

Chemicals at the European Environment Agency



Magnus Løfstedt / Swacc seminar/ 12th of March 2024

EEA at a glimpse

- A European Agency
- Founded in 1994
- 200+ datasets
- 280+ employees
- Located in Copenhagen, Denmark



We support policies with evidence-based knowledge to help the European Union and our member countries achieve sustainability



We build and maintain networks and partnerships to facilitate sharing of knowledge and expertise across Europe



We inform public and policy discussions on sustainability solutions and challenges



We collect, quality check and disseminate data, making full use of digitalisation and latest innovative technologies

EEA work areas supporting...

1 Biodiversity and ecosystems 

2 Climate change mitigation and adaptation 

3 Human health and the environment 

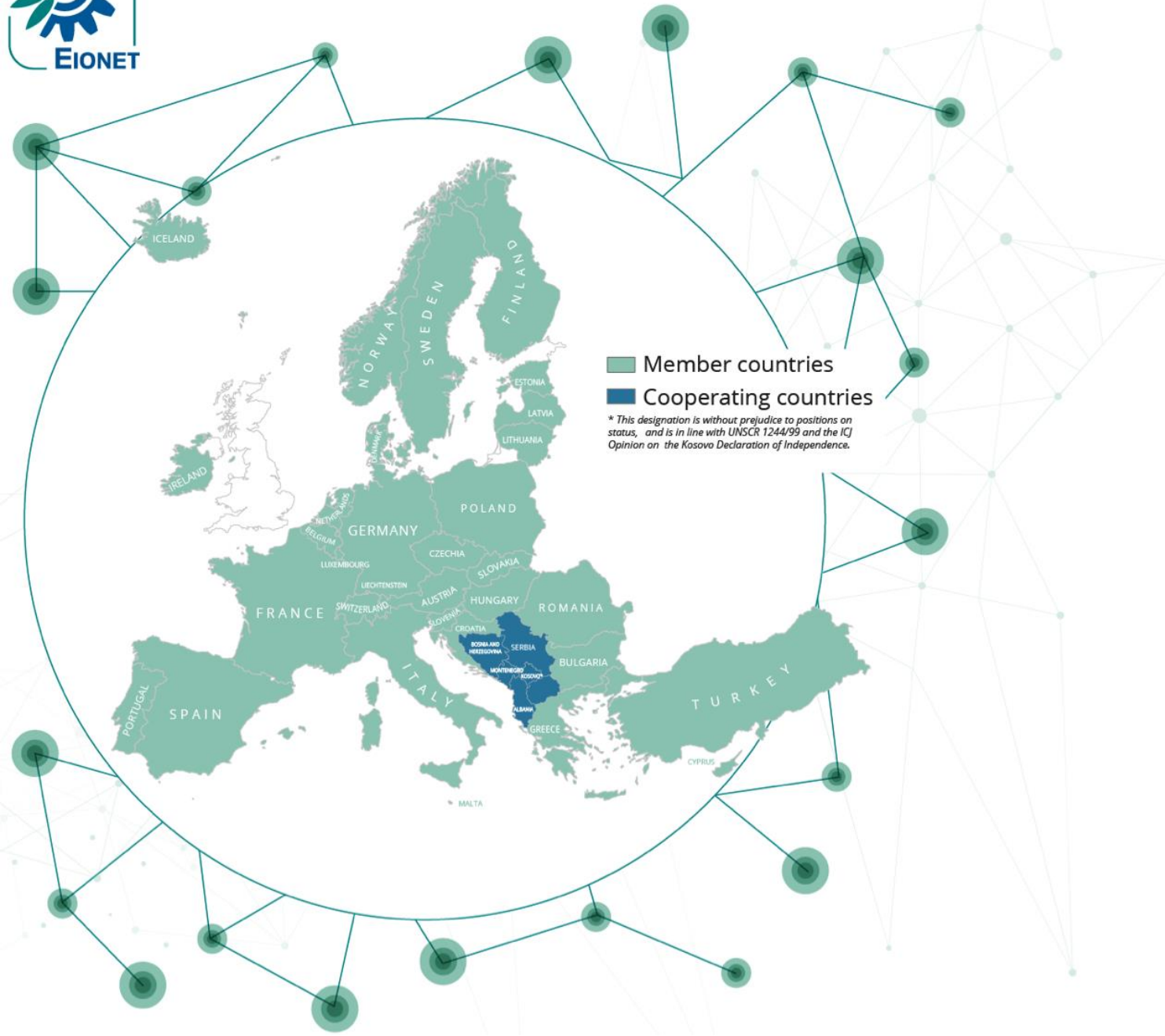
4 Circular economy and resource use 

5 Sustainability trends, prospects and responses 



- First **climate-neutral** continent, incl. **Adaptation Strategy**
- **Biodiversity Strategy 2030**
- New **Circular Economy Action Plan**
- **Zero pollution strategy**
- **Farm to fork strategy**
- **Just transition**

- **Sustainable European Investment Plan**
- **Future ready economy – new industrial strategy**



Eionet

Who we are

More than **500 institutions**

38 countries

around **1 500 experts**

13 Eionet groups

8 European Topic Centres

What we do

over **50 publications** a year

Air Quality report + app

SOER every 5 years

EEA and chemicals

Not your typical regulatory agency.....

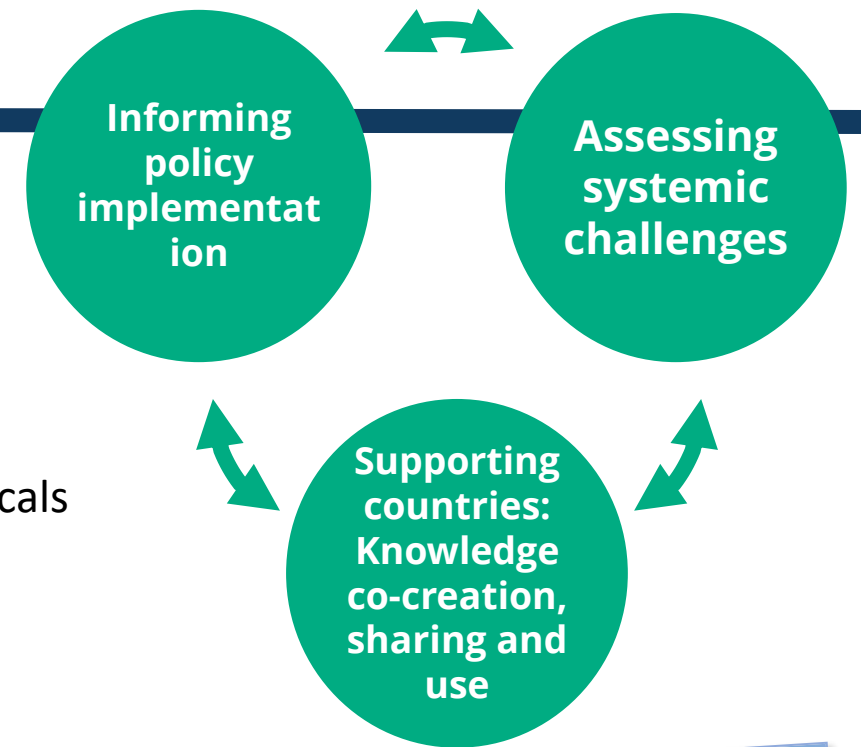
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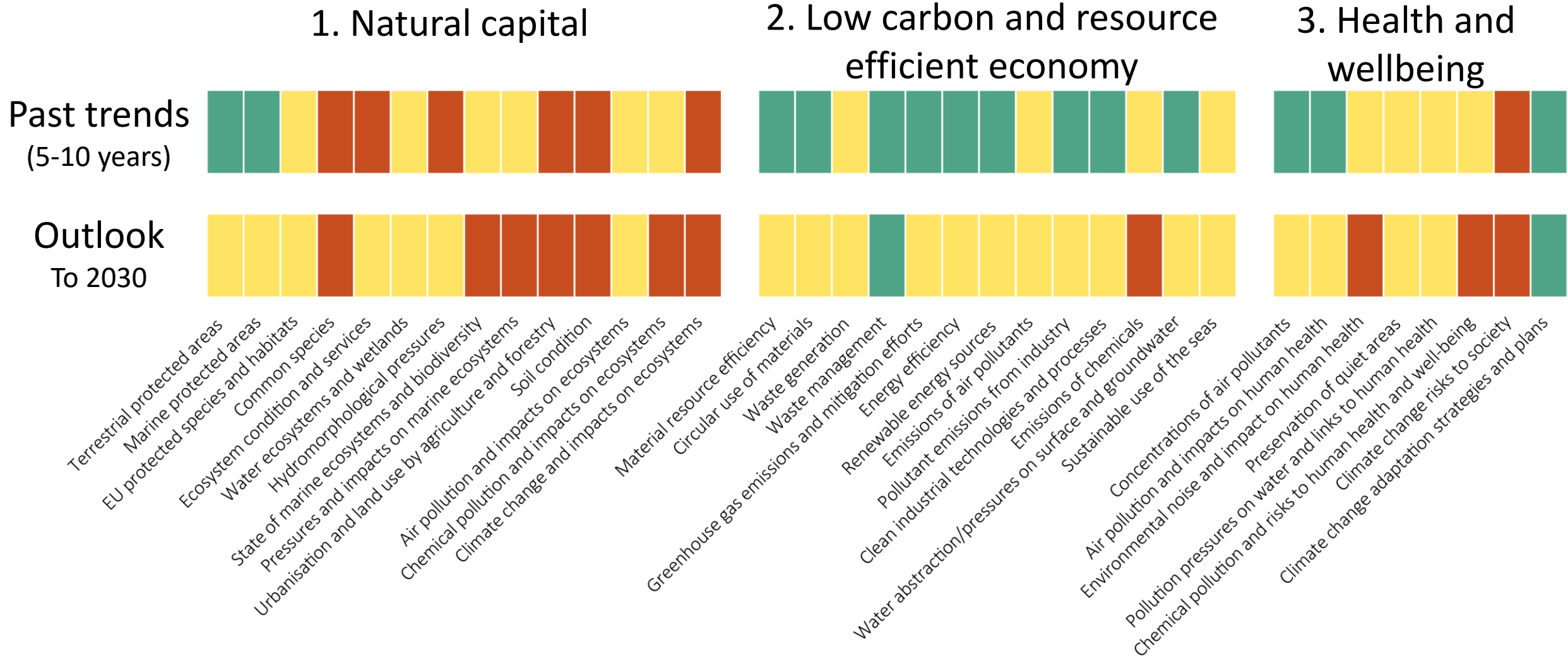
The EEA is:

- Assessing the state of the environment including impacts from chemicals
- Assessing cross-cutting and systemic challenges
- Informing on policy implementation
- Offering a network for exchange of data and knowledge

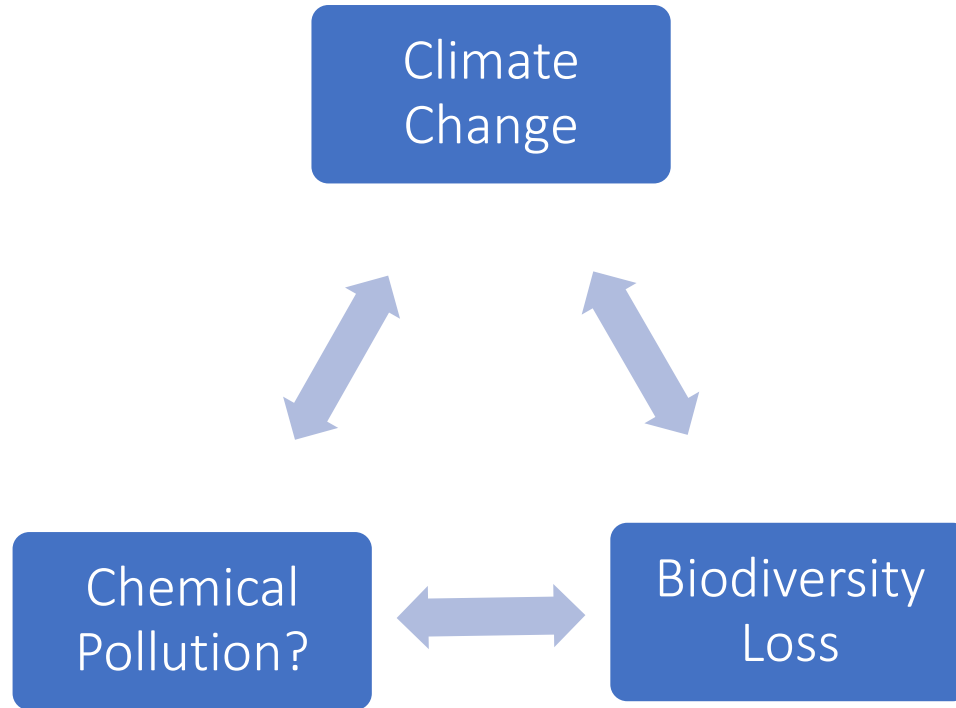
The occurrence of chemicals in surface water, drinking water, soil, air, biota and in humans is key in order to:

- Provide data on real exposure levels from multiple sources
- Estimate impacts on ecosystems and human health
- Evaluate the state of the environment
- Validate information from upstream chemical regulation (REACH, PPP, BPR, etc)
- Target policy interventions to substances that matters!



