

The Fossil Fuel-to-Plastics Connection



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LeboGreen
Sunnyhill Unitarian Universalist
Church of the South Hills
11/20/24

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Pennsylvania Constitution

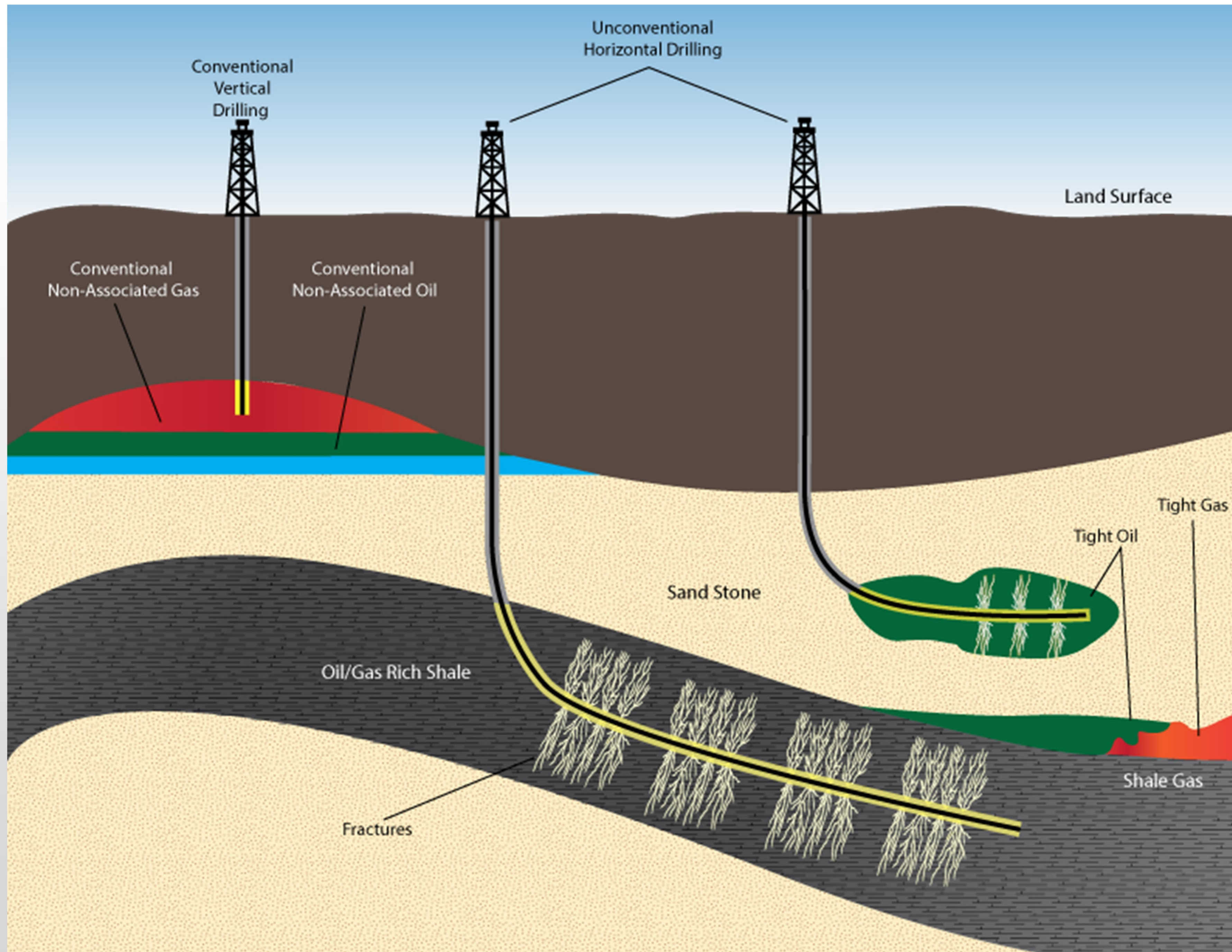
Article I Section 27

“The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment.

Pennsylvania's public natural resources are the common property of all the people, including generations yet to come.

As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.”

Ratified by PA voters on May 18, 1971



Chemicals used in fracking

**Chemicals Used by Hydraulic Fracturing Companies in Pennsylvania
For Surface and Hydraulic Fracturing Activities
Prepared by the Department of Environmental Protection
Bureau of Oil and Gas Management
Compiled from Material Safety Data Sheets obtained from Industry**

Other Ingredients	Fluid Composition %
Gellant	0.5%
Acid	.07%
Corrosion Inhibitor	.05%
Friction Reducer	.05%
Clay Control	.034%
Crosslinker	.032%
Scale Inhibitor	.023%
Breaker	.02%
Iron Control	.004%
Biocide	.001%

1,2,4-Trimethylbenzene	Glycol Ethers (includes 2BE)
1,3,5 Trimethylbenzene	Guar gum
2,2-Dibromo-3-Nitrilopropionamide	Hemicellulase Enzyme
2.2-Dibromo-3-Nitrilopropionamide	Hydrochloric Acid
2-butoxyethanol	Hydrotreated light distillate
2-Ethylhexanol	Hydrotreated Light Distilled
2-methyl-4-isothiazolin-3-one	Iron Oxide
5-chloro-2-methyl-4-isothiazotin-3-one	Isopropanol
Acetic Acid	Isopropyl Alcohol
Acetic Anhydride	Kerosine
Acie Pensurf	Magnesium Nitrate
Alcohol Ethoxylated	Mesh Sand (Crystalline Silica)
Alphatic Acid	Methanol
Alphatic Alcohol Polyglycol Ether	Mineral Spirits
Aluminum Oxide	Monoethanolamine
Ammonia Bifluoride	Naphthalene
Ammonia Bisulfite	Nitrilotriacetamide
Ammonium chloride	Oil Mist
Ammonium Salt	Petroleum Distillate Blend
Ammonia Persulfate	Petroleum Distillates
Aromatic Hydrocarbon	Petroleum Naphtha
Aromatic Ketones	Polyethoxylated Alkanol (1)
Boric Acid	Polyethoxylated Alkanol (2)
Boric Oxide	Polyethylene Glycol Mixture
Butan-1-01	Polysaccharide
Citric Acid	Potassium Carbonate
Crystalline Silica: Cristobalite	Potassium Chloride
Crystalline Silica: Quartz	Potassium Hydroxide
Dazomet	Prop-2-yn-1-01
Diatomaceus Earth	Propan-2-01
Diesel (use discontinued)	Propargyl Alcohol
Diethylbenzene	Propylene
Doclecybenzene Sulfonic Acid	Sodium Ash
E B Butyl Cellosolve	Sodium Bicarbonate
Ethane-1,2-diol	Sodium Chloride
Ethoxlated Alcohol	Sodium Hydroxide
Ethoxylated Alcohol	Sucrose
Ethoxylated Octylphenol	Tetramethylammonium Chloride
Ethylbenzene	Titanium Oxide
Ethylene Glycol	Toluene
Ethylhexanol	Xylene
Ferrous Sulfate Heptahydrate	
Formaldehyde	
Glutaraldehyde	

