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Umwelt 
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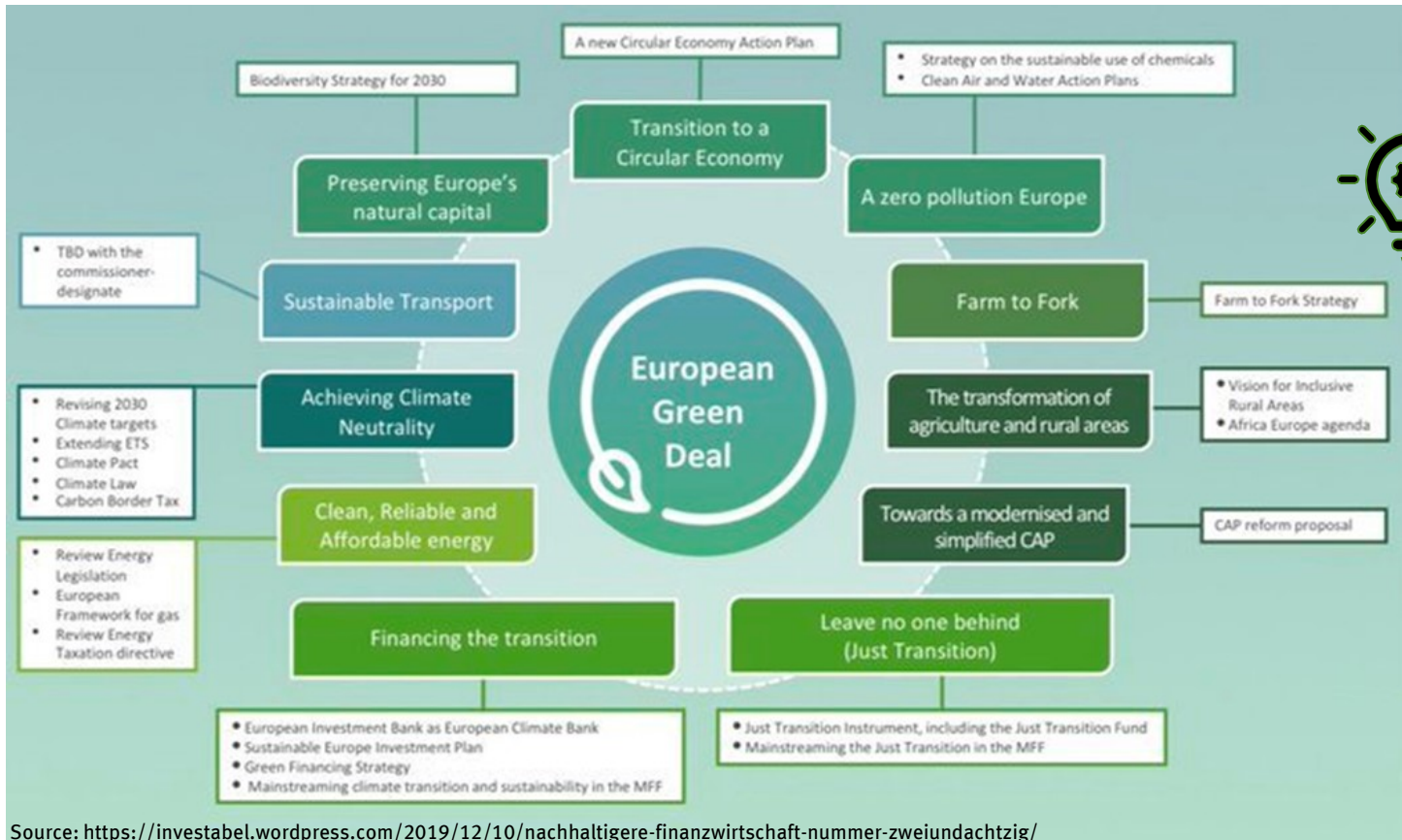
European perspectives on PFAS - already a blueprint for emerging pollutants?