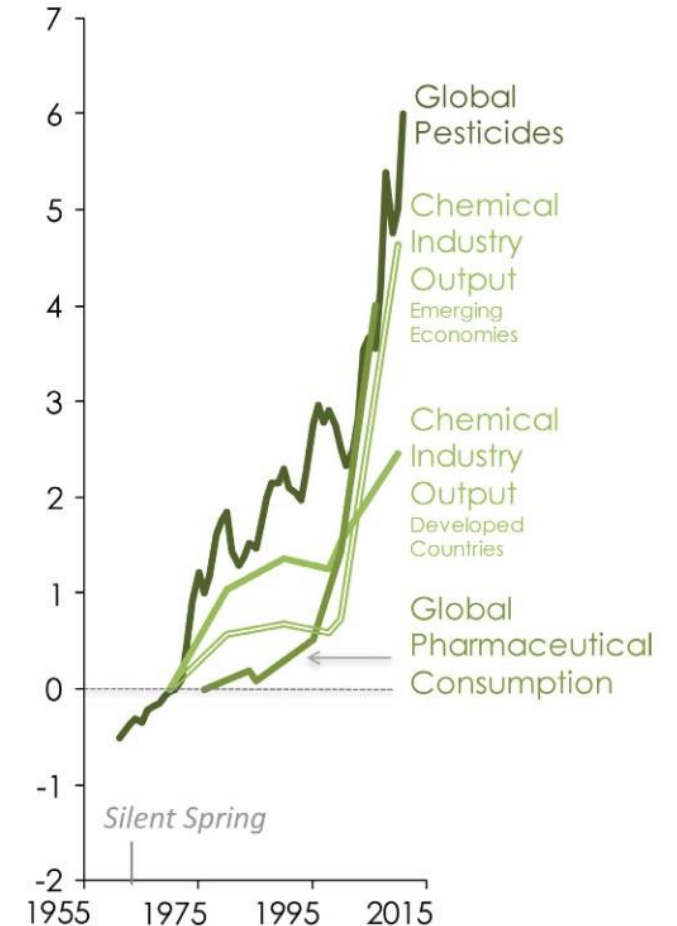


Is chemical pollution the third great planetary crisis?



Climate change, biodiversity loss and pollution add up to three self-inflicted planetary crises that are closely interconnected and put the well-being of current and future generations at unacceptable risk.

- United Nations, Making Peace with Nature, 2021.

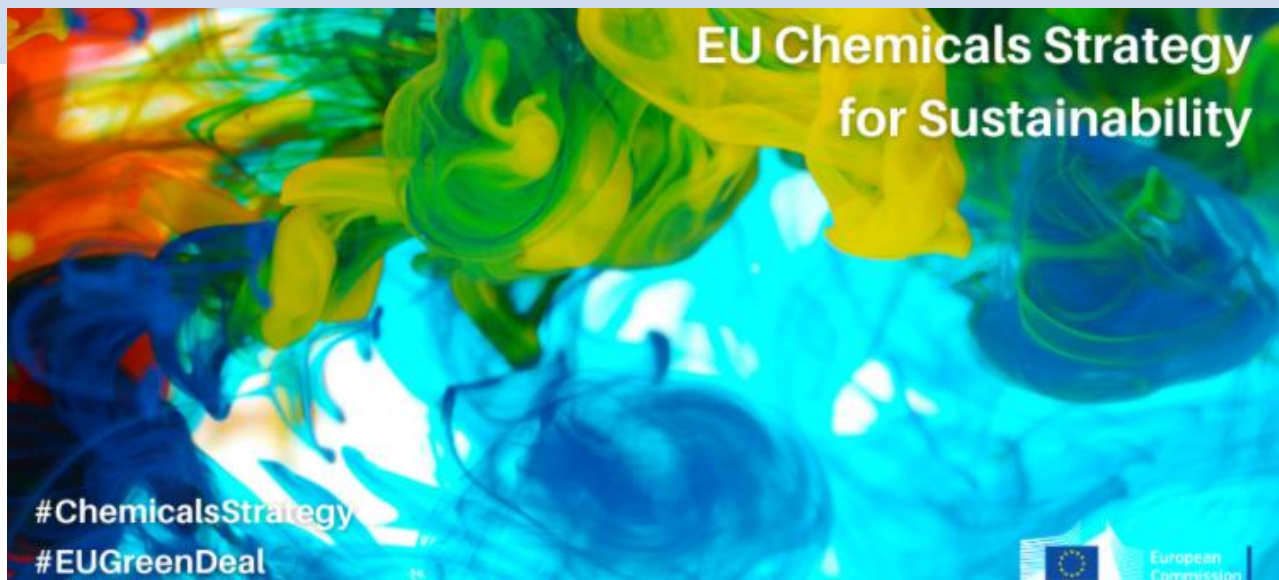


© Bernhardt et al., Front Ecol Environ 15(2), 2017



Knowledge supporting the European Green Deal

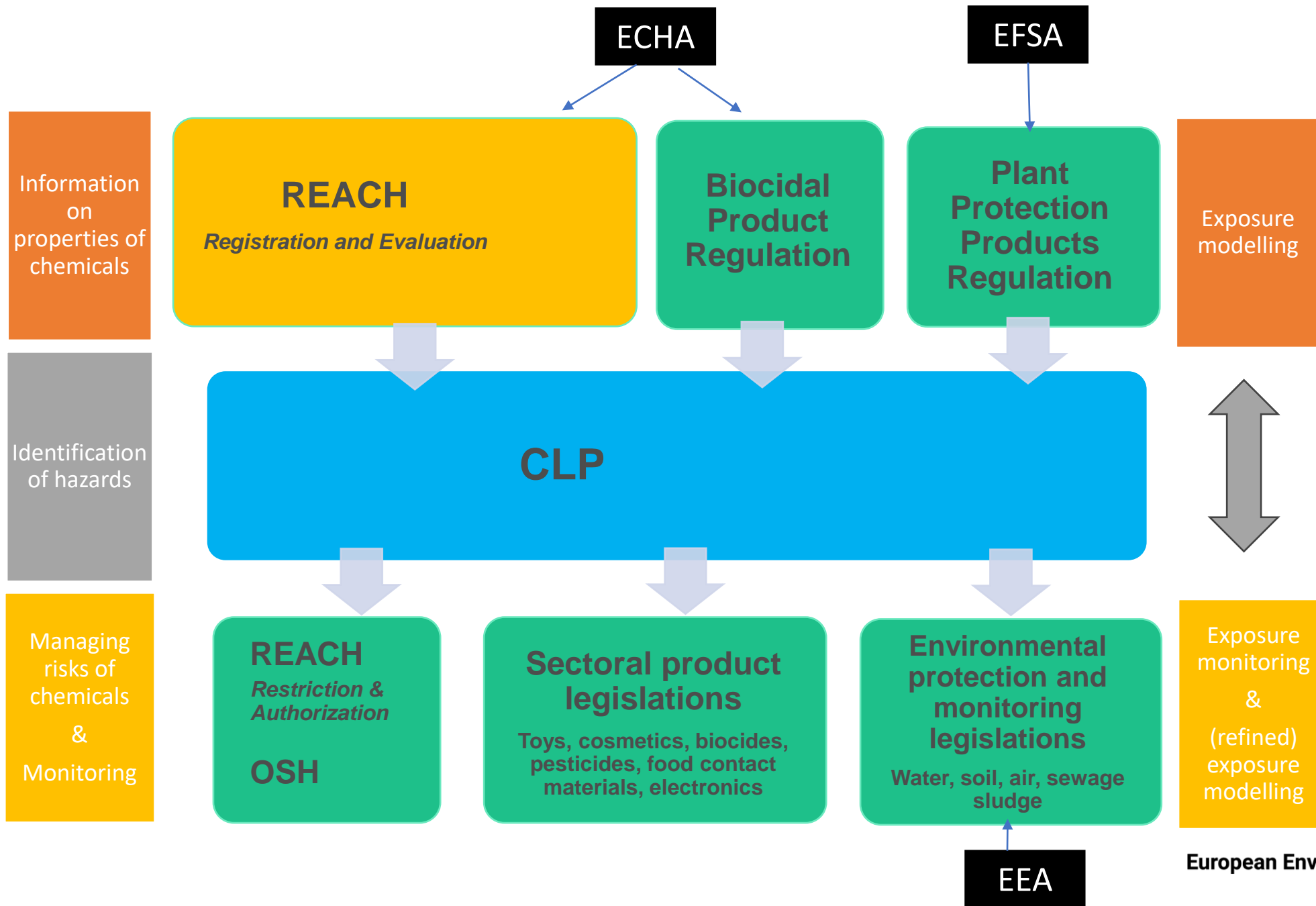
- **Chemicals Strategy for Sustainability**
- **Zero pollution strategy**
- **Farm to fork strategy**
- **New Circular Economy Action Plan**
- **Just transition**



Regulatory landscape for chemicals

REACH Regulation	CLP Regulation	Plant Protection Product Regulation	Sustainable Use of Pesticides Directive	Biocide Regulation	PIC Regulation	POP Regulation
Seveso Directive	Cosmetics Regulation	Toy Safety Directive	ROHS Directive	Detergents Regulation	Drinking Water Directive	Water Framework Directive
Environmental Quality Standard Directive	Fertilising Products Regulation	Test Method Regulation	Mercury Regulation	F-gas Regulation	Occupational Safety and Health (OSH) Regulation	Carcinogens and Mutagens Directive
Food Contact Material Regulation	Food Contaminants Regulation	Food Additives Regulation	Medicinal Device Directive	Medicinal Products Directive	Veterinary Medicinal Products Directive	Ambient Air Quality Directive
GLP Directive	Sewage Sludge Directive	E-PRTR Regulation	Industrial Emissions Directive	Sustainable Finance Regulation	Waste Framework Directive	Air Quality Directive