FRACKING WITH “FOREVER CHEMICALS”

RECORDS INDICATE OIL AND GAS FIRMS INJECTED PFAS INTO MORE THAN 1,200 WELLS SINCE 2012; EPA APPROVED CHEMICAL FOR OIL AND GAS OPERATIONS DESPITE PFAS CONCERNS

BY DUSTY HORWITT, J.D.
PHYSICIANS FOR SOCIAL RESPONSIBILITY
JULY 2021



ENVIRONMENTAL
HEALTH PROJECT
DEFENDING PUBLIC HEALTH 2012-2022

- **PFAS: per-/polyfluoroalkyl substances** (perfluorinated chemicals, polyfluorinated compounds, PFCs, “Forever Chemicals”)
- Slippery, oil- and water-repellent, and heat-resistant properties
- Useful in firefighting foams, food packaging, raingear, carpeting, medical devices, personal care products, Teflon (polytetrafluoroethylene)
- Nickname reflects how they do not break down in the environment

Serious Health Risks from PFAS

❖ Oncogenic:

- Testicular cancer
- Kidney cancer

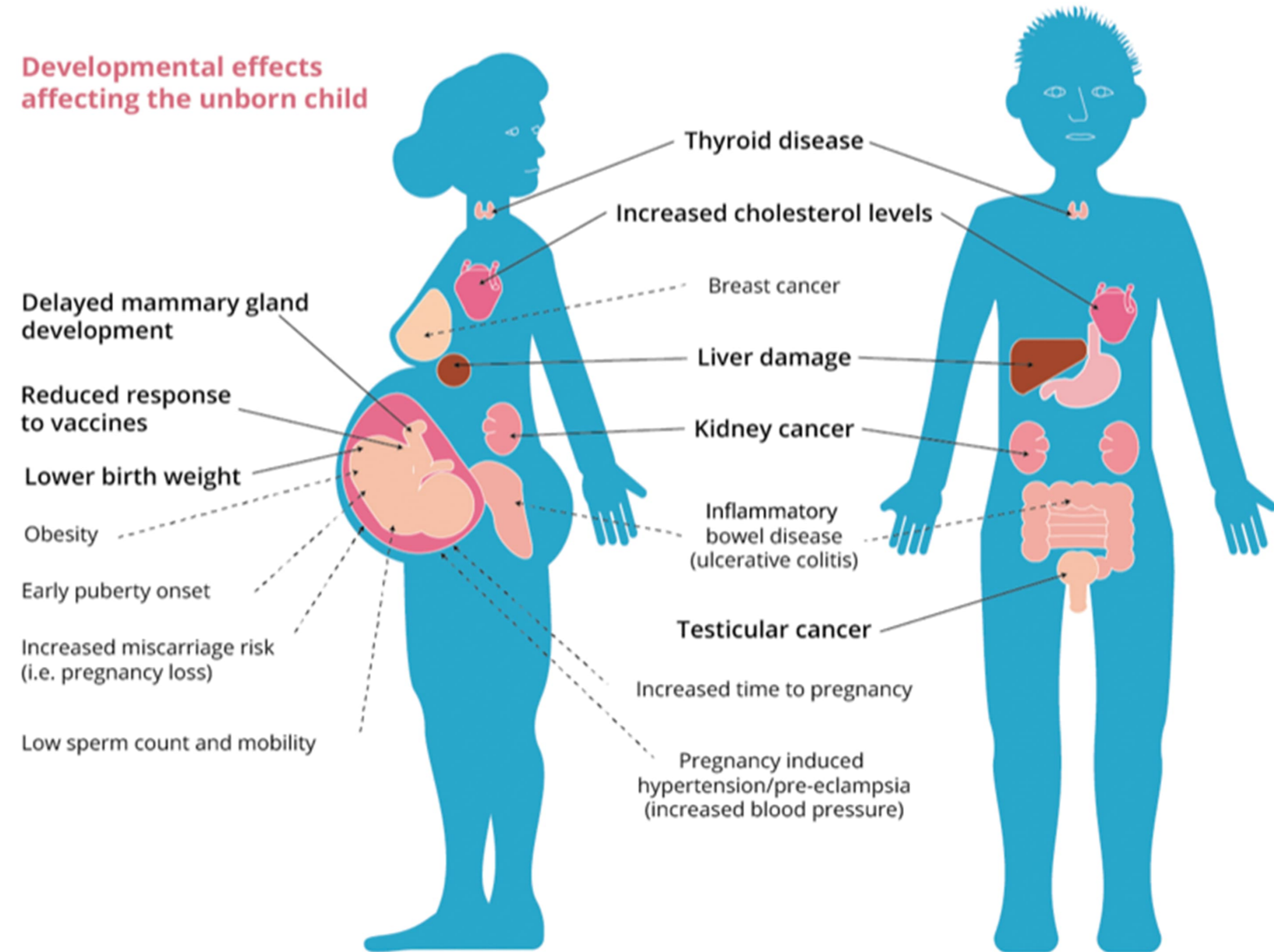
❖ Endocrine disruption:

- Thyroid disease
- Increased cholesterol
- Fetal & infant growth and development

❖ Immunologic:

