SUBSTANCES OF CONCERN AND EU DEVELOPMENTS

EMPEREST project 1st workshop
13.02.2024 Tartu

Interreg Baltic Sea Region
Co-funded by the European Union
SUSTAINABLE WATERS EMPEREST

Hannela Artus
chemicals-products-waste | persistent organic pollutants | EU market requirements and restrictions

SUBSTANCES OF CONCERN
SoC

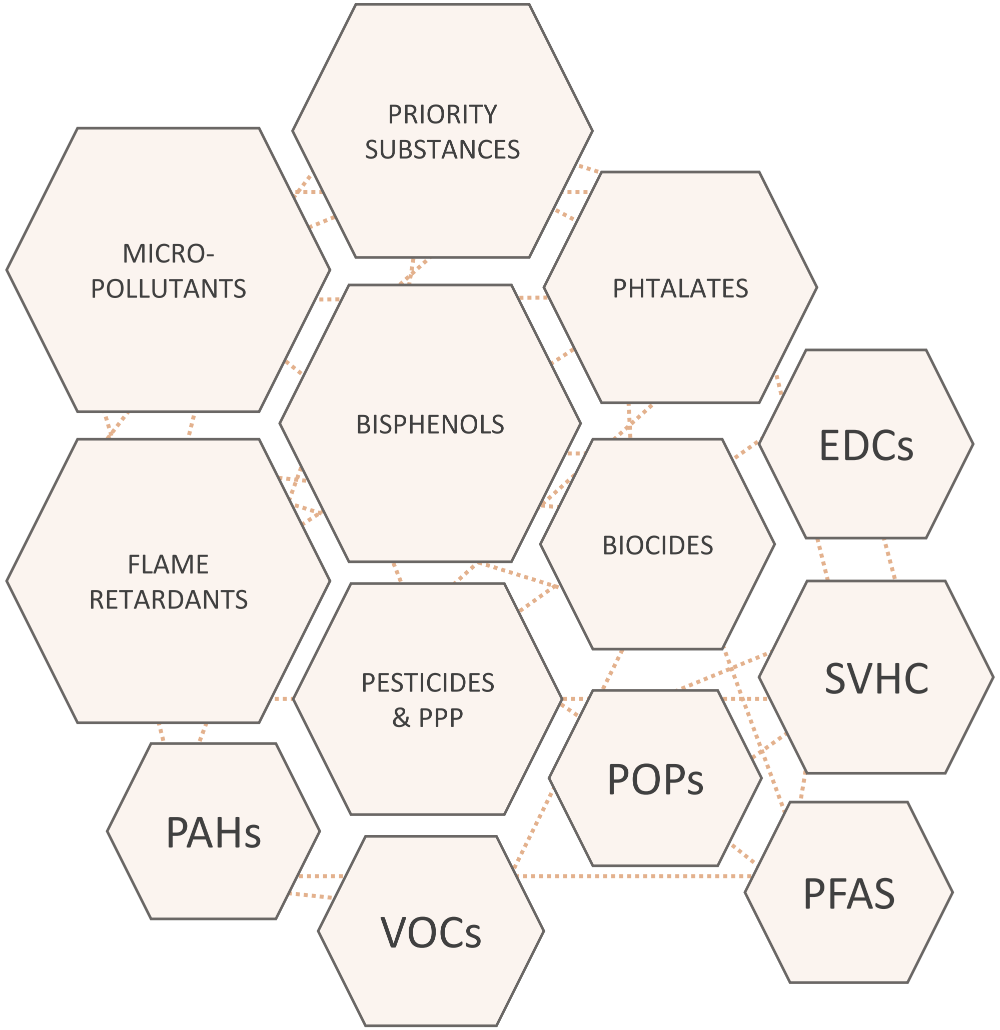
Variety of references to substance groups of different adverse effects to human health and the environment