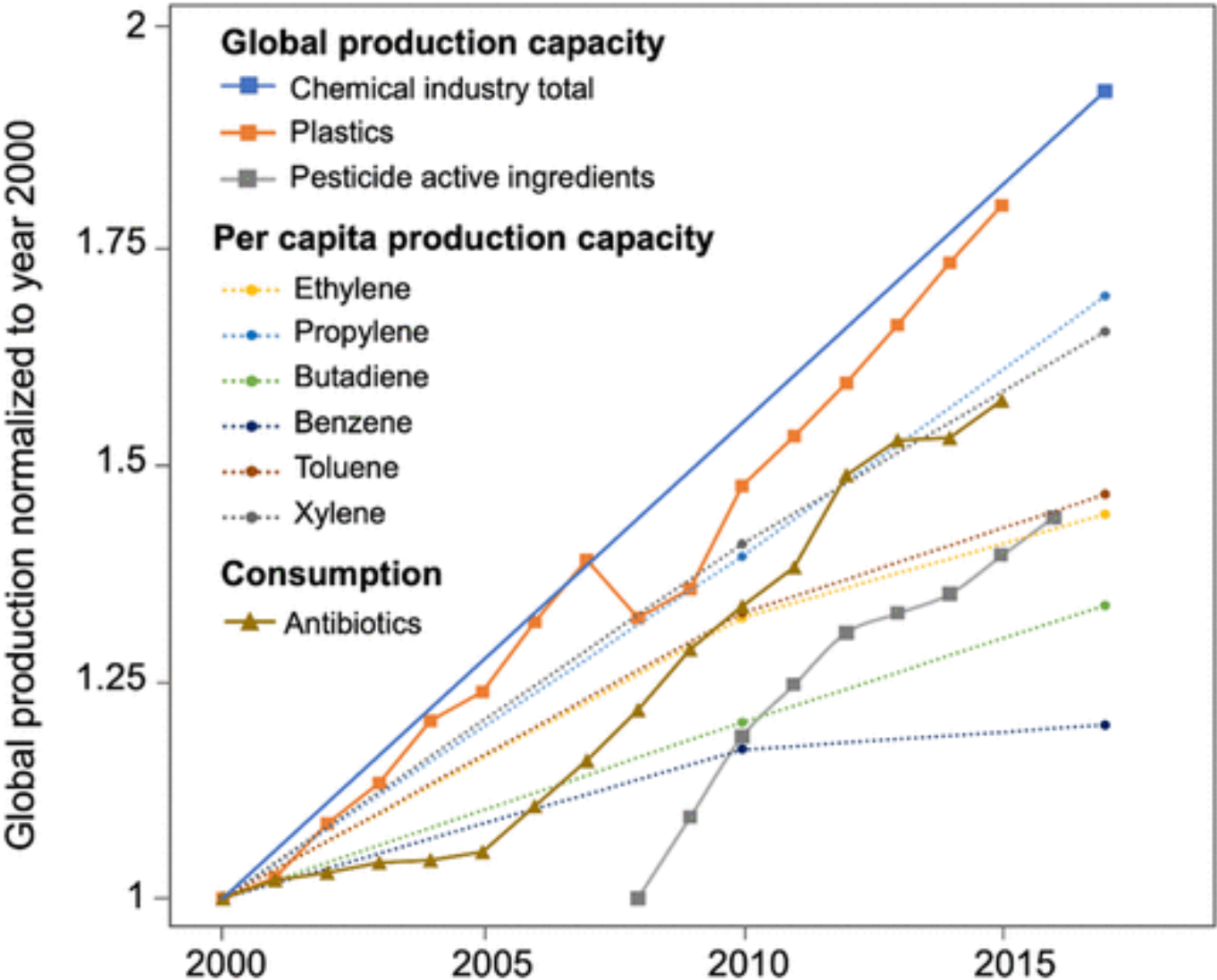
Agencies: ECHA, EFSA, EMA, EU-OSHA, EEA



More than 100,000 different chemicals exists in our surroundings

Sector	No of substances (appr)	Source
Pesticide active substances	450	Eu.boell.org
Biocide active substances	700	ECHA
Medicine active substances	3,000	EURD List
Veterinary medicine active substances	900	Union Register of veterinary medicinal products
Food additives and flavourings	3,000	EU Food and Feed Information Portal
Industrial chemicals > 1 T/Y	25,000	ECHA
Industrial chemicals < 1 T/Y	?	
Imported in articles from outside of EU	?	
Polymers	?	
Legacy substances	?	
Impurities	?	

Chemical production and releases – beyond planetary boundaries

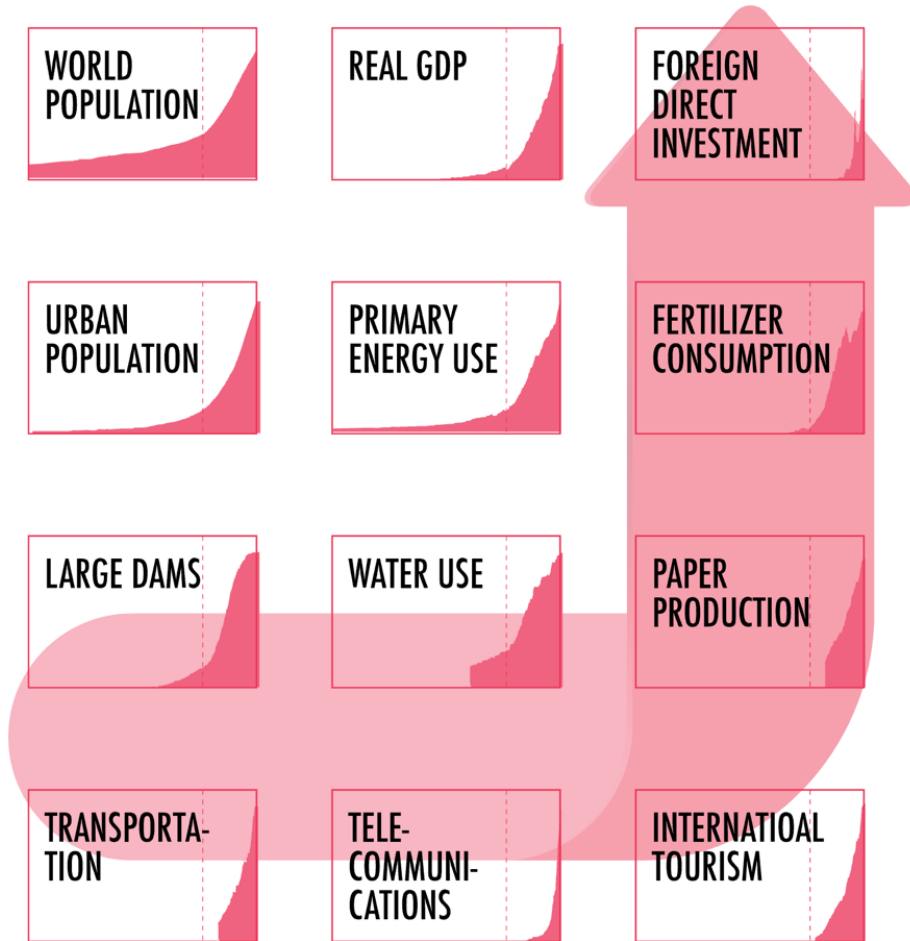


[Persson et al, 2022](#)