Joerg Frauenstein, Dietmar Müller-Grabherr

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EU - Interfaces

European Green Deal and Horizon Europe are providing a playing field of opportunities, an adequate political priority as well as research resources and budget.



Source: Cristina de Avila, DG ENV, Slide at International conference on PFAS Nov. 30th - Dec 1st 2020, Germany

Motivation CF PFAS-Team

- **Pushing forward the management of PFAS legacies in the environment in Europe**
- **Co-creation and contributing to the EU-strategy for a Non-toxic environment and the PFAS-Action-Plan**
 - PFAS posing strong human health and environmental risks!
 - Substances spread also far from the source of contamination
 - Observed findings in blood, mother milk, in polar bears, in all environmental compartments and about PFAS remaining in sewage sludges.

CF-survey: PFAS-Side Paper

- State-of-play for countries and regions having responded to a CF survey in 2020 and deliver additional information on PFAS drivers, pressures, state, impact and response.
- It becomes evident that the situation as well as data and information are very heterogeneous across Europe.
- Point source inputs as well as diffuse inputs to soil and water; Ubiquitous?
- A lack of specific analytical and detection methods and methodological bases for the investigation, the assessment and for site-specific decisions in case of pollution have been stated.
- Sequentially decrease in tox-data over time (see EFSA 2020)
- Hard-to-treat contamination, destruction of PFAS is economically feasible only for smaller quantities; Proportionality vs. Irreversibility?
- Lack of existing tools and regulations on national levels
- Needs to manage PFAS contamination are getting pressing!

Read more: https://www.commonforum.eu/publications_positionpapers.asp

PFAS-Memorandum



Calls...

- for a dialogue in policy developments and highlights the further need of applied research.
- to enhance networking and information exchange between policy domains, in particular with regard to chemicals, environmental and waste management.

KEY MESSAGES

- **Establishing high standard risk assessment**
- **Refining and validating risk-based modelling by biomonitoring**
- **Coordinating transnational development of remediation methods and integrated management approaches**
- **Alternatives to active technical rehabilitation measures, must be developed and integrated into policy frames and legislation.**
- **A harmonization of European and national regulatory approaches for soil, waste and groundwater**

Without reliable trigger or limit values for soils, excavated materials and sediments, we have to expect a growing uncertainty for their implementation and soil and groundwater protection.

Co-workers and cooperation are welcome!

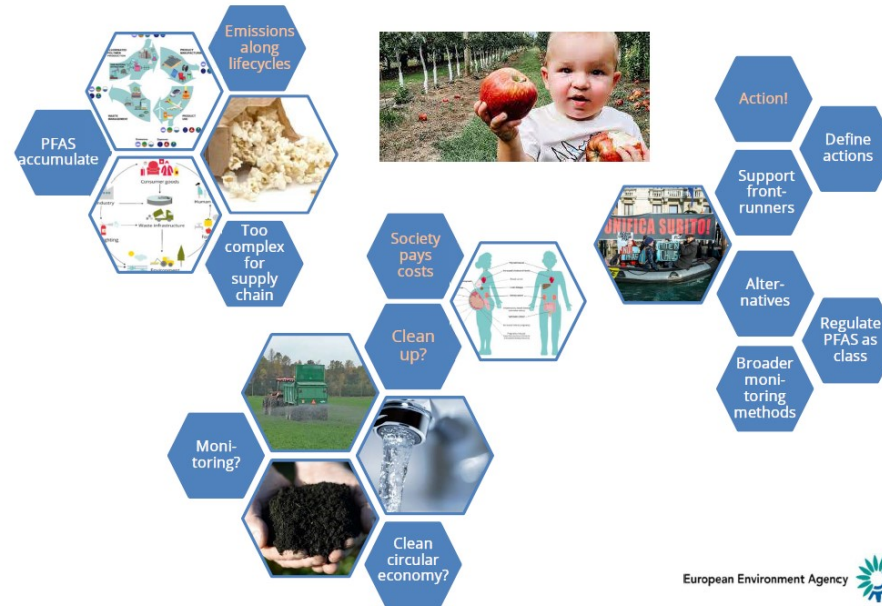
Why PFAS could be seen as blueprint?

