



GREEN SCIENCE  
POLICY INSTITUTE

# PFAS in Food Packaging: Peeling Back the Wrapper

SPC Impact 2020

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Green Science Policy Institute

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**ENVIRONMENTAL Science & Technology**

**Fluorinated building insulation: a phase out**

**Novel and High Volume Use Flame Retardants in US Couches**

**Fluorinated PentabDE Phase Out**

**ENVIRONMENTAL Science & Technology LETTERS**

**Fluorinated in U.S. Fast Food Packaging**

**Detection of Poly- and Perfluoroalkyl Substances (PFASs) in U.S. Drinking Water Linked to Industrial Sites, Military Fire Training Areas, and Wastewater Treatment Plants**

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**Supporting Information**

**ABSTRACT:** Drinking water contamination with poly- and perfluoroalkyl substances (PFASs) poses risks to the developmental, immune, metabolic, and endocrine health of consumers. We present a spatial analysis of 2013–2015 national drinking water PFAS concentrations from the U.S. Environmental Protection Agency's (US EPA) third Unregulated Contaminant Monitoring Rule (UCMR3) program. The number of industrial sites that manufacture or use these compounds, the number of military fire training areas, and the number of wastewater treatment plants are all significant

Hydrological units with detectable PFASs



Education

Research

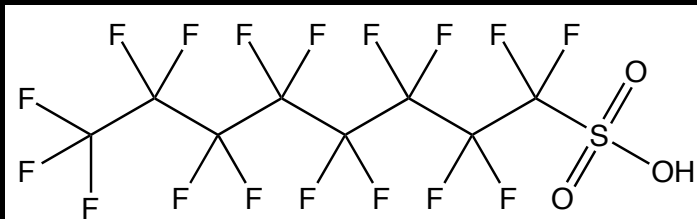
Retreats

**Policy & Purchasing Change**

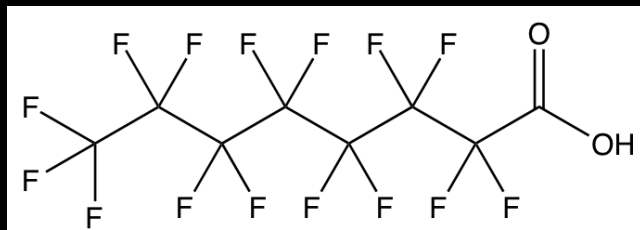
# PFAS

## (Per and Polyfluoroalkyl Substances)

PFOS



PFOA



Carbon-Fluorine bond strength:

- Leads to oil and water repellency
- “Forever chemicals” -- last for geologic time!



# Common Uses



CARPETS



CARPET CLEANING PRODUCTS



FOOD PACKAGING



FURNISHINGS



COSMETICS



OUTDOOR GEAR



CLOTHING



ADHESIVES AND SEALANTS



PROTECTIVE COATINGS



NON-STICK COOKWARE



CARSEATS



FIREFIGHTING FOAM



# May 2000

## 3M Employee Bulletin

Date: 05/16/2000

### 3M Phasing Out Some of its Specialty Materials

3M will phase out of the perfluorooctanyl chemistry in certain repellents and surfactant products by the end of this year. We thank the people in these business units for their hard work. They have consistently given the company and our customers their best efforts. For more information, below is a news release issued this morning:

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**ST. PAUL, Minn -- May 16, 2000 --** 3M today announced it is phasing out of the perfluorooctanyl chemistry used to produce certain repellents and surfactant products.



# Ohio River Valley: West Virginia Manufacturing Plant

- PFOA used to manufacture Teflon
- Releases to water & air
- 70,000 + residents with contaminated drinking water
- C8 Health Study





# PFASs exposure is a health concern



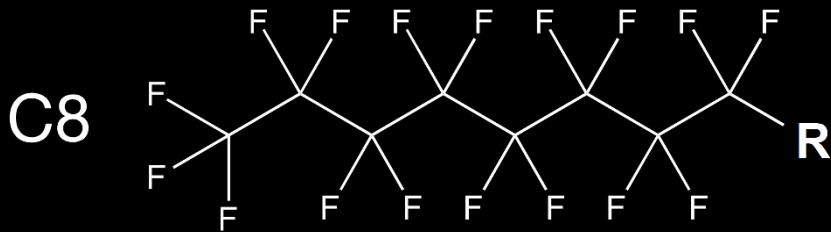
Exposure linked to health risks:

Cancer, elevated cholesterol, obesity, immune suppression, and endocrine disruption

Courtesy, Cindy Hu, Harvard University

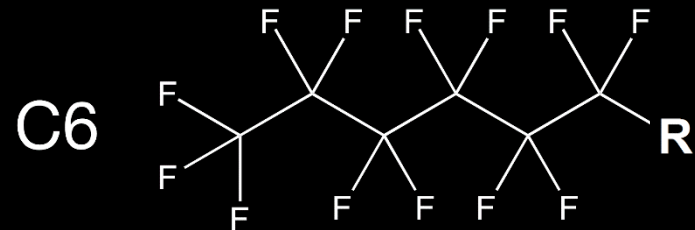
(Ref: Lewis et al., 2015; Grandjean et al., 2012; Braun et al., 2016; Barry et al., 2013)

# Is C6 a safer substitute for C8?



## Concerns:

- Extreme persistence
- Bioaccumulation
- Toxicity



## Concerns:

- Extreme persistence
- Bioaccumulation in plants
- Suspected toxicity
- More mobile
- Remediation more difficult

