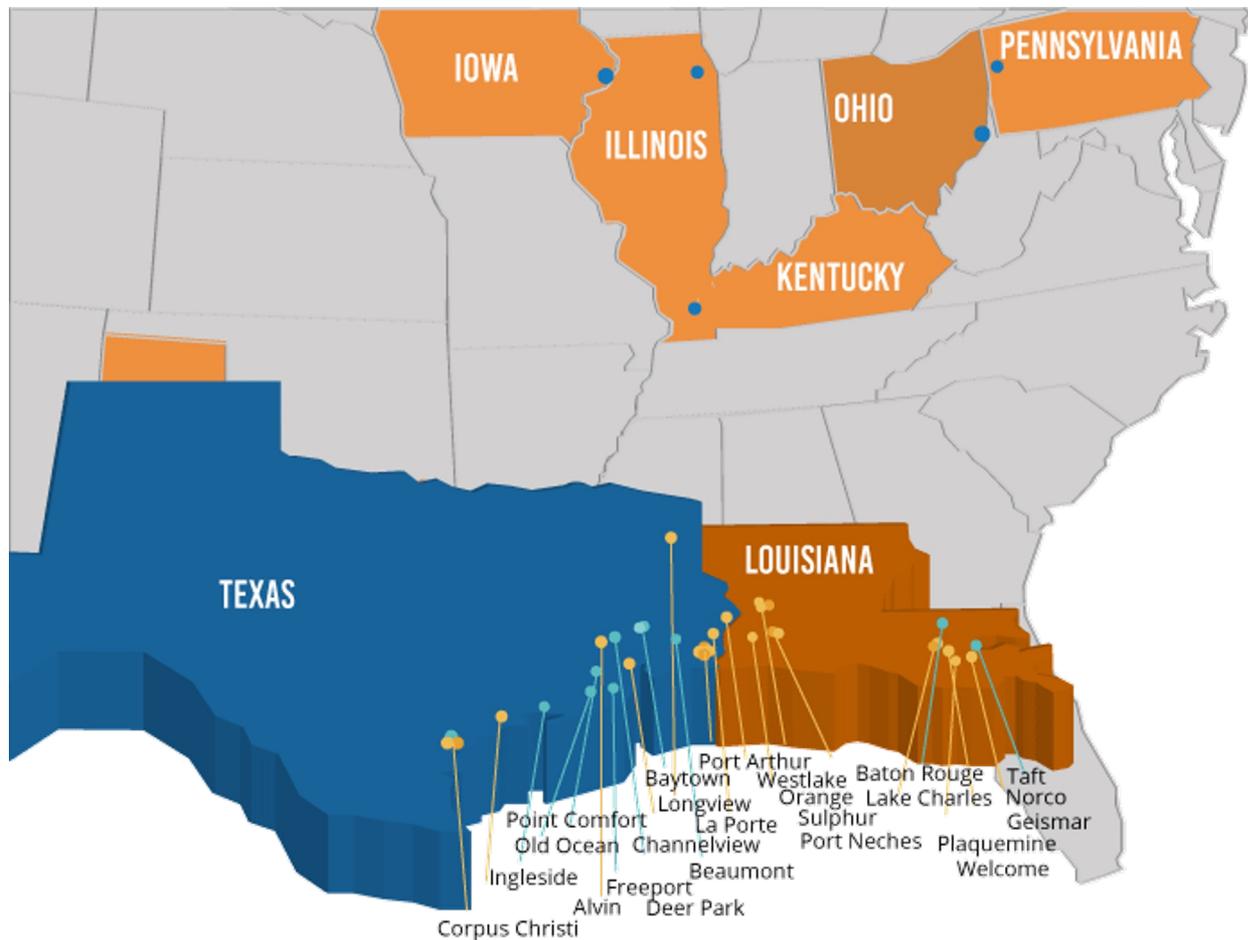


BEYOND PLASTICS

The Plastic Industry's Pollution Is *Not* Shared Equally

Communities in which the plastics industry releases 1 million+ tons CO2E per year

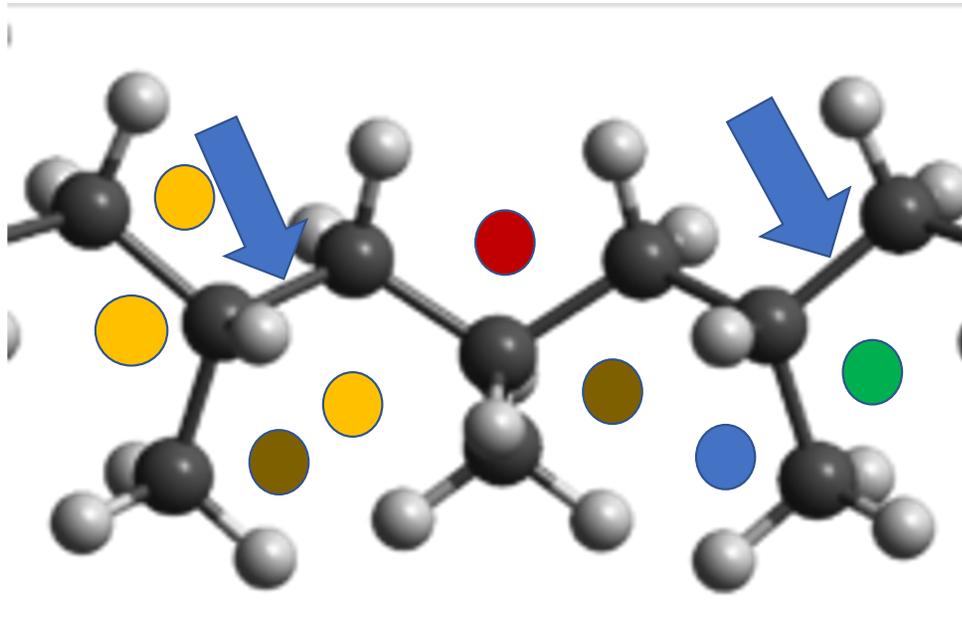
1. Houston/Baytown, Texas - 20.2 million tons
2. Freeport, Texas - 16.6 million tons
3. Norco/Taft, Louisiana - 10.3 million tons
4. Plaquemine/St. Gabriel, Louisiana - 8.6 million tons
5. Beaumont/Port Arthur, Texas - 7.8 million tons
6. Lake Charles, Louisiana - 7.7 million tons
7. Baton Rouge, Louisiana - 6.3 million tons
8. Geismar, Louisiana - 5.2 million tons
9. Point Comfort, Texas - 4.8 million tons
10. Kingsport, Tennessee - 4.1 million tons
11. Corpus Christi, Texas - 4 million tons
12. Orange, Texas - 3.3 million tons
13. Linden, New Jersey - 2.7 million tons
14. Longview, Texas - 2.4 million tons
15. Victoria, Texas - 1.9 million tons
16. Decatur, Alabama - 1.4 million tons
17. Hopewell, Virginia - 1.3 million tons
18. Calvert City, Kentucky - 1.27 million tons