Often the substances are the same

SoC is an umbrella term first time defined in the EU Sustainable Products Regulation[1]

[1]Regulation establishing a framework for setting ecodesign requirements for sustainable products and repealing Directive 2009/125/EC (ESPR)

SUBSTANCES OF CONCERN
SOC



EXAMPLES

POPs

Specific substances:
PFOS and related compounds
PFOA, its salts and PFOA-related compounds
PFHxS, its salts and PFHxS-related compounds

SVHC[1]

Specific substances:
PFOA
C9-14 PFCAs → restricted with REACH
PFHxS

Three groups of PFAS:
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propionic acid, its salts and its acyl halides (HFPO-DA)
PFBS and its salts
PFHpA and its salts

PFAS

General PFAS restriction:
Any substance that contains at least one fully fluorinated methyl (CF3-) or methylene (-CF2-) carbon atom (without any H/Cl/Br/I attached to it).

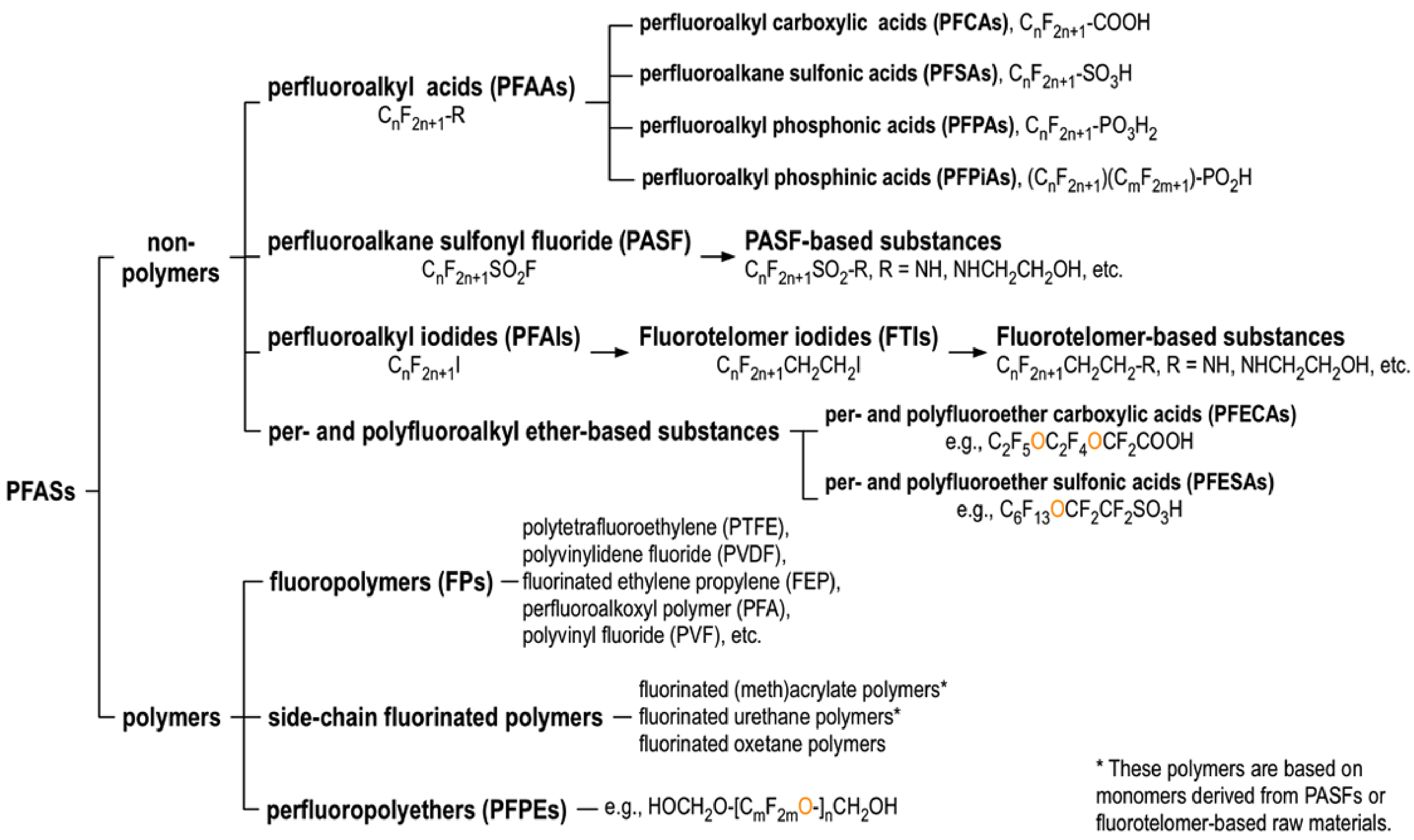
Or specific substances (e.g. Drinking Water Directive):
Perfluorobutanoic acid (PFBA)
Perfluoropentanoic acid (PFPA)
Perfluorohexanoic acid (PFHxA)
Perfluoroheptanoic acid (PFHpA)
Perfluorooctanoic acid (PFOA)
Perfluorononanoic acid (PFNA)
Perfluorodecanoic acid (PFDA)
Perfluoroundecanoic acid (PFUnDA)
Perfluorododecanoic acid (PFDoDA)
Perfluorotridecanoic acid (PFTrDA)
Perfluorobutane sulfonic acid (PFBS)
Perfluoropentane sulfonic acid (PFPS)
Perfluorohexane sulfonic acid (PFHxS)
Perfluoroheptane sulfonic acid (PFHpS)
Perfluorooctane sulfonic acid (PFOS)
Perfluorononane sulfonic acid (PFNS)
Perfluorodecane sulfonic acid (PFDS)
Perfluoroundecane sulfonic acid
Perfluorododecane sulfonic acid
Perfluorotridecane sulfonic acid