- PFAS are **Substances of Very High Concern (SVHC)** and broad applications in our daily life
- Found in all environmental compartments: surface water, groundwater, soils, sediments and already in food products, drinking water and sewage sludges
- Increasing background values in the environment
- Impact on land and soil management practices and circular economy.
- An enhanced REACH-Procedure are indispensable for a preventive approach.
- Stringent legal mechanisms to rule out hazardous chemicals from the product design phase are required unless essential uses are unavoidable.
- Legacy of pollution with emerging contaminants, demands an active and curative approach and should be adequately managed and remediated.

Bottlenecks

- No pre-market safety check obligation
- Lack of independent science and knowledge gaps
- Regrettable (non essential) uses by manufacturers
- Authorities unable to regulate due to lack info & burden of proof
- Slow & burdensome regulatory processes
- Questionable substitutions by companies
- Costs are externalized to taxpayers

What have we learnt from PFAS pollution?



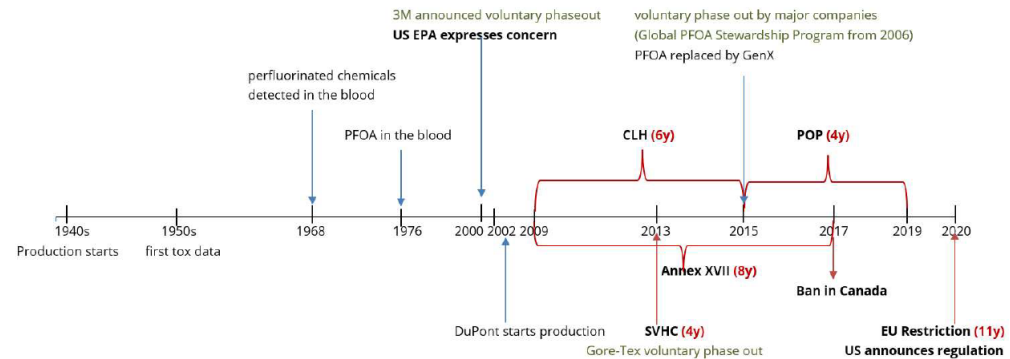
European Environment Agency

Source: Xenia Trier, EEA, Slide at International conference on PFAS Nov. 30th - Dec 1st 2020, Germany