WHAT IS PLASTIC?

Polymer Backbone:
Carbon-Carbon Bonds

Multiple Chemical Additives. Many are highly toxic
Phthalates, Bisphenols, PFAS, Brominated
Flame Retardants



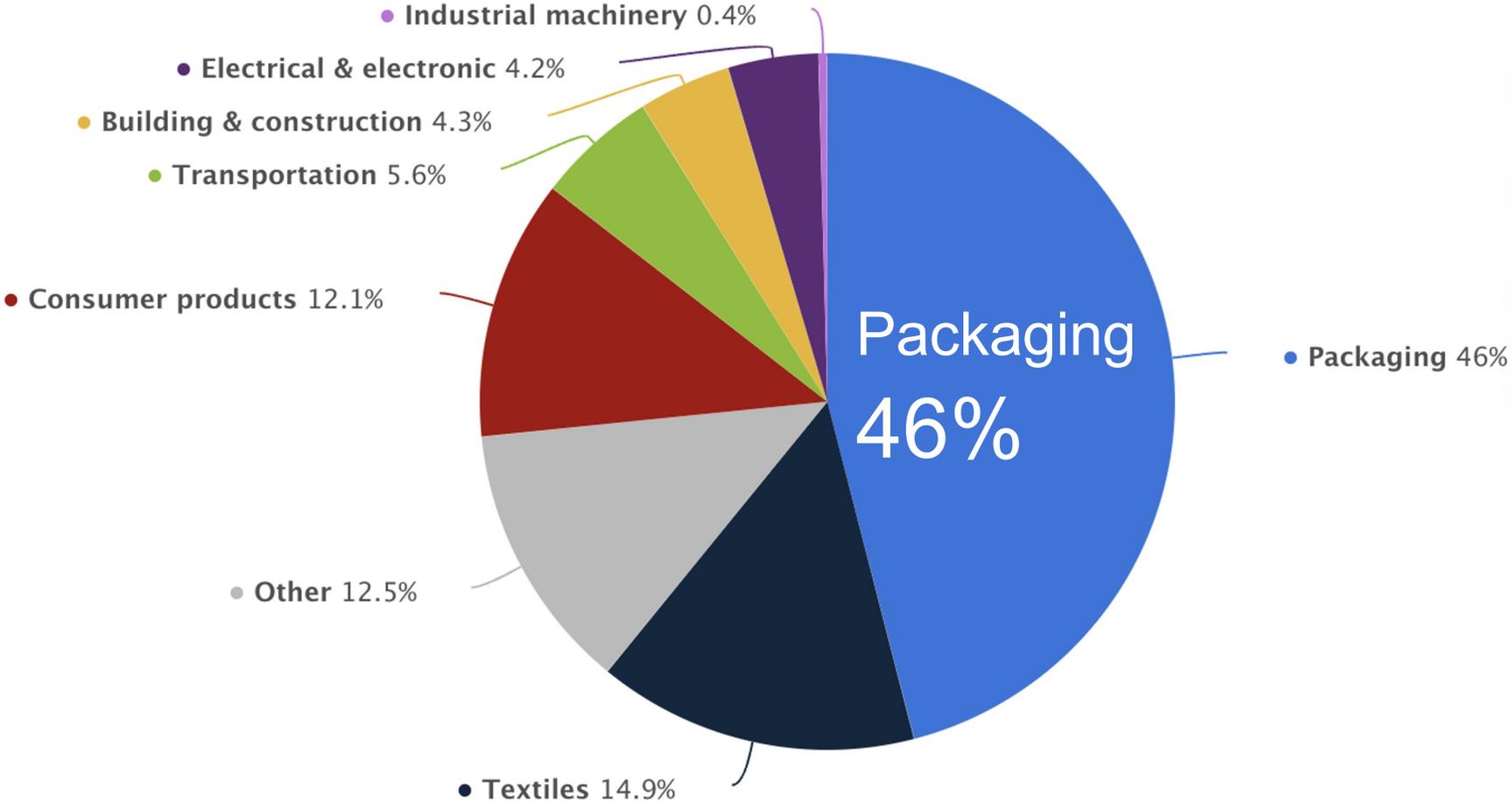
Chemical additives can comprise up to of plastic 50% by weight

Slide by Philip Landrigan, M.D.