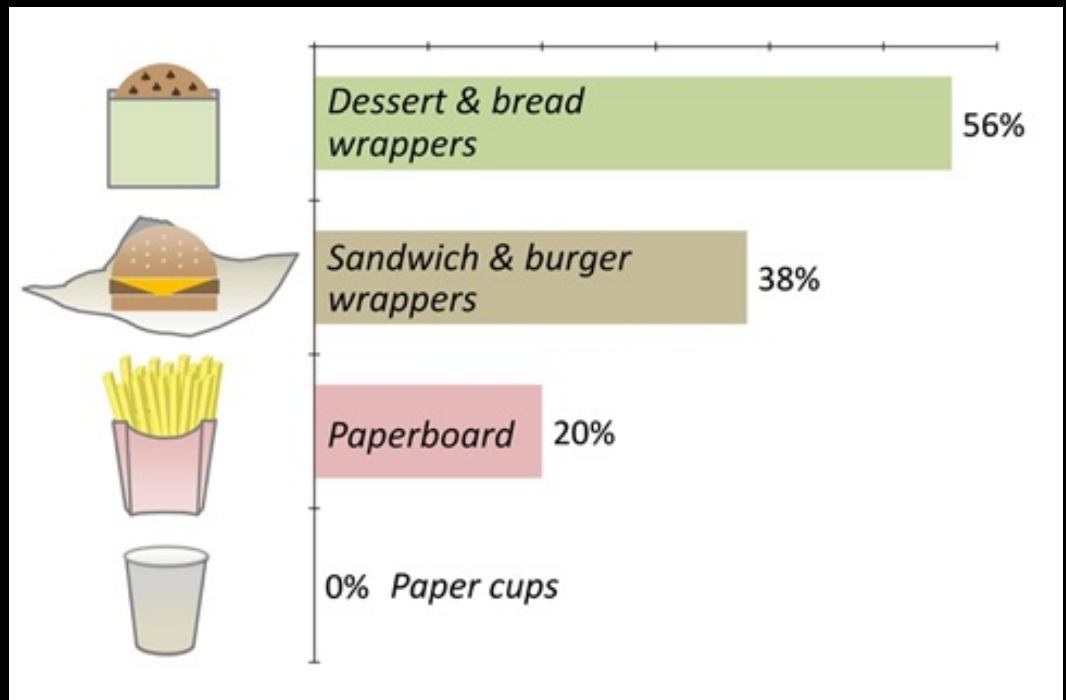


# Where are PFAS Used?



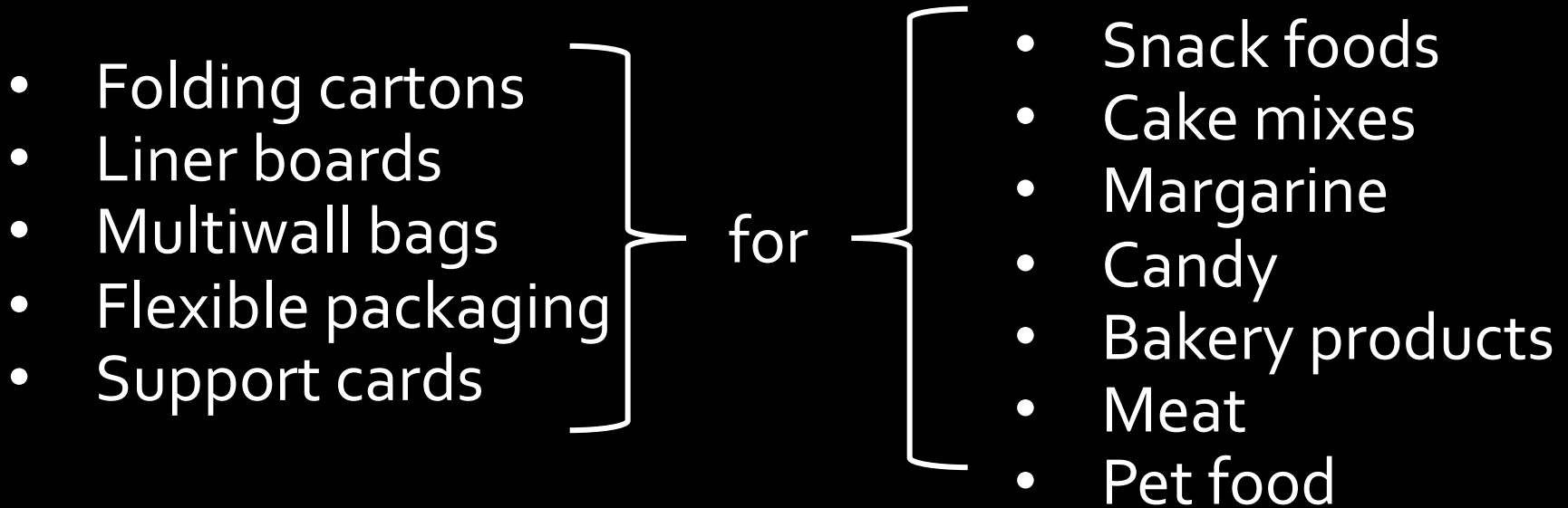
Molded fiber

Fluorine in U.S. fast food packaging paper (percent positive; 400 products sampled)



Schaider L. 2016 *Fluorinated compounds in U.S. fast food packaging.*

# Where are PFAS Used?



Kissa E. 2001 *Fluorinated surfactants and repellents*. 2<sup>nd</sup> Ed.