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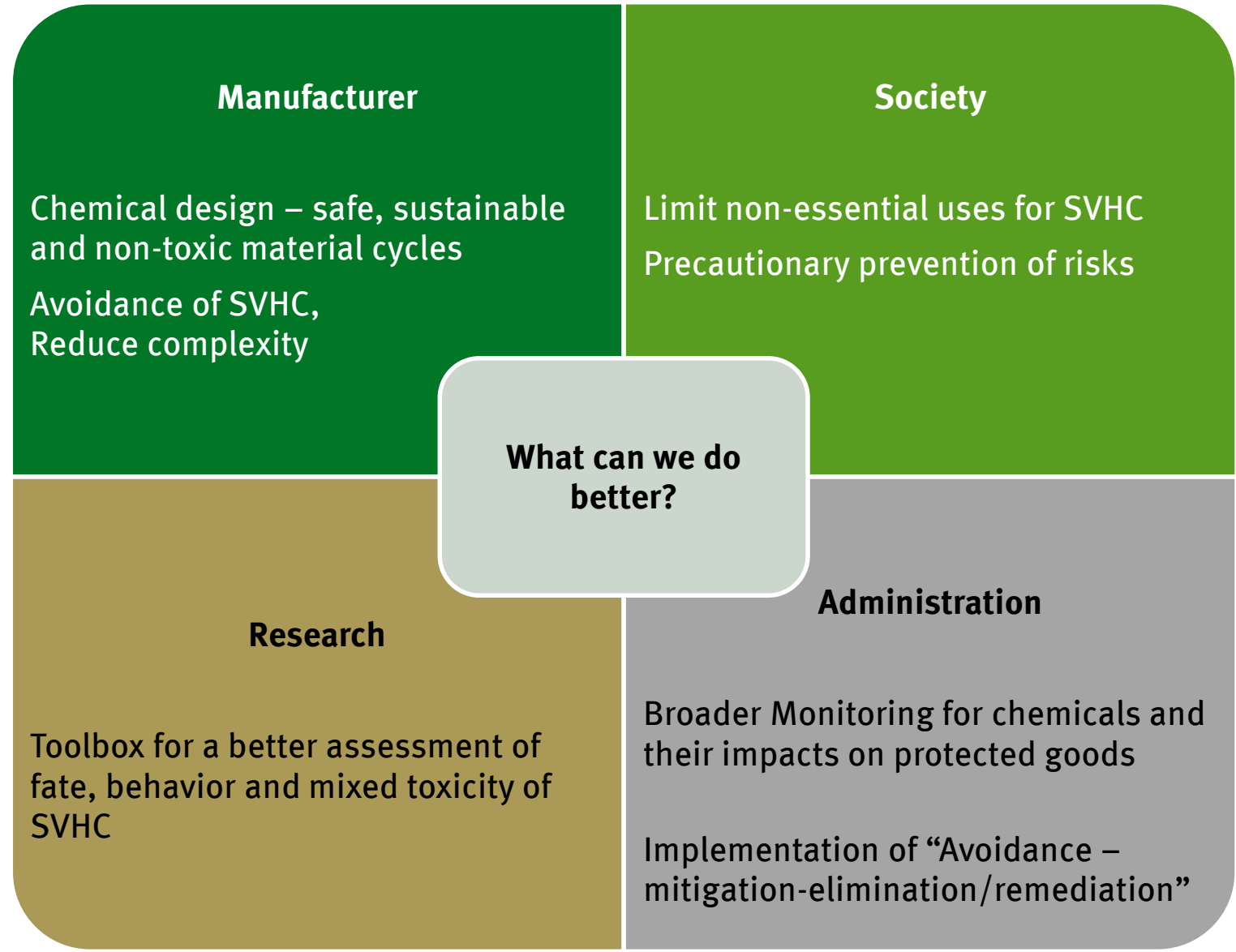
THE HISTORY OF PFOA

A case study of slow regulatory action



People and the environment are unnecessarily exposed to PFOA since decades.

Source: Tatiana Santos, EEB, Slide at International conference on PFAS Nov. 30th - Dec 1st 2020, Germany



What can we do better?

Need for a strategic plan!

Handling emerging pollutants referring to experiences on PFAS

- **Establishing evidence (understanding drivers and dimension)**
 - Identification and grouping (type, quantity, process-typical use, conditions of use, disposal routes and transfer pathways)
- **Monitoring**
 - Extension and methods of monitoring e.g. by non-target methods;
Innovation in developing sensitive and robust analytical methods;
Review and suitability of the sum parameter (AOF, EOF, Top Assay).
- **Mitigation potential and Prevention strategy**
 - Development of alternatives and alternative techniques for substitution
- **Removal mechanisms and remedial options**
 - Studies on the degradation;
 - Treatment of drinking water and sewage sludge containing PFAS;
 - Development of remediation techniques for soil and groundwater.

Draft - Prioritization approach for the prediction of Emerging Pollutants

Step 1: Pre-Selection and prioritization of concerned substances

Step 2: Selection of substances with potentially relevance

Step 3: “Watch list” of contaminants with pathway-relevance

Step 4: Verification

Step 5: Justification of measures of concerned contaminants

- Substance selection according to REACH regulation (Regulation (EC) No. 1907/2006) and (EU) No 253/2011
- Prioritization/assessment of human pharmaceuticals in sewage sludge with regard to possible inputs into soils
- Approval of detergents and cleaning agents
- Pesticide enforcement
- ...?