The durability of plastics: a double-edged sword

The same qualities that make plastic useful are the ones that make it harmful

Almost half of all plastics produced are used for packaging



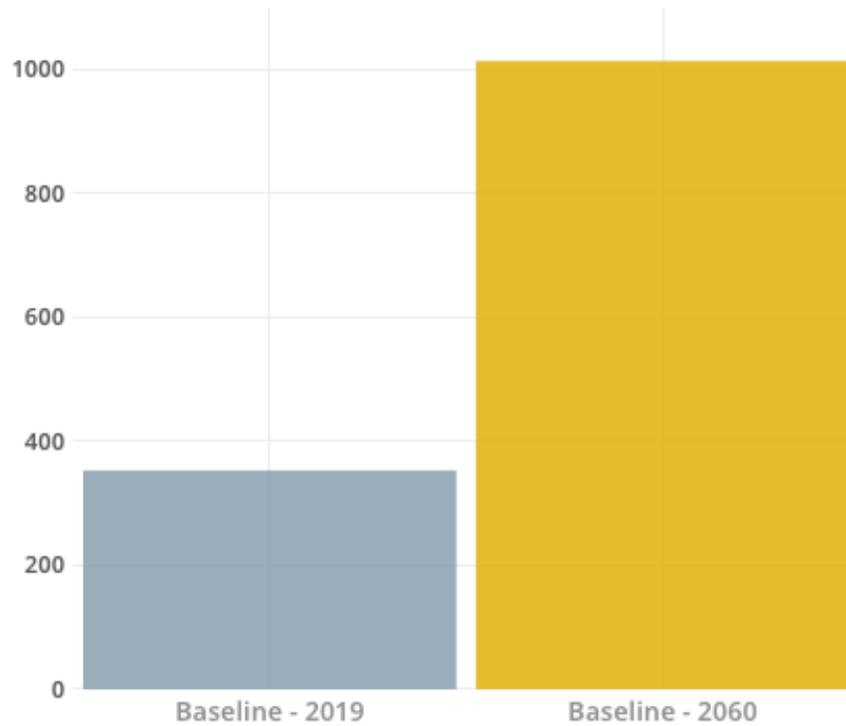
© Statista 2023



Plastic waste expected to triple by 2060

Yearly value in million tonnes (Mt)

Plastics Use Plastic Waste Mismanaged Plastic Waste Plastic Leakage

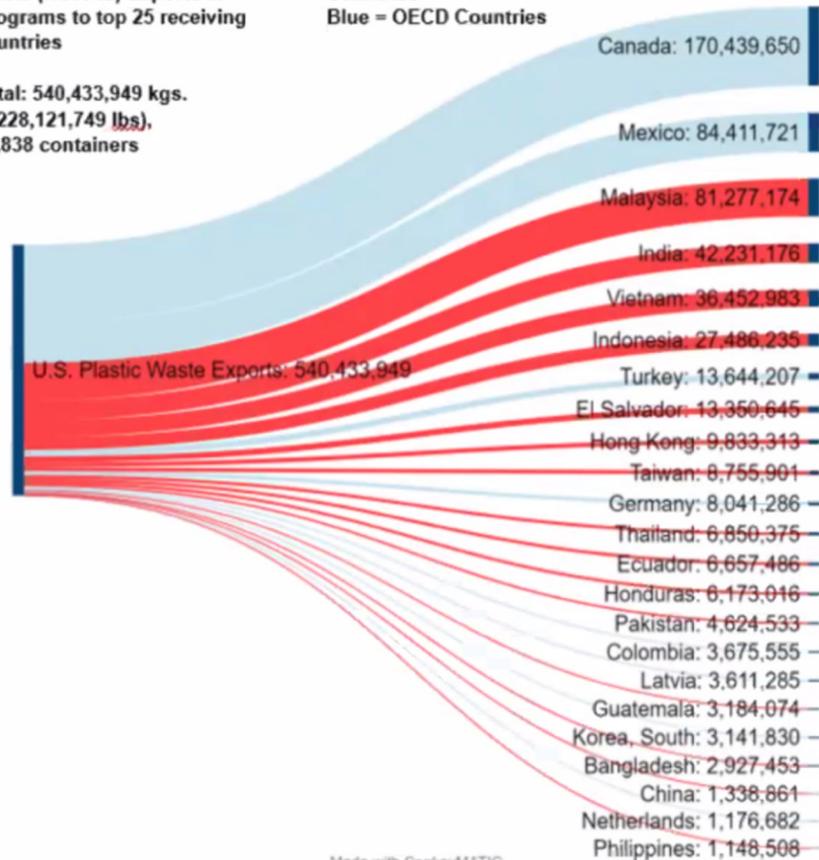


2021 Plastic Waste Exports from the US

2021 Full Year: U.S. Plastic Waste (HS3915) Exports in kilograms to top 25 receiving countries

Total: 540,433,949 kgs.
(1,228,121,749 lbs),
50,838 containers

Red = non-OECD Countries
Blue = OECD Countries



Made with SankeyMATIC

Much of our plastic is shipped overseas (often illegally)

Primary recipient countries:

- Canada (re-exported)
- Mexico
- Malaysia
- India
- Vietnam
- Indonesia
- Turkey
- El Salvador



Image from 'Plastic China' documentary website

8-15 million tons of
plastics enter our
oceans every year.



Plastics in the water: greenhouse gas emitters



Source: Surfrider Foundation Bioplastics Toolkit

BEYOND PLASTICS

Plastics in the air: greenhouse gas emitters



The U.S. plastic industry's greenhouse gas emissions are poised to surpass those of coal-fired power plants by 2030.

Plastic is the new coal.