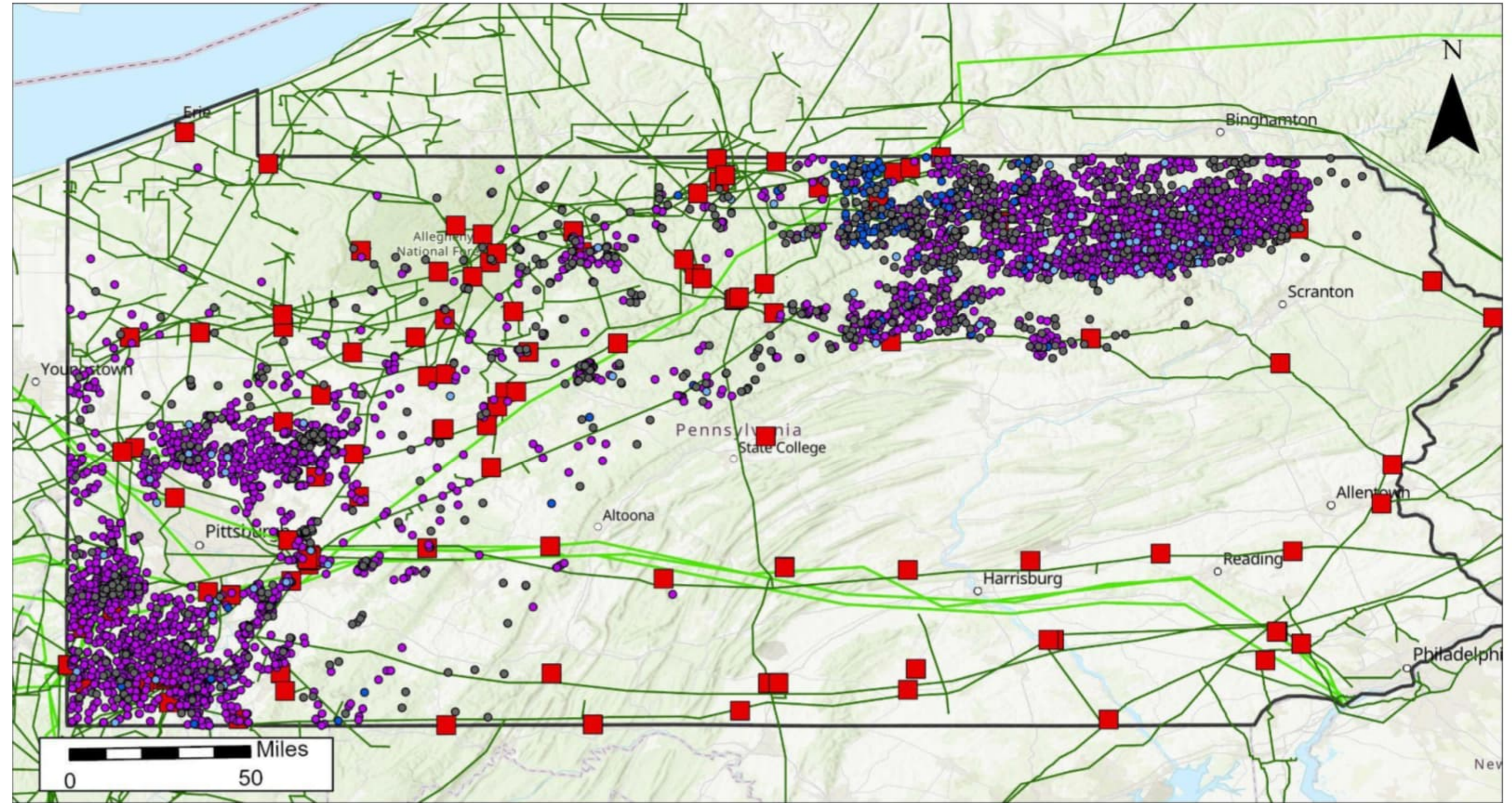
— High certainty
 ---- Lower certainty

Developmental effects affecting the unborn child



Where is the fracking industry active in Pennsylvania?

- 14,468 fracking wells
- 128 compressor stations
- Thousands of miles of pipelines



Esri, USGS, Centre County Government, data.pa.gov, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS



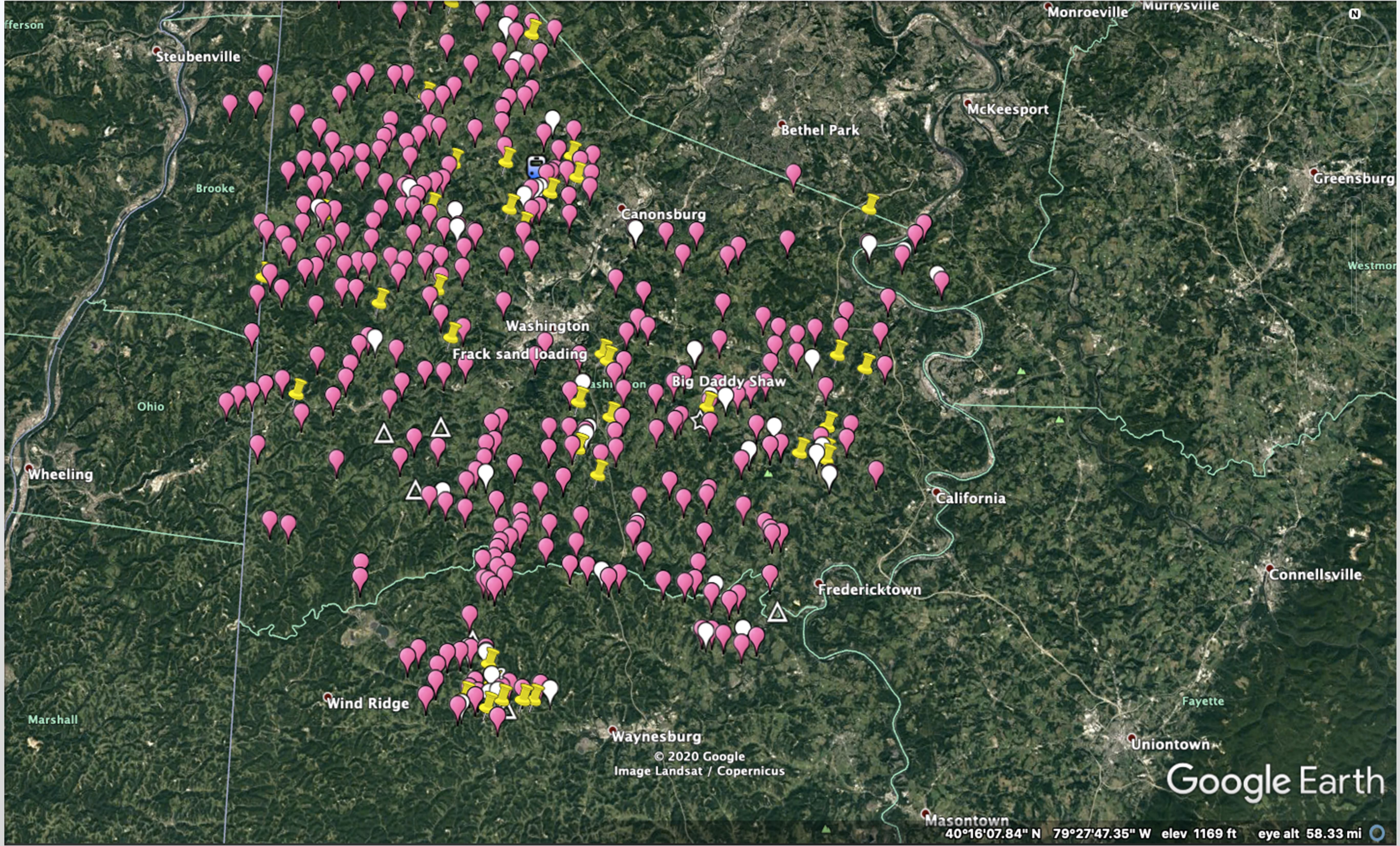
Legend

Fracking Wells	Natural Gas Compressor Stations
Well Status	■ Natural Gas Compressor Stations (128)
● Active (12,834)	Natural Gas Pipelines
● Regulatory Inactive Status (184)	— Natural Gas Pipelines (19)
● Abandoned (152)	— Natural Gas Liquid Pipelines (14)
● Plugged OG Well (1,298)	