MICRO-POLLUTANTS

Substances defined through the health and environmental hazard criteria of the CLP Regulation (EC) No 1272/2006

[1] https://echa.europa.eu/hot-topics/perfluoroalkyl-chemicals-pfas

PER- AND POLYFLUOROALKYL SUBSTANCES (PFASs)



© https://www.oecd.org/chemicalsafety/portal-perfluorinated-chemicals/aboutpfass/Figure1-classification-of-per-and-polyfluoroalkyl-substances%20-PFASs.pdf

WHY PFAS?

Properties

Strong carbon-fluorine bonds – extremely persistent – 'forever chemicals'

Technical properties:
water, oil and dirt repellency
durability under extreme conditions:
temperature, pressure, radiation, chemicals
electrical and thermal insulation

Adverse effects:
Bioaccumulation
Mobility
Long range transport potential
Accumulation in plants
Effects on human health and ecosystems
Endocrine activity
Mixture effects – the 'cocktail effect'

Large family & Wide use

Over 4700 substances (EU PFAS ban refers to ~10 000)

Industrial and consumer applications since the 1950s: *firefighting foams, non-stick metal coatings for frying pans, paper food packaging, creams and cosmetics, textiles for furniture and outdoor clothing, paints and photography, chrome plating, pesticides and pharmaceuticals*

Extensive contamination

Monitoring data shows ubiquitous presence of PFASs in the environment and in humans (majority of data for PFOA and PFOS)[1]

Large-scale pollution around PFAS production and manufacturing plants, PFAS fire fighting foam sites, certain industries, wastewater and sewage sludge, waste incineration