RANKED: WORLD'S BIGGEST CLIMATE POLLUTERS

in annual greenhouse
gas emissions

Source: Nat. Clim. Chang. 9, 374-378 (2019)

#1: CHINA



#2: USA



#3: INDIA



#4: RUSSIA



#5: PLASTIC



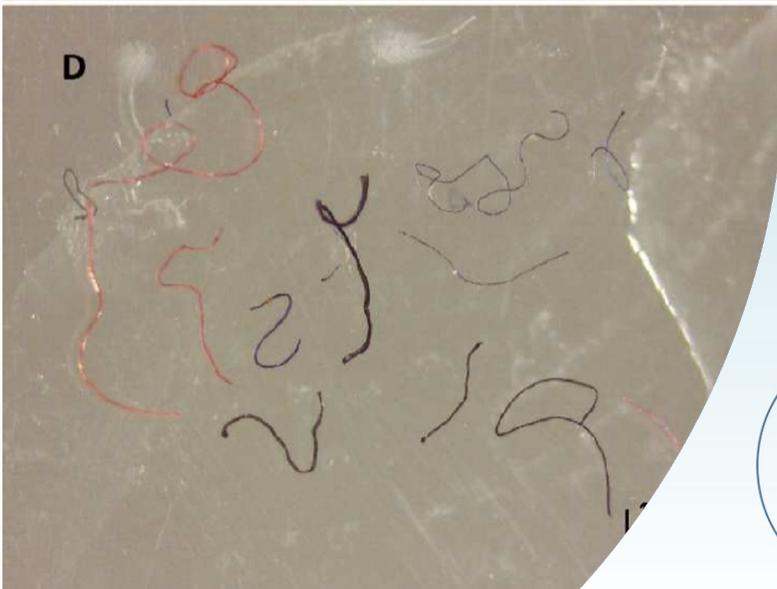
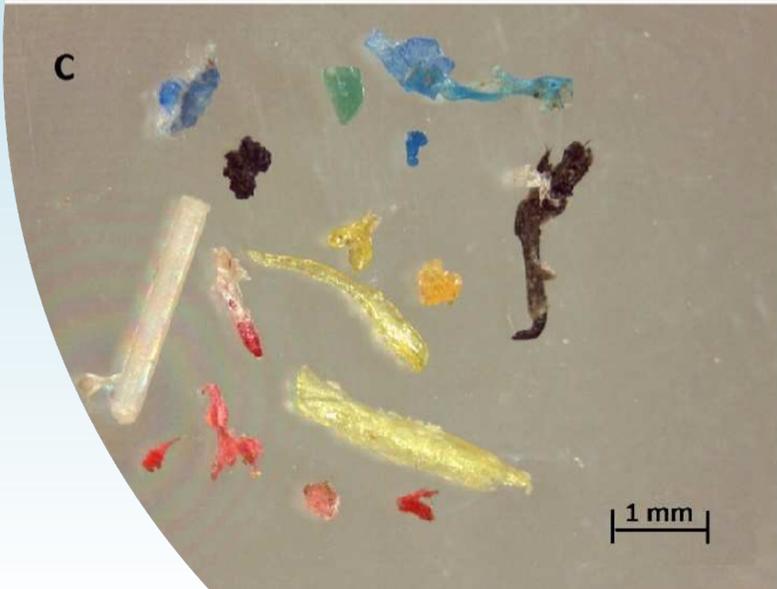
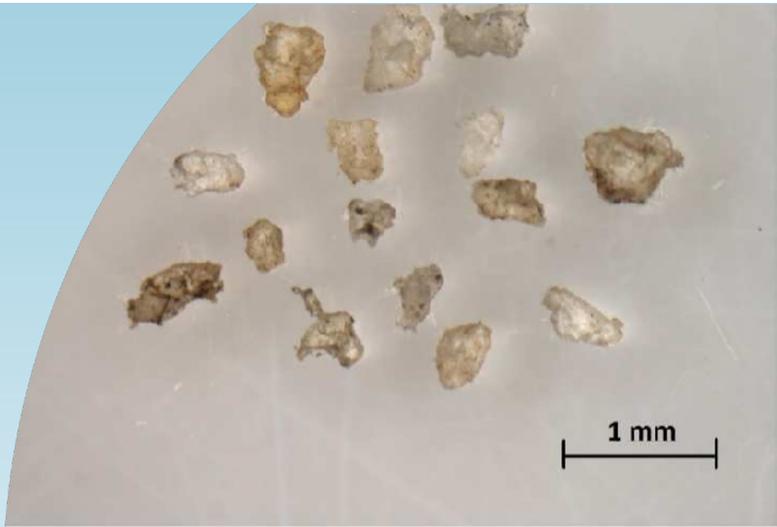
- The U.S. plastics industry is responsible for at least 232 million tons of CO₂e gas emissions per year.
- If plastic were a country, it would be the world's fifth largest greenhouse gas emitter.



By 2025, there will
be will be 1 pound
of plastics for every
3 pounds of fish in
the ocean.