Extensive data sets for the individual substances are already available as part of the registration and permitting processes.

The pathways identified as priority pathways for biocide residues in soils are sewage sludge-soil and manure-soil. This allows the priority substances for soils to be captured from the biocide enforcement train.

STEP 1 : Pre-Selection and prioritization of concerned substances

Criteria for the Identification of **Persistent, Bioaccumulative and Toxic Substances**, and very Persistent and very Bioaccumulative Substances

COMMISSION REGULATION (EU) NO 253/2011

amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as regards Annex XIII

PBT and vPvB properties (organic substances and organo-metals)

Degradation half-life DT50 (d)		Relevance	Persistence (P)
soil/sediment	water		
<40	<15	non-relevant	$\sim 1/3 P_{\text{REACH}}$
>40 & <120	>15 & <40	potentially relevant	$< P_{\text{REACH}}$
>120 & <180	>40 & <60	relevant	$P < vP_{\text{REACH}}$
>180	>60	urgently	$> vP_{\text{REACH}}$ und P_{POP}
unknown	unknown	research needs	

Pre-Selection and prioritization of concerned substances (2)

Persistent substances have already been classified/classified in the CLP Regulation (EC No. 1272/2008; Regulation (EU)

- with carcinogenic, mutagenic or reprotoxic properties (C or/and M or/and R = P + CoMoR),
- with PBT properties (persistent, bioaccumulative and toxic; based on aquatic triggers) or
- as vPvB (very persistent + very bioaccumulative).

Most practical approach to filter out: SVC Substance properties of concern are identified using the related classifications and categories

Criteria	PBT-Trigger	VPvB-Trigger / POP
Persistence -1.1.1. (Degradation half-life)	marine waters > 60 d fresh and estuarine waters > 40 d marine sediments > 180 d fresh and estuarine marine sediments > 120 d Soil > 120 d	> 60 d > 60 d > 180 d > 180 d > 180 d
Bioaccumulation -1.1.2. (Bioconcentration factor)	BCF > 2000	BCF > 5000
Toxicity-1.1.3. (no-observed effect concentration or EC 10)	NOEC < 0,01 mg/l	- /adverse effects(POP)
Long range transport	-	2 days (POP)

Prioritization concept of Switzerland

"Early detection of future organic pollutants in the environment (FROSCH)"

The Swiss early detection concept for pollutants in soils was developed through extensive research in 2010 - 2016.

The reason for the development of the concept in Switzerland was the problem that so far it has only been possible to investigate individual substance groups in soil that have become particularly conspicuous and problematic, as well as those that are already regulated by law (Gubler, Keller, Wächter, Bucheli 2016).

As main input pathways into soils, the Swiss identified Targeted and parcel-specific inputs (e.g., from pesticides), indirect inputs, as contaminants in farmyard manure (i.e., slurry), compost, and other recycled fertilizers (e.g., antibiotics), and diffuse atmospheric deposition. In order to detect potential problem substances at an early stage, a multi-stage procedure was proposed in 2010.

HOW TO DEAL WITH “BLACK SWAN” POLLUTANTS?

... to cover gaps in knowledge and system understanding:

CLM “REPORTING AND EARLY WARNING CENTRE”

AIM: Identifying unexpected / unknown environmental pollutants

- Regular transnational reporting mechanism on identified unknown/unexpected pollutants (e.g. triggering a chain of administrative and technical responses)
- Carrying and organising co-operation to check for relevance

... accelerating information flow calls for
a pan-European action/network!

Knowns	Known Knowns Things we are aware of and understand.	Known Unknowns Things we are aware of but don't understand.
	Unknown Knowns Things we understand but are not aware of.	Unknown Unknowns Things we are neither aware of nor understand.
Unknowns	Knowns	Unknowns

**Thank You,
any questions and remarks?**

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