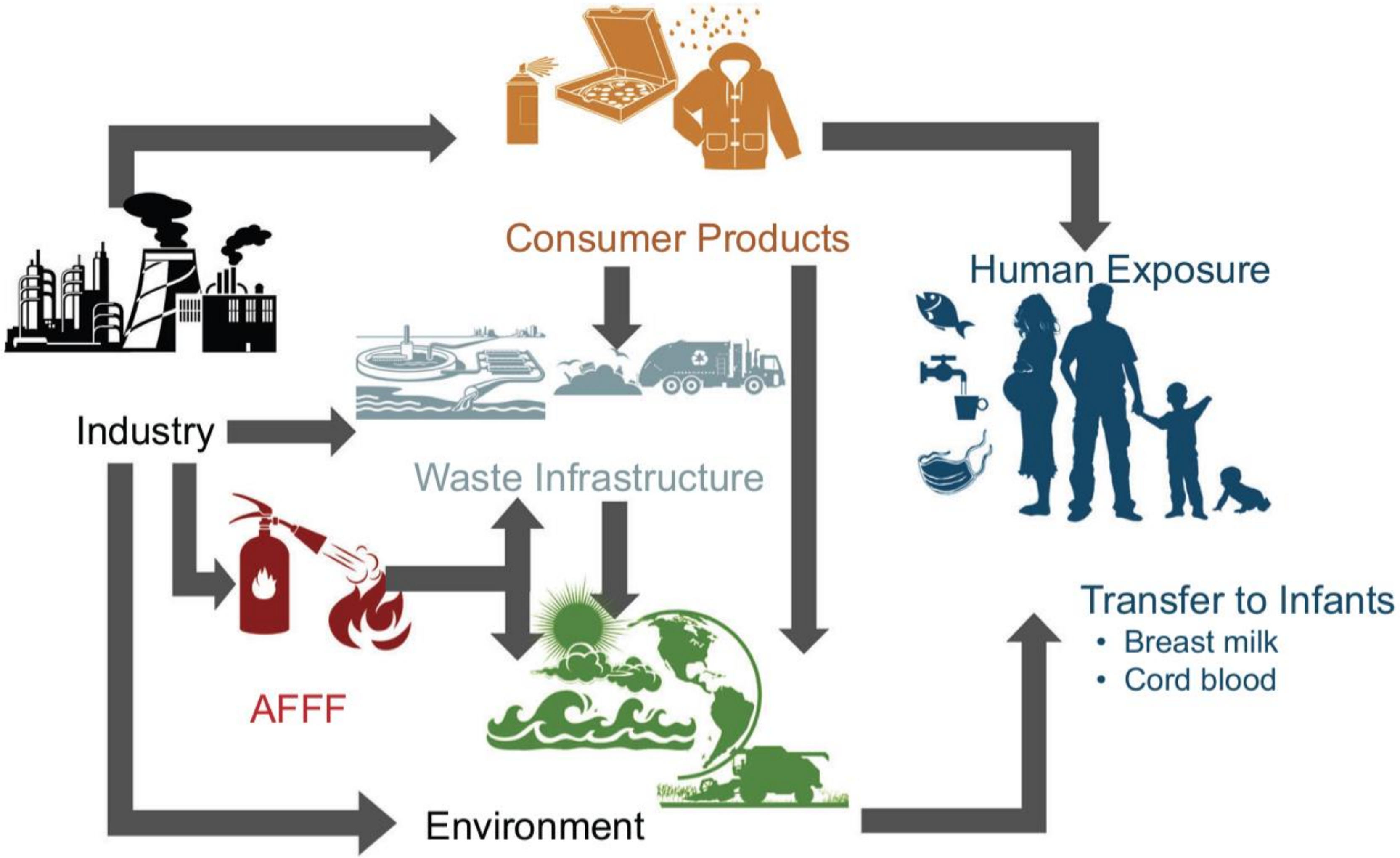
Pollution of surface water, ground water, rainwater

Human exposure by food, water, consumer products containing PFAS, building materials, repeated contact of workers

Court cases & raising awareness[2,3]