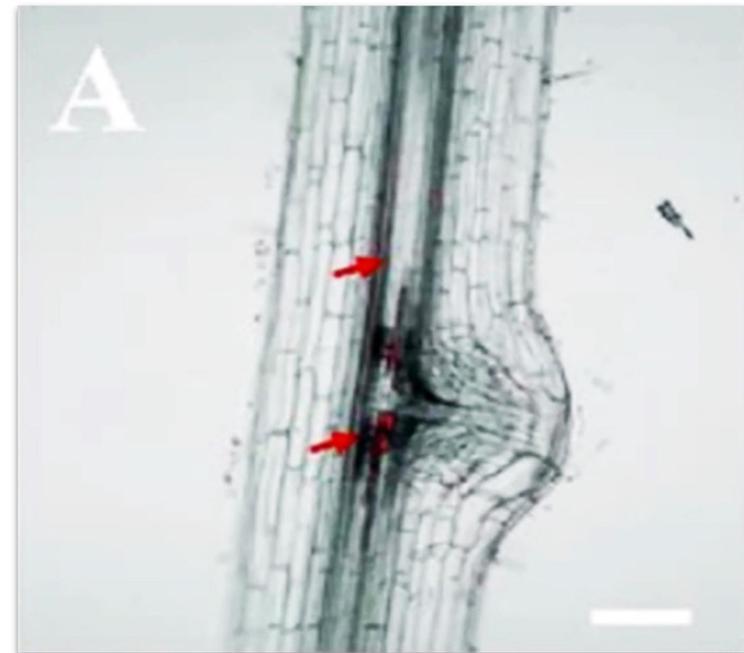

BEYOND PLASTICS



Microplastics are now everywhere in nature



**Microplastic filament
on a snowflake**

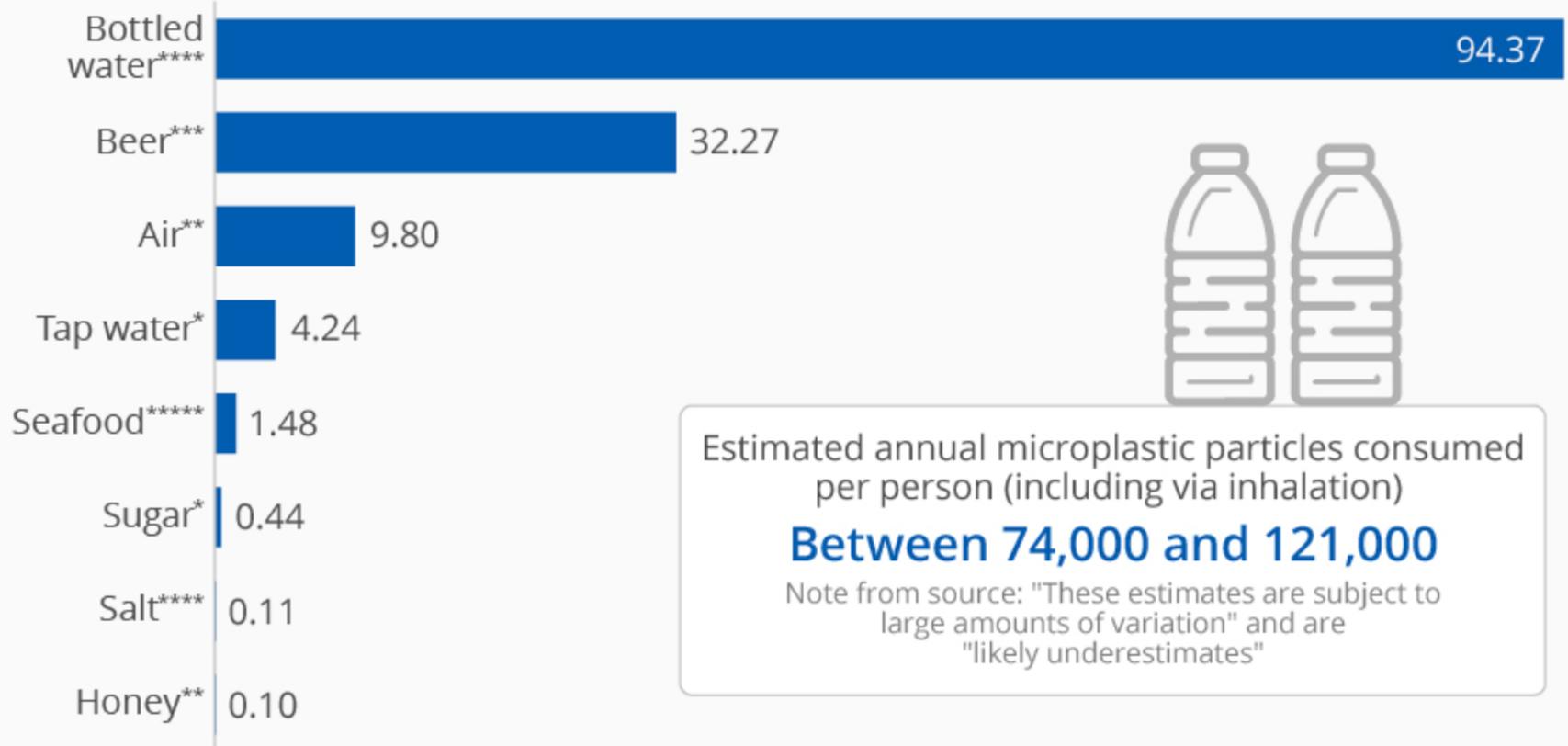


Uptake in Plants

Li et al., 2019 *Nat Sust.* Li et al., 2020, *Nat Sust*

How We Eat, Drink and Breathe Microplastics

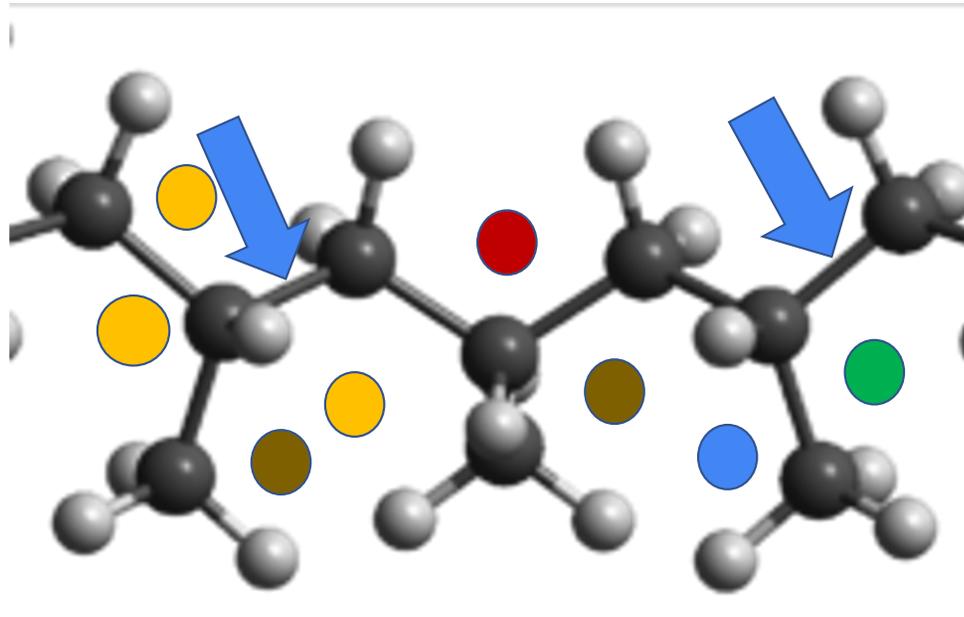
Average number of microplastic particles found per gram/liter/m³ of selected consumables