# Where are PFAS Used?

## FDA Inventory of Food Contact Notifications: search “fluoro”

- Oil and water repellents for paper and board (35)
- Food processing equipment and “repeat-use” (24)
- Polymer processing additives (7)
- Other (lubricant, colorant) (2)

# Transfer to food

PFAS can migrate from food contact material to food:

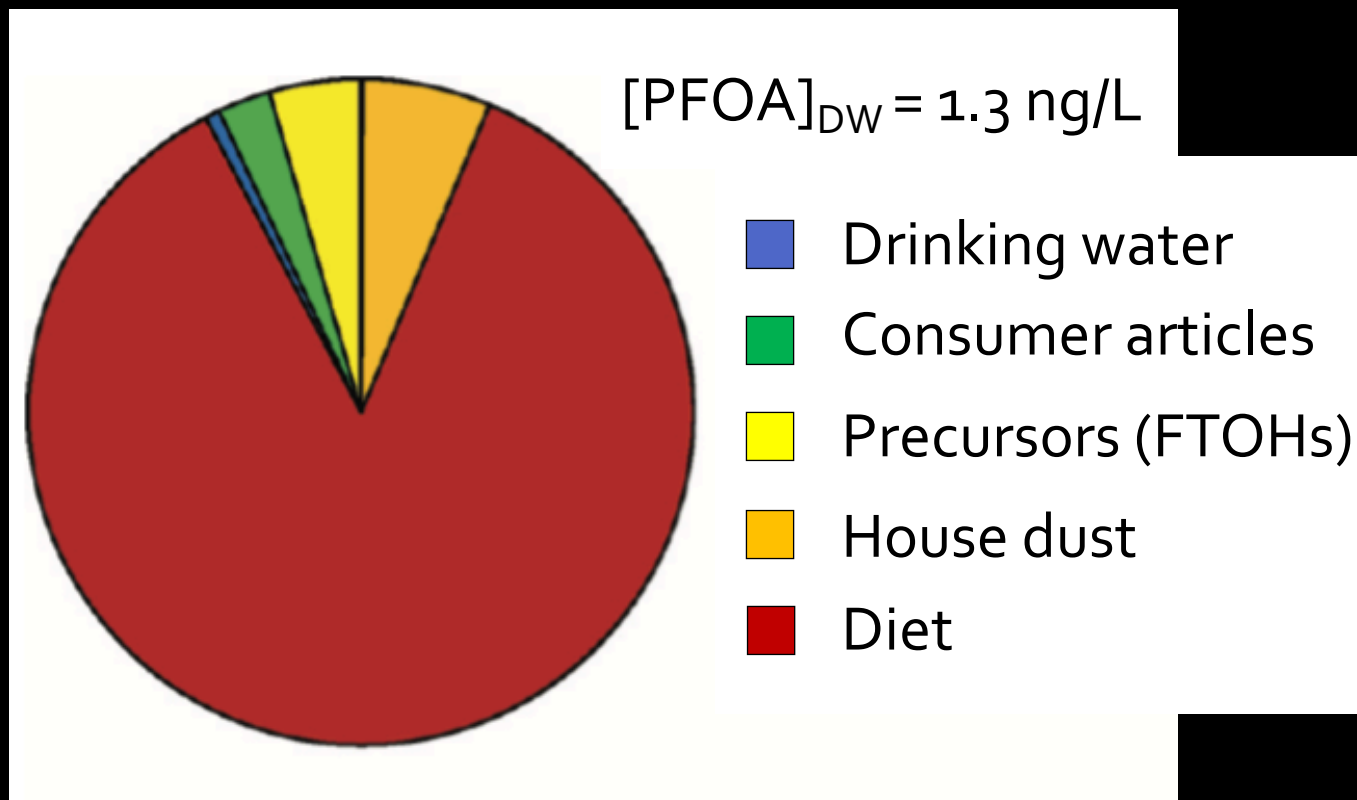
- Begley, et al. *Food Add. Cont. A*, 2008
- Yuan et al. *Env. Sci. Technol.*, 2016

Extent of migration depends on:

- Amount and type of PFAS
- Type of food (fat content)
- Temperature
- Contact time