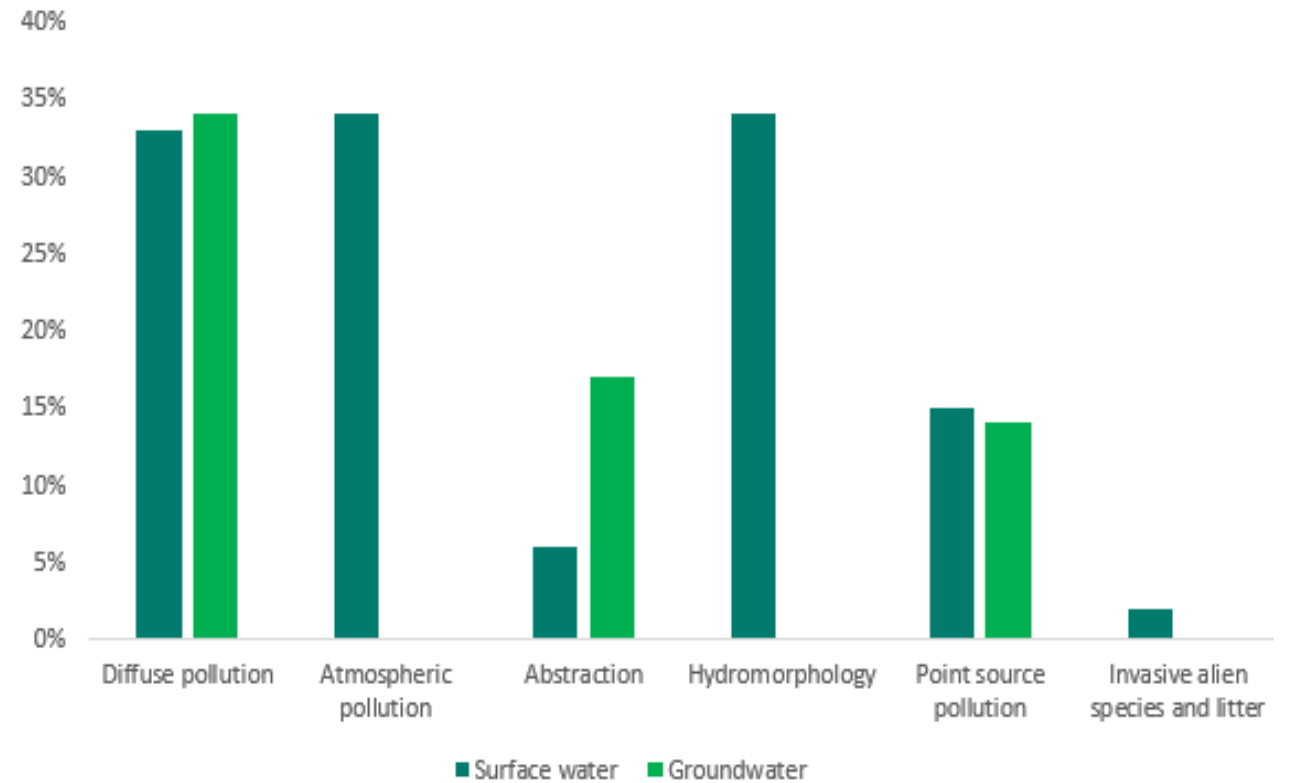
Chemical pollution in water

Water under pressure: global trends in the current paradigm

Socio-economic trends

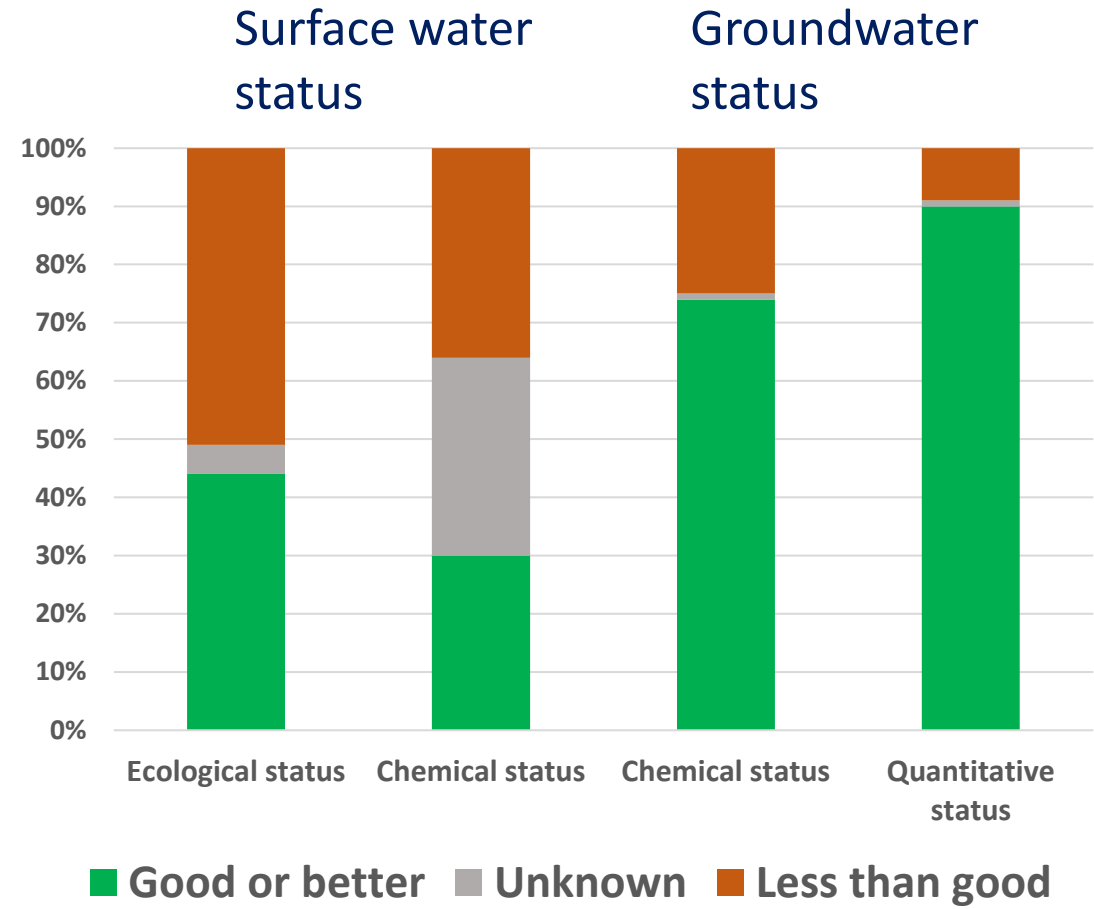
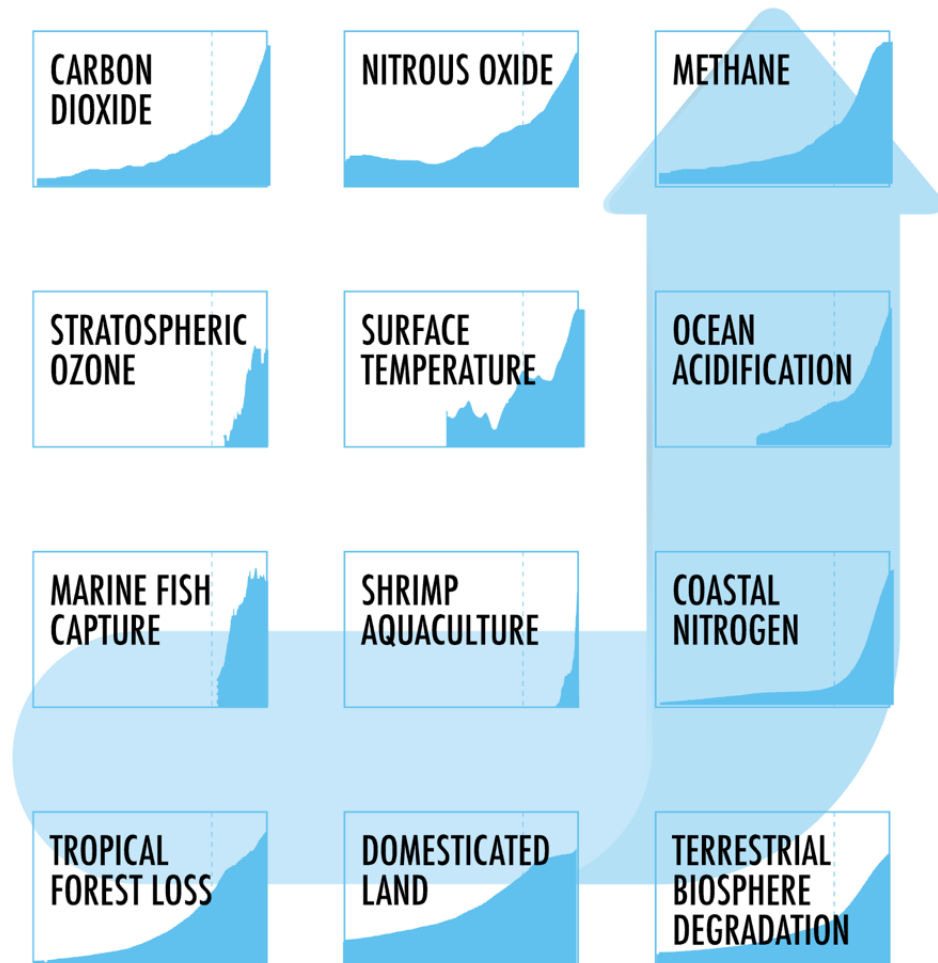


Share of surface waterbodies with a significant pressure identified



Waterbodies suffering: global trends in the current paradigm

Earth system trends



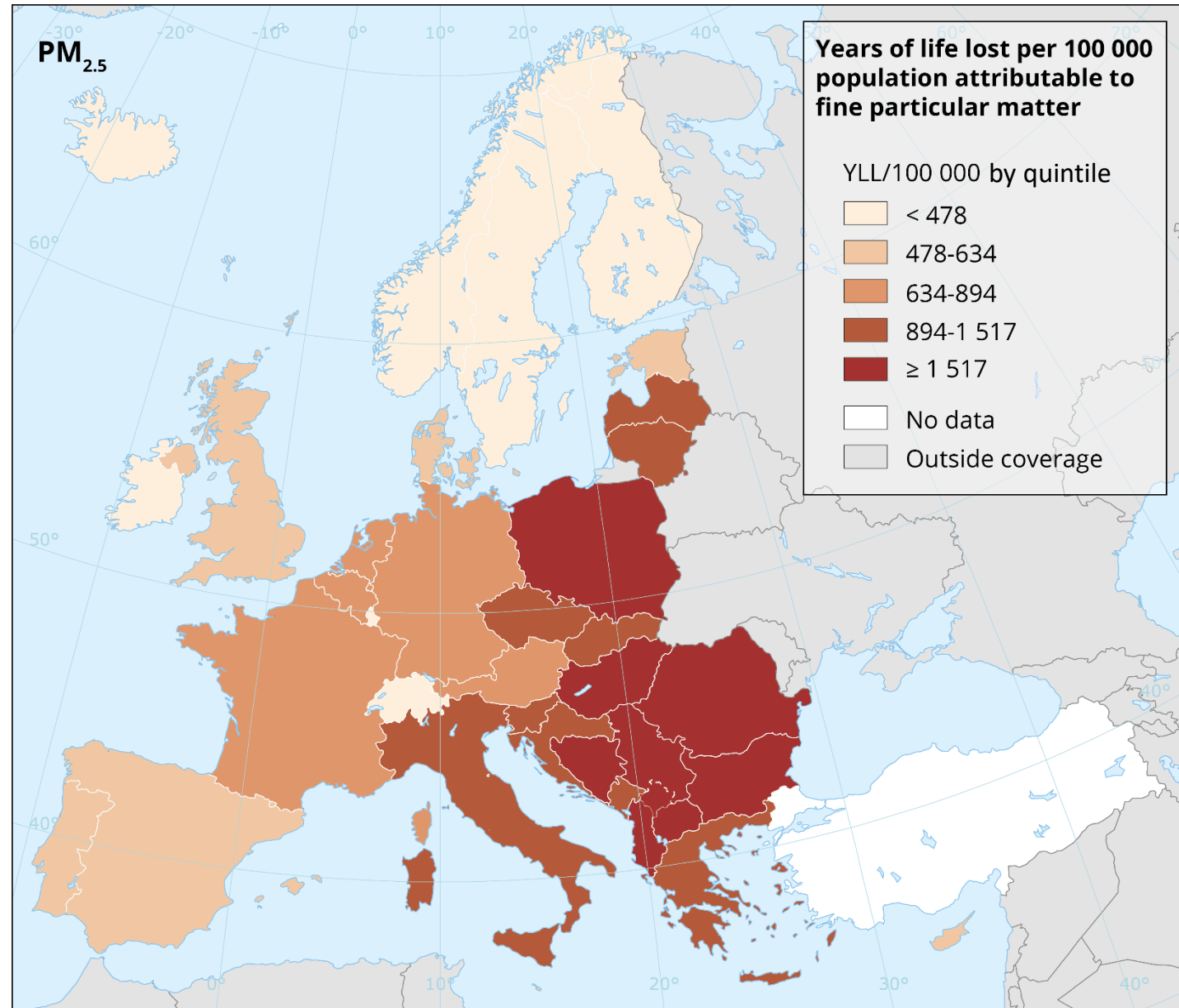
Chemical pollution in air

No 1. environmental risk factor in Europe: Air pollution

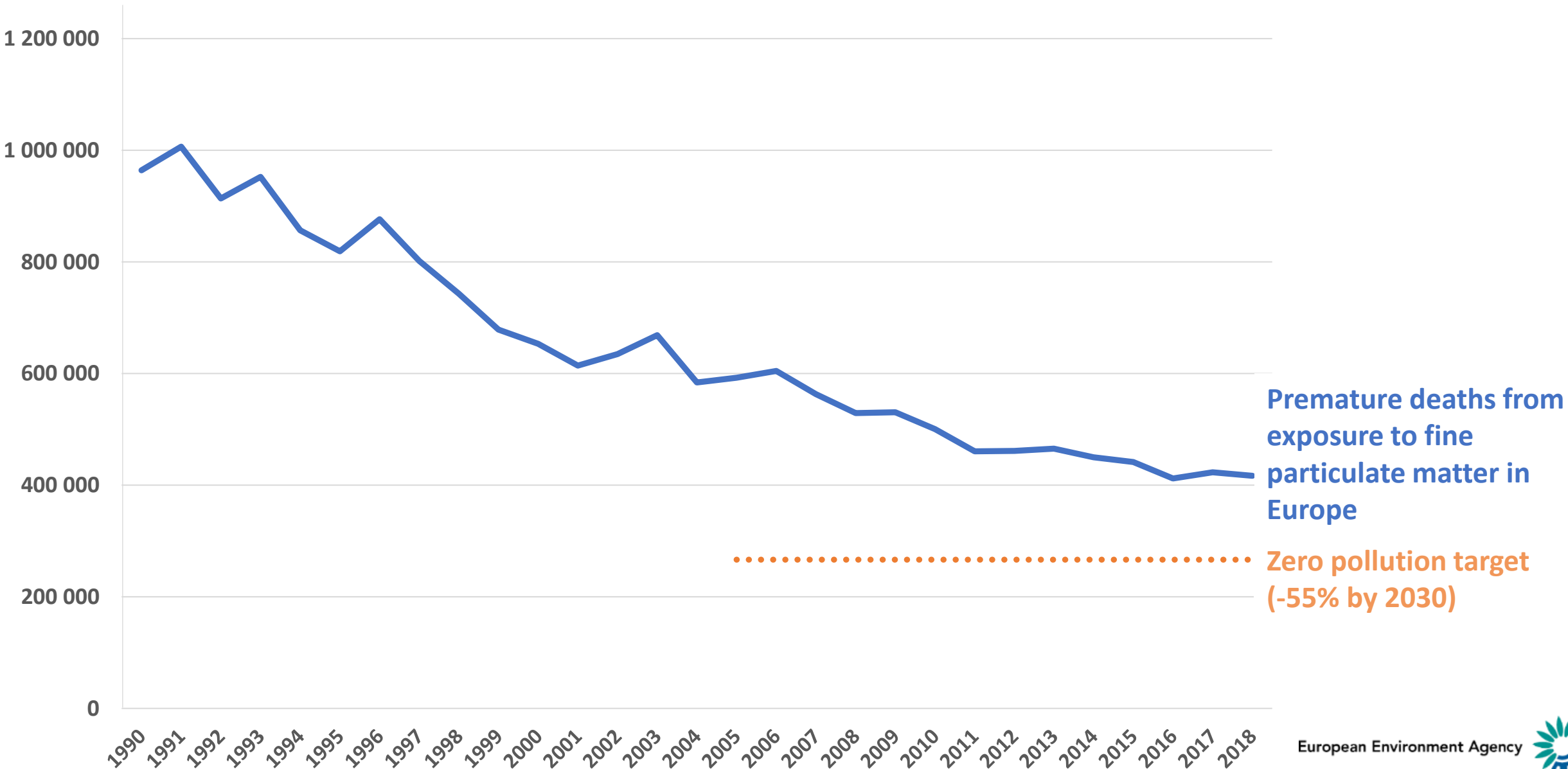
Around 400 000 premature deaths in Europe in 2018

Air pollution is linked to:

- 17 % of deaths from lung cancer
- 12 % of deaths from ischaemic heart disease
- 11 % of deaths from stroke