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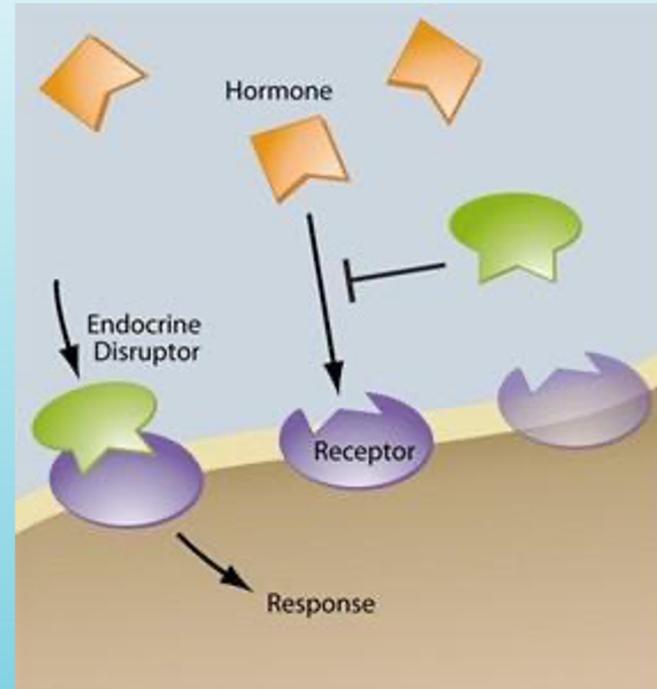
Chemical additives can comprise up to of plastic 50% by weight

Slide by Philip Landrigan, M.D.

Endocrine Disrupting Chemicals (EDCs)



Many of the chemicals in flame retardants are endocrine disruptors.

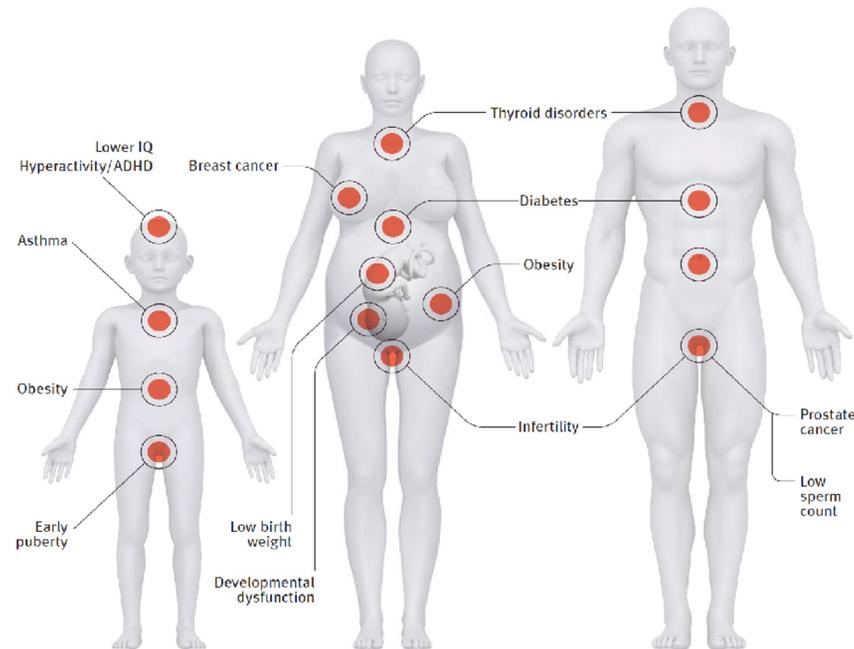


Endocrine disrupting chemicals (EDCs) trick the body into thinking they are hormones.

Endocrine
Disrupting
Chemicals

Low Doses Matter

Everyday exposures to EDCs contribute to modern health epidemics.

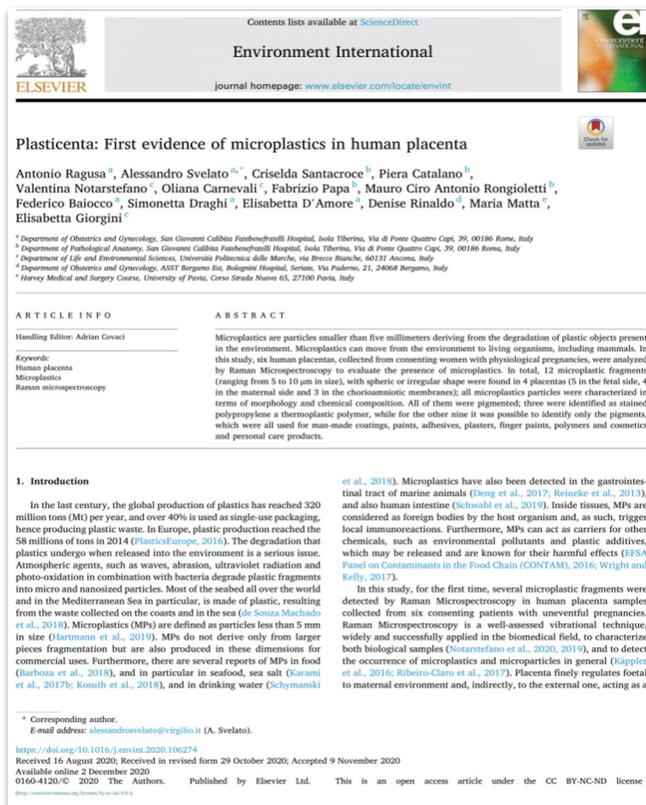


How are people exposed?