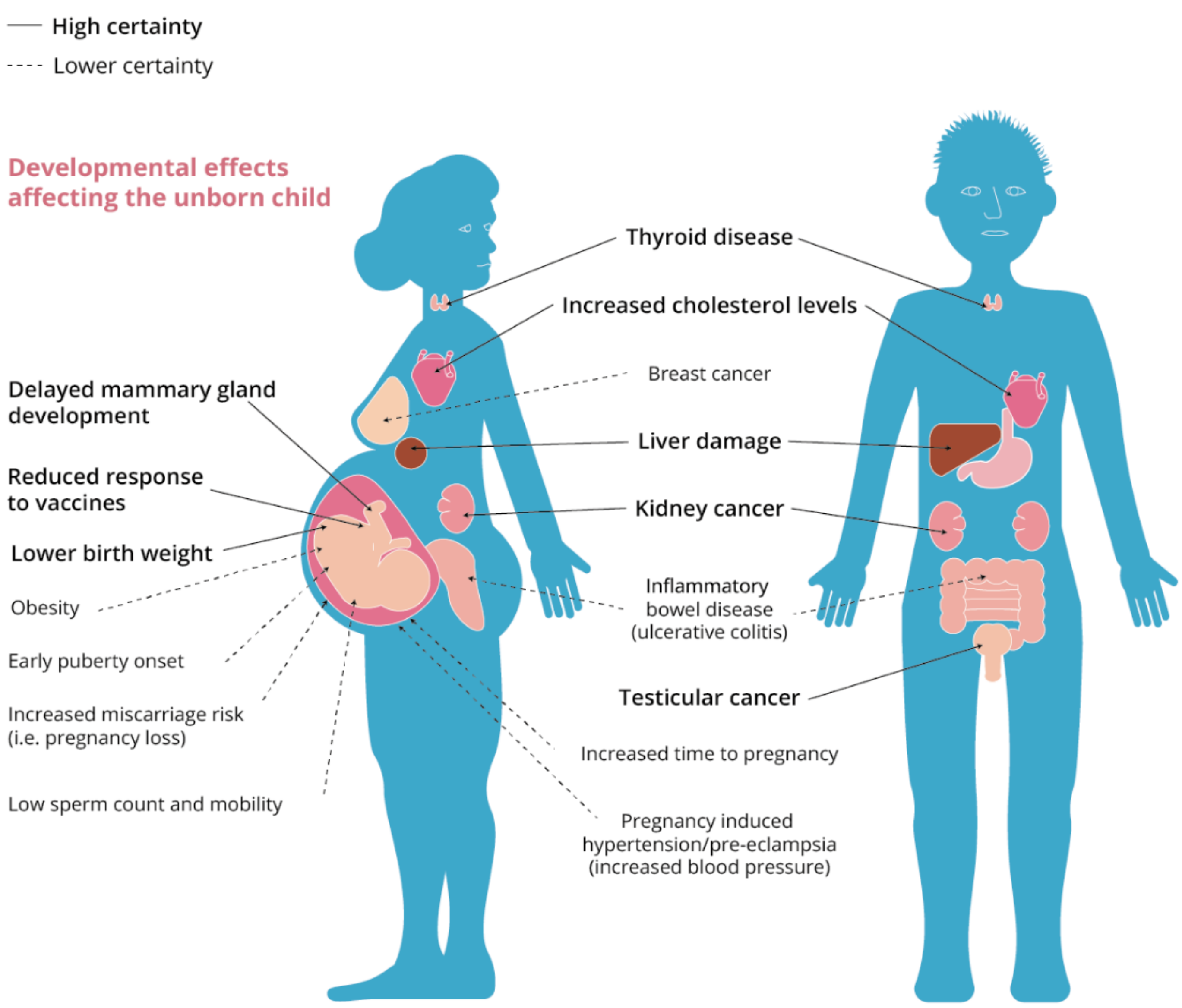
[1]European Environment Agency, 2023. Cross-cutting story 3: PFAS. https://www.eea.europa.eu/publications/zero-pollution/cross-cutting-stories/pfas
[2]EEB, ChemSec, 2024. High-level European politicians polluted by PFAS. https://eeb.org/high-level-european-politicians-polluted-by-pfas/
[3] 'Forever Pollution Project' 2023 (updated 2024). https://www.lemonde.fr/en/les-decodeurs/article/2023/02/23/forever-pollution-explore-the-map-of-europe-s-pfas-contamination_6016905_8.html