Updated: July 31, 2024

(Slide courtesy of Katie Jones/FracTracker Alliance)





Steubenville

Brooke

Canonsburg

Washington

Frack sand loading

Big Daddy Shaw

California

Fredericktown

Wind Ridge

Waynesburg

Uniontown

Masontown

40°16'07.84" N 79°27'47.35" W elev 1169 ft eye alt 58.33 mi

Google Earth

© 2020 Google
Image Landsat / Copernicus

Greensburg

Westmoreland

Connellsville

Fayette

Bethel Park

McKeesport

Monroeville

Murrysville

Wheeling

Ohio

Marshall

Jefferson



**Compendium of Scientific, Medical, and Media Findings
Demonstrating Risks and Harms of Fracking
and Associated Gas and Oil Infrastructure**

Ninth Edition

October 2023



©Julie Dermansky Photography
Gas industry site on BLM land, San Juan Basin, New Mexico

“Our examination uncovered no evidence that fracking can be practiced in a manner that does not threaten human health directly or without imperiling climate stability upon which human health depends.”

“The only method of mitigating its grave threats to public health and the climate is a complete and comprehensive ban on fracking. Indeed, a fracking phase-out is a requirement of any meaningful plan to prevent catastrophic climate change.”

<https://concernedhealthny.org/compendium/>

FRACKING IS A HEALTH CRISIS

Fracking activities contaminate and destroy water.



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Air Toxics from Shale Oil & Gas Operations

FRACKING IS A HEALTH CRISIS

FRACKING AND FLARING CREATE TOXIC AIR POLLUTION
AT LEVELS HARMFUL TO NEARBY RESIDENTS.



- PM 2.5 and smaller
- VOCs (incl. BTEX, formaldehyde)
- PAHs
- Fracking chemicals
- Silica dust
- Heavy metals (Pb, As, Hg)
- TENORMs (Ra 226, Ra 228, Rn 222)
- Carbon monoxide
- NOx (ozone)
- Greenhouse gases (CO₂, CH₄)

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FRACKING IS A HEALTH CRISIS

120 STUDIES SHOW HEALTH HARMS FROM FRACKING. THOSE LIVING CLOSEST SUFFER MOST.



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FRACKING IS A HEALTH CRISIS

PREGNANT WOMEN AND INFANTS ARE AT SPECIAL RISK.

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FRACKING IS A HEALTH CRISIS

MULTIPLE STUDIES LINK FRACKING TO ASTHMA AND RESPIRATORY DISTRESS.



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FRACKING IS A HEALTH CRISIS

Multiple studies
link fracking to
CANCER in kids.



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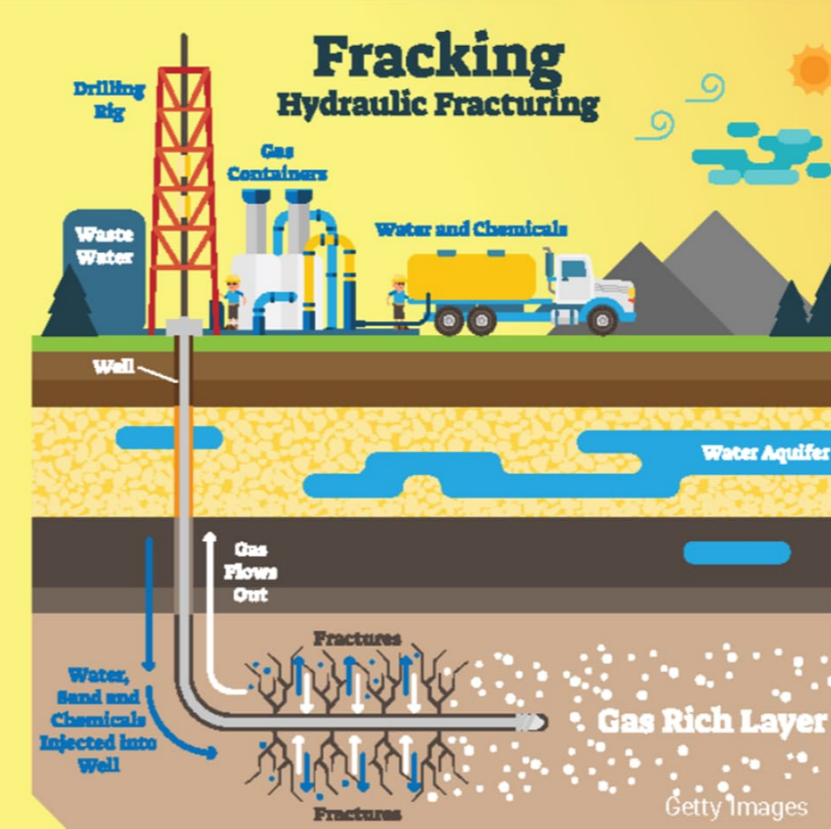
BACKGROUND

In 2020, the Pennsylvania Department of Health (PA DOH) contracted with researchers at the University of Pittsburgh School of Public Health to conduct three observational epidemiological studies focusing on asthma, childhood cancers and birth outcomes.

The studies were conducted to address community concerns in Southwestern Pennsylvania (Allegheny, Armstrong, Beaver, Butler, Fayette, Greene, Washington and Westmoreland counties) about unconventional natural gas development, also known as fracking, in the area.

The phases of unconventional natural gas development include preparation, drilling, hydraulic fracturing and production.

Study question: Does living near unconventional gas development activities or other environmental hazards in Southwestern Pennsylvania increase the risk for specific health issues?



METHODS

The studies were conducted from 2021-2023. Observational health records included data from 1990-2020, depending on the study.

UPMC MEDICAL RECORDS
46,676 ASTHMA EXACERBATIONS

PA DOH CANCER REGISTRY
498 ALL CHILDHOOD CANCERS

PA DOH BIRTH REGISTRY
185,849 BIRTHS

RESULTS

PEOPLE WITH ASTHMA living close to wells during the production phase had an increased chance of their asthma getting worse.