Policies are working: reducing air pollution saves lives



Premature deaths from exposure to fine particulate matter in Europe

Zero pollution target (-55% by 2030)

Source: EEA

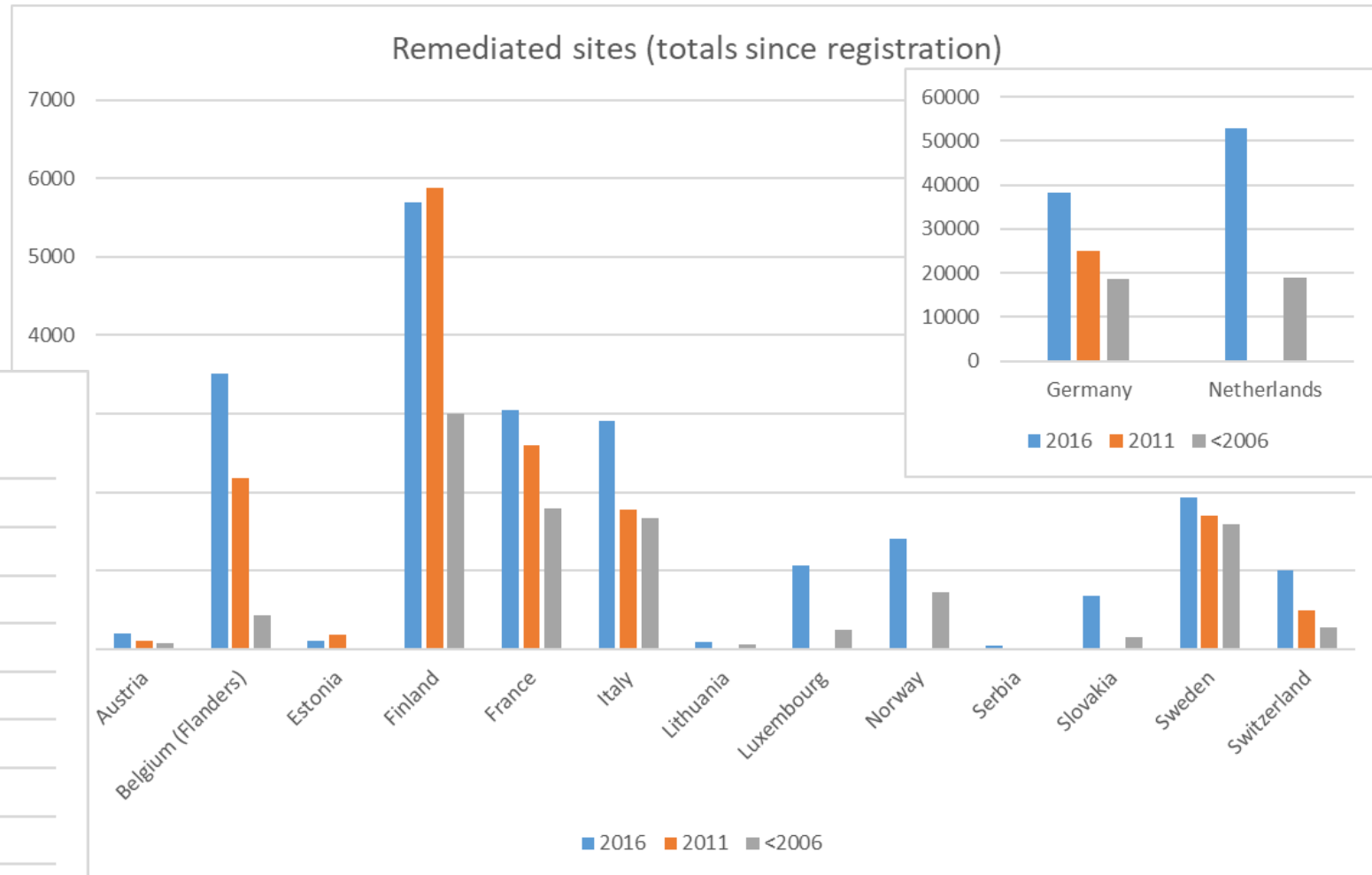
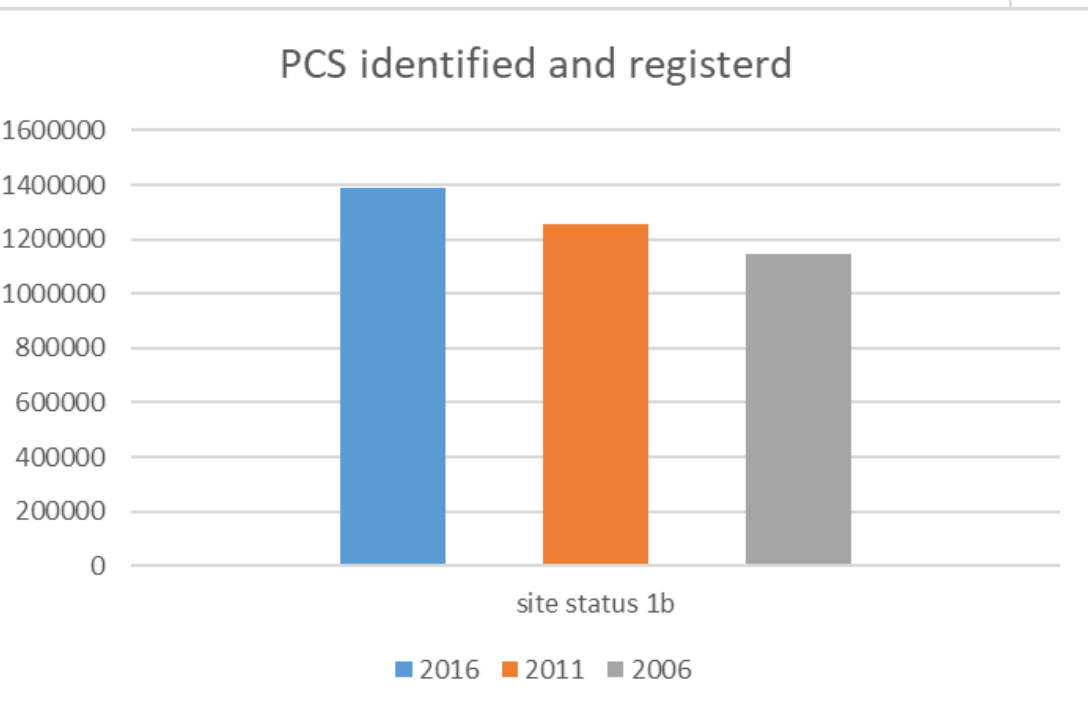
Chemical pollution in soil

Local Soil Pollution

EEA Land and Soil Indicator Set: “Progress in the Management of Contaminated Sites”

[EEA 2022](#)

- Comprehensive inventories exist in 12 EU countries (98% of all registered sites)
- 2.8 Mio estimated contaminated sites, of which a significant proportion still needs registration, monitoring, risk assessment, remediation



Chemicals and the circular economy

RAW MATERIAL

- Emissions to air
- Emissions to soil
- Emissions to water

import
export



PRODUCTION

- Emissions to air
- Emissions to soil
- Emissions to water



Basic chemicals



Intermediates



Products

import
export

- Emissions to air
- Emissions to soil
- Emissions to water



import
export

WASTE TREATMENT

wastewater
waste



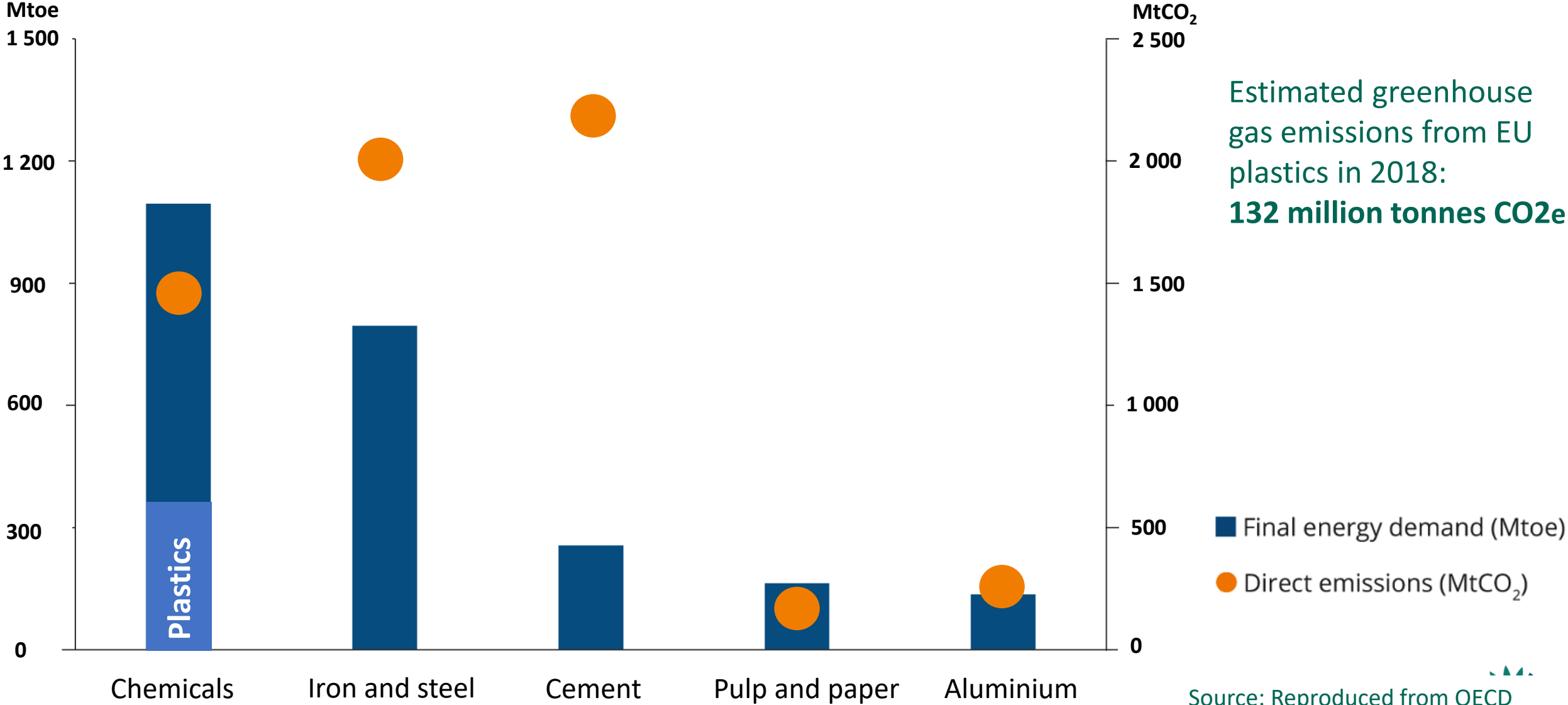
- Emissions to air
- Emissions to soil
- Emissions to water