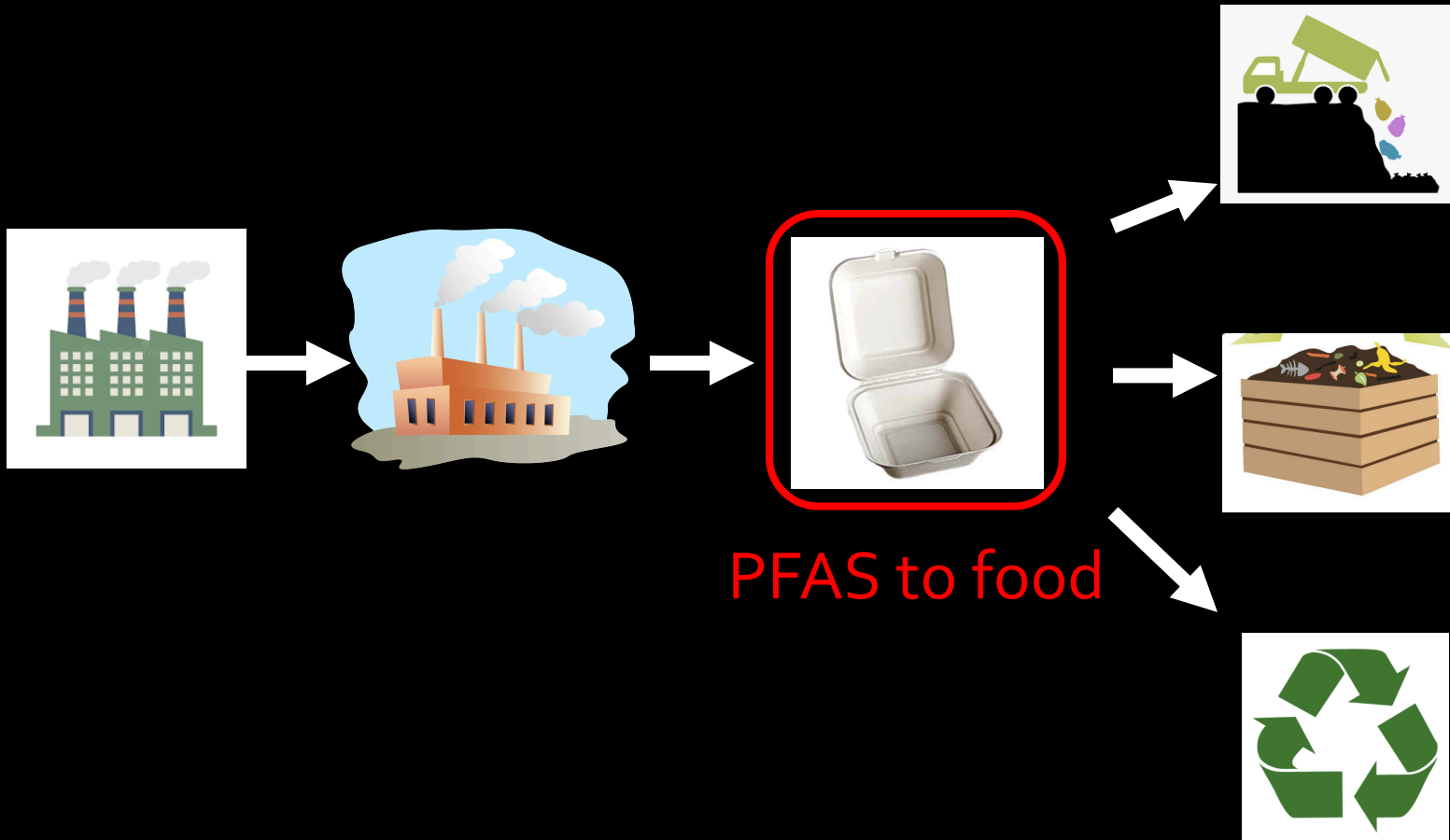


# PFAS Exposure: Importance of Food



PFAS in Diet = PFAS from Food + PFAS from Packaging

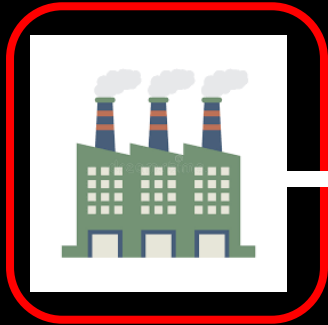
# Life Cycle Impacts





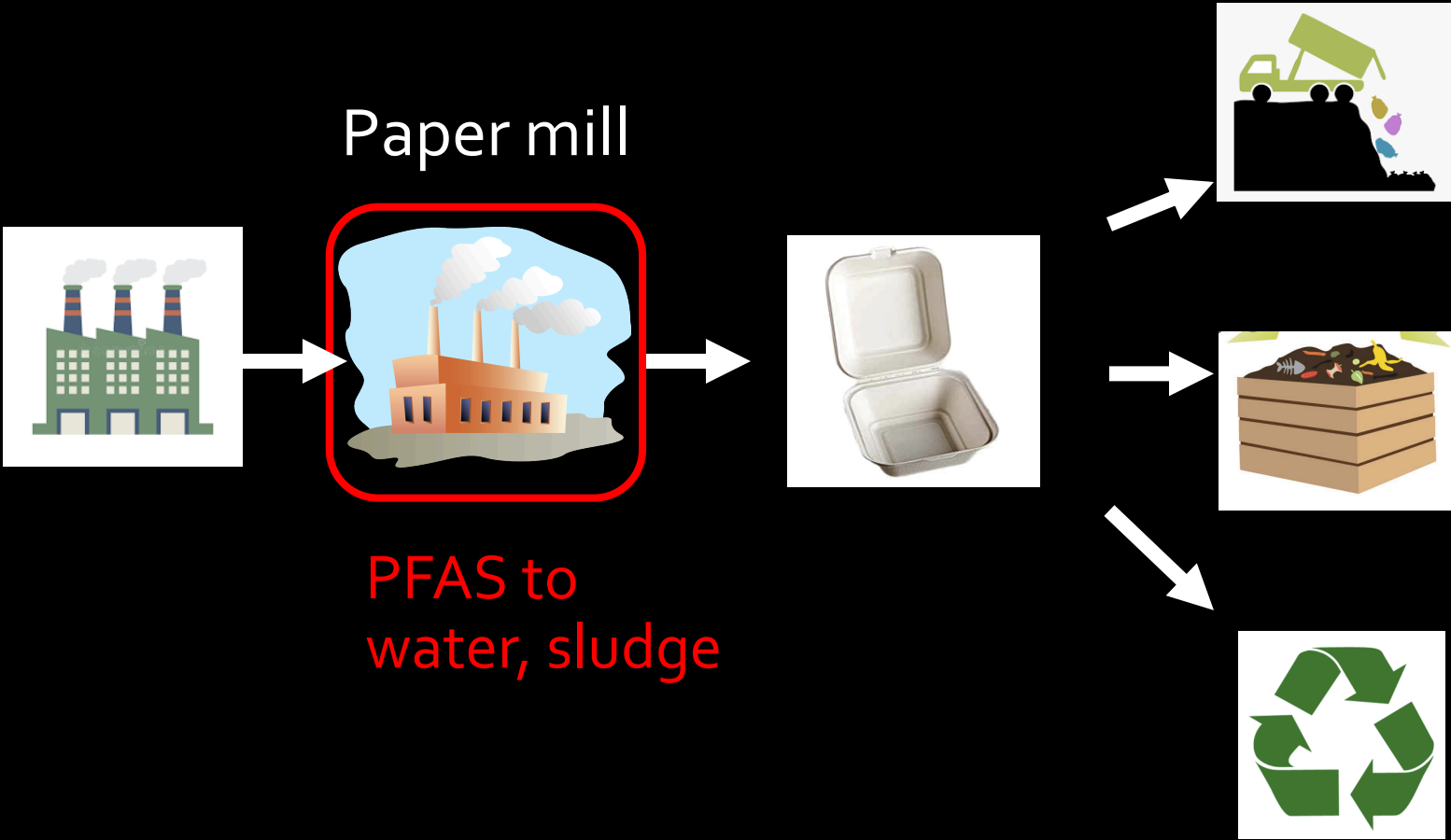