CHILDREN WHO LIVED WITHIN 1 MILE OF ONE OR MORE WELLS had 5 to 7 times the chance of developing lymphoma, a relatively rare type of cancer, compared to children who lived in an area without wells within 5 miles. There were no associations between unconventional natural gas development activities and childhood leukemia, brain and bone cancers, including Ewing's family of tumors.

INFANTS born to pregnant women who lived near wells during the production phase were 20-40 grams (about 1 ounce) smaller at birth.

<https://www.health.pa.gov/topics/envirohealth/Pages/OilGas.aspx>

ASTHMA

- 4-5x increased risk for severe asthma attack, ED visit, hospitalization
- 10 miles from 1+ wells
- Production phase

CHILD CANCER

- 5-7x increased risk for lymphoma
- 1 mile from 1+ wells
- No link to leukemia, brain/CNS, and bone cancers (incl. Ewing sarcoma)

BIRTH OUTCOMES

- Low birth weight (20-40 g)
- Small for gestational age
- Prematurity (PM2.5)
- 10 miles from wells (prep. and production)

FRACKING IS A HEALTH CRISIS

THE ELDERLY ARE DISPROPORTIONATELY HARMED.



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FRACKING IS A HEALTH CRISIS

FRACKING INCREASES VIOLENT CRIMES AGAINST WOMEN.
RAPE • ASSAULT • SEX TRAFFICKING • DOMESTIC VIOLENCE



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FRACKING IS A HEALTH CRISIS

MENTAL HEALTH PROBLEMS LINKED TO FRACKING INCLUDE
DEPRESSION, ANXIETY, AND TRAUMA.



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FRACKING IS A HEALTH CRISIS

Methane from fracking is accelerating the climate crisis, threatening the safety of 3 billion people.



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Shell's elevated flare seen over Potter Township on Feb. 13, 2023. *Chrissy Suttles/BCT*

Shell Ethane Cracker Plant Permitted Emissions (PA-DEP)

<u>Air Contaminant</u>	<u>Emission Rates (tons/yr.)</u>
Nitrogen Oxides (NOx)	328.5
Carbon Monoxide (CO)	983.7
Volatile Organic Compounds (VOCs)	516.2
PM 2.5	163.7
Hazardous Air Pollutants (HAPs)	32.0
Ammonia (NH3)	154.0
Carbon Dioxide (CO2e)	2,304,499

Shell Ethane Cracker: 53 Identified Compounds of Potential Concern

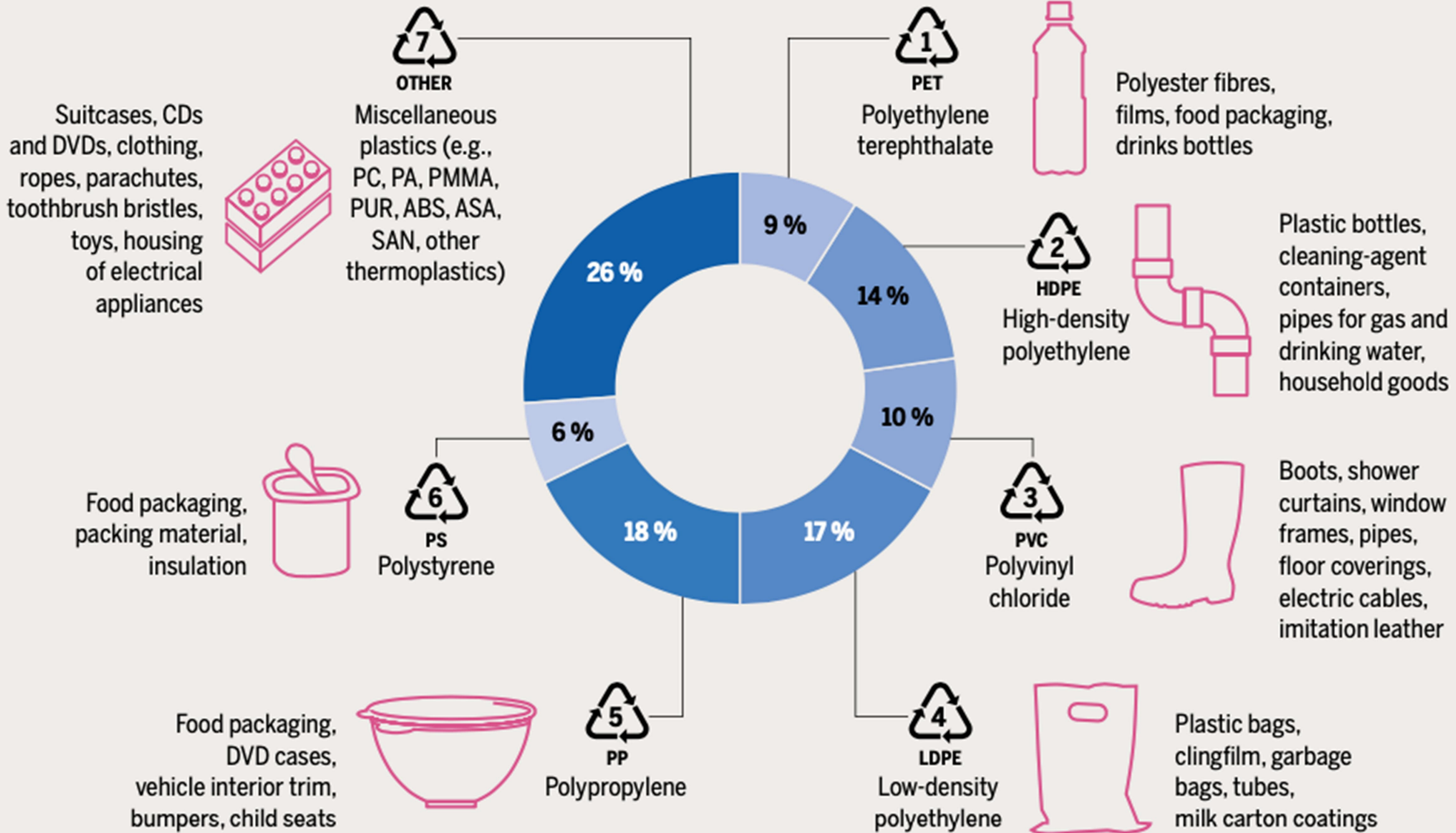
1,3-Butadiene	Dichlorobenzene
2-Methylnaphthalene	Ethylbenzene
3-Methylchloranthrene	Ethylene Oxide
7,12-Dimethylbenz(a)anthracene	Fluoranthene
Acenaphthene	Fluorene
Acenaphthylene	Formaldehyde
Acetaldehyde	Hexane
Acrolein	Indeno(1,2,3-cd)pyrene
Anthracene	Lead
Arsenic	Manganese
Barium	Mercury
Benzene	Methanol
Benzo(a)anthracene	Molybdenum
Benzo(a)pyrene	Naphthalene
Benzo(b)fluoranthene	Nickel
Benzo(g,h,i)perylene	Pentane
Benzo(g,h,l)perylene	Phenanthrene
Benzo(k)fluoranthene	Phenol
Beryllium	Propane
Biphenyl	Propylene Oxide
Cadmium	Pyrene
Chromium VI	Selenium
Chromium III ²	Styrene
Chrysene	Toluene
Cobalt	Vanadium
Copper	Xylenes
Dibenzo(a,h)anthracene	