Life cycle and exposure



https://sunderlandlab.org/assets/sunderland_jeseerev_2018wsi.pdf

Adverse effects from exposure



Also, evidence of PFAS direct effects to fetuses[1] and more focus on the father's chemical exposure effects to offspring[2]

[1]Hyötyläinen, T., et al., 2024. In utero exposures to perfluoroalkyl substances and the human fetal liver metabolome in Scotland: a cross-sectional study. https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(23)00257-7/fulltext

[2]ChemSec, 2024. https://chemsec.org/fathers-transfer-past-chemical-exposure-to-their-children/

WHAT ARE WE DOING ABOUT PFAS?

GLOBALLY

The Stockholm Convention
The production, use, stockpiles, emissions, and waste management of POPs

WITHIN THE EU

POP Regulation (EU) 2019/1021

PFOS and related compounds
PFOA, its salts and PFOA-related compounds
PFHxS, its salts and PFHxS-related compounds

The European Green Deal and
Chemical strategy for sustainability[1]
Zero pollution action plan for water, air and soil[2]
Revising measures to address pollution from *large industrial installations*[1,2]

REACH Regulation (EC) No 1907/2006 (REACH)

Drinking Water Directive (EU) 2020/2184 (DWD)

Proposal for a revised Urban Wastewater Treatment Directive (UWWTD)

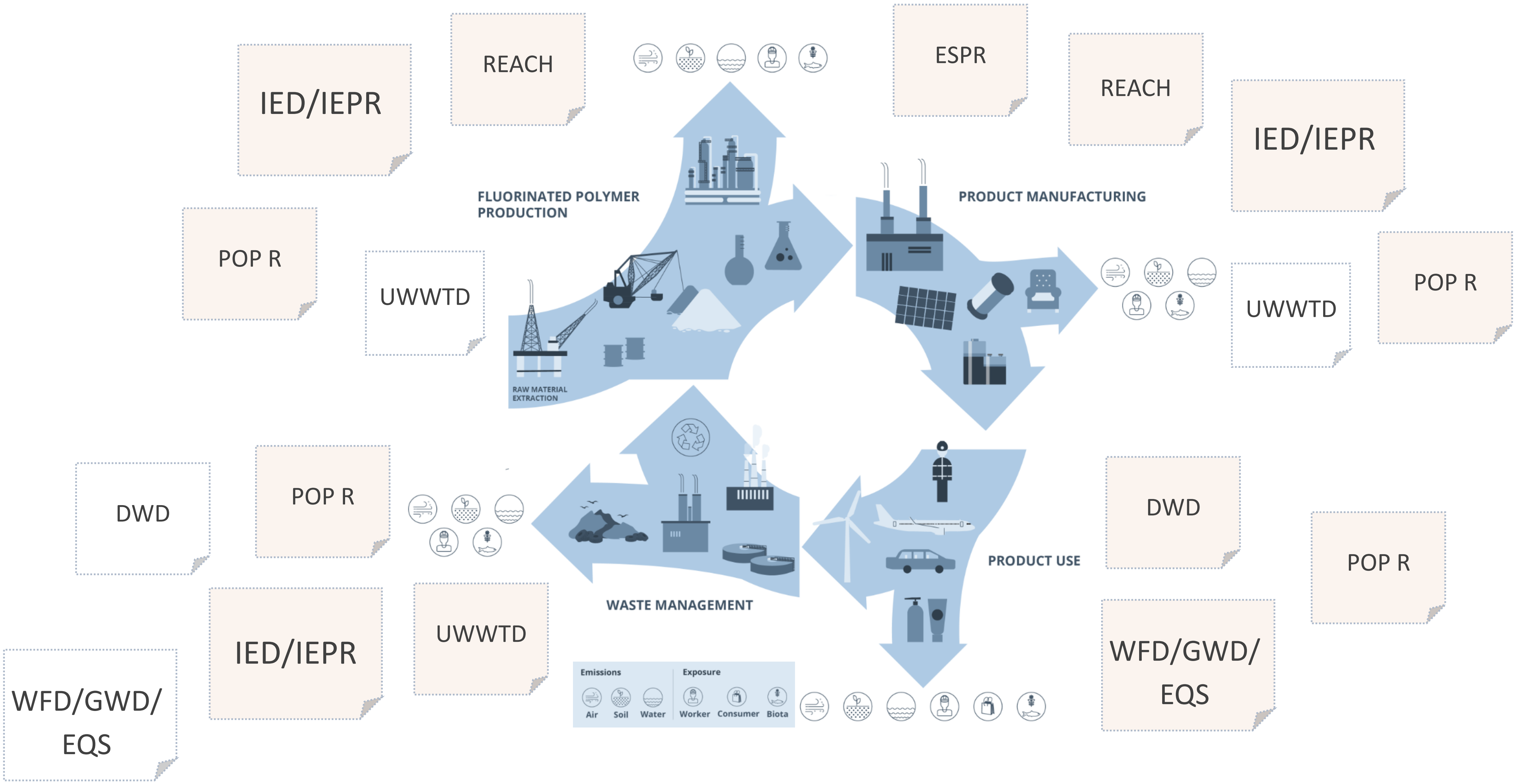
Proposal for a Directive amending the Water Framework Directive, the Groundwater Directive and the Environmental Quality Standards (WFD/GWD/EQS)