# Life Cycle Impacts

PFAS  
manufacturing

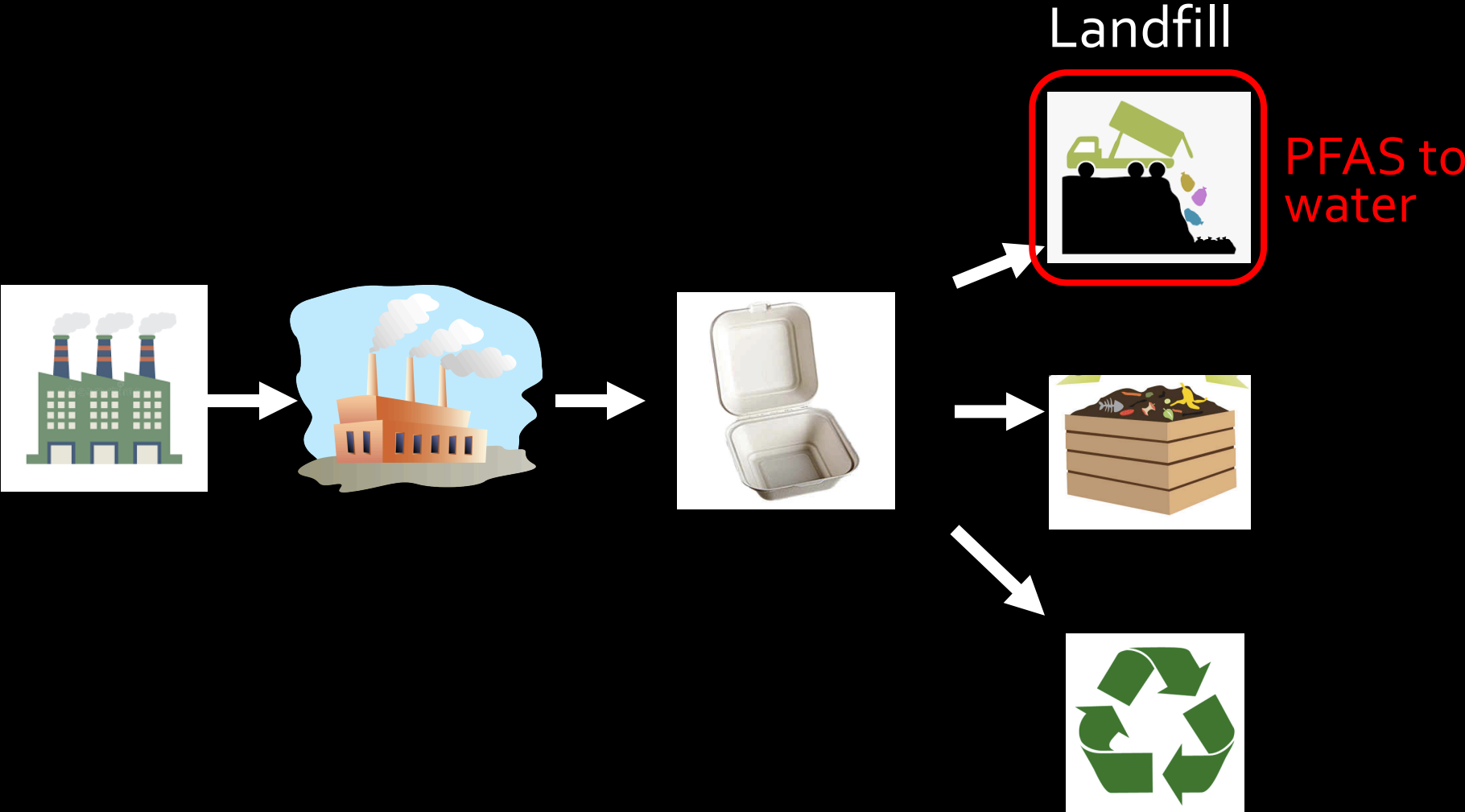


PFAS to  
water & air

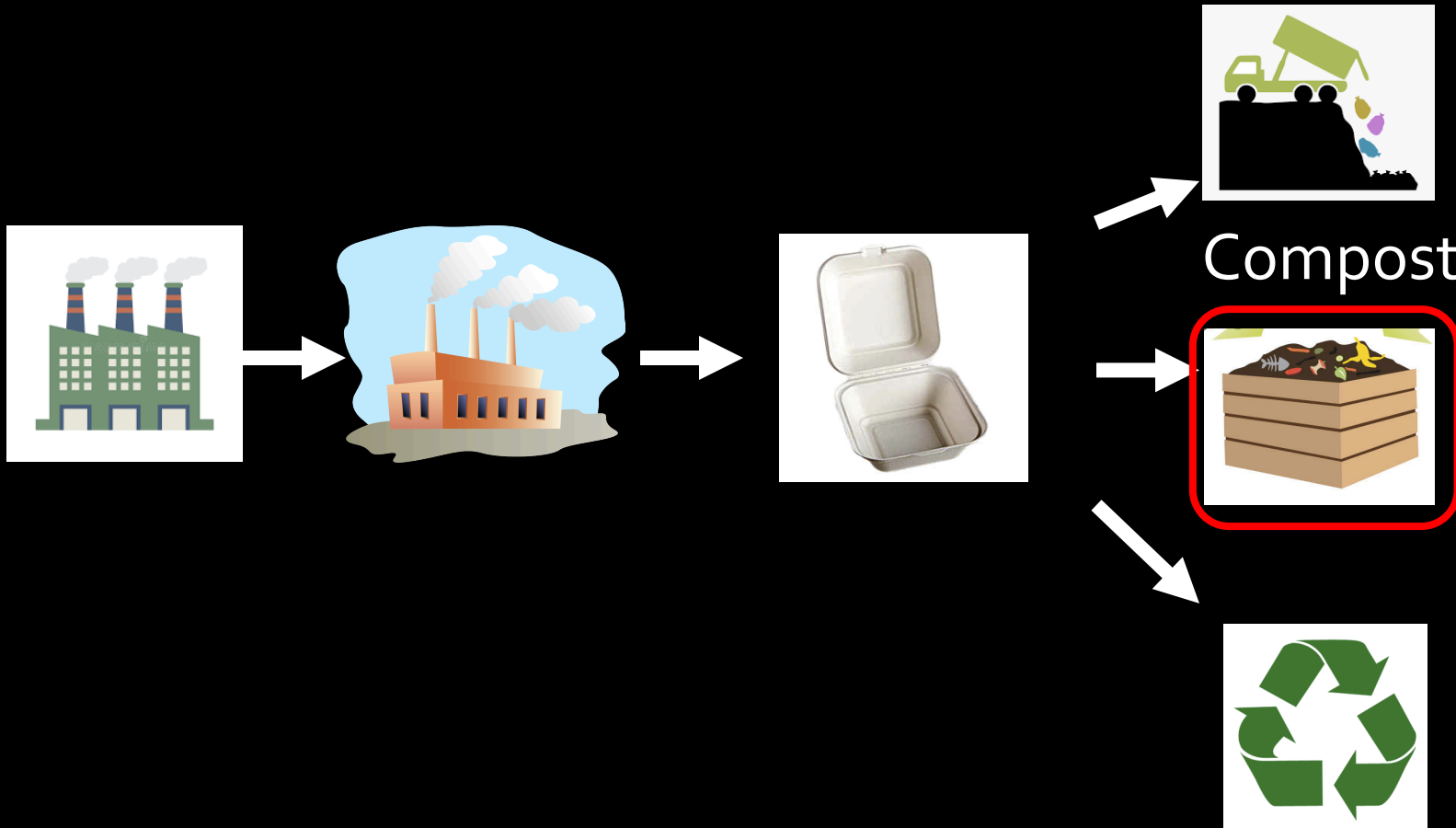
# Life Cycle Impacts



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# Life Cycle Impacts