Children's toys (phthalates)	Fragrances (phthalates)
Plastic drinking bottles (BPA, BPS, BPF)	Food (pesticides like chlorpyrifos)
Cleaning products (phthalates, triclosan)	Food packaging (BPA, PFAS, phthalates)
House dust (flame retardants, pesticides)	Thermal cash register receipts (BPA, BPS)
Home furniture/electronics (flame retardants, PFAS)	Drinking water (arsenic, lead, perchlorate)
Building materials (flame retardants, phthalates, PFAS)	Personal care products (parabens, phthalates, triclosan)

BEYOND PLASTICS

Microplastics are everywhere in the human body: even before birth



Water, water, everywhere...in plastic



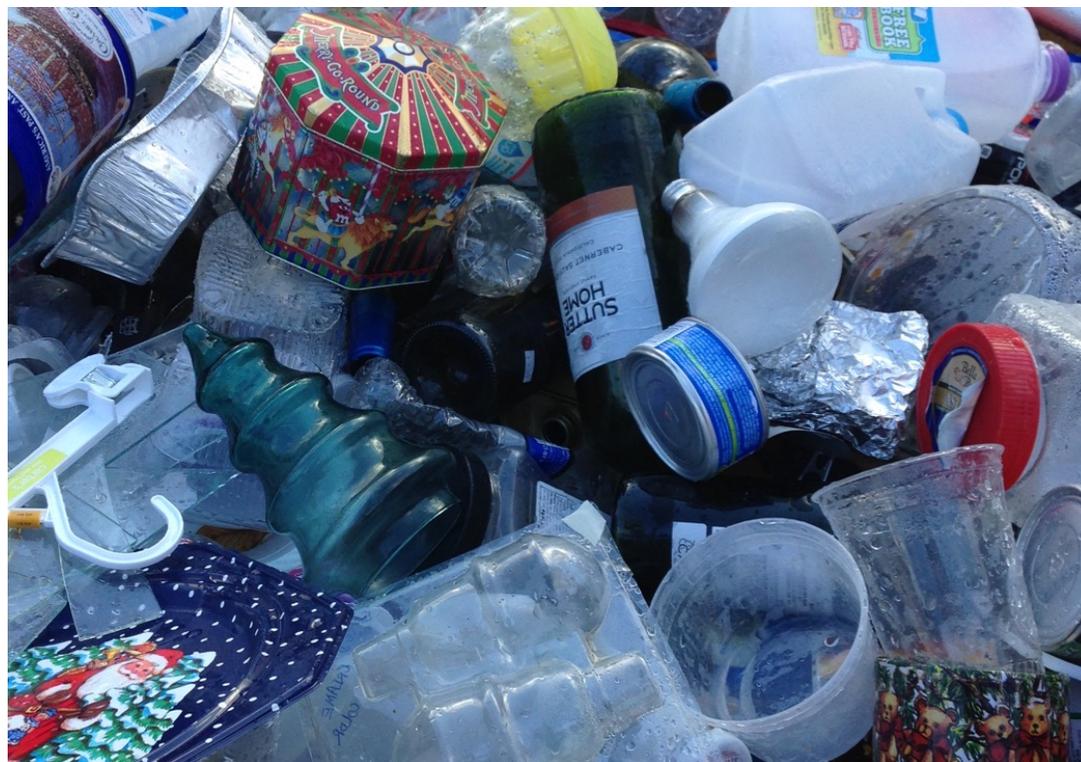
Other non-carbonated beverages in plastic



How do we **solve** this?