Source: Shell Chemical Appalachia LLC Emission Estimates for the Inhalation Risk Assessment for Petrochemical Complex Beaver County, PA

(received by PA DEP on January 28, 2015)

THE PLASTIC ROUNDABOUT

Seven recycling codes defined by the European Commission and percentage of total quantity produced worldwide, 2015

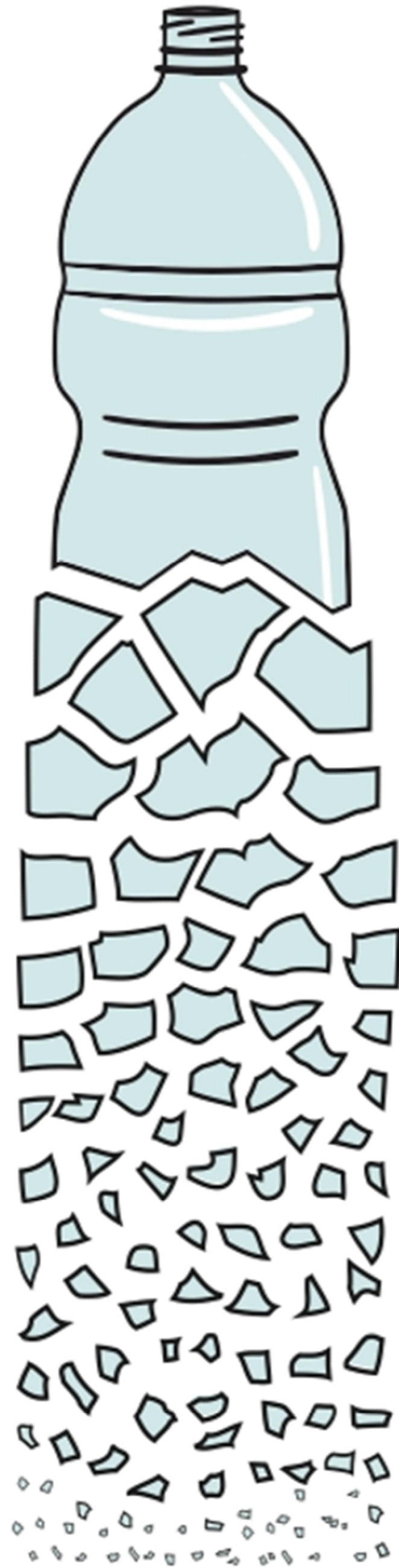


© PLASTICATLAS 2019 / YEO

TABLE 4

Common Toxic Chemical Additives to Plastic

Toxic Chemical Additive	Products In Which They Can Be Found	Health Impact
Acrylonitrile	Drinking cups, acrylic carpet and other textiles, plastic furniture, 3-D printing, automotive parts, and appliances.	Carcinogen
Bisphenol A	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.
Cadmium	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.
Flame retardants	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.
Lead	Lead is used as plastic stabilizers and has been found in plastic jewelry, ¹ vinyl raingear, ² lunchboxes, ³ 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. ⁴ There is no safe level of exposure to lead.
Perfluorinated Substances (PFAS)	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."
Phthalates	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. ⁵ 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. ⁶
Styrene (also known as Vinyl Benzene)	Polystyrene plastics and expanded polystyrene.	Carcinogen
Vinyl Chloride	PVC: plastic furniture, carpet backing, packaging or wall covering.	Liver cancer
SCCP	Plastic consumer product, children's products.	SCCPs adversely affect the kidney, liver, and thyroid, disrupt endocrine function, and are believed to be human carcinogens. ⁷