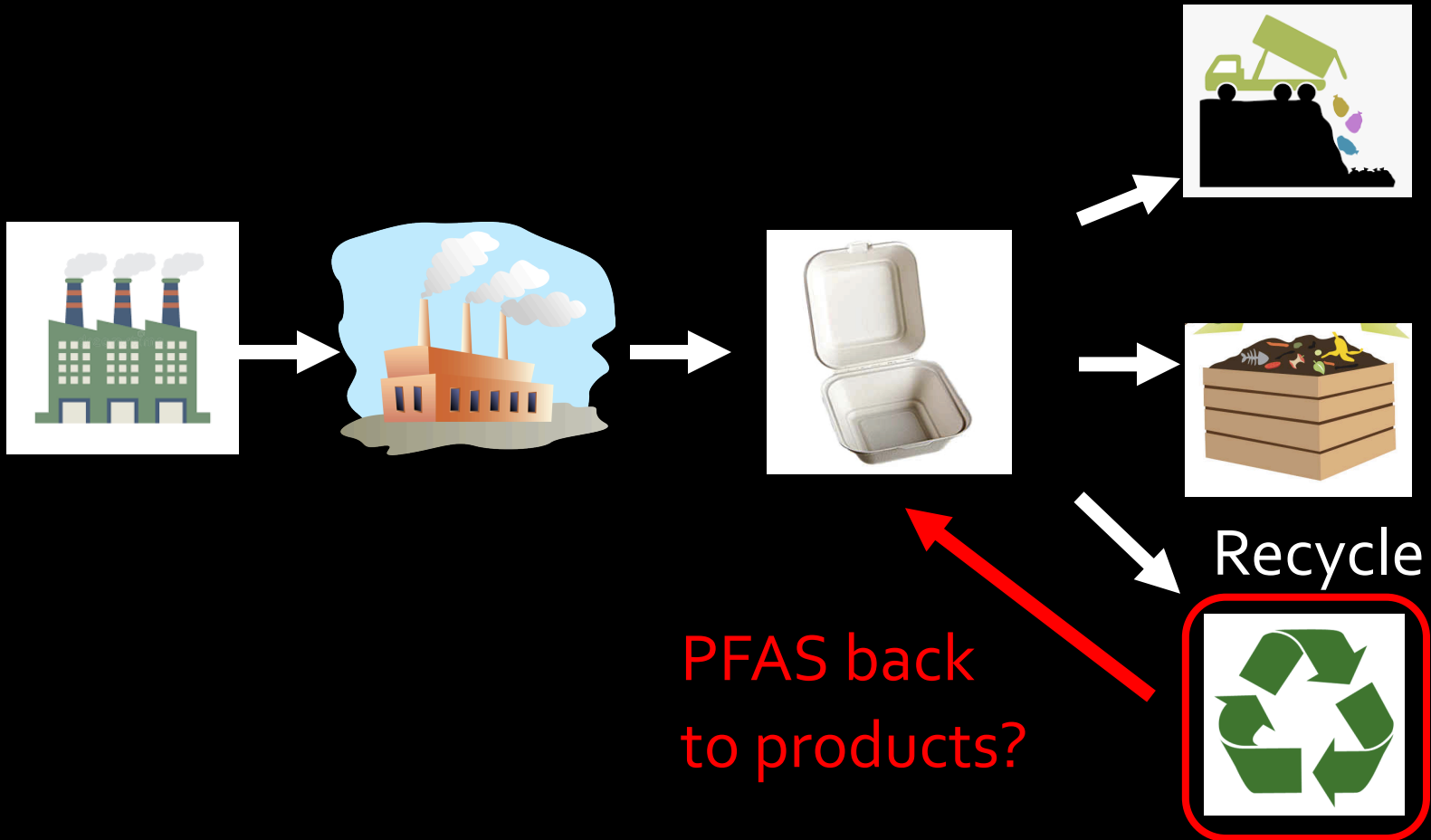


Compost

PFAS to  
water,  
soil, &  
crops



# Life Cycle Impacts



# PFAS Measurement: Looking for the Trees or the Forest?



Compound  
specific

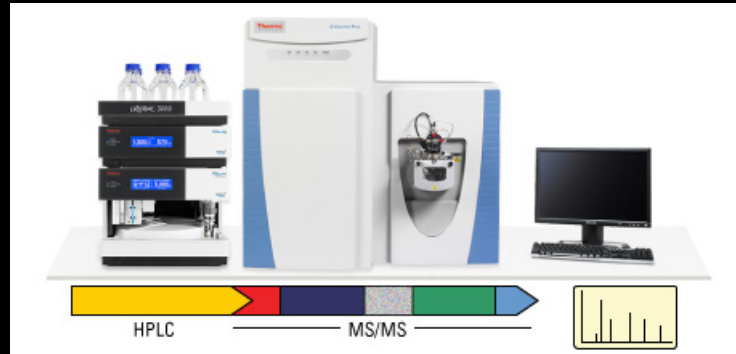
Total  
Fluorine



LC/MS,  
GC/MS

PIGE

# PFAS Measurement: LC- or GC-MS/MS



## Traditional detection technique

### Pros

- Compound specific
- Low detection limits
- Measures only compounds that are readily extractable