import
export

USE

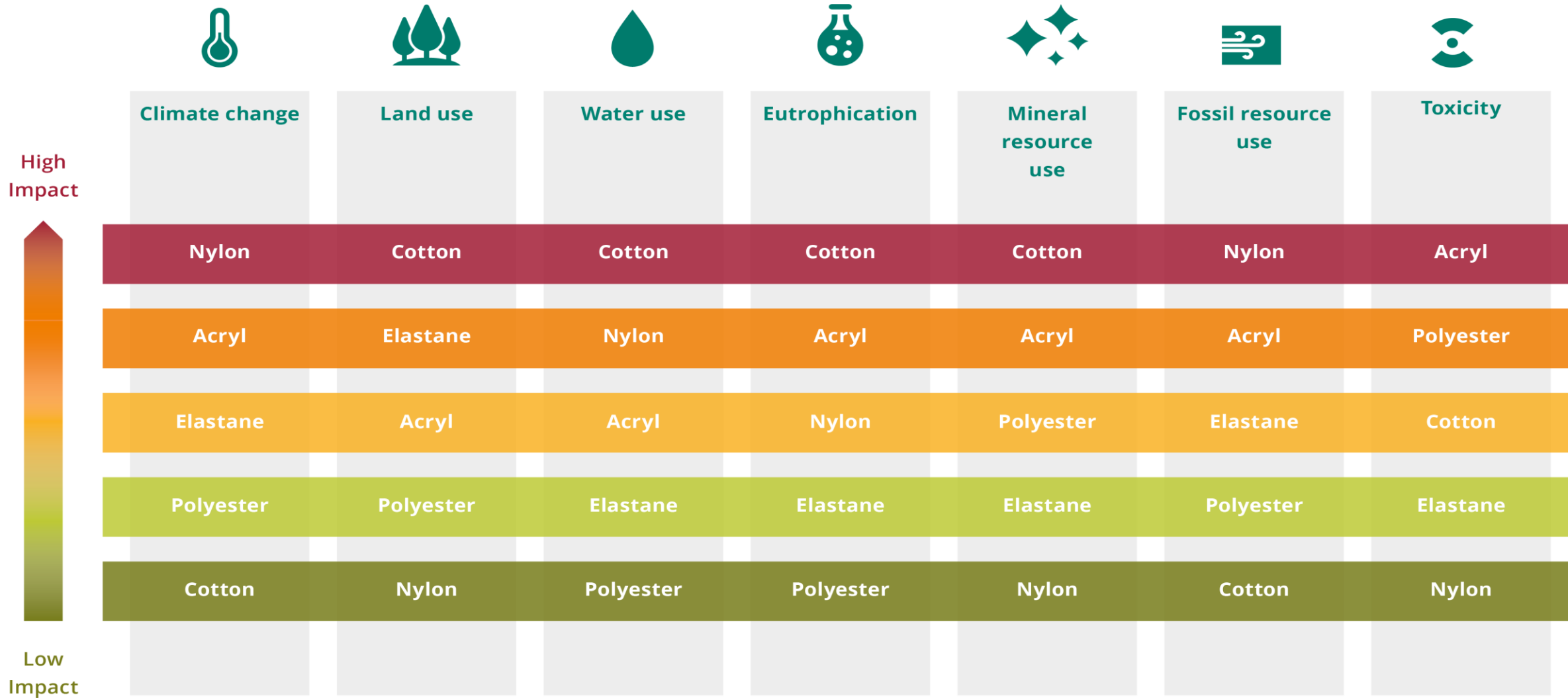


Greenhouse gas emissions from plastic production



Source: Reproduced from OECD and IEA (2018).

Making the right choice for textiles: no easy solutions



Safe-by-design chemicals: reduce hazard and complexity!

'Safe and sustainable by design' Questioning the fundamentals?

Humanitarian
Elements

Enabling System Conditions
Elements

Noble
Elements

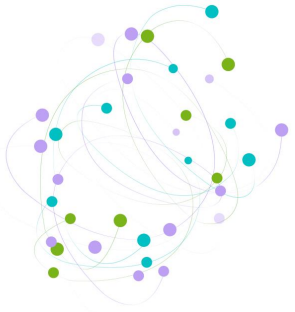
- Conceptual Frameworks
- Economics and Market Forces
- Metrics
- Policies and Regulations
- Tools

- Prevent Waste
- Atom Economy
- Less Hazardous Synthesis
- Molecular Design
- Solvents/Aux
- Energy
- Renewable Feedstocks
- Catalysis
- Degradation
- Measurement and Awareness

5 B Biomimicry	6 Cb Life Cycle Cost-Benefit Analysis	7 Ae Atom Economy	8 Pr Extended Producer Responsibility	9 Ea Epidemiological Analysis and Ecosystem Health	10 P Design for Posterity
13 Ce Circular Economy	14 Fc Full Cost Accounting	15 Ef E-Factor	16 Pb Property Based Regulation	17 Aa Alternatives Assessment	18 Lp Life-Compatible Products & Processes
31 Bd Benign by Design	32 Hc Harm Charge / Carbon Tax	33 Ff F-Factor	34 Ct Chemical Transparency	35 Lc Life Cycle Assessment	36 Z Zero Waste
49 Ie Industrial Ecology	50 Dc Depletion Charge	51 Ql Qualitative Metrics	52 Cl Chemical Leasing	53 So Solvent Selection Screens	54 Fi Chemistry is Equitable and Fully Inclusive
67 Tg Trans-Generational Design	68 Rf Sustained Research Funding	69 Qn Quantitative Metrics	70 Se Self-Enforcing Regulations	71 Cf Chemical Footprinting	72 De Benefits Distributed Equitably
85 Be Bio-Based Economy	86 Ci Capital Investment	87 Bb Chemical Body Burden	88 I Innovation Ecosystem Translation from Lab to Commerce	89 Et Education in Toxicology and Systems Thinking	90 K Extraordinary Chemical Knowledge Comes with Extraordinary Responsibility

1 A Appropriate Technologies for the Developing World	3 Cw Chemistry for Wellness	4 Dd Design to Avoid Dependency	11 Sw Access to Safe and Reliable Water	12 Fg Ensure Access to Material Resources for Future Generations	19 Bf Chemistry for Benign Food Production and Nutrition	20 Tc Transparency for Chemical Communication	21 Wu Waste Material Utilization and Valorization	22 Sa Molecular Self-Assembly	23 Ru Reduce use of Hazardous Materials	24 Dg Design Guidelines	25 Aq Aqueous and Biobased Solvents	26 Ee Energy and Material Efficient Synthesis and Processing	27 Ib Integrated Biorefinery	28 E Enzymes	29 Bm Benign Metabolites	30 Sn Sensors	37 J Ensure Environmental Justice, Security, and Equitable Opportunities	38 Cs Chemistry for Sustainable Building and Buildings	39 Op One-Pot Synthesis	40 Ip Integrated Processes	41 Gc In-Situ Generation & Consumption of Hazardous Materials	42 Cm Computational Models	43 Il Ionic Liquids / Non-Volatile Solvents	44 R Renewable / Carbon-Free Energy Inputs	45 C Carbon Dioxide and other C1 Feedstocks	46 Ac Earth Abundant Metal Catalysis	47 Md Molecular Degradation Triggers	55 Pc Chemistry to Preserve Natural Carbon and Other Biogeochemical Cycles	56 Ic An Individual's Molecular Code Belongs to that Individual	57 Pi Process Intensification	58 As Additive Synthesis	59 Ch C-H Bond Functionalization	60 Ba Bioavailability / ADME	61 Sc Sub- and Super-Critical Fluids	62 Es Energy Storage / Transmission Materials	63 Sb Synthetic Biology	64 Ht Heterogeneous Catalysis	65 Dp Degradable Polymers and Other Materials	66 Ex Exposome	73 Wo No Chemicals of War or Oppression	74 Nc Molecular Codes of Nature Belong to the World	75 Ss Self-Separation	76 W Non-Covalent Derivatives / Weak Force Transformation	77 Is Inherent Safety and Security	78 Ts High Throughput Screening (Empirical / In Vivo / In Vitro)	79 S "Smart" Solvents (Obedient, Tunable)	80 V Waste Energy Utilization and Valorization	81 Bt Biologically-Enabled Transformation	82 Hm Homogeneous Catalysis	83 Pd Prediction and Design Tools	84 Ga Green Analytical Chemistry
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Bisphenols



HBM4EU

Human Biomonitoring for EU



Launched in 2016, ended in 2022



Purpose:

- Improve understanding of human exposure to hazardous chemicals
- Developing HBM as an exposure assessment method



Budget: 74 million EUR



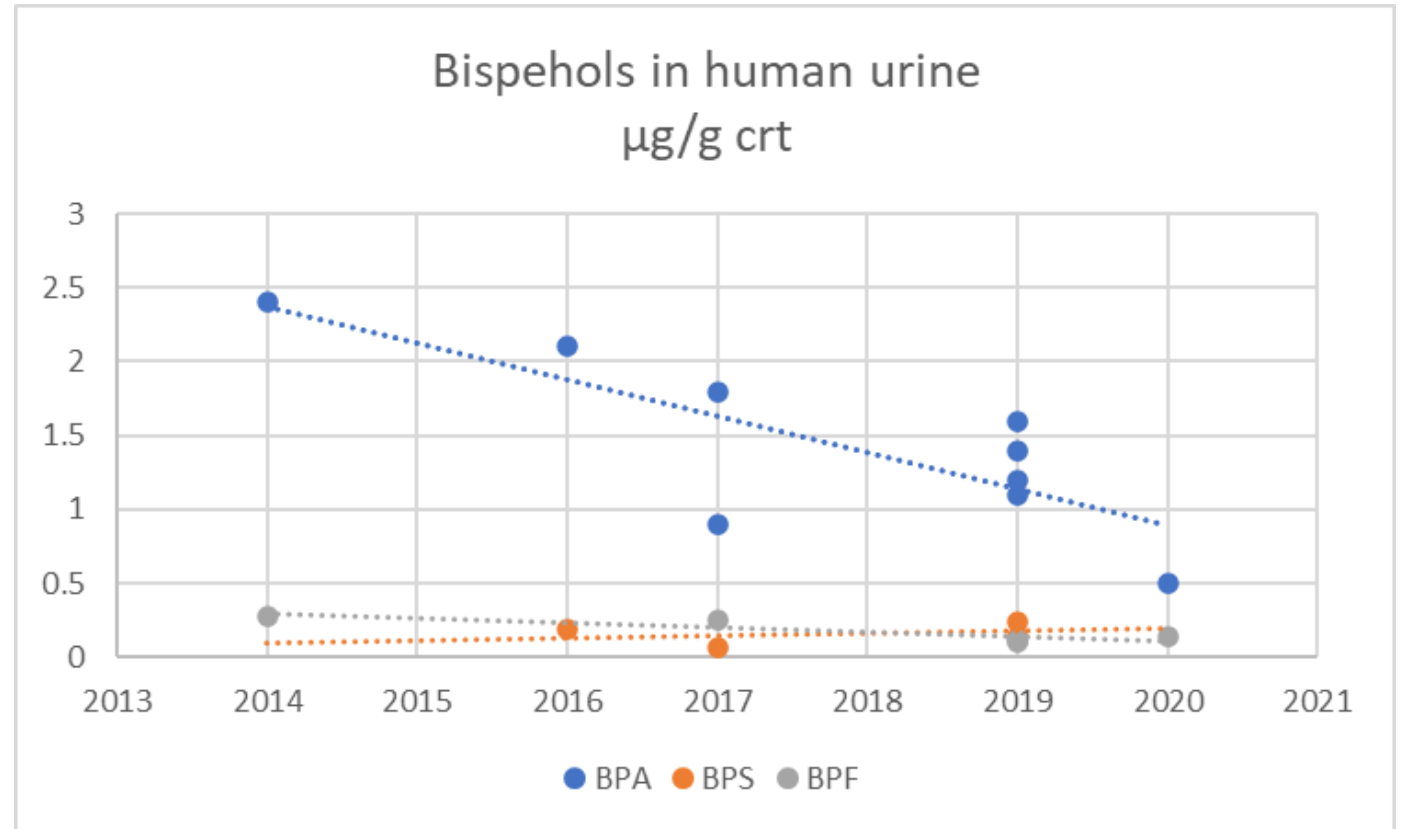
120 partners from 28 participating countries





Biomonitoring of bisphenols under HBM4EU

- Three different bisphenols measured in human urine
- 2756 adults from 11 countries (France, Luxembourg, Finland, Denmark, Germany, Poland, Czechia, Iceland, Croatia, Portugal and Switzerland).
- Decreasing exposure to BPA from 2014 to 2020 (regulation is working!)
- Indication of slightly increasing exposure to BPS (regrettable substitution?)