Proposal for a Revision of the Industrial Emissions Directive and Industrial Emissions Portal Regulation (IED/IEPR)

PFAS in firefighting foams restriction proposal[3]
General PFAS restriction proposal[4]

Grouping approach for ALL PFAS

[1] https://environment.ec.europa.eu/strategy/chemicals-strategy_en#actions
[2] https://environment.ec.europa.eu/strategy/zero-pollution-stakeholder-platform/actions_en#actions
[3] https://echa.europa.eu/registry-of-restriction-intentions/-/dislist/details/0b0236e1856e8ce6
[4] https://echa.europa.eu/registry-of-restriction-intentions/-/dislist/details/0b0236e18663449b



© European Environment Agency, 2023. Cross-cutting story 3: PFAS. https://www.eea.europa.eu/publications/zero-pollution/cross-cutting-stories/pfas

WHAT ARE THE CHALLENGES RELATED TO PFAS?

WIDE RANGE OF USES

Where to look for PFAS?

Emissions throughout the life cycles of these products, including *from production, manufacturing, product use and waste management*

New monitoring schemes

RAPID SCREENING & SAMPLE PREPARATION

Identification of PFAS-containing products

Avoiding cross-contamination

Commercially available sample preparations and analytical methods for enforcement and companies

SAMPLE ANALYSIS

Different methods for different matrices

Different restrictions for certain PFAS -> LOD + Limit values

TOP Assay for ‘related substances’

CONCLUSIONS BASED ON FINDINGS

What action to take if PFAS is detected:

Products

Water

Contaminated soil

CONCLUSION?

From the products perspective

Implement “Safe-and-sustainable-by-design”

Find alternatives

Avoid “regrettable substitution”

Consider “essential use”

From the emission perspective

Life-cycle approach keeping in mind the so-called pollutant conservation law

THANK YOU!

Hannela Artus

artushannela@gmail.com

www.linkedin.com/in/hannelaartus

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