### Cons

- Expensive
- Time-consuming
- Only good for known targets

# PFAS Measurement: Combustion ISE or IC

ISE: Ion-selective electrode

IC: Ion chromatograph

## Pros

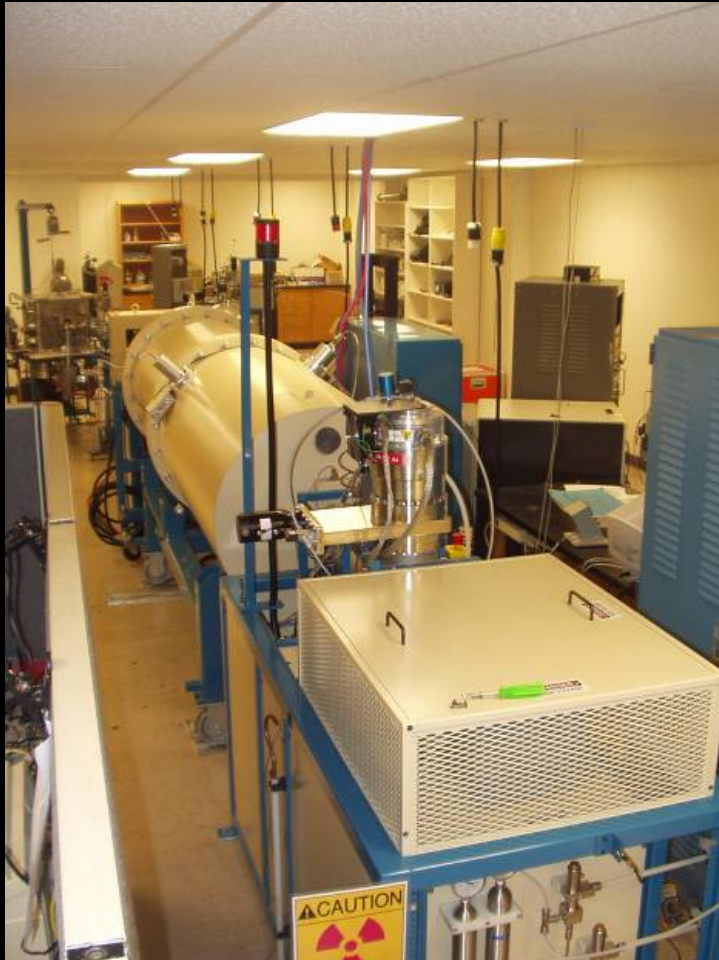
- Commonly available from commercial labs, standardized
- Relatively quick and inexpensive
- Total F measurement

## Cons

- Not compound specific
- Higher detection limit



# PFAS Measurement: PIGE



Novel detection technique:  
Particle induced gamma-ray  
spectroscopy

## Pros

- Rapid
- Minimal sample prep
- Total F measurement

## Cons

- Not compound specific
- Higher detection limit

# BPI Composability Standard

Effective January 1, 2020

Products cannot be BPI Certified as biodegradable if they contain more than 100 ppm total fluorine.



# San Francisco

- All single-use food ware must be compostable



- 2018: Prohibition on PFAS in single-use foodware in city purchasing
- 2020: Ban on PFAS in single-use foodware (grocery stores, restaurants, etc.)

# Washington State's Healthy Food Packaging Act Passes House & Senate

February 28, 2018



Bans paper food packaging containing any PFAS

Maine followed in 2019.

Similar bills have been introduced in several other states.

<https://toxicfreefuture.org/key-issues/legislative-priorities-2018/>



# Congress bans PFAS in military MRE packaging

- National Defense Authorization Act FY 2020
- By 10/1/21, DoD "shall ensure that any food contact substances used to assemble and package meals ready-to-eat (MREs)...do not contain any perfluoroalkyl or polyfluoroalkyl substances"



# HR 2827: Keep Food Containers Safe from PFAS Act of 2019.

Sponsor: Dingell, Mi-12

- Designates as “unsafe” any PFAS used as a food contact substance starting 2022.
- Cited PFAS in Ann Arbor municipal compost stemming from food packaging



# Denmark bans all PFAS in paper and paperboard food packaging

- “I do not want to accept the risk of harmful [PFAS] migrating from the packaging and into our food. These substances represent such a health problem that we can no longer wait for the EU.”

- Danish Food Minister Mogens Jensen



• <https://www.cnn.com/2019/09/04/health/denmark-pfas-food-packaging-ban-intl/index.html>

# PFAS Phase-out Gaining Traction in Europe

- Proposal from Sweden, Netherlands, Germany, Denmark:
- Take action “on the EU-level to phase out PFASs at the latest by 2025, to be in effect by 2030.”
- “A broad restriction under REACH covering all PFAS would be the preferred option.”



# Moving away from PFAS in food packaging

## Whole Foods Ditches Packaging Containing PFAS Chemicals

12/11/2018



The headquarters of supermarket group Ahold Delhaize in Zaandam.  
Photographer: Koen Van Weel/AFP/Getty Images

## Grocery Chain Phasing PFAS, Other Chemicals Out of Packaging (2)



MEDIA RELEASE / MARCH 6, 2020

## Sweetgreen to phase out toxic PFAS in food packaging

MEDIA RELEASE / JANUARY 10, 2020

## Taco Bell to phase out toxic chemicals in food packaging

Fast-food chain will ban PFAS, phthalates, and BPA by 2025; public health advocates urge the

<https://saferchemicals.org/2020/01/10/taco-bell-to-phase-out-toxic-chemicals-in-food-packaging/>



# Moving away from PFAS



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FIREFIGHTING FOAM

# Thank you!

**PFAS Central: sharing notable news, scientific papers & events**

**NEWS**  
**PFAS Chemicals to be Banned in Firefighting Foam Used on Military Bases**  
U.S. Senator Kirsten Gillibrand today announced that a provision she cosponsored to prohibit the Department of Defense from procuring firefighting foam that contains per- and polyfluoroalkyl substances (PFAS) passed the Senate Armed Services Committee as part of the annual National Defense Authorization Act (NDAA).  
[LEARN MORE](#)

**SCIENCE**  
**Larval amphibians rapidly bioaccumulate poly- and perfluoroalkyl substances.**  
Toxic frogs lead to bioaccumulation in predator species.  
[LEARN MORE](#)

**POLICY**  
**The Cost of Inaction: A socioeconomic analysis of environmental and health impacts linked to exposure to PFAS**  
A recent Nordic Council study, The Cost of Inaction: A socioeconomic analysis of environmental and health impacts linked to exposure to PFAS, estimates the very high cost of harm to human health and the environment from PFAS exposure in Europe.  
[LEARN MORE](#)

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tom@GreenSciencePolicy.org