PLASTIC WASTE

**PLASTIC
BREAKDOWN**

MACROPLASTICS
>5mm



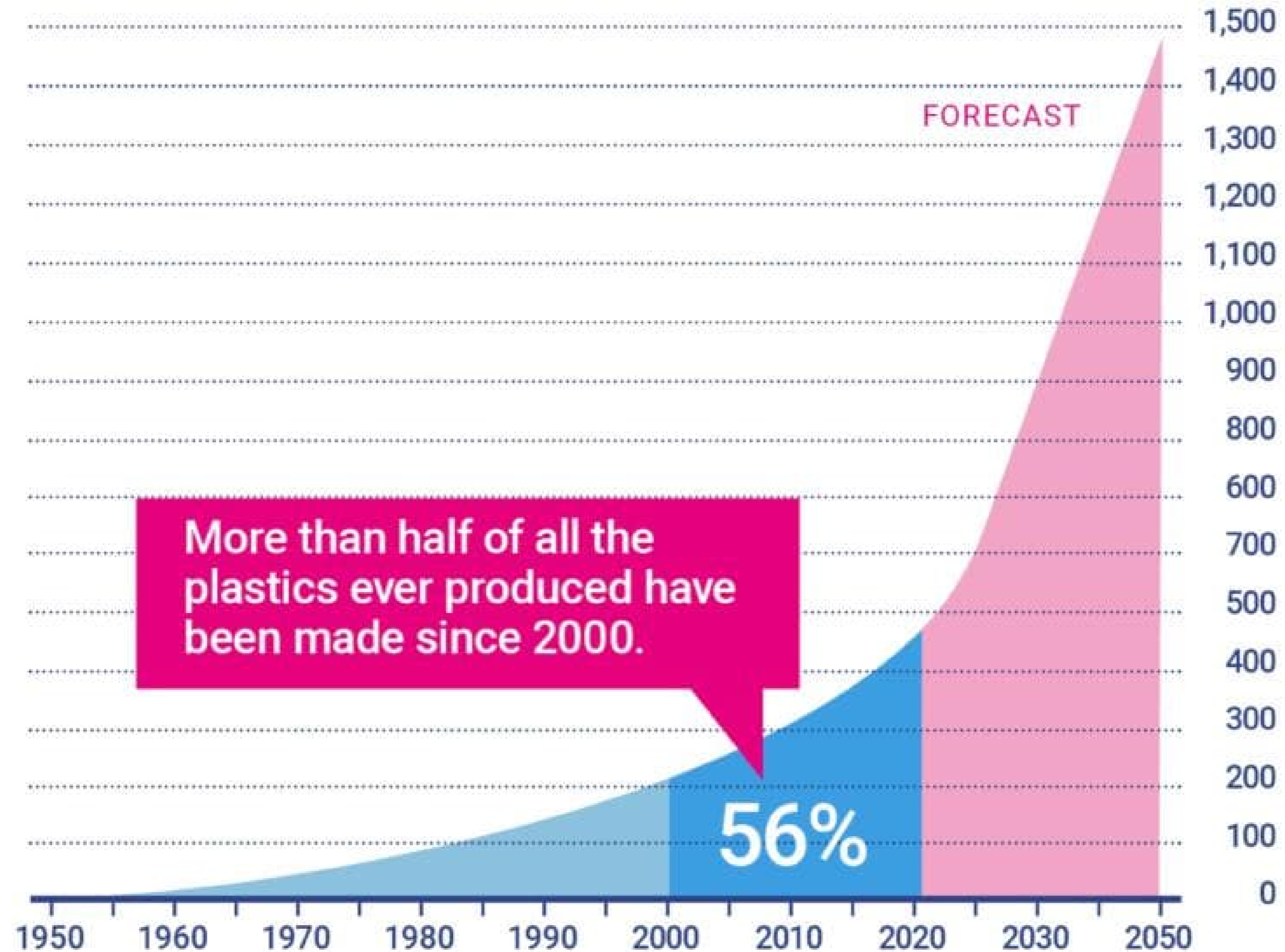
MICROPLASTICS
5mm-0.1µm



NANOPLASTICS
<0.1µm

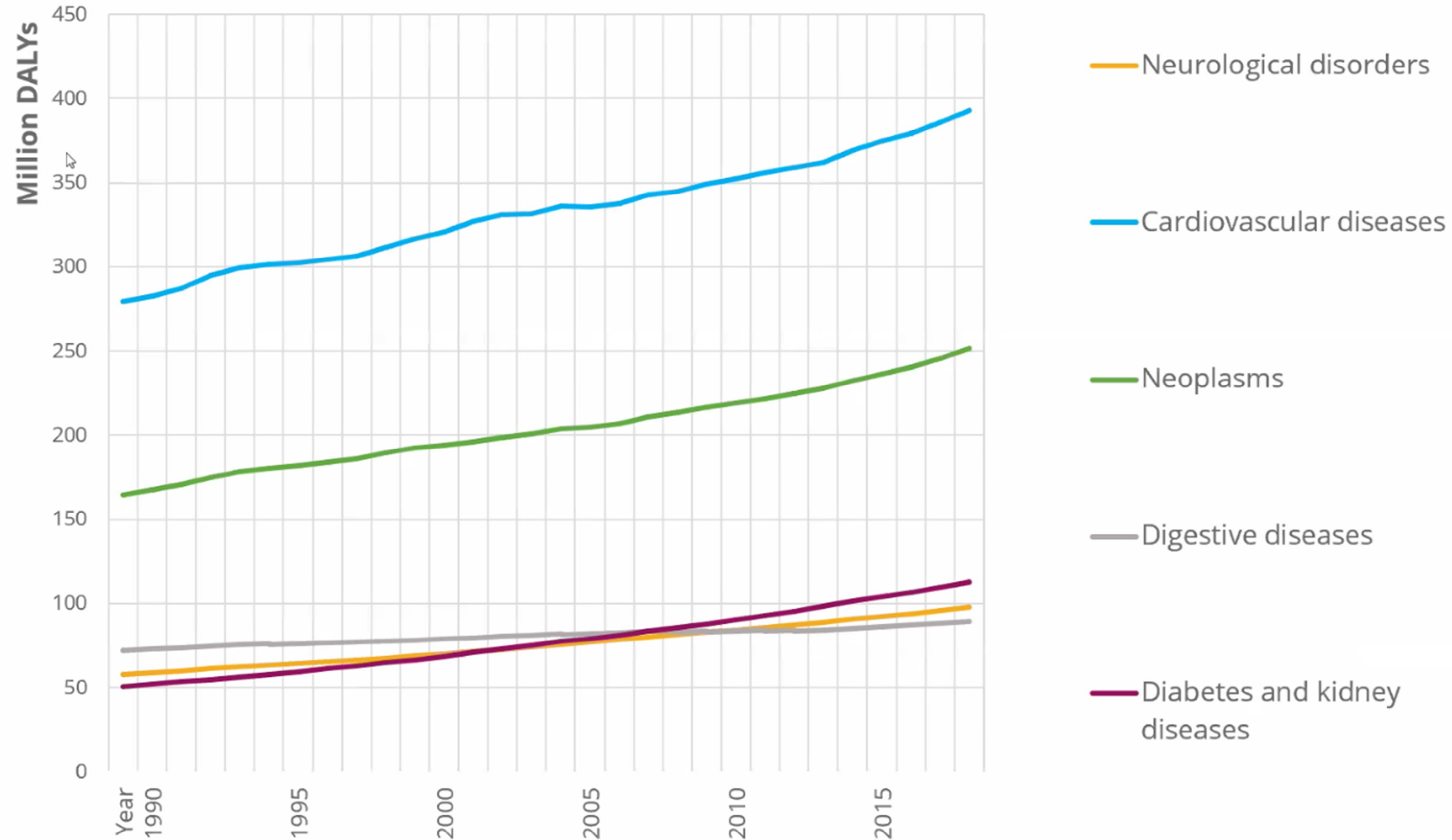
PRODUCTION OF PLASTIC

Global annual plastic production in million tonnes.