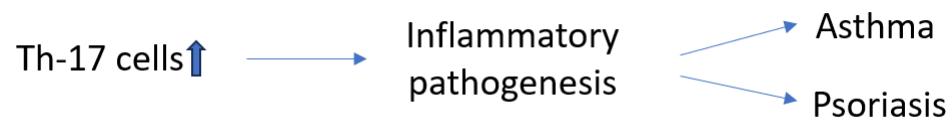


Establishing safe threshold levels

EFSA establishes health-based threshold values for intake. The **Tolerable daily intake (TDI)** for BPA estimates the amount that can be taken daily over a lifetime without significant health risk:

- 2015: EFSA establishes a *temporary* TDI of 4 µg/kg bw/day
- 2023: EFSA establishes a final TDI of 0.2 ng/kg bw/day
- The new TDI is 20,000 times lower than the previous TDI.

The new TDI from EFSA is established based on information that BPA can affect cells that are critical in the development of **immune related diseases**.

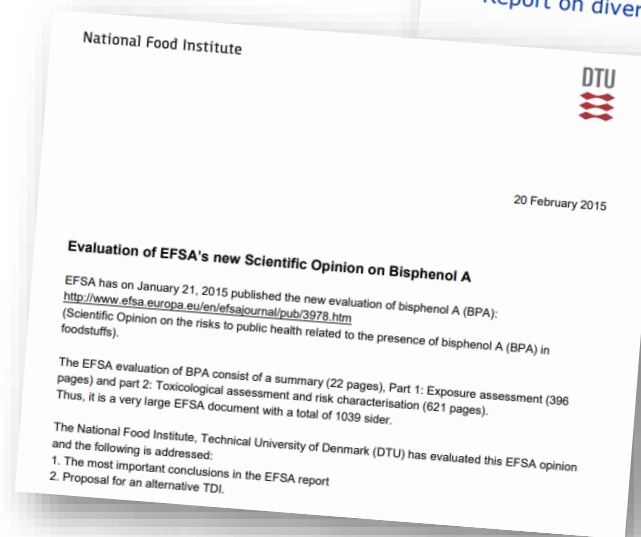
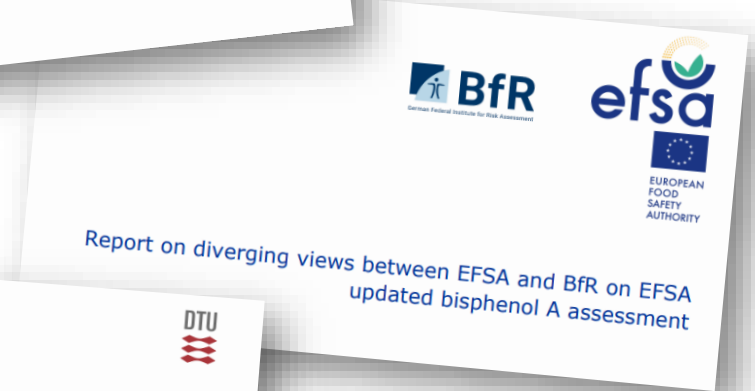


Scientific disagreements

Both the 2015 temporary TDI and the 2023 final TDI has given rise to scientific disagreements.

For the 2023 TDI both diverging views and support has been expressed from different experts.

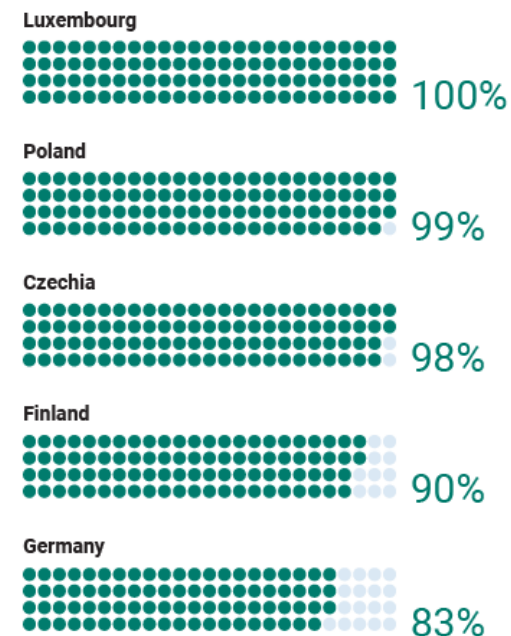
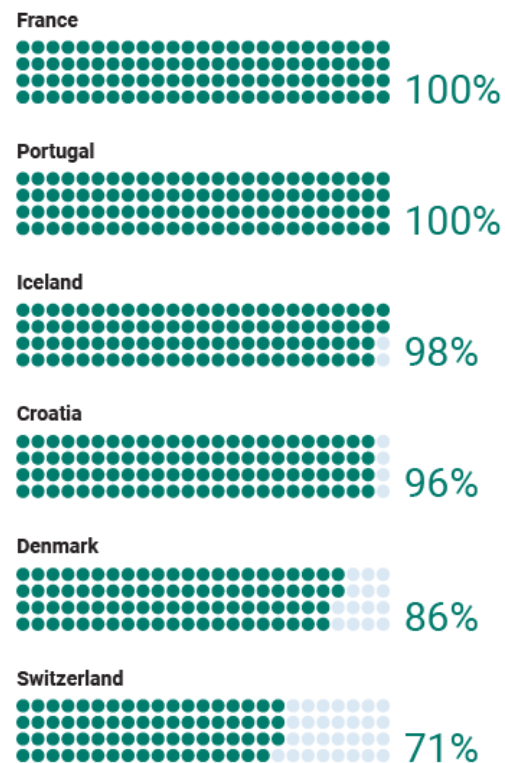
The EEA have not performed an individual assessment of the TDI but have based the briefing on the TDI derived by EFSA as the competent EU authority in relation to assessments of chemical risks from food.



Share of adults exceeding the HBM-GV for BPA

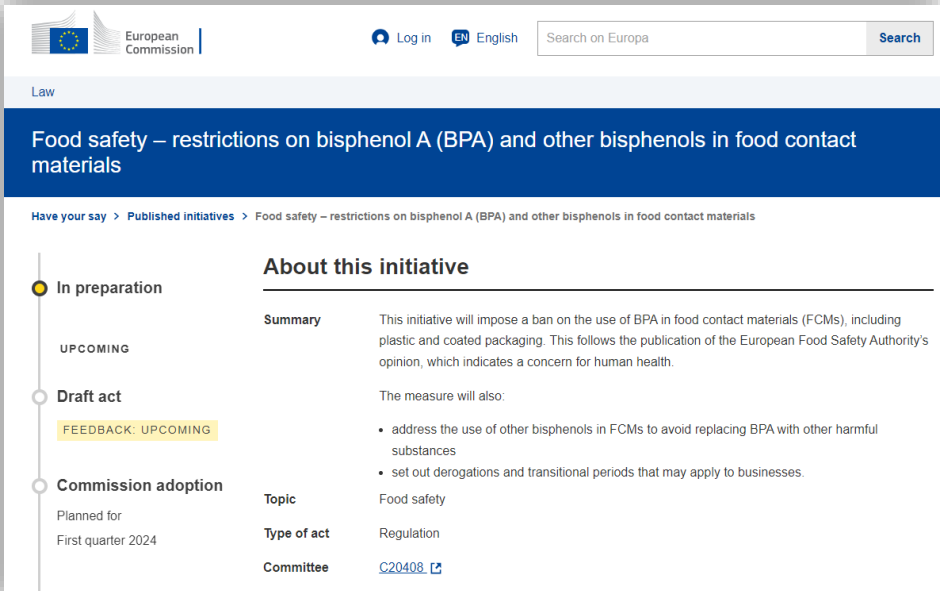
- 71 – 100 % exposed to BPA above the guidance value
- HBM-GV below limit of quantification in some countries - exposure could be underestimated in these countries

Exposure to BPA is far too high and constitutes a potential health concern



What happens next?

- Many regulatory measures have already been introduced for BPA (migration limits, ban in thermal paper, ban in baby bottles, etc.) - but not sufficient to mitigate risks.
- Assessment from ECHA on group of bisphenols identify the need for restriction of 30 bisphenols due to their potential hormonal or reprotoxic effects.
- Germany proposed a REACH restriction for bisphenols (temporarily withdrawn).
- European Commission has published an intention to propose a ban in food contact materials.
- EU Partnership on the Assessment of Risks from Chemicals (**PARC**) to provide new data on the occurrence of BPA in the European population.



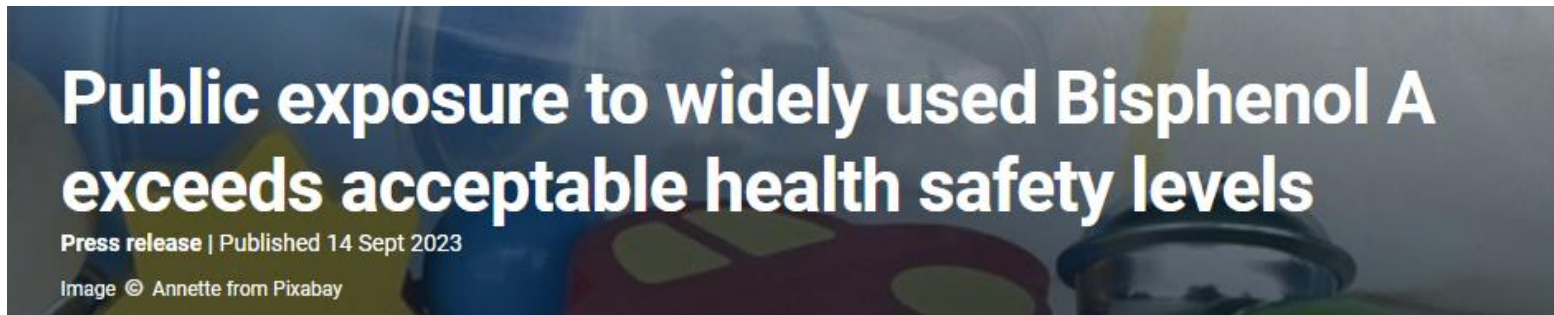
The screenshot shows the European Commission's 'Have your say' page for the initiative 'Food safety – restrictions on bisphenol A (BPA) and other bisphenols in food contact materials'. The page is in English and includes a search bar and a navigation menu. The main content area features a progress indicator on the left with stages: 'In preparation' (selected), 'UPCOMING', 'Draft act', 'FEEDBACK: UPCOMING', and 'Commission adoption'. The 'About this initiative' section on the right provides a summary, the measure's purpose, and key details.

About this initiative	
Summary	This initiative will impose a ban on the use of BPA in food contact materials (FCMs), including plastic and coated packaging. This follows the publication of the European Food Safety Authority's opinion, which indicates a concern for human health.
	The measure will also:
	<ul style="list-style-type: none">• address the use of other bisphenols in FCMs to avoid replacing BPA with other harmful substances• set out derogations and transitional periods that may apply to businesses.
Topic	Food safety
Type of act	Regulation
Committee	C20408

Source: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13832-Food-safety-restrictions-on-bisphenol-A-BPA-and-other-bisphenols-in-food-contact-materials_en