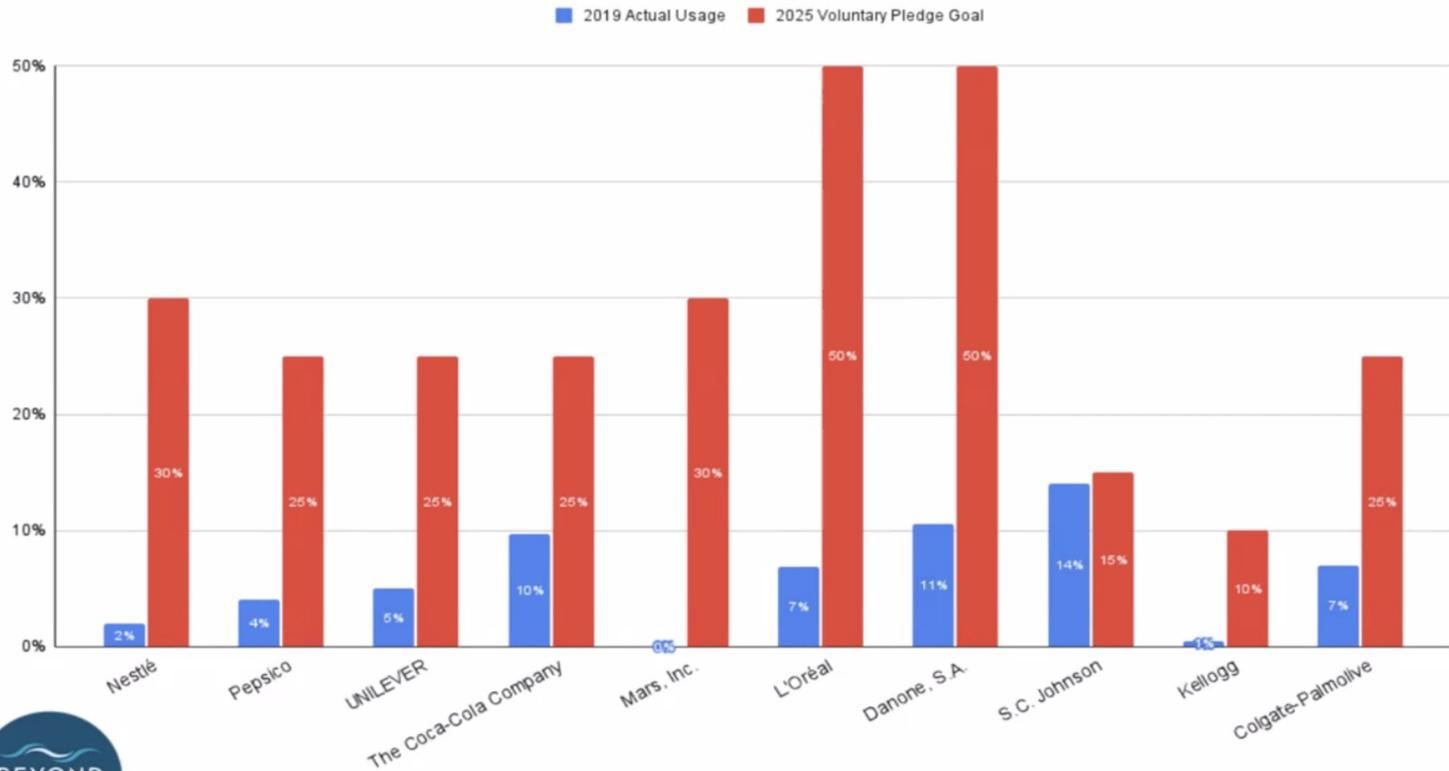


Not with curbside and dropoff recycling



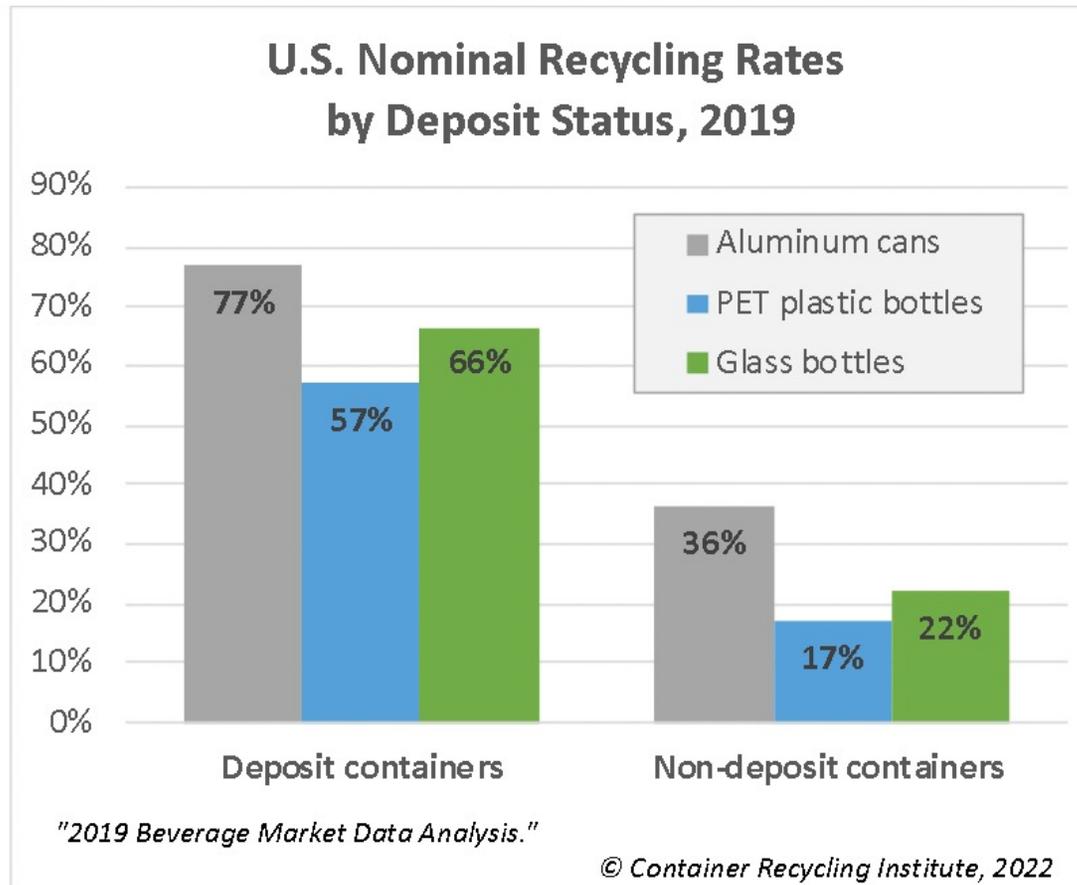
Not with voluntary corporate pledges

Corporate Promises to Use Recycled Materials: Promises vs. Reality



Prepared by Beyond Plastics Oct. 2021. Source: Ellen MacArthur Foundation's The Global Commitment 2020 Progress Report, pp 15-16

Deposits. Add non-carbonated beverages to VT's bottle bill.



Waste reduction, including refilling



Deposits: a simple policy measure with so many benefits

- Human health
- Marine pollution / ocean ecology
- Soil health
- Environmental justice
- Greenhouse gases
- Landfills & incinerators
- Littering

Thank you

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