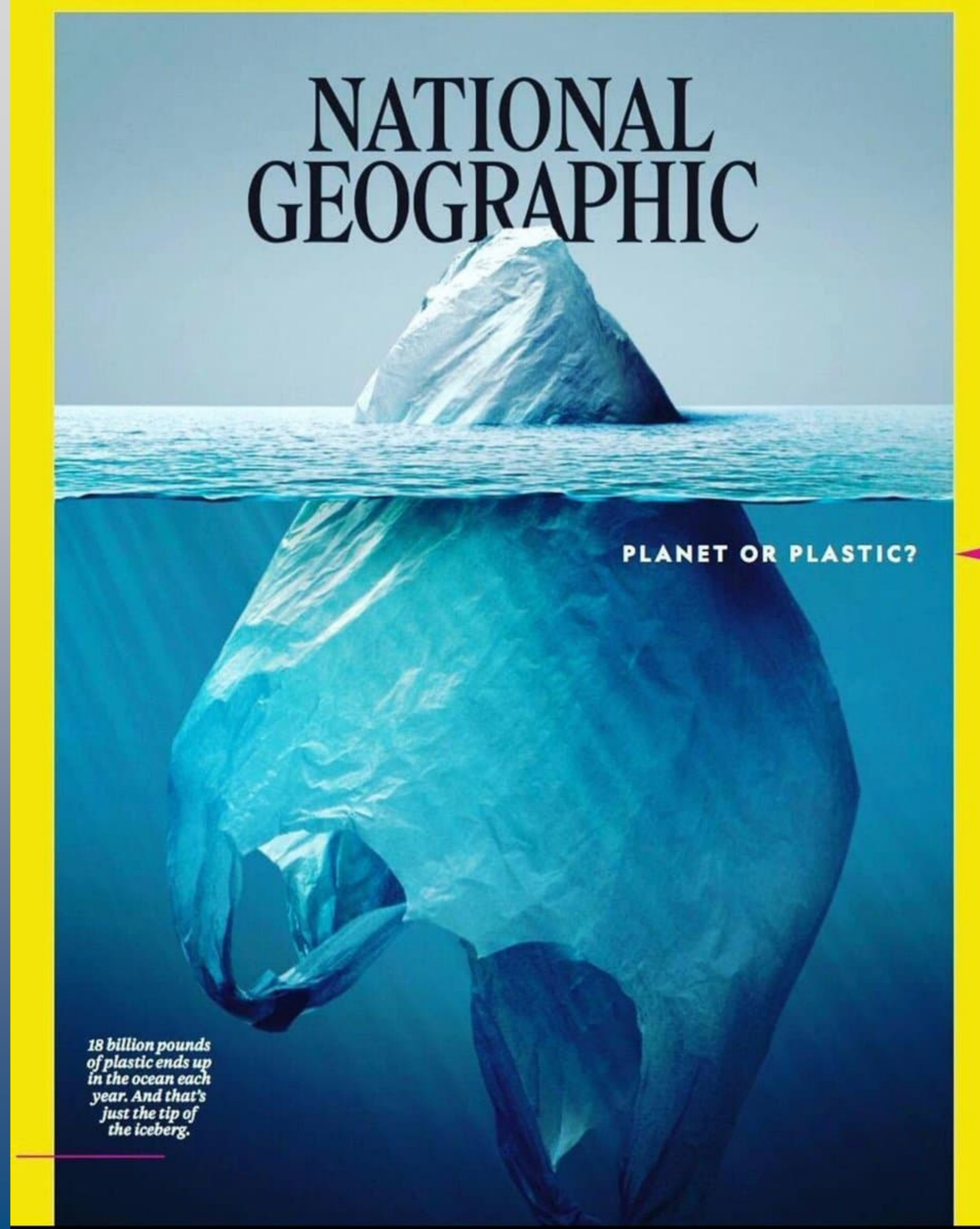
Chronic disease burden is increasing globally



Disability-Adjusted Life Years (DALYs).
Data: Global Burden of Disease 2021.



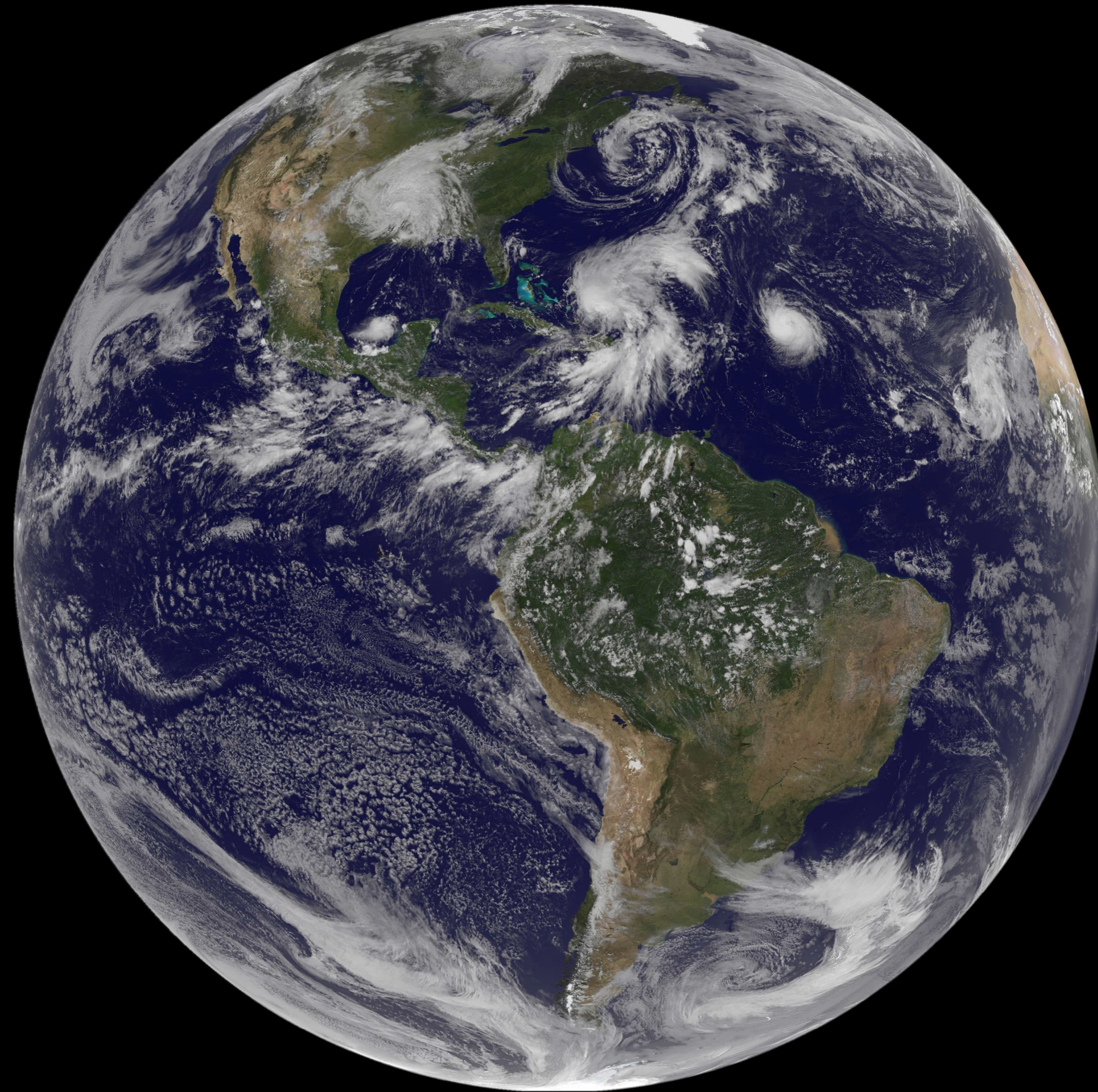
Planet
Or
Plastic?



National Geographic
June 2018

(Google Images)

Thank You!



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