Read more



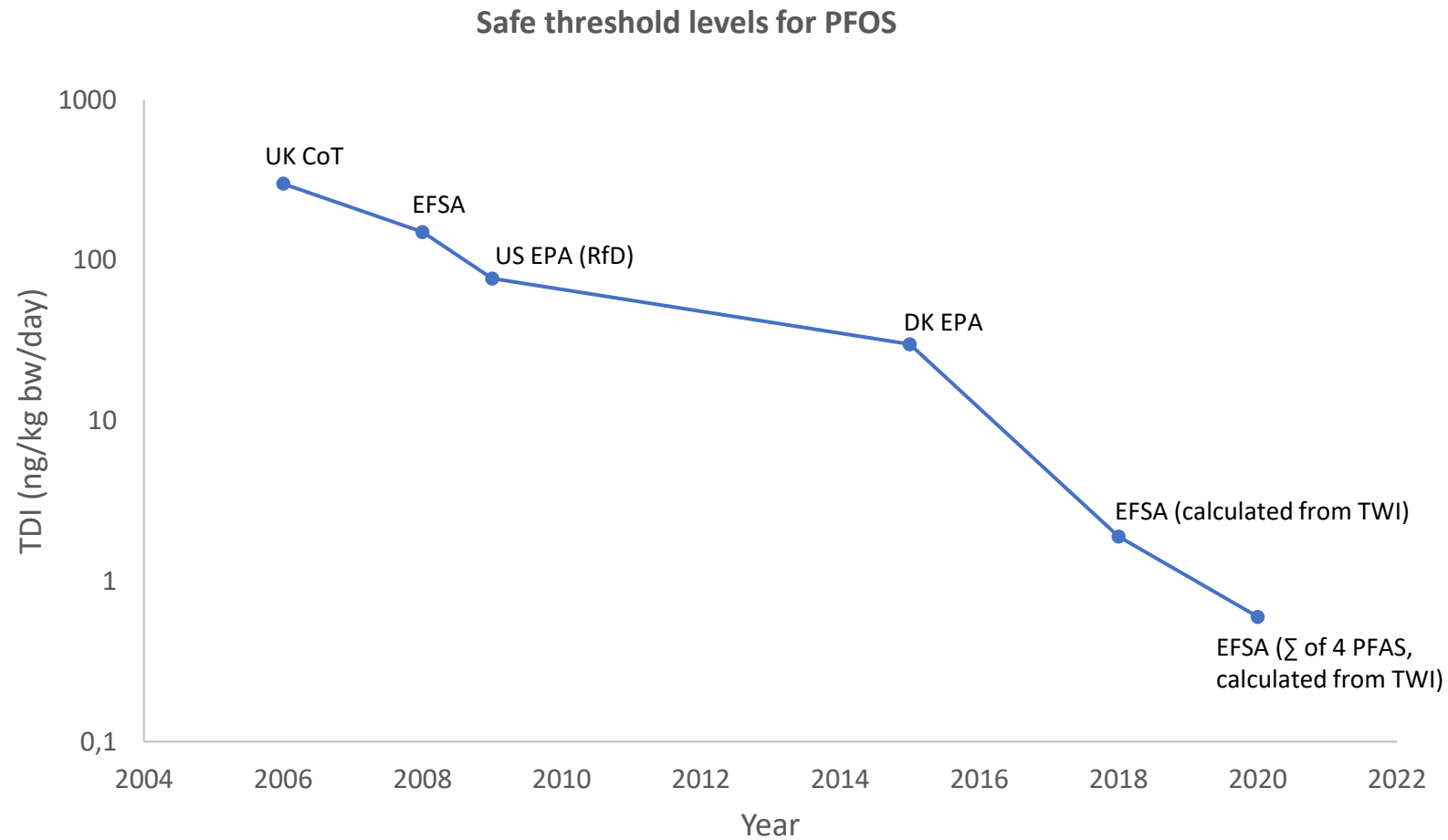
Population exposure to the synthetic chemical Bisphenol A (BPA), which is used in everything from plastic and metal food containers to reusable water bottles and drinking water pipes in Europe is well above acceptable health safety levels, according to updated research data. This poses a potential health risk to millions of people, a European Environment Agency (EEA) briefing published today says.

<https://www.eea.europa.eu/en/newsroom/news/public-exposure-to-bisphenol-a>

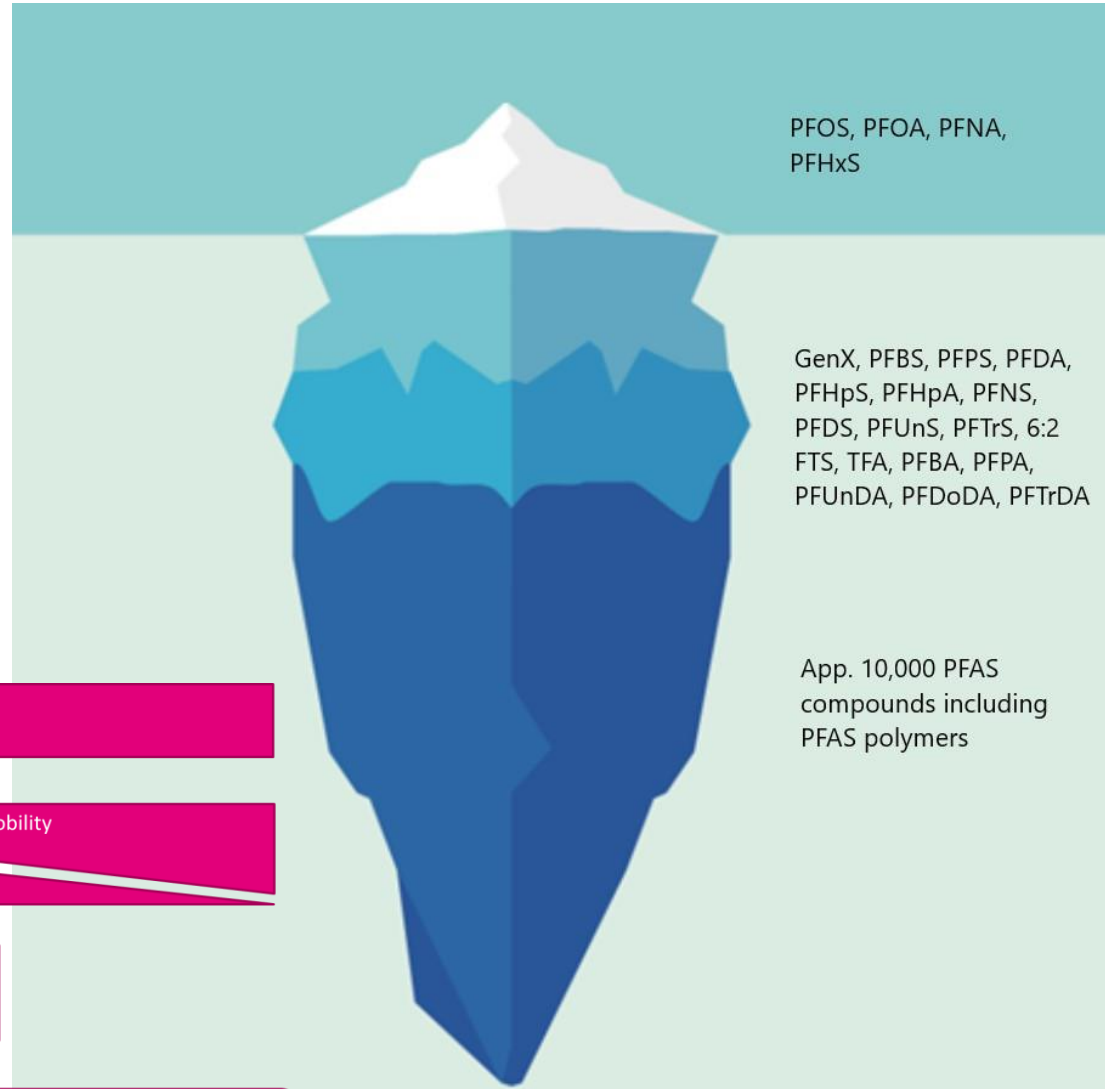



PFOS


PFOS impacts on human health – increased knowledge over time




For PFAS as a group we have limited knowledge



 The known knowns

 The known unknowns

 The unknown unknowns

Persistence

Mobility

Bioaccumulation

Human toxicity
Ecotoxicity

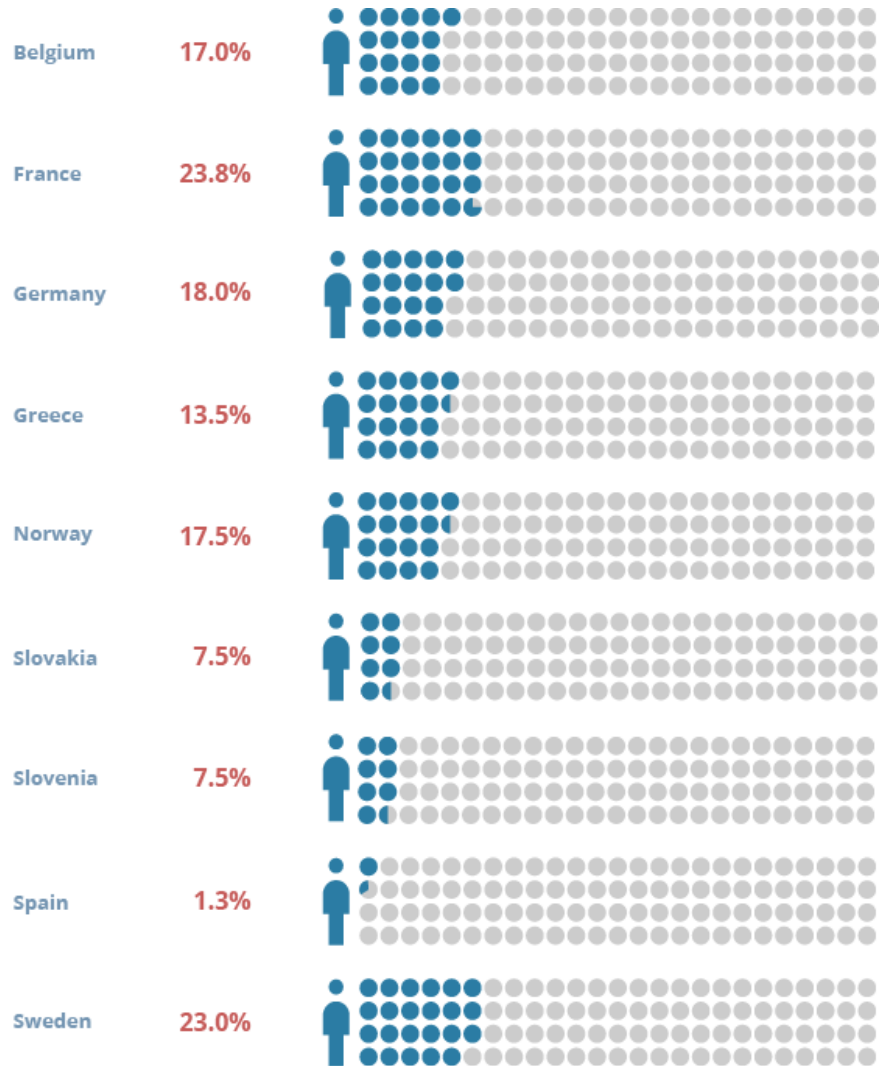
PFAS



Human exposure to PFOS, PFOA, PFNA and PFHxS



science and policy
for a healthy future



Human Biomonitoring Initiative in Europe (HBM4EU)

- 2017–2022
- Co-funded under Horizon 2020

- Overall exceedance of health-based guidance values: 14.3 %

- Decreasing trend for PFOS and PFOA concentrations

- Association of higher maternal PFAS levels with increased propensity for infections in children

Source: Blood levels in European teenagers above the health-based guidance value (2014 - 2021) - HBM4EU



PARC – the new European research partnership on chemicals

WP	Name
1	Partnership Management and Coordination
2	A common science-policy-agenda
3	Synergies, collaborations and awareness
4	Monitoring and exposure
5	Hazard assessment
6	Innovation in regulatory risk assessment
7	FAIR Data
8	Concepts and Toolboxes
9	Building infrastructural and human capacities

<https://www.eu-parc.eu/>

Public-Public

Co-Fund Budget
EU 50/50 MS,AC
400 M€

Born: 01/05/2022
Duration : 7 years

~200 Partners


28 countries

23 Member States: Austria (AT), Belgium (BE), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Hungary (HU), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Netherlands (NL), Poland (PL), Portugal (PT), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE)

3 Associated countries: Iceland (IS), Israel (IL), Norway (NO)

2 Non-associated Third countries: Switzerland (CH), United Kingdom (UK)


3 European Agencies :



PARC COMPOSITION

LEGEND

- MEMBER STATES
- ASSOCIATED COUNTRIES
- NON-ASSOCIATED THIRD COUNTRIES
- EU AGENCIES
 - ECHA - Finland
 - EFSA - Italy
 - EEA - Denmark



Personal reflections

https://traineeships.ec.europa.eu/index_en

Jobs at the European Commission

“Blue Book” traineeship programme

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Thank you

